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WOOD, BARK AND PITH STRUCTURE IN TREES AND SHRUBS OF CYPRUS: ANATOMICAL DESCRIPTIONS AND ECOLOGICAL INTERPRETATIONS

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Preface

The idea of this thesis starts in 2005 in the island of Cyprus. At that time I was visiting the ancient timber structures belonging to the Cyprus' cultural heritage with a group of European scientists. During a visit to the city of Limassol, I bought a reference flora book of the region. I chose the book *Trees and Shrubs in Cyprus* (Tsintides *et al*. 2002). Once made it home, I looked for some literature about the wood anatomy of the flora of the island: I realized that only few species indicated in the book were described in their wood anatomies. I also learned that I visited a very interesting country, also from the botanical and ecological points of view.

Few months later I met prof. dr. Fritz H. Schweingruber at the Dendroanatomical week in Davos Laret (CH). We discussed the feasibility of a large study focused on the anatomy of Cyprus' trees and shrubs. We early realized that the indigenous flora to the island of Cyprus can be considered representative for the eastern Mediterranean region.

Finally, in 2007, we started to work on the Cyprus' trees and shrubs wood anatomy. A first result was my master thesis in Forestry Science concerning wood anatomy and ecology of 26 Cypriot species from the southern costal range. After this first approach Mr. Takis Tsintides and Mr. Charalambos S. Christodoulou of the Forestry Department – Cyprus' Ministry of Agriculture and Environmental Recourses (and Authors of the book I bought in Limassol few years earlier) demonstrated their warm interest in my larger project covering the entire woody flora of the island. They offered the needed assistance in an extensive collecting campaign on Cyprus, by providing plant identification, and logistic assistance during fieldwork in 2009 and 2010. Since that time samples collection and slides preparation were carried out.

At this moment the original idea, with modifications and improvement, exists in this thesis.

Acknowledgements

To reach the aims of my PhD project I needed the help of many scientists and specialists from different countries. I feel to start this thesis with my acknowledgments to the people that supported me with enthusiastic contribution.
First and foremost I wish to thank my thesis' mentor, Fritz H. Schweingruber, for his warm encouragement and thoughtful guidance. He has been supportive since the days I began working on the anatomy of Cyprus' plants as an undergraduate. Ever since, Fritz has encouraged me in many ways.
I am also extremely indebted to Takis Tsintides, Charalambos S. Christodoulou, Takis Papachristophorou, and Andreas Zissimos of the Department of Forests – Cyprus' Ministry of Agriculture, Natural Resources and Environment, for providing necessary infrastructures and resources to accomplish my sampling work in Cyprus. Without their support, this project would not have been possible.
I want to express my great gratitude to Barbara Lachenbruch of the Department of Wood Science and Engineering, Oregon State University, Corvallis (USA), for accepting me the internship opportunities in her group and leading me working on biomechanics and wood anatomy. I'm also deeply indebted to Katherine McCulloh of the Department of Forest Ecosystems and Society at OSU. Barb and Kate demonstrated me what share knowledge and productive collaboration are in science, their ideals and concepts will have a remarkable influence on my entire (prospective) research career. During my six months long stay at OSU I also had the opportunity to meet and discuss with Steve Volker, Frederick Meinzer, Lisa Ganio, and Peter Kitin, I really appreciated their advices and talks.
I spent four months at Swiss Federal Institute for Forest, Snow and Landscape Research in Switzerland, during that time I met Holger Gartner, Paolo Cherubini and Patrick Fonti, they supported me in many ways. I wish to thank also Petra Zibulski of the Institut für prähistorische und naturwissenschaftliche Archäologie (IPNA) in Basel (CH), we shared thought on the definitions of anatomical features for bark and pith anatomies.
During my PhD I have collaborated with many other colleagues for whom I have great regard, and I wish to extend my warmest thanks to all those who have helped me in many ways.

I would like to thank Prof. Dr. Achim Brauning, Institute of Geography - University of Erlangen-Nuremberg and Prof. Dr. Katarina Cufar, Department of Wood Science and Technology, Biotechnical Faculty, University of Ljubljana for reading and evaluating my dissertation. I really appreciated their comments and advices.

Abstract

The dissertation deals with wood, bark and pith anatomy of trees and shrubs of Cyprus. It consist of three parts: (1) the anatomical description of stem wood, twig bark and pith of the endemic and indigenous trees and shrubs species belonging to the flora of the island, (2) the ecological wood and bark anatomies interpretation and (3) a study focused on conductive vs. mechanical tradeoff in climbers vs. subshrubs.
Original samples for each species were collected during 3 field trips on Cyprus. About 270 species were collected, and 600 double stained (astra blue and safranin) slides were prepared. New lists of anatomical features were developed for the specific needs of this research, especially for bark and pith anatomy. The described species represent almost the entire woody flora of the island. A great number of them have never been anatomically described before. The anatomical descriptions are a perfect base for wood anatomists interested to wood structure of single species or the range of anatomical patterns within the Eastern Mediterranean region, and also for archeologist and palaeobotanists who determine wood remains, and for wood technologist who compare structures with physical wood properties.
In the ecological wood anatomy analysis we observed wood diffuse porous structure associated to woody chamaephytes. We detected semi-ring and ring porous xylems related to nanophanerophytes and phanerophytes. Rays features seem to be associate to space filling in wood, and the rays dimensional features seems to be constrained by vessels. In fact, rays became larger moving from woody chamaephytes to phanerophytes, and the numbers of rays per millimeter decrease moving from woody chamaephytes to phanerophytes, maybe allowing vessels to be greater in taller life forms. Raylessness is clearly associated to woody chamaephytes. Rays composition vary from homogeneous in woody chamaephytes, to heterogeneous in nanophanerophytes and phanerophytes. The axial parenchyma was rare in woody chamaephytes, apotracheal in nanophanerophytes and mainly paratracheal in phanerophytes. Endemic species showed absence of axial parenchyma, raylessness, homogeneous rays, and did not show association to tension wood. We recorded a predominance of diffuse porous species in dry/hot site, and the presence of ring porous species in wet/cold sites. Diffuse porous structures were associated to rocky and sandy sites, and semi-ring porous woods to forest and shrublands habitats. Thick walled fibers species were associated to moist and ruderal habitats, thin walled fibers to forest and shrubland species. A clear trend was observed in fiber wall thickness vs. wood density: greater in the fiber wall thickness, greater is the wood density.
The bark anatomical features describe sieve tube morphology and distribution, sclerenchyma presence and arrangement, rays, phellem, phelloderm, crystals, secretory structures, and appearance under polarized light. Sieve tubes were typically arranged tangentially in nanophanerophytes but not in woody chamaephytes. Bark ray dilatation was noted in moist site species but lacking in

endemic, shrubland, and forest species. Sclerenchyma tended to be lacking in woody chamaephytes, and in endemic and dry site species. The tangential arrangement of fibers tended to be lacking in woody chamaephytes and Mediterranean species. The presence of prismatic crystals was associated with nanophanerophytes and phanerophytes, but not with endemic, shrubland, or forest species. Phloem homogeneity was associated with endemic species. Phellem homogeneity was associated with climbers, phanerophytes, and species of moist habitats. The association of sclerenchyma with life form suggests a biomechanical role, especially for young twigs. The level of endemism and the species' habitat were strongly linked to a number of bark features opening new fields of ecophyletic and ecophysiological investigation.

In the third part of the dissertation the all sampled woody climbers (10 species) and most of the woody subshrubs (25 species) of Cyprus were characterized by their vessel and fiber anatomies relative to mechanical and hydraulic function. Consistent with their lower need for self-support, on average the climbers had lower wood density than did the subshrubs, and had a lower proportion of their cross-section devoted to fibers. Consistent with climbers' need for higher hydraulic conductance and total plant height, climbers had vessel sizes and frequencies closer to the theoretical packing limit than did subshrubs.

Riassunto

La tesi si occupa di anatomia del legno, della corteccia e del midollo di alberi e arbusti appartenenti alla flora dell'isola di Cipro. Si compone di tre parti: (1) la descrizione anatomica del legno del tronco, e di corteccia e midollo dei rametti, (2) l'interpretazione ecologica dell'anatomia del legno e della corteccia e (3) uno studio focalizzato sul compromesso delle funzioni di conduzione e di sostegno meccanico in liane a piccoli arbusti.
Nel corso di 3 campionamenti a Cipro sono stati raccolti campioni per circa 270 specie. Da questi sono stati realizzati 600 preparati anatomici a doppia colorazione (astra blu e safranina). Nuove liste codificate per la descrizione delle caratteristiche anatomiche della corteccia e del midollo sono state sviluppate appositamente per gli scopi di questa ricerca. Le specie descritte rappresentano quasi l'intera flora legnosa dell'isola. Un gran numero di specie sono qui descritte prima dal punto di vista anatomico. Le descrizioni anatomiche sono una base perfetta per anatomisti legno interessati alla struttura in legno di singole specie o allo studio della gamma di modelli anatomici nella regione del Mediterraneo orientale, e anche per archeologi e paleobotanici che hanno la necessità di identificare reperti legnosi, e anche per tecnologi del legno che confrontano le strutture anatomiche con le proprietà fisiche e meccaniche del legno.
Le indagini di ecologia del legno hanno rilevato relazioni statisticamente significative tra legno a porosità diffusa e camefite legnose, mentre le porosità semi diffusa e anulare sono legate alle nanofanerofite e alla fanerofite arboree rispettivamente. Le caratteristiche dei raggi sembrano associate al riempimento dello spazio nel legno e le dimensioni dei raggi in sezione trasversale sembrano limitate dai vasi. Infatti i raggi sono più larghi nelle fanerofite arboree che nelle camefite legnose e il numero di raggi per millimetro diminuisce passando da fanerofite arboree, a nanofanerofite fino alle camefite legnose, consentendo così alla forme biologiche con altezza maggiore di avere vasi più grandi. L'assenza di raggi è una caratteristica tipica delle camefite legnose. La composizione dei raggi varia da omogenea nelle camefite legnose a eterogenea in nanofanerofite e fanerofite arboree. Il parenchima assiale è raro o difficilmente osservabile nelle camefite legnose, tipicamente apotracheale nelle nanofanerofite e principalmente paratracheale nelle fanerofite arboree. Le specie endemiche a Cipro sono caratterizzate dall'assenza di parenchima assiale, dall'assenza di raggi o dalla presenza di raggi omogenei e non mostrano alcuna relazione significativa con la presenza di legno di tensione. È stata riscontrata una netta predominanza di specie a porosità diffusa nei siti caldi e secchi, e di specie a porosità anulare in siti umidi e freddi. Legni a porosità diffusa appartengono a specie che vivono in siti rocciosi e sabbiosi, la porosità anulare è associata ad habitat forestali e di macchia mediterranea. Le fibre a parete spessa risultano legate a a siti umidi, fibre a pareti sottili ad habitat forestali e di macchia mediterranea. Un chiaro trend *lega proporzionalmente lo spessore delle fibre con la densità del legno.*

Le caratteristiche anatomiche analizzate per la corteccia descrivono morfologia e distribuzione dei tubi cribrosi, la presenza e la disposizione di tessuti sclerenchimatici, i raggi, il sughero, il felloderma, i cristalli, le strutture di secrezione e la visibilità in luce polarizzata. I tubi cribrosi sono tipicamente disposti in bande tangenziali nelle nanofanerofite, ma non nelle camefite legnose. L'allargamento dei raggi nel felloderma è legato a specie che vegetano in siti midi, non è presente nelle specie endemiche, in quelle tipiche di macchia mediterranea a negli habitat forestali. I cristalli sono associati alle nanofanerofite e alle fanerofite arboree, non alle specie endemiche, di macchia e di ambiente forestale. L'omogeneità del felloderma è stata riscontrata nelle fanerofite lianose, in quelle arboree e alle specie di ambienti umidi. L'associazione di tessuti sclerenchimatici con le forme biologiche suggerisce un ruolo biomeccanico di questo tessuto, soprattutto nei giovani rametti. Il livello di endemico e l'habitat delle specie sono fortemente legati a diverse caratteristiche anatomiche della corteccia offrendo nuove possibilità di studio nel campo dell'ecologia e dell'ecofisiologia.

Nella terza parte che costituisce la tesi tutte le 10 specie di fanerofite lianose campionate e la maggior parte delle camefite legnose (25 specie) sono state caratterizzate per quanto riguarda le caratteristiche anatomiche di vasi e fibre che hanno ripercussioni importanti nelle funzioni di conduzione e di sostegno meccanico del legno. In accordo con la loro inferiore necessita di auto-sostegno, le fanerofite lianose hanno una densità basale inferiore rispetto alle camefite legnose. Inoltre, le liane presentano una inferiore proporzione di sezione trasversale destinata a fibre. In accordo con le maggiori necessità conduttive e in relazione alla loro altezza, le liane hanno un diametro e una frequenza dei vasi che le colloca più vicine al funzione "packing limit" rispetto alle camefite legnose.

1. Introduction

Five regions on the Earth, located between 30° and 40° latitude both in northern and southern hemisphere, have a Mediterranean climate. These Mediterranean regions occupy less than 5% of the Earth's surface, they are isolated one to the other, and are found in the west or south-west coasts of the continents. Mediterranean regions are known by their outstanding biodiversity (Cowling *et al.* 1996), and they also have exceptionally high numbers of rare and locally endemic plants (Arroyo *et al.* 1994, Cody 1986, Cowling *et al.* 1992, Thompson *et al.* 2005).

In the surrounding Mediterranean Sea area the main reason of the richness in plant species is not so much the variety of species in any given area as the remarkable number of endemics, many of which are restricted to a single or few localities in sandy areas, islands, geological areas with unusual soil or rock type, or to isolated mountains range (Blondel & Aronson 1999). More than half of the species in the Mediterranean region are endemic, and 80% of all European endemic species are Mediterranean (Gomez-Campo 1985).

Mediterranean island floras typically show high percentage of endemism, usually 10 to 13%, or even greater (Médail & Verlaque 1997). Examples include Corsica with 11% (240 endemic from a total of 2150 vegetal species), as compared to only 7.2% for the nearby continental area of south-eastern France. Crete has about 11.7% endemics among plants (200/1710), Sicily 9.7% (255/2402) (di Martino & Raimondo 1979), and the three larger Balearic islands each about 12%. In the island of Cyprus 95 endemic *taxa* are recorded at species level, and 132 at lower taxonomic levels, the latter represent 7% of the total number of species that grown in Cyprus (Alziar 1995, Quezel 1988). Cyprus is the most eastern island in the Mediterranean Sea and it is the third largest island in area. In relation to its size, Cyprus has one of the richest floras in the Mediterranean. This is due to a number of factors, including its geological structure, climatic conditions, geographic location (situated in the boundary of three continents), its insular character, the surrounding sea, and its topographical configuration (Tsintides *et al.* 2002). Extensive plains, mountain masses, wetlands, coasts, sand dunes, gorges and cliffs provide a huge variety of habitats for many indigenous and endemis species.

References to the flora of Cyprus can be found in many ancient texts. The first true scientific investigation can be accurately dated to 8^{th} April 1787, since that day three British botanists, John Sibthorp, John Hawkins, and Ferdinand Bauer systematically collected and identified 313 specimens (Meikle 1977). Ever since that time many researchers explore the island's flora, producing books and noteworthy botanical collections which served as valuable reference sources for other researchers (e.g. Holmboe 1914, Chapman 1949, Meikle 1977, 1985, Pantelas *et al*. 1993, Tsintides 1998, Tsintides *et al*. 2002).

Despite the interest of Botanist on Cyprus's plants identification, very few literature have been published on the anatomy of this interesting flora. Some wood atlases for the eastern Mediterranean region, and for some adjacent areas, have been published (e.g. Abbate Edlmann *et al*. 1994, Chudnoff 1956, Huber & Rouschal 1954, Fahn *et al*. 1986). Some woody species of the region were described in some other books (Schweingruber 1978, 1990, Schweingruber *et al*. 2011). But all the available descriptions for the Eastern Mediterranean species are of limited values for identification, since they are fragmentary, and since most of them have been published before the introduction of the codified international anatomical characters list (Wheeler *et al*. 1989).

The lack of comprehensive basic knowledge on the wood structure of lignified species indigenous to the Eastern Mediterranean countries, and the continuing demand for wood identification, gave rise to the idea of the work presented in this thesis.

Overall aims of the study

The overall aims I followed during my work can be summarized as follow:

1) *describe the anatomy of wood, bark and pith of the endemic, indigenous, and of the most common adventive woody species that grow in Cyprus.*

   Wood of only a few shrubs and dwarf shrubs, as well as wood of not widely technologically used trees, has been investigated thoroughly and in detail before. Pith and bark anatomy were rarely presented systematically for a great number of species (Schweingruber *et al*. 2011). Here I will describe in details pith and juvenile bark anatomies by following a new classification for anatomical features of those tissues. I think that combining bark, wood and pith anatomical information it will be much more possible to determine a plant fragment found of an archaeological site, or pieces of wood that have been washed ashore. Identifying wood from archeobotanical findings (carbonized wood, glacial deposits, etc.), historical objects, and remains belonging to the human cultural heritage (prehistoric stuffs, structural beams, etc.) is often difficult because wood anatomical features are only partially present. Therefore, having bark and pith anatomical descriptions address new possibilities in plant identification, and new ecological applications will be opened. The results of this objective consist in the second chapter.

2) *Describe the presence of relationships between anatomical features and ecological, taxonomical and biological factors.*

   A large dataset covering almost the entire woody flora of a well defined geographical region (the island of Cyprus) represent a great opportunity to describe patterns in distribution of anatomical features in relation to ecological, biological, taxonomical attributes. The results of this objective will be described in the third chapter by an analysis based on selected anatomical features in endemic and indigenous species growing on Cyprus. At the same time, by investigating the same anatomical features, an evaluation of the suitability for dendrochronological and dendroecological studies (ring distinctness, age of plants) is possible.

3) *Use anatomical data of some selected species to test some biomechanical hypothesis and the constrain in mechanical and conductive functions in stem.*

   A wide range of taxonomically important anatomical structures occurring in Cyprus, including various habits from trees, shrubs, dwarf shrubs to some perennial herbs and woody liana, were sampled and described. By characterizing vessel and fiber anatomies relative to mechanical and hydraulic function of all the woody climbers (10 species) and most of the woody subshrubs (25 species) of Cyprus I will test some biomechanical hypothesis. The results of this objective will be described in the fourth chapter.

2. Wood, bark and pith anatomy of Cyprus' trees and shrubs

Introduction

The island of Cyprus lies at the easternmost end of the Mediterranean basin, neighboring Africa, Asia and Europe, 64 km south of Turkey and 105 km west to Syria, between 34°33' - 35°41' north and 32°17' - 34°35' east (Fig. 1). With an area of 9251 km^2 Cyprus is the third island in the Mediterranean Sea (after Sicily 25711 km^2, and Sardinia 24090 km^2, and before Crete 8261 km^2). Its greatest length is approximately 225 km, and its greatest width is approximately 65 km.

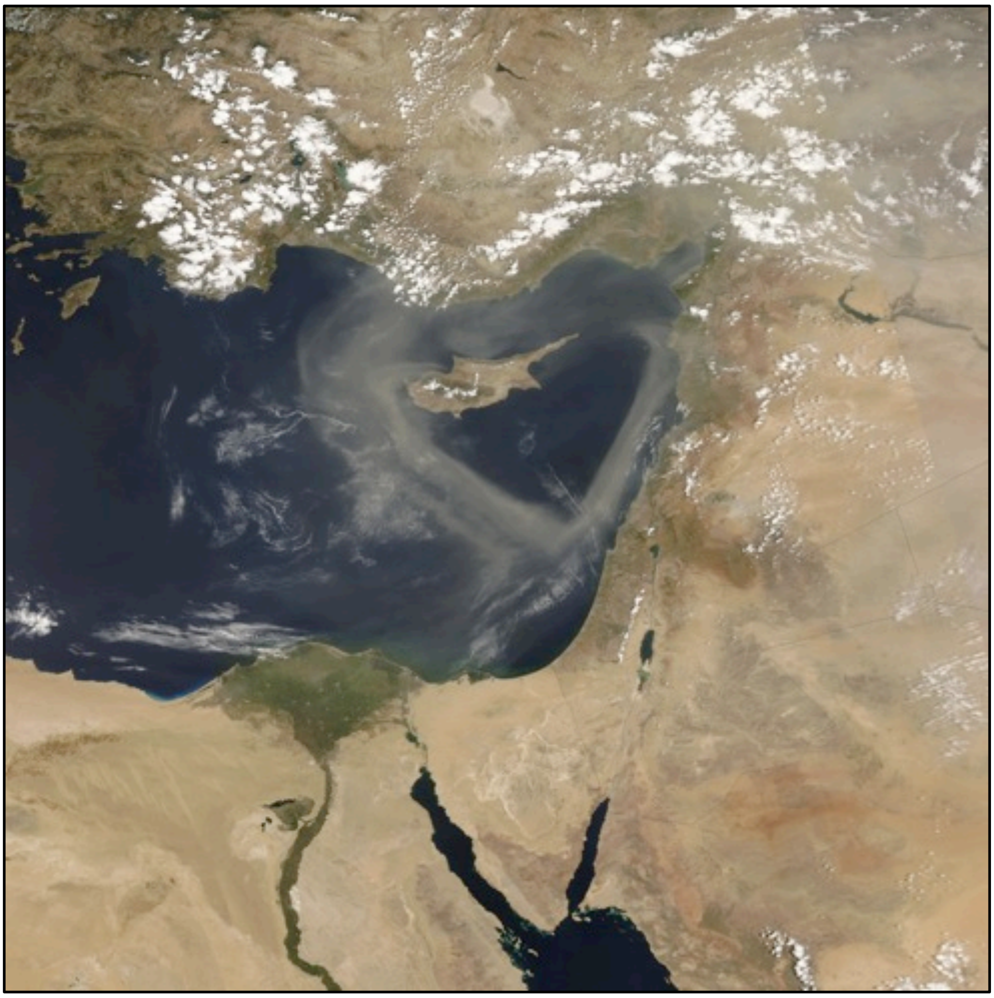


Fig. 1. This image, acquired by NASA's Moderate-resolution Imaging Spectrometer (MODIS) on January 26, 2008, shows the dust that blew toward Cyprus from the coast of Turkey. The Island of Cyprus is clearly located at the easternmost end of the Mediterranean Sea (www.earthobservatory.nasa.gov)

Fig. 2. Image acquired by NASA's MODIS on January 30, 2001, showing the island of Cyprus. Lefkosia, the capital city of the Republic of Cyprus, is visible as a grayish-brown patch near the image's center (www.earthobservatory.nasa.gov)

According to Hadjikyriacou (2005) four different geographical regions can be identified in the island (Fig. 2), each one with different geological formations (Fig. 3) and other interesting features:

- the Troodos range is a dome-shaped highland of mainly infertile igneous rocks situated in the central-western part of the island, rising to 1952 m at Mount Olympus. Lower belts of dome-shaped pillow lava, a most infertile area, which level off gradually towards the cost, surround the hard igneous rocks.
- The Pentadactylos range, situated in the north, is mainly composed of limestone and rises to 1024 m. This mountain range is composed of a succession of mostly allochthonous sedimentary formations.
- The *Mesaoria* or central plane is situated between the Troodos and Pentadactylos mountain ranges and has low relief, not exceeding 180 m, near Nicosia, the capital city of Cyprus. This plan is composed of flysch-type rocks carried by rivers from the Troodos and Pentadactylos ranges.
- The coastlands from valleys that almost entirely surround the country: Kyrenia valley with its narrow coast in the north, Pafos and Chrysochou valleys in the west, and Famagusta valley in the east. The soils are alluvial and fertile.

The geotectonic zone of Troodos consists of the ophiolite rocks of Troodos, aged 92 millions years, which comprise part of the oceanic crust and extend below Mesaoria plain. The collision of the African and Eurasian lithospheric plates and the subsequent subduction of the former beneath the latter resulted in the uplifting and final placement of the Troodos range. Troodos ophiolite has an elliptical shape and its longer axis has a NW – NE direction. It is a dome-shaped with Olympus the highest peak (1952 m). Its most distinguishing characteristic in that the lower stromatographic rocks (namely the ultrabasic plutonic rocks), topographically appear at the highest parts of the range, replaced gradually towards the circumference by the stromatographically overlaid rocks. The ophiolite of Troodos in one of the best preserved and most thoroughly studied worldwide and it constitute a model for geologist who study the oceanic crust (Konstantinou *et al*. 1997).

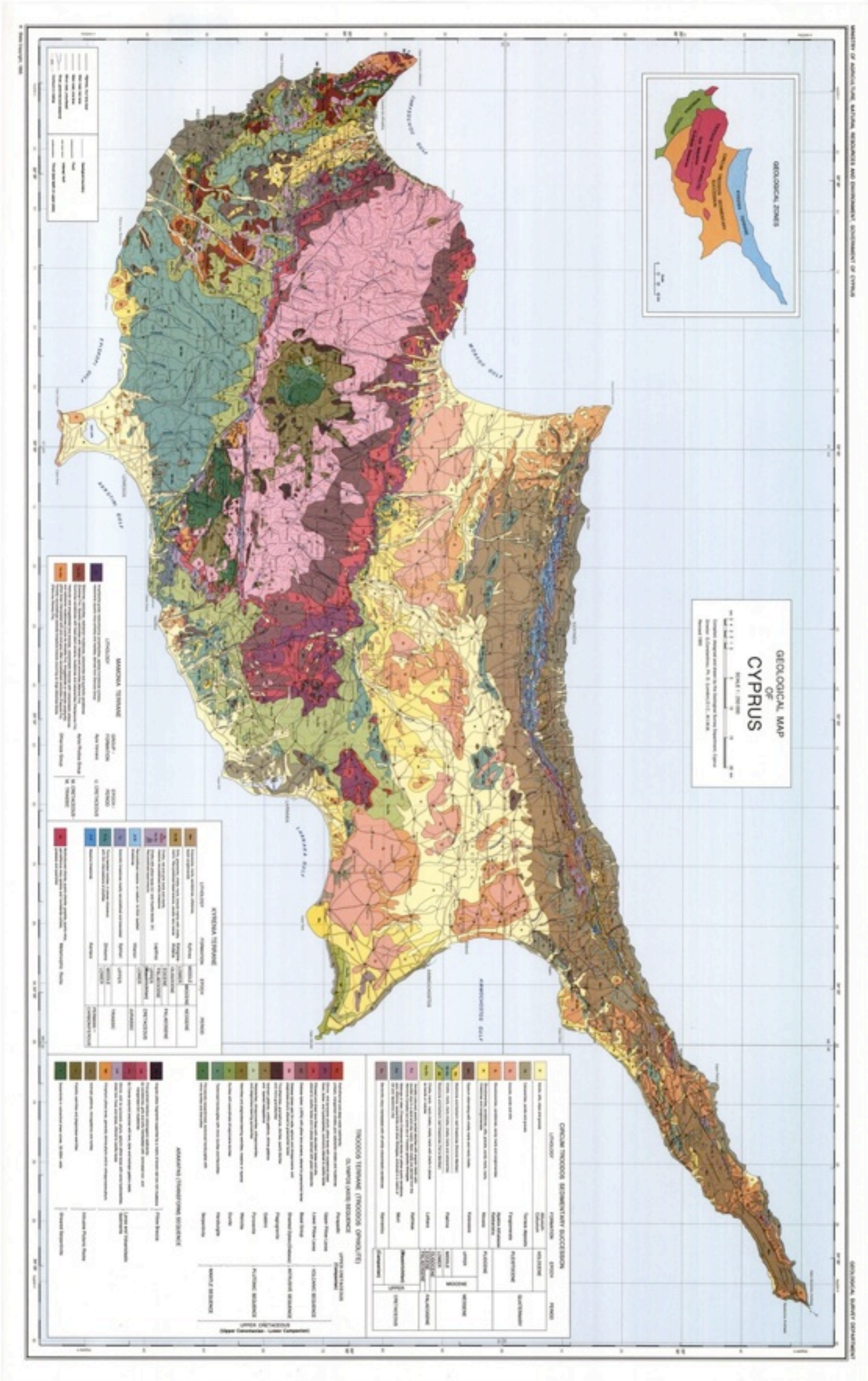


Fig. 3. Geological map of Cyprus (Geological Survey Department, www.moa.gov.cy).

Climatic conditions on Cyprus

The overall climate on Cyprus is Mediterranean, but on a local basis it is strongly influenced by geographical position related to relief and position relative to the Mediterranean Sea. According to the Rivas-Martínez classification, the bioclimate is mediterranean-mesophytic to xerophytic-oceanic with zones ranging from thermo-mediterranean-semi-arid to supra-mediterranean-humid (Barber & Valles 1995).

According to the data available from the Cyprus' Meteorological Service's web site (2011) detailed climatological information are available for the island.

The predominantly clear skies and high sunshine amounts give large seasonal and daily differences between temperatures of the sea and the interior of the island, which also cause considerable local effects especially near the coasts.

In summer the island is mainly under the influence of a shallow trough of low pressure extending from the great continental depression centered over southwest Asia. It is a season of high temperatures with almost cloudless skies.

In winter Cyprus is near the track of frequent small depressions that cross the Mediterranean Sea from west to east between the continental anticyclone of Eurasia and the low-pressure belt of North Africa. These depressions give periods of disturbed weather usually lasting from one to three days and produce most of the annual precipitation, the average fall from December to February being about 60% of the annual total. The average annual total precipitation increases up the southwestern windward slopes from 450 mm to nearly 1100 mm at the top of the central Troodos massif. On the leeward slopes amounts decrease steadily northwards and eastwards to between 300 and 350 mm in the central plain and the flat southeastern parts of the island. The narrow ridge of the Kyrenia range produces a relatively small increase of rainfall to nearly 550 mm along its ridge at about 1000 m. Snow occurs rarely in the lowlands and on the Kyrenia range but falls frequently every winter on the ground above 1000 m usually occurring by the first week in December and ending by the middle of April.

The seasonal difference between mid-summer and mid-winter temperatures is quite large at 18°C inland and about 14°C on the coasts. In July and August the mean daily temperature ranges between 29°C on the central plain and 22°C on the Troodos mountains, while the average maximum temperature for these months ranges between 36°C and 27°C respectively. In January the mean daily temperature is 10°C on the central plain and 3°C on the higher parts of Troodos mountains with an average minimum temperature of 5°C and 0°C respectively. Frosts are rarely severe but are frequent in winter and spring inland.

The flora of Cyprus

The publication of the Flora of Cyprus (Meikle 1977, 1985) was a milestone in the studies on the flora of Cyprus, which began in 1787 and has been continuous up to now with the discovery of new indigenous and alien *taxa* (Chrtek & Slavik 1981, 1993, 1994, 2000, 2001, Della & Iatrou 1995, Alziar 1985, 1986, 1995, 1999, Hand 2000, 2001, 2003, 2004, 2006, Hadjikyriakou *et al.* 2004), and new endemic *taxa* (Brullo *et al.* 1993, Georgiadis & Hadjikyriakou 1993, Hadjikyriakou & Alziar 1998, 2006, Hadjikyriakou & Hand 2006, Raus & Scholz 2004).

Indigenous or native plants are those which form natural populations on Cyprus. In total the indigenous flora of Cyprus (*Pteridophytes* and *Spermatophytes*) include 1610 species or 1738 *taxa* at variety level (Alziar 1995, Meikle 1977, 1985, Cyprus Flora 2007).

Endemic plants are those restricted exclusively to the island. The endemic flora of Cyprus includes 108 species or 143 taxa at variety level (6.7% and 8.7% of the indigenous flora respectively). The National Forest Park of Troodos in a center per endemics, hosting 13 local endemics and 74 Cyprian endemics, while the all Troodos range host 94 endemic *taxa*. Other important areas for endemics are the Pentadactylos range and Akamas Peninsula with 56 and 44 Cyprian endemic *taxa*, respectively (Tsintides *et al.* 2007). Some notable flora elements are the endemic trees *Cedrus brevifolia* (Hook F.) Henry and *Quercus alnifolia* Poech, and also the endemic shrub *Bosea cypria* Boiss., a relict element of Tethys.

Exotic plants are the adventive and cultivated species; most of them originated from very distant geographical regions, while some are native to nearby areas of the Mediterranean region. The alien flora includes 238 *taxa* (Meikle 1977, 1985, Cyprus Flora 2007, Tsintides *et al.* 2007).

Cyprus is an island with diverse landscapes, due both its varied climate, geology, and the presence of man since -8200 (Guilaine & Briois 2003; Peltenburg 2003, Peltenburg *et al.* 2000). Of the total forest area, natural vegetation includes high forests (44.6%), maquis (32.6%), al lower vegetation types such as shrubs and phrygana (22.8%) (Hadjikyriacou 2005). Shrubs, alternating with build up areas and fields, cover the hills. The plains of the lowlands are covered by cultivations (about 45% of the island) and habitations, but there are also small areas of natural habitats locality. The natural and semi-natural vegetation types as well as the cultivations, especially traditional ones such as tree orchards, constitute important habitat of rare plants (Hadjikyriacou 2005).

The thermophiles Calabrian pine (*Pinus brutia* Tenore) form most of the extent forests, from sea level to about 1400 m altitude, and cover the Troodos and Pentadactylos Mountain range and part of the Akamas peninsula. Cypress (*Cupressus semprevirens* L.) forests occur mainly in Pentadactylos. The semi-deciduous *Quercus infectoria* Oliv. subsp. *veneris* (A.Kern.) Meikle forms only remnant stands at the western part at the western part of the island. The *Pinus nigra* J.F.Arnold subsp. *pallasiana* (Lamb.) Holmboe forests, the endemic *Cedrus brevifolia* forest stands of mountain Juniper are restricted to the higher altitudes of Troodos. The golden oak (*Quercus alnifolia*) occurs under the conifers or in pure stands, at altitude of 700 m and above all across the Troodos range (Tsintides *et al.* 2007).

Meikle (1977) subdivides the island of Cyprus in 8 botanical divisions to illustrate the internal distribution of each species. Fig. 4 shows a map with Cyprus' botanical divisions and tab. 1 describes each one of them.

Fig. 4. Botanical divisions of Cyprus mapped (Meikle 1977).

Botanical division	Description
Division n. 1	A very heterogeneous area topographically, geologically, and floristically, with much natural (but often heavily grazed) vegetation. Mostly hilly, with deep narrow gorges cut through chalk, limestone or sandstone, and with areas of serpentine. The coasts are generally low, and sandy or rocky, except for a limited range of steep cliffs in the northern coastal range.  
Division n. 2	Mostly the Troodos range, an area of high, but usually rounded or pyramidal, igneous peaks, with much of the ground above 1200 m, reaching 1952 m at the summit. The whole area abounds of endemics.  
Division n. 3	A region of rounded chalk hills, gradually rising inland towards the Troodos range. Much of the ground consists of vineyards, and the costal belt is extensively cultivated, the hilly zone consists of calcareous marls and limestone. Few salt lakes are located in this region.  

Division n. 4	Mostly cultivated and heavily grazed with numerous barren, eroded chalk or limestone hills. Larnaca salt lake provides habitat for many halophytes.  
Division n. 5	Almost wholly occupied by the fields of the Mesaoria plain, with weed communities on waste and fallow lands.
Division n. 6	Heavily cultivated region, which includes the most dry region of the island.
Division n. 7	Includes almost all the Kyrenia range, and the fertile northern coastal range. The rugged limestone cliffs and pinnacles host a rich flora.  
Division n. 8	The peninsula, an area of fertile soils, low hills and extensive sandy or rocky shores, was not visited during this research.

Tab. 1. Descriptions of botanical division of Cyprus (Meikle 1977).

Materials and methods

Samples collection

The goals of this research could not be reached without an extensive sampling of original plant material. Sample collection was carried out in three distinct sampling trips: on February 2009, on September 2009, and on March 2010. Different times of the year, which correspond to different plant phenological phases, were chose to facilitate plant identification in relation to presence of flowers or seeds.

The specimens were collected in the sites indicated in the following map (Fig. 5). These collections were mainly from the Troodos region, Akamas peninsula, and from the southern coastal range.

Fig. 5. Sampling sites on Cyprus (map drew by Charalambos S. Christodoulou).

We followed the book Trees and Shrubs in Cyprus (Tsintides *et al*. 2002) as a sampling reference list. The book covers 366 *taxa*, including endemic, indigenous, adventive and exotics plants. The Authors of the book are personnel of the Cyprus' Department of Forests and are the same people that facilitated me to carry out the field sampling activities and plan identification.

During the sampling activities special emphasis has been placed on endemic and indigenous species to the island of Cyprus. Additionally, some fruit trees and cultivated plants have been included. A number of introduced species, generally used as interior or pot plants, have been omitted, as well as some exotics that are rare on Cyprus or found only in botanical or private gardens.

Rare or protected species where collected in botanical gardens, especially from the Arboretum in Athalassa National Park, which is situated south-east from Nicosia.

Every sampling day, just before the fieldwork, we listed the plants growing in the specific region we were going to visit. We used the range descriptions in the standard reference of the woody flora (Meikle 1979, 1985; Tsintides *et al.* 2002) to choose a sampling area that was representative of the geographic distribution and habitat range for each species.

At the representative site we collected samples from one individual. The individual chosen appeared normal, healthy, and was one of the tallest individuals of that species at a site.

For each plant two samples were cut off: one from the stem (in multi-stem shrubs from a vertical stem), and another one from a twig. A stem portion was cut near the plant's base (with the height dependent on the plant's stature). The sample from the stem was extracted in different ways on the base of stem diameter: stems less than 2 cm in diameter were cut with a scissor; stems with diameter from 3 to 12 centimeters were cut off with a saw; and for stems larger than 12 centimeters a core was extracted with a Pressler corer. A 5-8 centimeters long pieces of twigs were cut from a shoot with a scissor. The twig sample was chosen from the principal stem for plants shorter than 2 meters. For plants taller than 2 meters the twig sample came from a branch. The distance between the tip of the shoot and the sampling point was variable: I followed the rule to have a 2-4 years old sample from each twig (age of the twig was determined by counting the bud scars).

The disks were stored in a sealed plastic bag to which we added several drops of 40% ethanol and kept them at 3-4°C until they were sectioned. On each plastic bag a pre-printed label table was stuck to register site and sample information.

Site and sample characteristics description

During field sampling information about the sampled plant and about the environment where the plant thrived were recorded. The basic information were:

- date, general location, and forest region,
- elevation, slope, and aspect,

- any evidence of site disturbance,
- water equability at the micro site level.

If needed a plot diagram with a brief description of key site features was sketched.

Information regarding the sampled plant and the samples themselves were recorded on a pre-printed label glued on each sealing bag. The recorded information concerned:

- scientific name and family,
- growth form, plant height,
- phenology,
- distance from the tip of the branch to the sampling location for twig sample measured in centimeters,
- distance from the soil level to the sampling region for stem sample measured in centimeters,
- name of the nearest village or locality,
- elevation of the sampling site in meters,
- location by Northing/Easting UTM system coordinates,
- date of sampling.

Later, in the office, the work continued with the following tasks:

- to locate the sampling site on a map and record it,
- if latitude and longitude were not entered in the field, to determine the coordinates from the map,
- to compare elevation recorded in the field with that indicated on a topographic map, and adjust if appropriate,
- check again that all the required information has been collected and recorded,
- transcription of the information collected on the field into an excel format dataset.

Slide preparation and observation

Permanent slide collection offer a number of advantages concerning wood studies. The structure of wood, which is the main point of a slide collection, is there for viewing with a microscope using transmitted light, or by polarized light, to show crystals and other structure non readily visible under transmitted

or reflected light (Schweingruber *et al.* 2011). Sections can be stained to show various structures more clearly. However, different staining of wood tissues is only really effective when the wood is freshly cut from a living plant (Ives 2001).
In order to study wood anatomy, it is necessary to observe the cell structure in three different planes: transverse, tangential and radial. At least one thin section was cut from each of these planes and mounted together on one slide.
From each 5-8 cm long disk, coming both from the stem and from the twig, a 1 cm long disk was cut off from the central part. In this way only wood which did not come in contact with alcohol was cut and stained.
The blocks were split longitudinally by using a chisel. Stem disks greater than 1.5 cm in diameter were split to obtain a cubic block 1 cm each side, when possible keeping the rays running parallel to one side of the transverse section. In very small blocks a little forward planning was necessary to determine the sections cutting order, but where possible the transverse section was cut first. In twig disks special care was needed to preserve the bark and the pith on the same section.
The wood samples didn't require any preparation before microtoming. The sections were cut using a disposable blades and a sliding Reichert microtome in each of two wood anatomy laboratories: the Dept. Land, Environment, Agriculture and Forestry – University of Padova (TeSAF - UNIPD) in Italy, and the Swiss Federal Institute for Forest, Snow and Landscape Research (WSL) in Switzerland.
Tangential sections were cut from the outer growth ring, mostly from intermediate and latewood.
The sections were stained with astra blue and safranin, dehydrated with alcohol and xylene, and mounted in Canada balsam (Chaffey 2002; Schweingruber 2007). The cell walls richer in cellulose were blue stained and those richer in lignin were red-stained; with this double-staining, parenchyma cells were usually blue and the remaining cells were usually red. This made it easier to study the wood patterns in cross-sections. Sections were finally mounted in Canada balsam or Eukitt®.
Transmission light microscope was used to observe slides. Polarized filters were applied for observing crystals presence, and for examining the stages of cell wall development. Sections were imaged using a digital camera mounted on the microscope.

Definition of wood anatomical features

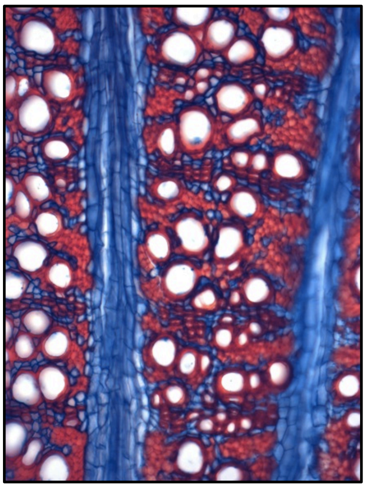
The wood anatomy of coniferous woods was described following the IAWA list of microscopic features for softwood identification (Richter *et al.* 2004).

The wood anatomical characters for hardwoods were described on the basis of the IAWA List of Microscopic Features for Hardwood Identification (Wheeler *et al.* 1989). As this list is proposed for tree and shrub woods, it was slightly modified to fit with the anatomical features observed in the collected samples. In particular a number of complementary features or character states were inserted following the "Definition of anatomical features" proposed by Schweingruber *et al.* (2011). At the same time some IAWA features were not considered at all because of their uncertain determination in the observed samples.

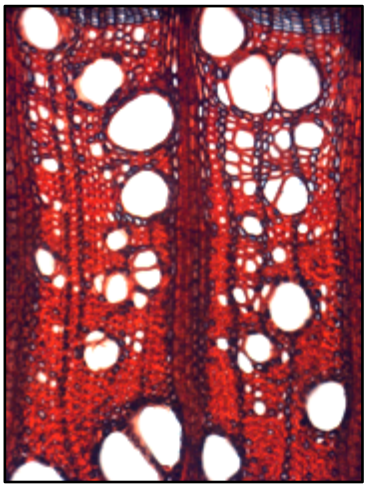
Next pages give a short description of all the wood anatomical features detected in the observed samples. Full color pictures will accompany those features which do not belong to IAWA Hardwood List (Wheeler *et al.* 1989). These features can be discriminated by the general appearance as "X.#" where "X" is the modified relative IAWA character number and "#" is a consecutive number.

Growth rings distinctness

1 - Growth rings distinct	Growth rings with an abrupt structural change at the boundaries between them. Growth rings number can be easily and exactly determined.
1.1 - Clearly demarcated rings only along some radii	The change at the boundaries between rings is visible only along some radii or only in between some parenchyma rays. This character may present a solution to the problem of ambiguous differences between "indistinct" and "distinct" growth ring boundaries and the presence of intermediates between them.



Astragalus echinus DC. (20x)



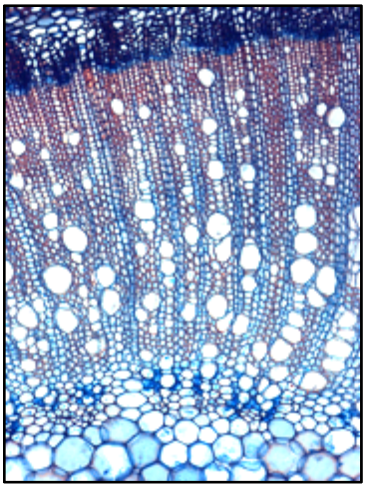
Rubus sanctus Schreb (20x)

2 - Growth rings indistinct or absent

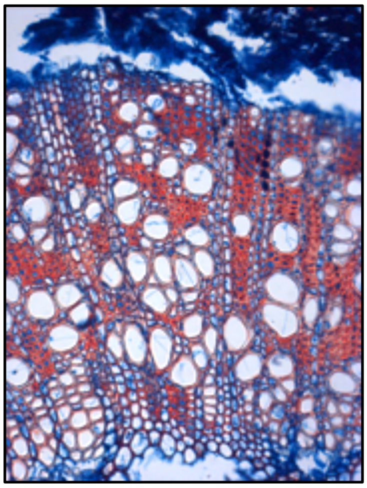
Growth ring boundaries marked by more or less gradual structural changes at their poorly defined boundaries, or not visible. Growth ring number cannot be easily determined and their number is uncertain.

2.1 - Only one ring

Only one growth ring is present in the observed sample. This feature was used for annual plants, for perennial specimens that did not show any annual growth ring delimitation, and for 1-year-old twig samples.



Phytolacca pruinosa Fenzi (10x)



Hedysarum cyprium Boiss. (20x)

Wood porosity

3 - Wood ring-porous

Wood in which the earlywood vessels are distinctly larger (greater than 6 times in diameter) than those in the latewood of the previous and of the same growth ring, and form a well-defined zone or ring,

	and in which there is an abrupt transition from earlywood to latewood of the same growth ring.
4 - Wood semi-ring-porous	Wood in which the vessels in the earlywood are distinctly larger (3 to 5 times) than those in the latewood of the previous growth ring, but in which there is a gradual diameter decrease to narrower vessels in the latewood of the same growth ring. Earlywood vessels are generally closely spaced. This intermediate condition between ring-porous and diffuse-porous may occur even within an individual, in different growth rings or in different regions of the same growth ring.
5 - Wood diffuse-porous	Wood in which the vessels have more or less the same diameter throughout the entire growth ring. This category also includes woods in which the latest formed vessels in the latewood are considerably smaller than those of the earlywood of the next ring, but in which the vessel diameter is uniform throughout most of the growth ring.

Transitional structures between features 3 and 4, and 4 and 5 may occur even within different growth rings of the same individual. In such cases both features were marked and described as present.

Vessel arrangement

6 - Vessels in intra-annual tangential bands	Vessels arranged perpendicular to rays and forming discontinuous short or continuous tangential bands. These bands can be straight or wavy, and can or cannot change shape and dimension crossing a ray.
7 - Vessels in diagonal and/or radial pattern	Vessels arrangement intermediates between tangential and radial (dendritic). Transition between diagonal and dendritic distribution may occur within an individual. In ring-porous woods, only the intermediate wood and latewood was examined.
8 - Vessels in dendritic pattern	Vessels arranged in a branching pattern, forming distinct tracts, separate by areas without vessels.

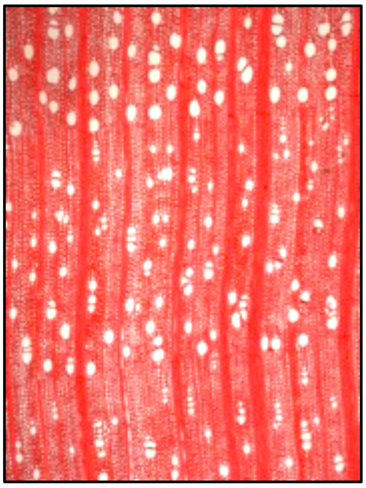
Solitary vessels

9.0 - Vessels predominantly solitary	Most of the vessels (as opposed to “90% or more,” IAWA character list) appear not to contact another vessel. Vessels are in pairs only by chance, most apparent pairs actually are overlapping ends of vessels elements as seen in transverse sections.

Vessel groupings

9.1 - Vessels in radial multiples of 2 to 4 common — Commonly radial files of 2 to 4 vessels in contact.

Odontites cypria Boiss. (100x)



Acer obtusifolium Sibth. et Sm. (40x)

10 - Vessels in radial multiples of 4 or more common — Commonly radial rows of 4 or more adjacent vessels.

11 - Vessel (predominantly) in clusters — Groups of 3 or more vessels having both radial and tangential contacts. Groups about as wide radially as tangentially.

In the common situations in which vessels are partly solitary, partly in radial multiples, or partly in small clusters all the characters were marked and described. This is in contrast to considering the absence of IAWA features 9, 10, and 11 as “the most common vessel grouping”.

Perforation plates

13 - Simple perforation plates — Perforation plates with a single circular or elliptical opening.

14 - Scalariform perforation plates — Perforation plates with elongated and parallel openings separate by one to many mainly unbranched bars.

19 - Foraminate perforation plates — Perforation plates with circular or elliptical openings like a sieve; the remaining wall portions can be thicker than in the reticulate type (e.g. *Ephedra* spp.).

Bars number in scalariform perforation plates

15 - Scalariform perforation plates with ≤ 10 bars.

16 - Scalariform perforation plates with 10 - 20 bars.

17 - Scalariform perforation plates with 20 - 40 bars.

18 - Scalariform perforation plates with ≥ 40 bars.

Intervessel pit arrangement

20 - Intervessel pits scalariform	Horizontally elongated or linear intervessel pits arranged in a ladder-like series.
21 - Intervessel pits opposite	Intervessel pits arranged in short to long horizontal rows across the length of the vessel.
22 - Intervessel pits alternate	Intervessel pits arranged in diagonal rows.

Intervessel pit size

Horizontal diameter of a pit chamber at the broadest part was measured for all pits type (note: IAWA list suggest not measuring size of intervessel pits in scalariform pits).

24 - Intervessel pits minute ≤ 4 μm.

25 - Intervessel pits small 4 - 7 μm.

26 - Intervessel pits medium 7 - 10 μm.

27 - Intervessel pits large ≥ 10 μm.

Vessel-ray pits

30 - Vessel-ray pits with distinct borders; similar to intervessel pits in size and shape throughout the ray cell.

31 - Vessel-ray pits rounded or angular with large apertures.

32 - Vessel-ray pits with large horizontal apertures.

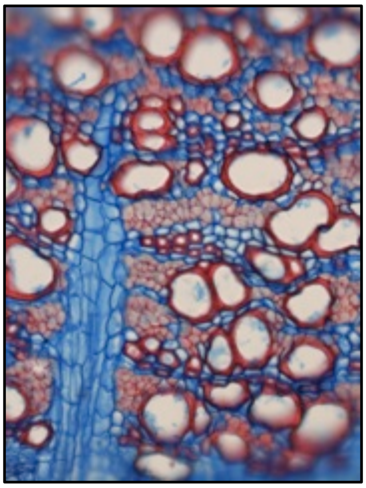
Vessel helical thickenings

36 - Helical thickenings in vessel elements present	Ridges on the inner face of the vessel element in a roughly helical pattern. Very thin and thick helical thickenings were marked and described.
39 - Helical thickenings only in narrower vessel elements	Narrower does not means always latewood vessels.

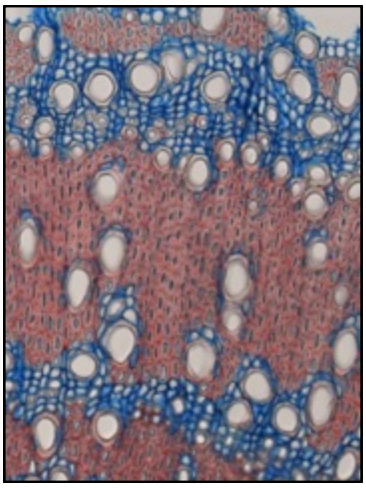
Vessels cell wall thick

39.1 - Vessels cell wall thickness ≥ 2 μm.

This feature is well seen if the vessels cell wall is thicker than surrounding cell tissues.



***Astragalus echinus* DC. (100x)**



***Alyssum akamasicum* B.L.Burtt (200x)**

Mean tangential diameter of vessel lumen

In transverse sections the tangential diameter of the earlywood vessel lumina, excluding the wall, was measured at the widest part of the opening. In ring-porous woods and woods with two distinct diameter classes, only the larger size vessel classes are determined.

40.1 - Mean tangential diameter of earlywood vessel lumina <= 20 μm.

40.2 - Mean tangential diameter of earlywood vessel lumina 20 - 50 μm.

41 - Mean tangential diameter of earlywood vessel lumina 50 - 100 μm.

42 - Mean tangential diameter of earlywood vessel lumina 100 - 200 μm.

43 - Mean tangential diameter of earlywood vessel lumina >= 200 μm.

Vessels dimorphism

45 - Vessels of two distinct diameter classes

Wood with a distinct bimodal distribution of tangential diameters of vessel lumina. Feature applied only to diffuse porous wood.

Vessels per square millimeter

Every vessel was counted, regardless of type of vessel grouping. No data were collected for ring porous woods because of the ambiguity in the determination of the feature.

46 - Earlywood vessels per square millimeter ≤ 5.

47 - Earlywood vessels per square millimeter 5 – 20.

48 - Earlywood vessels per square millimeter 20 – 40.

49 - Earlywood vessels per square millimeter 40 – 100.

50.1 - Earlywood vessels per square millimeter 100 – 200.

50.2 - Earlywood vessels per square millimeter ≥ 200.

Mean earlywood element length

52.1 - Earlywood vessel element length less than 50 µm

52.2 - Earlywood vessel element length 50-100 µm

52.3 - Earlywood vessel element length 100-200 µm

53.1 - Earlywood vessel element length 200-500 µm

53.2 - Earlywood vessel element length greater than 500 µm

Tyloses and deposits

56 – Tyloses common	Outgrowths from an adjacent ray or axial parenchyma cell through a pit in a vessel wall, partially or completely blocking the vessel lumen, and of common occurrence.
58 - Gums and other deposits in heartwood vessels and/or fibers	A wide range of substances in vessels and/or fibers lumen was noted.

Imperforate tracheary elements

60 - Vascular/vasicentric tracheids present	Imperforate cells resembling in size, shape, pitting, and wall ornamentation narrow vessel elements and intergrading with the latter. Also including imperforate cells with numerous distinctly bordered pits in their radial and tangential walls, present around the vessels, and different from ground tissue fibers.

Ground tissue fiber pits

61 - Fibers with simple to minutely bordered pits	Fibers (libriform fibers) with simple pits or bordered pits with the chambers less than 3 µm in diameter.
62 - Fibers with distinctly bordered pits	Fibers (or fiber-tracheids or ground tissue tracheids) with bordered pits with chambers over 3 µm in diameter.

Fiber helical thickening

64 - Helical thickenings in ground tissue fibers	Helical thickenings in ground tissue fibers, or ridges on the inner face of the fiber wall in a roughly helical pattern.

Septate fibers

65 - Septate fibers present	Fibers with thin, unpitted, transverse wall(s). They are mostly unlignified and blue-stained.

Fiber bands

67 - Parenchyma-like fiber bands alternating with ordinary fibers	Tangential bands of relatively thin-walled fibers alternating with bands of thicker-walled fibers.

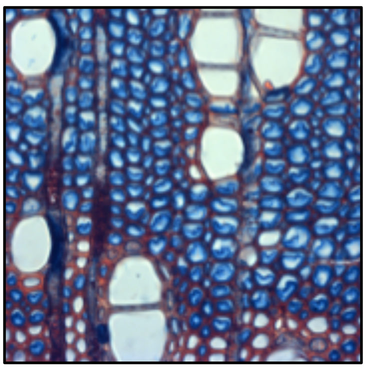
Fiber wall thickness

68 - Fibers very thin-walled	Fiber lumina 3 or more times wider than the double wall thickness.
69 - Fibers thin- to thick-walled	Fiber lumina less than 3 times the double wall thickness, and distinctly open.
70 - Fibers very thick-walled	Fiber lumina almost completely closed.

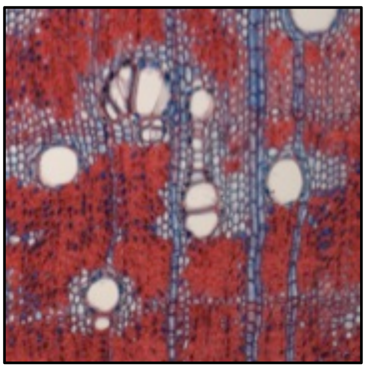
The intermediate character 69,70 was used to describe “thick to very thick” wall in fibers

Tension wood

70.2 - Tension wood present	The gelatinous layer, blue-stained, is visible in fibers. Gelatinous layers usually separated from the other cell wall layers during sectioning.



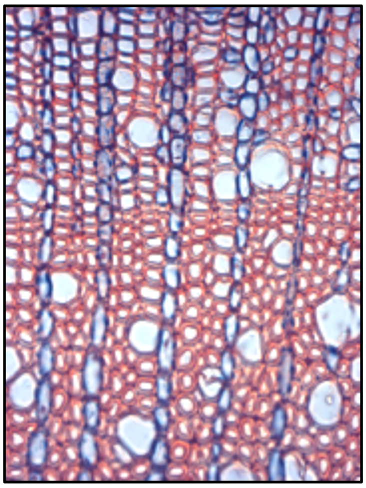
Acer pseudoplatanus **L. (40x)**



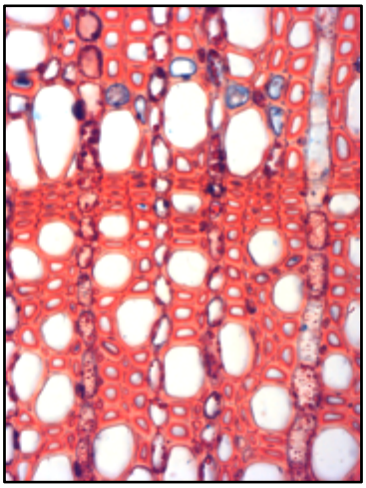
Ceratonia siliqua **L. (100x)**

Flat marginal fibers

70.3 - Radial flat marginal fibers — Thick fibers that form a more or less continuous layer of variable width at the margins of a growth ring.



Scabiosa cyprica Post (40x)



Lonicera etrusca Santi (40x)

Axial parenchyma

75 - Axial parenchyma absent, extremely rare, or not recognizable.

Apotracheal axial parenchyma

76 - Axial parenchyma diffuse — Single parenchyma strands or pairs of strands distributed irregularly among the fibrous elements of the wood.

77 - Axial parenchyma diffuse-in-aggregates — Parenchyma strands grouped into short discontinuous tangential or oblique lines.

Paratracheal axial parenchyma

78 - Axial parenchyma scanty paratracheal — Occasional parenchyma cells associated with the vessels, usually related to paratracheal diffuse parenchyma, which are immediately adjacent to vessels.

79 - Axial parenchyma vasicentric — Parenchyma cells forming a complete sheath of parenchyma around a solitary vessel or vessel multiple.

83 - Axial parenchyma confluent — Coalescing vasicentric or aliform parenchyma surrounding or to one side of two or more vessels, and often forming irregular bands.

84 - Axial parenchyma — Paratracheal parenchyma forming semi-circular *unilateral paratracheal* — hoods or caps only on one side of the vessels and which can extend tangentially or obliquely in an aliform or confluent or banded pattern

Banded parenchyma

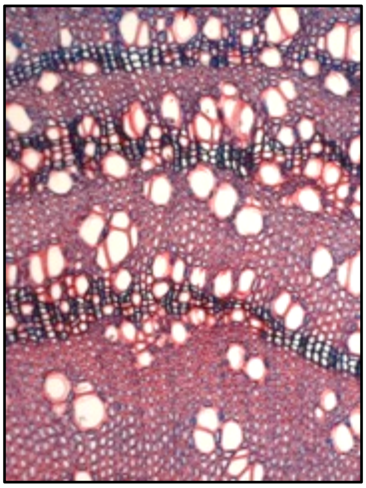
Numerous kinds of parenchyma bands were described: independent of the vessels (apotracheal), definitely associated with the vessels (paratracheal) or both.

85 - Axial parenchyma bands greater than three cells wide (e.g. Ficus).

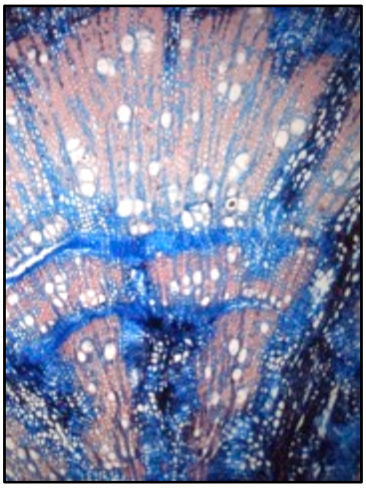
86 - Axial parenchyma in narrow bands or lines up to three cells wide (e.g. Quercus).

89 - Axial parenchyma in marginal or in seemingly marginal bands — Parenchymatous bands that form a more or less continuous layer of variable width at the margins of a growth ring.

89.1 - Parenchyma marginal thin walled, dark in polarized light. — Parenchyma cells without secondary wall do not reflect polarized light and appear as dark zones.

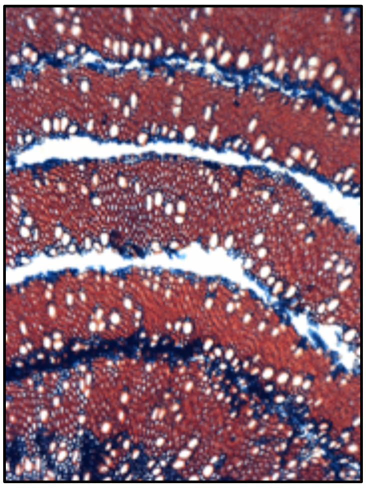


Onosma mitis **Boiss. et Heldr. (100x)**



Convolvulus dorycnium **L. (40x)**

89.2 - Ring shake — Thin walled parenchyma cell rings that typically break along the ring boundary during sample preparation procedures (e.g. *Saxifraga*).



Arabis purpurea Sibth. et Sm.
(10x)

Ray width

According to IAWA Hardwood list (1989) rays width was determined on the tangential section by counting the number of cells on the widest part of the rays, perpendicular to the ray axis. When rays are of two distinct sizes (feature 103), the width of the larger size class was used.

96 - Rays exclusively uniseriate

96.1 - Rays predominantly uniseriate	90% or more rays are uniseriate, the remaining rays are usually 1 to 3 seriate

Sorbus aria (L.) Crantz subsp. *cretica* (Lindl.) Holmboe
(200x)

Crataegus monogyna Jacq.
(200x)

97 - Ray width mostly 1 - 3 cells

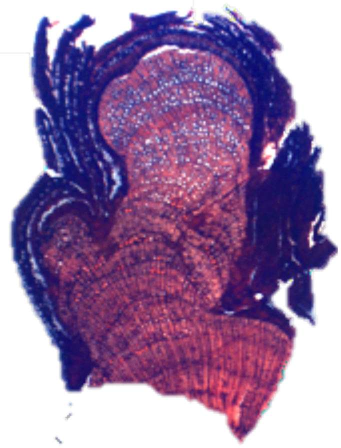
98 - Larger rays commonly 4 - 10 seriate

99 - Larger rays commonly greater than 10 seriate

Stem lobed

99.2 - Stem lobed

The external shape of the stem in transverse section is not roundish, but is divided in multiple parts by radial fissures of various depth.



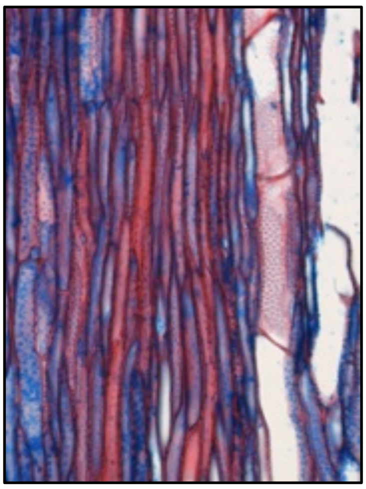
Fumana thymifolia **(L.) Verlot (4x)**

Ray height

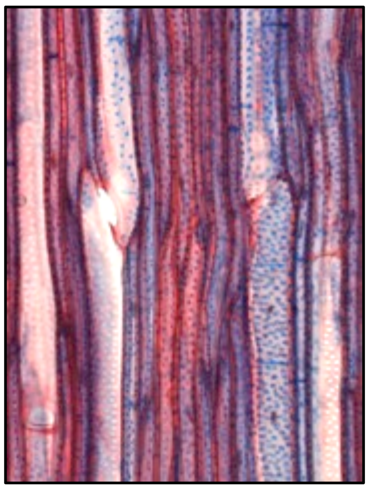
100 - Rays with multiseriate portion(s) as wide as uniseriate portions

100.1 - Rays confluent with ground tissue

Lateral border of ray (tangential section) merges with axial tissue.



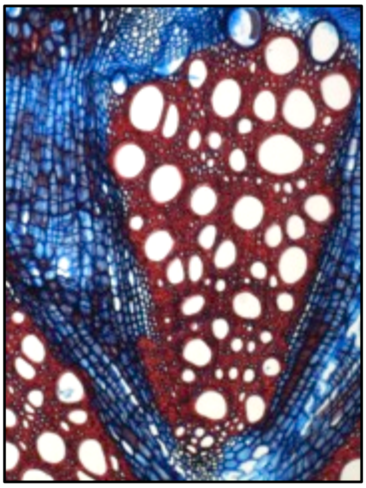
Lycium schweinfurthii **Dammer (200x)**



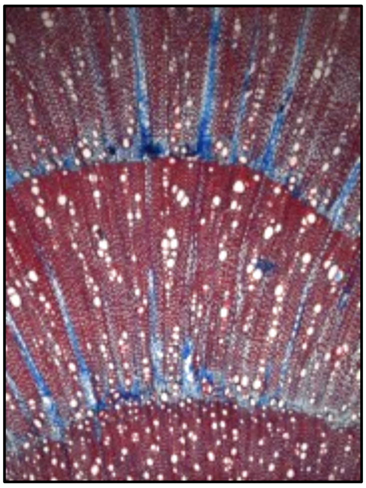
Salvia lanigera **Poir. (200x)**

Rays unlignified

100.2 - Rays become invisible in polarized light



***Aristolochia sempervirens* L. (100x)**



***Echium angustifolium* Link ex Willk. & Lange (40x)**

Aggregate rays

101 - Aggregate rays	Lateral border of ray (tangential section) merges with axial tissue.

Ray height

102 - Ray height > 1 mm	The large rays commonly exceeding 1 mm in height.

Rays of two distinct sizes

103 - Rays of two distinct sizes	When viewed in tangential section, rays form two distinct populations by their width and usually also by their height.

Ray cellular composition

104 - All ray cells procumbent.

105 - All ray cells upright and/or square.

106 - Body ray cells procumbent with one row of upright and/or square marginal cells.

107 - Body ray cells procumbent with mostly 2-4 rows of upright and/or square marginal cells.

108 - Body ray cells procumbent with over 4 rows of upright and/or square marginal cells.

109 - Rays with procumbent, square and upright cells mixed throughout the ray.

Rays per millimeter

The number of rays per linear unit was determined from a transverse section along a line perpendicular to rays. This procedure permitted measurement of the number of rays per millimeter exclusively in latewood.

114 - Rays per millimeter ≤ 4/mm.

115 - Rays per millimeter 4-12/mm.

116.1 - Rays per millimeter 12-20/mm.

116.2 - Rays per millimeter ≥ 20/mm.

Wood rayless

117 - Wood rayless	Wood without apparent radial elements evaluated in tangential section.

Storied structure

Storied structure refers to cells arranged in horizontal series as viewed in tangential section.

119 - Low rays storied, high rays not storied and axial parenchyma and/or vessel elements storied.

120 - Axial parenchyma and/or vessel elements storied.

121 - Axial parenchyma and/or vessel elements storied and fibers storied.

Oil cells

124 - Oil and/or mucilage cells associated with ray parenchyma.

Radial canals

130 - Radial canals	Tubular intercellular duct surrounded by an epithelium present in rays.

Successive cambia (included phloem)

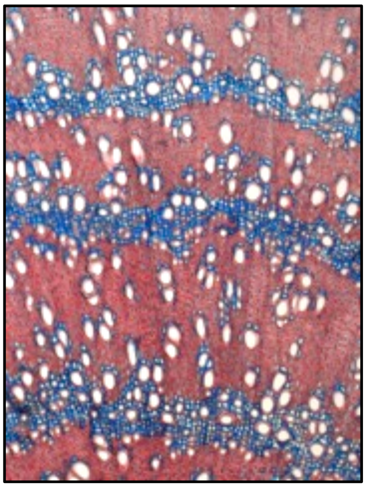
133.1 - Concentrically arranged single vascular bundles	Vascular bundles are separate from one other.

Noaea mucronata (Forssk.) Asch. et Schwinf. (100x)

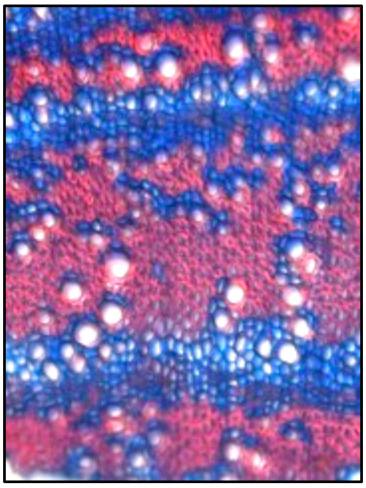
Suaeda aegyptiaca (Hasselq.) Zohary (40x)

133.2 - Concentric continuous

The successive cambia produce continuous tangential band of lignified xylem and discontinuous radial strips of unlignified parenchyma and phloem.



Alyssum akamasicum B.L.Burtt (40x)



Erysimum kykkoticum Hadjikyriakou et Alziar (200x)

Prismatic crystals

136 - Prismatic crystals present

Solitary rhombohedral or octahedral crystals composed of calcium oxalate, which are birefringent under polarized light.

136.1 - Prismatic crystals in ray parenchyma cells

141.1 - Prismatic crystals in axial parenchyma cells

Crystal druses

144 - Druses present	Compound crystal, more or less spherical in shape, in which the many component crystals protrude from the surface giving the whole structure a star-shaped appearance.
145 - Druses in ray parenchyma cells	
146 - Druses in axial parenchyma cells	

Other crystals

149 – Raphides	Bundle of long needle-like crystals.
150 - Acicular crystals	Small needle-like crystals, not occurring in bundles.
151 - Styloids and/or elongate crystals	Crystals at least four times as long as broad with pointed or square ends.
153 - Crystal sand	A granular mass composed of very small silicate crystals.

Definition of bark macroscopical features

A huge variety of different textures can be found in barks of woody plants. I tried to apply to my samples the Vaucher (2003) classification of bark textures, which describe external appearance of barks into 18 different types. The classification was in many cases too ambiguous in its practical applications, and it was not possible to classify the barks by macroscopic features.

Definition of bark anatomical features

The term bark designate all the tissues outside the vascular cambium (Trockenbrodt 1990). In the secondary state, bark includes the secondary phloem, the primary tissues that may be still present outside the secondary phloem, the periderm, and the dead tissues outside the periderm (Evert 2006).
Bark anatomical features were anatomically described in a number of papers and plant anatomy books (Baas 2001, Carlquist 1992b, Chang 1954, Evert 2006, Howard 1977, Junikka 1994, Ley-Yadun 1991, Machado *et al*. 2005, Manwiller 1972, Metcalfe & Chalk 1950, Miles & Smith 2009, Schweingruber 2006, Trockenbrodt 1990, Zahur 1959). I followed the available literature to find out the following codified list of features used in bark anatomy descriptions.

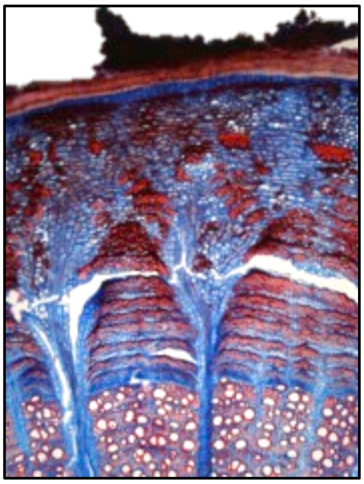
Sieve tubes

B1 – Groups of 3 or more sieve tubes	Groups of sieve tubes can be recognized among other phloem cells of the axial system.
B1.1 - Sieve tube arrangement in tangential rows	Tangentially distributed sieve tube groups can be recognized among other phloem cells of the axial system.
B1.2 - Sieve tube arrangement in radial rows	Sieve tubes in more or less long continuous radial files.
B2 - Collapsed sieve tubes present	Sieve tubes are more or less collapsed or obliterated.

Ray dilatation

B3 - Distinct ray dilatation

All rays become dilated by cell expansion. Dilatation can occur by tangential increase of the number of ray cells, by expansion of ray cells, or both.

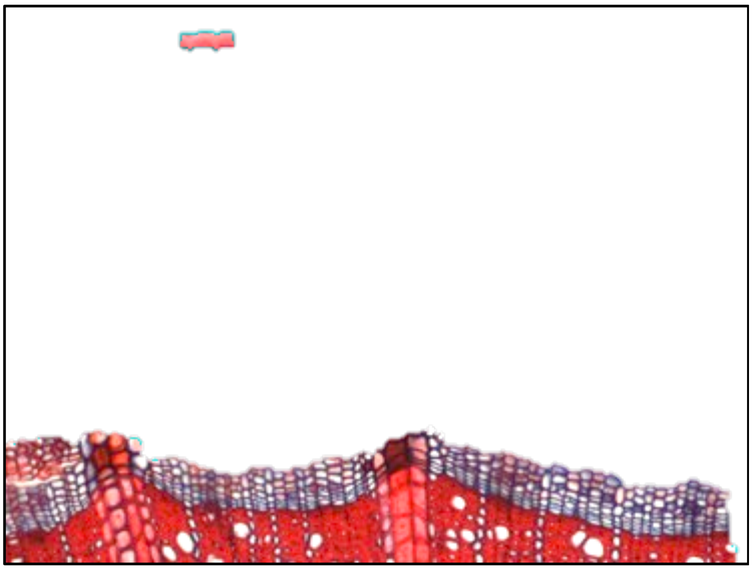


Astragalus echinus **DC. (40x)**

Rhus coriaria **L. (40x)**

B3.1 - Only some rays become dilated

Usually larger rays become dilated.



Rosa chionistrae **H.Lindb. (100x)**

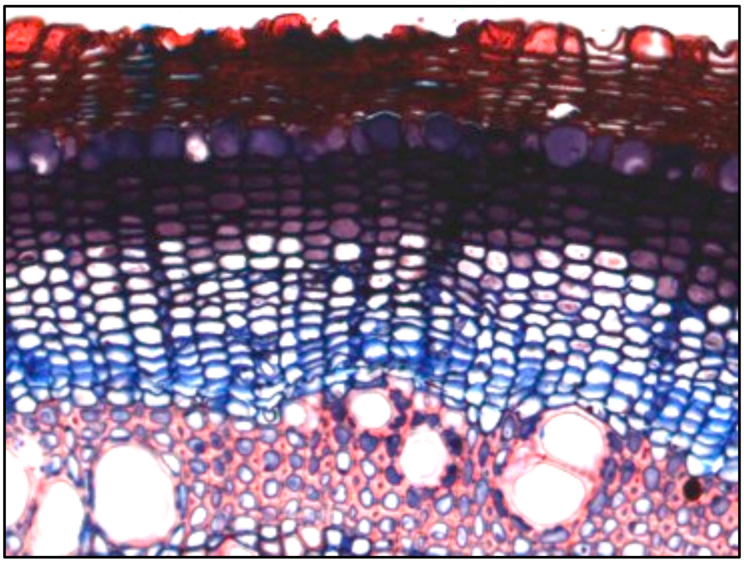
Bark cellular composition

B4 - Sclerenchyma cells present both in phloem and cortex

Both fibers and sclereids are present in phloem and in cortex.

B8 - Phloem uniform

Composed only of sieve tubes and parenchyma cells, sclerenchyma cells are not present.



Onosma mitis **Boiss. et Heldr. (200x)**

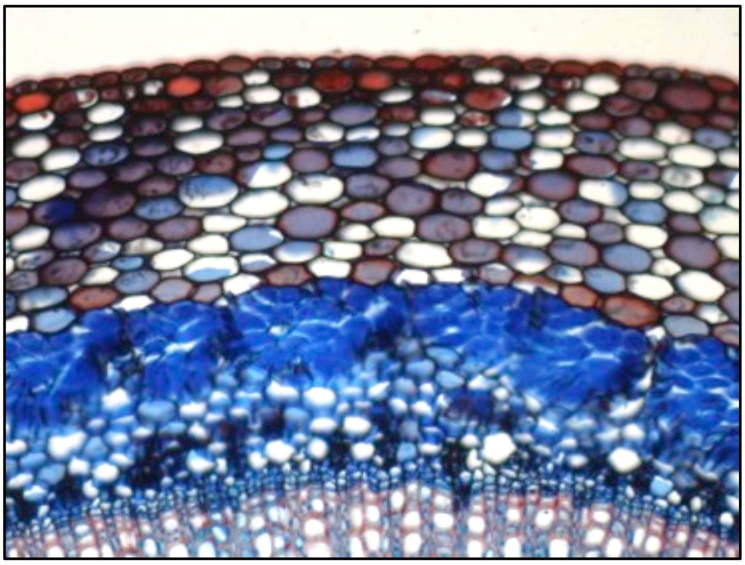
Fibers

B5 - Fibers present

Fibers are more or less thick walled, lignified and elongated. In primary phloem (visible in twig samples), fibers occur in the outermost part of the tissue. In the secondary phloem fibers are present in various distributional patterns among other phloem cells of the axial system (see below).

B5.0 - Fibers with unlignified innermost layer

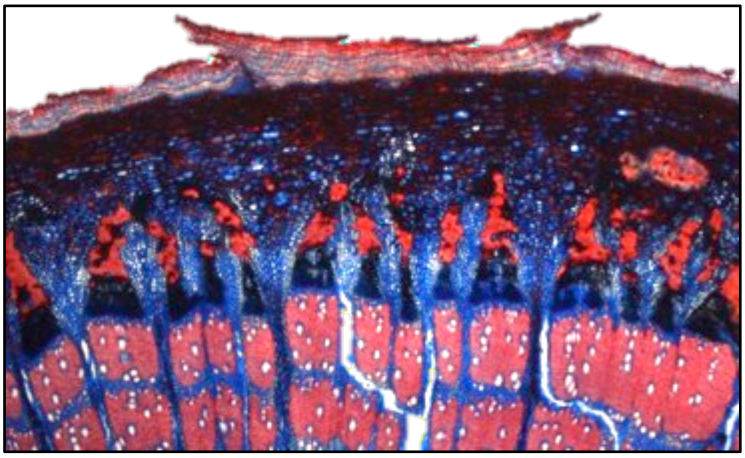
The fibers innermost layer, which has a structure quite similar to gelatinous layer in tension wood fibers, is unlignified (blue stained).



***Vinca major* L. (100x)**

B5.1 - Fibers in radial rows

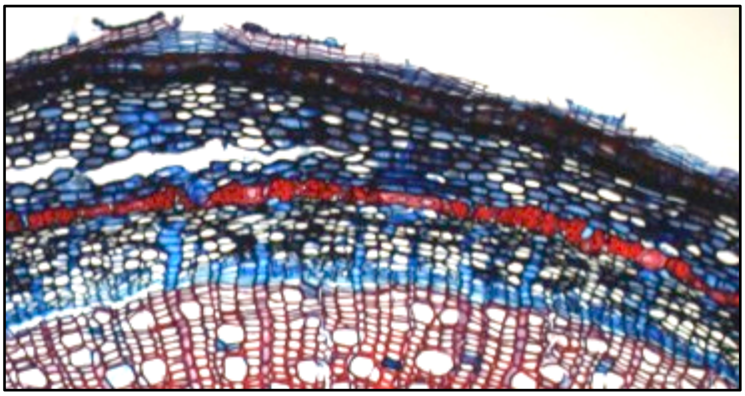
Single or few cells wide rows of fibers are few cells wide in radial direction.



***Alyssum chondrogynum* B.L. Burtt (40x)**

B5.2 - Fibers in tangential bands

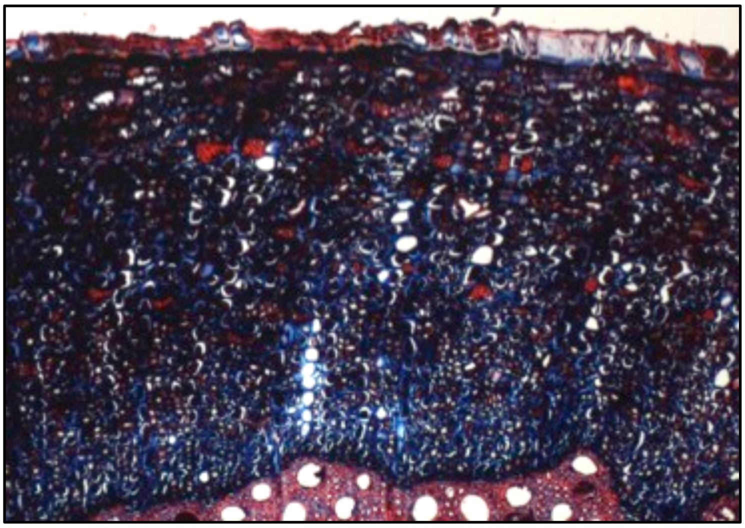
Tangentially continuous fiber rows or bands, more or less alternating with bands containing sieve tubes and parenchymatous components of the axial system.



***Alnus orientalis* Decne (100x)**

B5.3 - Fibers scattered or irregularly dispersed

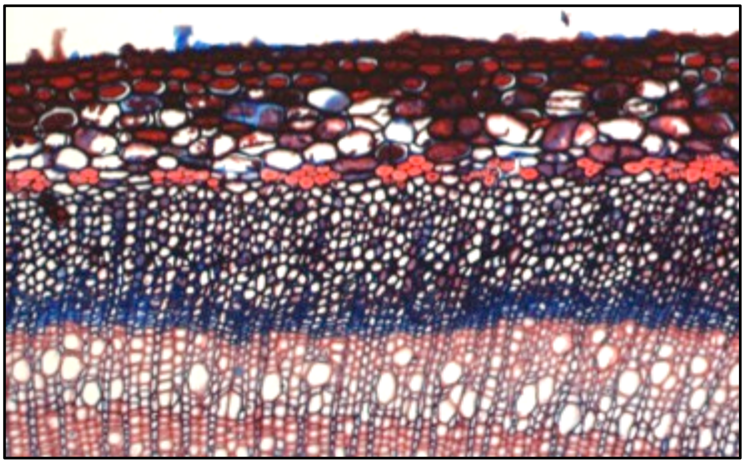
Single fiber cells dispersed in phloem.



***Eucalyptus torquata* Luehm. (40x)**

B5.4 - Fibers grouped

3 to more cells per group; groups irregularly or tangentially distributed in phloem.



***Teucrium kotschyanum* Poech. (100x)**

Sclereids

B6 - Sclereids present Sclereids are very thick walled, lignified and relatively short cells (sclereid length variation is often present even within an individual). Sclereids' secondary wall typically appears multilayered. Sclereid arrangement was described as fiber arrangement.

B6.1 - Sclereids in radial rows

B6.2 - Sclereids in tangential bands

B6.3 - Sclereids scattered or irregularly dispersed

B6.4 - Sclereids grouped

Crystals

B7 - Prismatic crystals present.

B7.1 - Acicular crystals present.

B7.2 - Druses present.

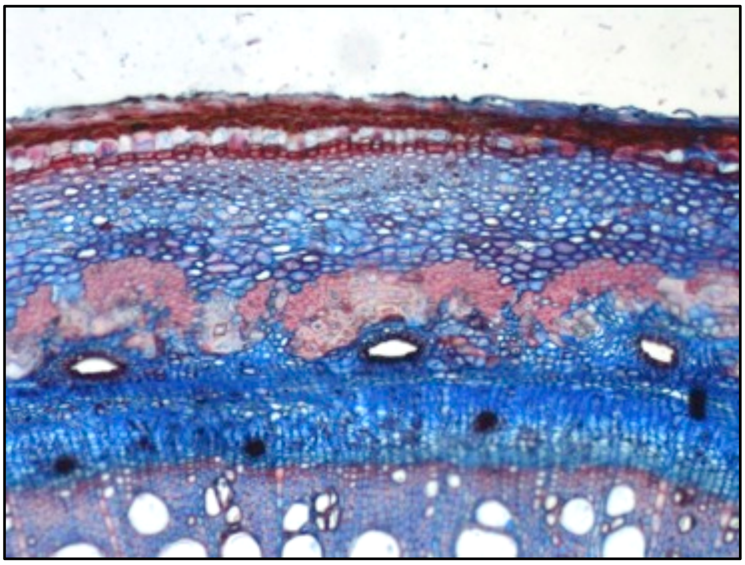
B7.3 - Crystal sand present.

B9 – Raphides present.

Secretory elements and canals

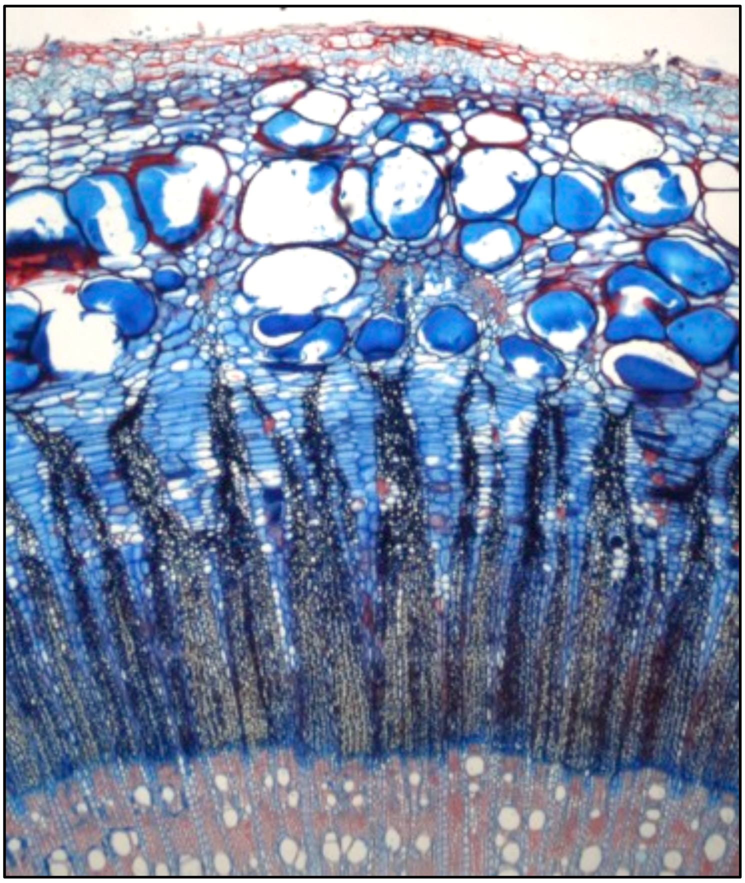
B10 - With single, irregularly dispersed laticifers or ducts

B10.2 - Ducts.



***Pistacia lentiscus* L. (100x)**

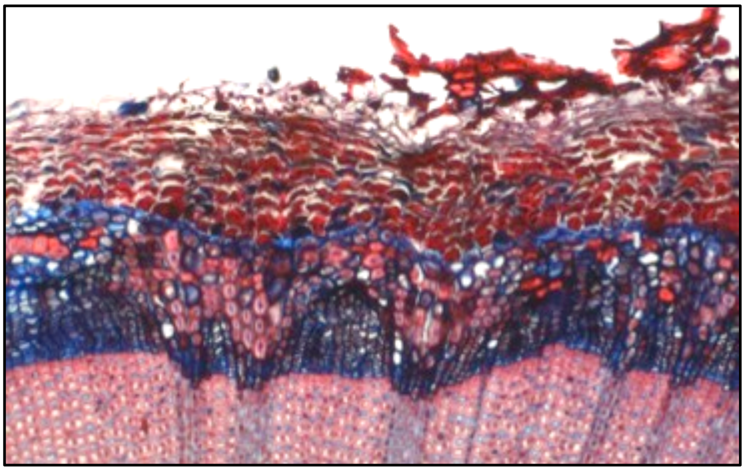
B10.3 - Laticifers or intercellular canals.



***Alhagi maurorum* Medik. (40x)**

Cell content

B11 - Cell contents in parenchyma cells.

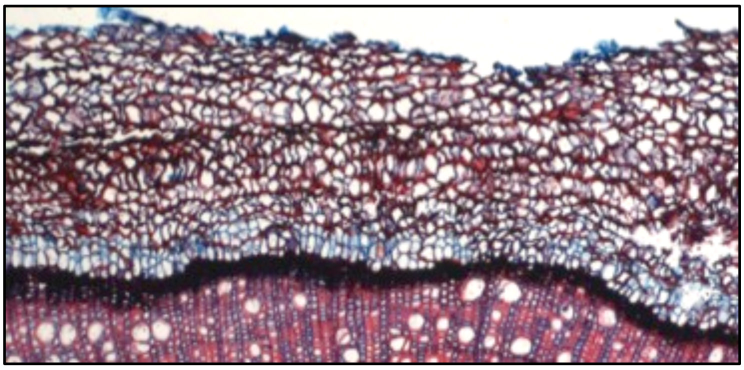


***Ephedra nebrodensis* Guss. (100x)**

Phellem

B14 - Phellem not clearly distinct

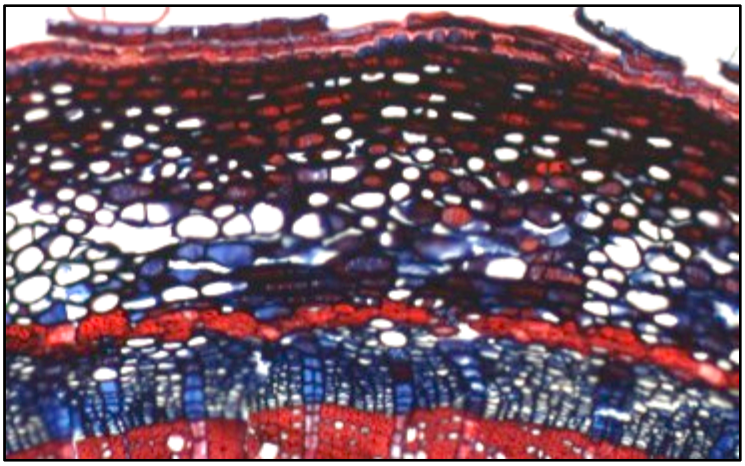
The cellular composition doesn't permit clear separation between phloem and phellem.



***Origanum dubium* Boiss. (100x)**

B14.1 - Phellem homogeneous

Phellem distinct, consists of regularly arranged square or rectangular cells.



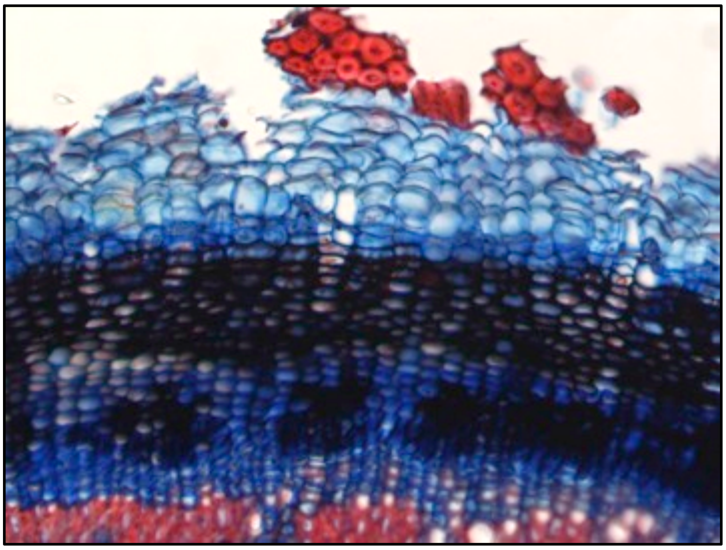
***Crataegus monogyna* Jacq. (100x)**

B14.2 - Phellem heterogeneous

Phellem distinct, consists of irregular shaped cells.

B14.3 - Phellem and/or epidermis distinct in polarized light.

B14.4 - Lignified cells in phellem



***Arabis purpurea* Sibth. et Sm. (200x)**

B16 - Layered phellem	Phellem composed of alternating bands of sclerenchyma and parenchyma tissues.

Phelloderm

B18 - Layered phelloderm	Phelloderm composed of alternating bands of sclerenchyma and parenchyma tissues.

Definition of pith anatomical features

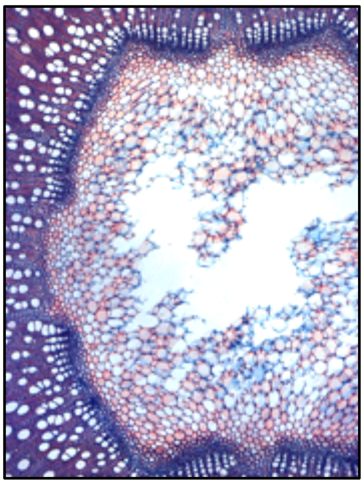
Only very few paper and books describe the pith structure (Carlquist 1992b, Metcalfe e Chalk 1950, Oslon 2005, Piccioli 1919, Schweingruber 2007). The following list of features was defined by looking at the feature in the slides, not on the base of the available literature.

Pith not visible in polarized light

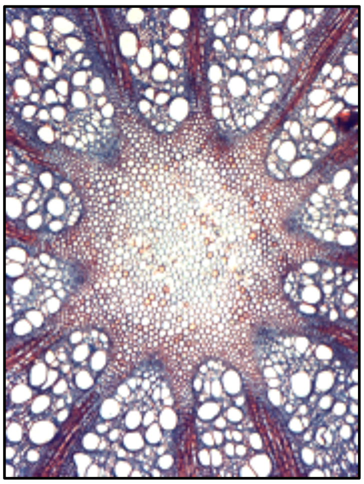
P0.1 - Pith not visible in polarized light	If the sample is observed in polarized light the pith area becomes completely black.

Pith shape

P1 - Pith shape round	The shape of the pith in transverse section is round or roundish to oval.
P1.1 - Pith shape polygonal	Pith shape with at least four straight sides and angles: rhomboid, hexagonal, irregular and star shaped. Triangular and pentagonal shapes are not described in this features (see P1.2 and P1.3).



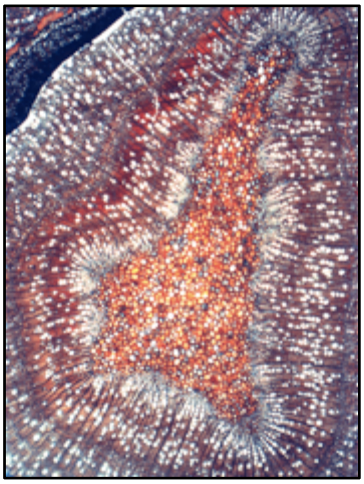
***Vitex agnus-castus* L. (4x)**

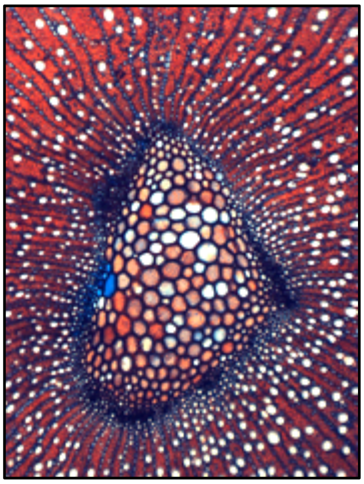


***Clematis vitalba* L. (4x)**

P1.2 - Pith shape triangular

Pith shape with three straight sides and angles.

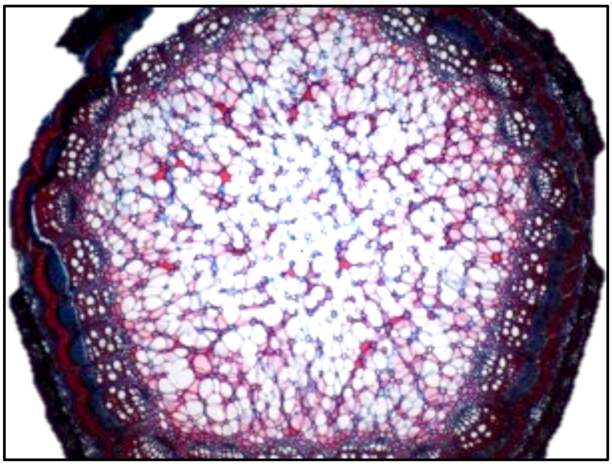




Citrus paradisi **Macfad. (4x)** ***Zygophyllum album*** **L. (4x)**

P1.3 - Pith shape pentagonal

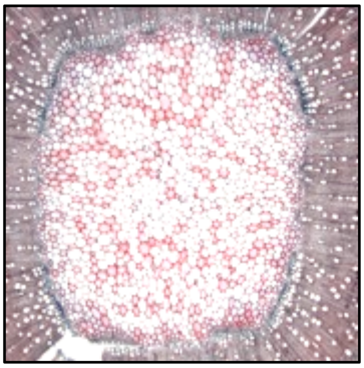
Pith shape with at five straight sides and angles.

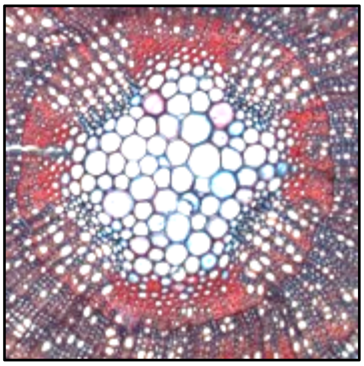


Rubus discolor **Weihe et Nees (2x)**

P1.4 - Pith shape square, rectangular

Pith shape with at four straight sides and angles.

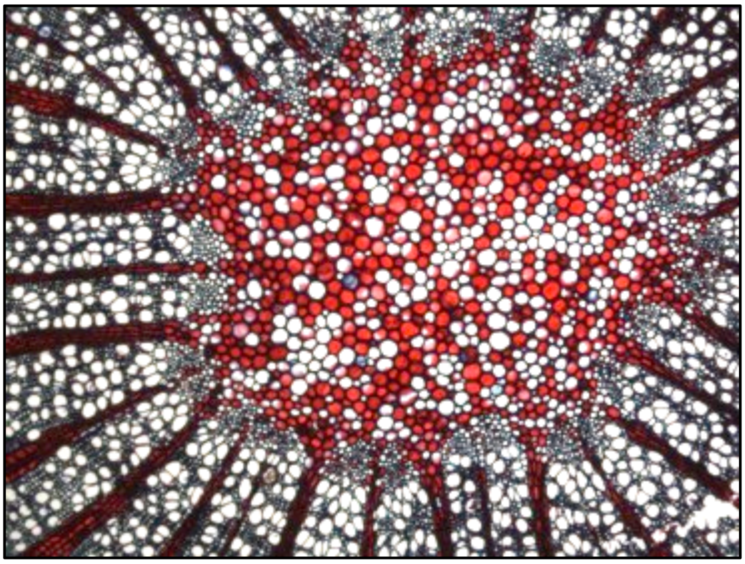




Lantana camara **L. (20x)** ***Micromeria cypria*** **Kotschy (100x)**

Medullary sheath

P2 - Medullary sheath present — A layer of thick-walled cells surrounding the pith.

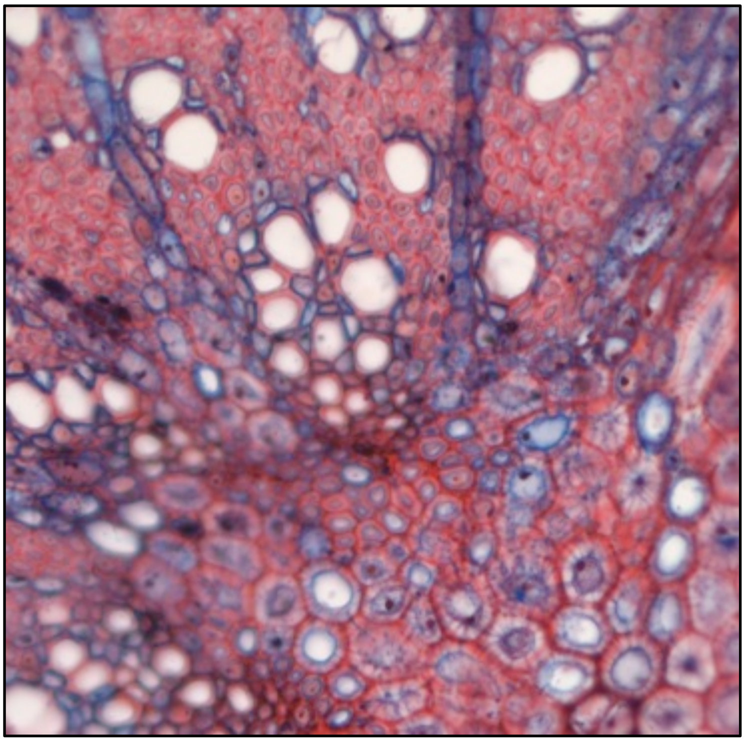


***Platanus orientalis* L. (100x)**

Pith cellular composition

P3 - Heterocellular pith — Different cell types in various distributional patterns occur among parenchymatic cells.

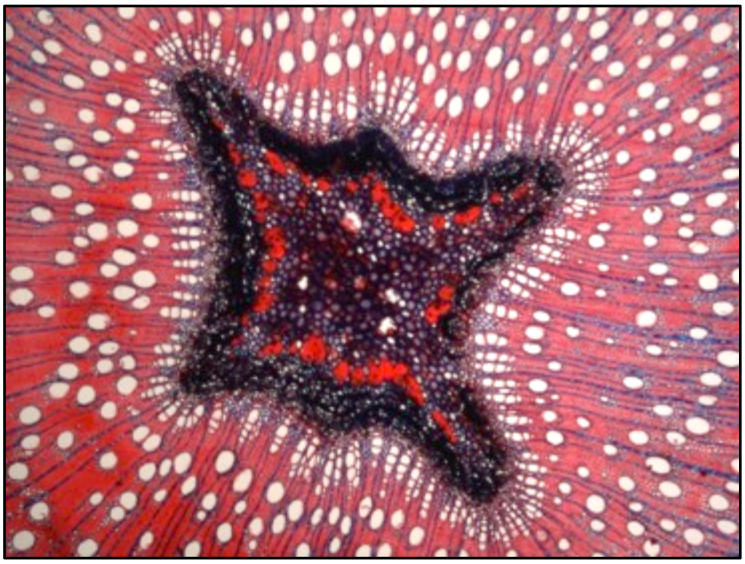
P3.1 – Sclereids present — Sclereids in the pith.



***Tamarix ahpylla* (L.) H.Karst (200x)**

P3.2 – Fibers present

Fibers in the pith.



***Eucalyptus camaldulensis* Dehnh. (40x)**

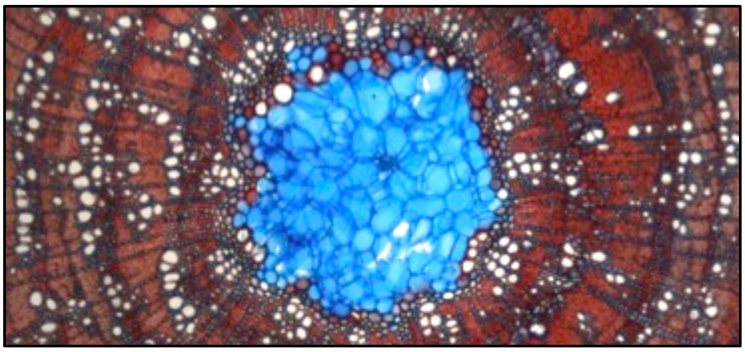
P3.3 - Thick walled parenchyma cells present

Parenchyma cells with thick cell walls present.

***Brassica hilarionis* Post (100x)**

P3.4 - Unlignified cells present

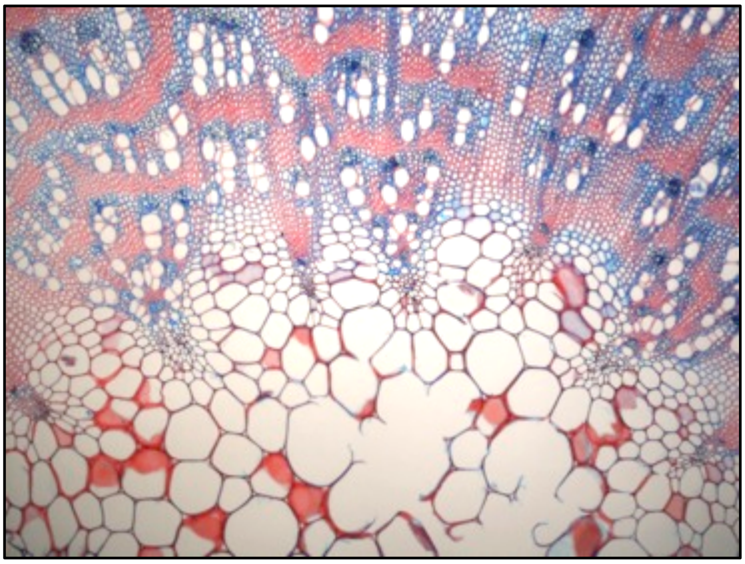
Pith completely or in part composed of unlignified cell walls. In safranin and astra-blue stained sections this cells appear blue.



***Coronilla emerus* L. (40x)**

P4 - Cells dimorphic throughout pith

Cells of different shape and size occur throughout the pith.



Suaeda aegyptiaca **(Hasselq.) Zohary (40x)**

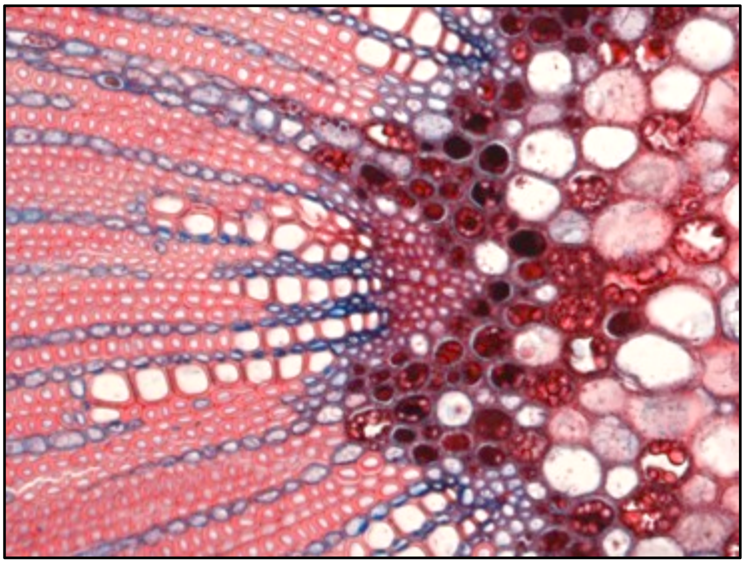
P4.1 - Cells dimorphic center vs. border of the pith

Pith consisting of cells in two zones: different size and/or shape in pith center than in pith periphery.

Pith cell contents

P5 - Cell contents present

Numerous kinds of substances visible in cell lumen (gum, tannins, dark staining substances).



Zizyphus lotus **(L.) Lam. (200x)**

Pith crystals

P6 - Prismatic crystals present.

P6.1 - Acicular crystals present.

P6.2 - Crystal druses present.

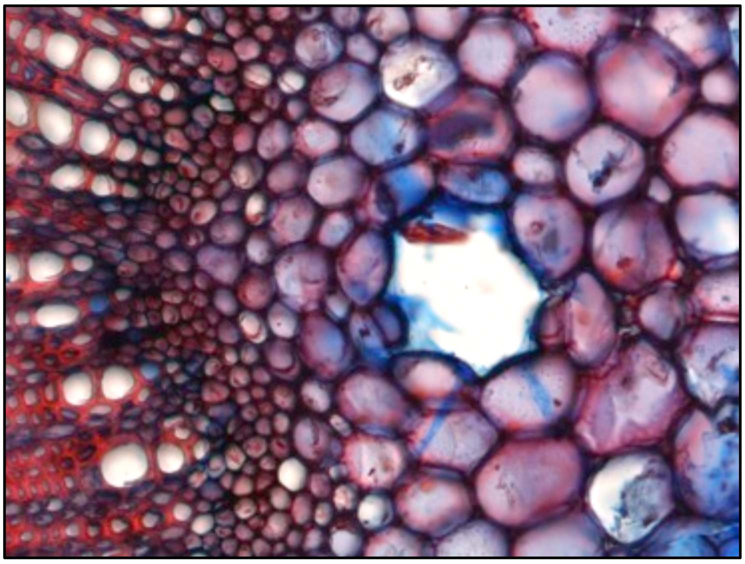
P6.3 - Raphides present.

P6.4 - Crystal sand present.

Pith canals

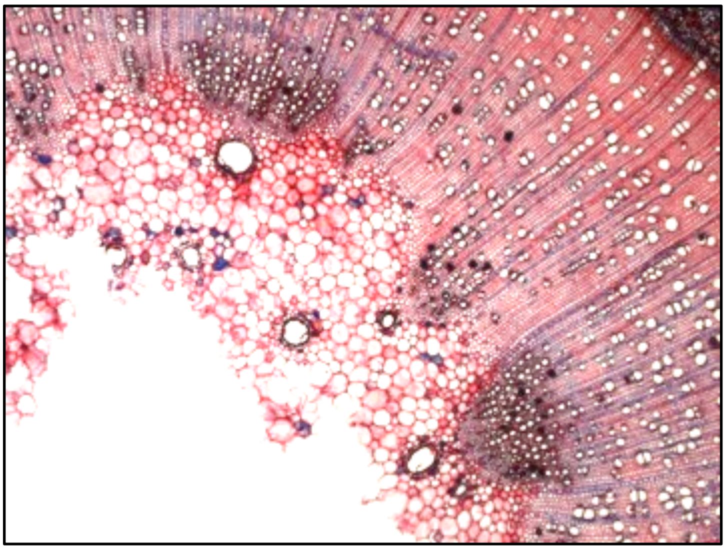
P7 - Laticifers or intercellular canals

Tube-like canals without border cells.



Zizyphus zizyphus **(L.) Meikle (200x)**

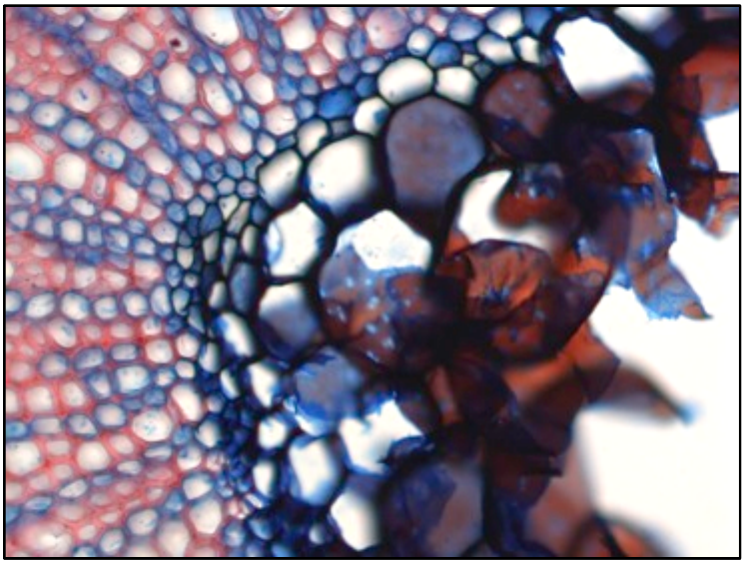
P8 - Intercellular canals with border cells



Schinus terebinthifolius **Raddi (40x)**

Pith cell pits

P9 - Pits in longitudinal cell walls (radial section)	Simple pits present in longitudinal pith cell walls.
P9.1 - Pits in transverse cell walls	Simple pits present in transverse pith cell walls.
P9.2 - Pits grouped	Simple pits aggregated into clusters of 2 or more in longitudinal and/or in transverse cell walls.

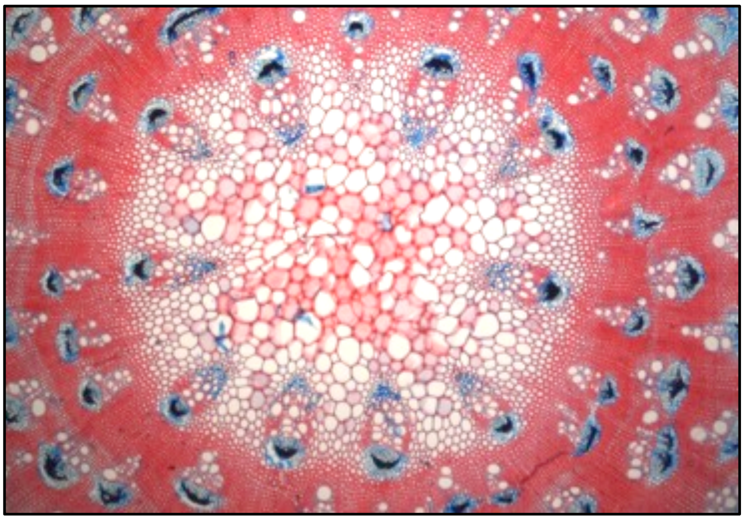


***Fagonia cretica* L. (200x)**

P9.3 - Pits of two distinct size and/or shape	Pits of two distinct diameters or shapes in longitudinal and/or in transverse cell walls.

Primary vascular bundle

P10 - Vascular bundles in the pith	Vascular bundles completely embedded in the pith.



Atriplex halimus L. (40x)

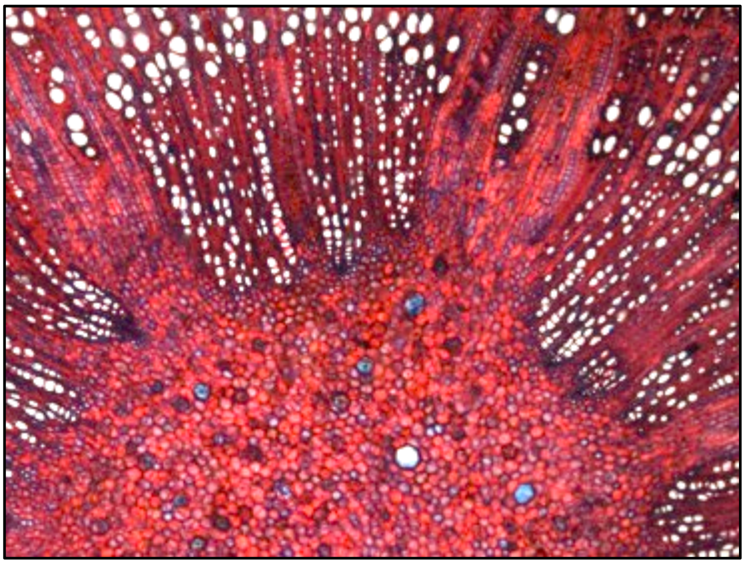
P10.1 - Primary vascular bundle separated from one another

Single vascular bundles are clearly separated from one another by rays or fibers.

P10.2 - Primary vascular bundle not distinct

P12 - Tracheary elements of metaxylem in distinct radial rows

Radial files of 2 or more tangentially adjacent primary vessels easily recognizable.



***Prunus dulcis* (Mill.) D.A.Webb (40x)**

Pith cell axial arrangement

P13 - Axial cells arranged in regular rows

Pith cells in regularly arranged vertical rows, observed in radial section.

Results: wood, bark and pith anatomical descriptions

General anatomy was described recording the presence of anatomical features listed in the codified anatomical characters lists. Conifers and Angiosperms wood anatomies were described by the specific IAWA lists of anatomical features (Richter *et al.* 2004, Wheeler *et al.* 1989), including the added features presented in the previous chapter. Bark and pith anatomies were described by the new codified lists specifically developed in this work.

The description of each species starts with a short overall plant description which comprehends its life form, plant height, and soil type were it usually grows. The description of the anatomical features for stem wood, juvenile bark and pith are presented for each species. Wood features are described separately from each one of the three anatomical sections (transverse, radial and tangential). Each description is completed by the codified list of anatomical features for wood, bark (codes start with the capital letter "B") and pith (codes start with the capital letter "P"). After the plant name is indicated the plate number in annex 1 for photomicrograph.

Cupressaceae

*Cupressus sempreviren*s L.
(Annex 1, plate no. 1)

Evergreen tree up to 30 m in height, with broad or, most commonly, conical crown. Native to eastern Mediterranean and northern Iran. Low demanding species (0-1400 m alt.).

Xylem

Transverse section: Growth ring boundaries distinct. Latewood tracheids thin walled (double wall thickness less than radial lumen diameter). Axial parenchyma present, diffuse and tangentially layered.

Radial section: Pitting in radial walls of earlywood tracheids predominantly uniseriate. Average tracheids length short (less than 3000 μm). Torus in earlywood tracheids' pits present. Axial parenchyma transverse end walls smooth. Ray tracheids absent or very rare. End walls of ray parenchyma cells smooth. Horizontal walls of ray parenchyma cells smooth (unpitted). Cross-field pitting piceoid. Number of pits per cross-field in earlywood 1-3.

Tangential section: Average ray height medium (5 to 15 cells). Rays in part 2-3 seriate.

Bark

Groups of sieve tubes in radial rows. Sclerenchyma cells both in phloem and cortex. Fibers in tangential rows. Crystal sand, mostly in rays. Phellem distinct in polarized light.

Pith

Pith shape polygonal. Thick walled parenchyma cells present. Cell dimorphism. Pits in transverse and in longitudinal cell walls. Pits of two distinct sizes. Primary vascular bundle not distinct.

Codified description

28 32 34 40 44 50 54 56 72 73 74 76 80 85 87 92 98 103 108 — B1.2 B4 B5 B5.2 B7.3 B14.3 — P1.1 P3.3 P4 P9 P9.1 P9.3 P10.2

Juniperus excelsa M.Bieb.

(Annex 1, plate no. 1)

Evergreen tree up to 20 in height; crown at first pyramidal, broadly branched in mature trees. Native to Balkans, Crimea, Turkey and eastwards as far as Afghanistan. Indigenous to Cyprus, restricted to the Troodos range (1200-1650 m alt.).

Xylem

Transverse section: Growth ring boundaries distinct. Intercellular spaces throughout the wood visible in transverse section. Latewood tracheids thick walled (double wall thickness larger than radial lumen diameter). Axial parenchyma present, diffuse. Traumatic resin canals present.

Radial section: Pitting in radial walls of earlywood tracheids predominantly uniseriate. Organic deposits in heartwood tracheids present. Torus in earlywood tracheids' pits present. Axial parenchyma transverse end walls smooth. Ray tracheids absent or very rare. End walls of ray parenchyma cells distinctly pitted. Horizontal walls of ray parenchyma cells smooth (unpitted). Cross-field pitting cupressoid. Number of pits per cross-field in earlywood 1-3.

Tangential section: Average ray height very low (up to 4 cells). Rays exclusively uniseriate.

Bark

Groups of sieve tubes in radial rows. Collapsed sieve tubes. Distinct rays dilatations. Sclerenchyma cells both in phloem and cortex. Fibers in tangential rows. Crystal sand. With resin ducts. Phellem homogeneous, distinct in polarized light. Layered phellem.

Pith
Pith shape triangular. Thick walled parenchyma cells present. Pits in transverse and in longitudinal cell walls. Primary vascular bundle not distinct.

Codified description
30 33 40 44 48 53 55 56 72 73 76 80 86 87 93 98 102 107 111 — B1.2 B2 B3 B4 B5 B5.2 B7.3 B10 B10.2 B14.1 B14.3 B16 — P1.2 P3.3 P9 P9.1 P10.2

Juniperus foetidissima Willd.
(Annex 1, plate no. 1)

Evergreen tree up to 20 in height; with conical or pyramidal crown. Native to Greece, Turkey, Caucasia and Syria. Indigenous to Cyprus, restricted to the Troodos range (1400-1950 m alt.).

Xylem
Transverse section: Growth ring boundaries distinct. Latewood tracheids thin walled (double wall thickness less than radial lumen diameter). Axial parenchyma present, diffuse and tangentially zonate.
Radial section: Pitting in radial walls of earlywood tracheids predominantly uniseriate. Organic deposit in heartwood tracheids present. Torus in earlywood tracheids' pits present. Axial parenchyma transverse end walls smooth. Ray tracheids absent or very rare. End walls of ray parenchyma cells distinctly pitted. Horizontal walls of ray parenchyma cells distinctly pitted. Cross-field pitting cupressoid. Number of pits per cross-field in earlywood 1-3.
Tangential section: Average ray height very low (up to 4 cells) to medium (5 to 15 cells). Rays exclusively uniseriate.

Bark
Groups of sieve tubes in tangential rows. Sclerenchyma cells both in phloem and cortex. Fibers in tangential rows, scattered or irregularly dispersed. Crystal sand. Phellem homogeneous, distinct in polarized light. Phellem and phelloderm layered.

Pith
Pith shape round. Thick walled parenchyma cells present. Pits of two distinct size in transverse and in longitudinal cell walls. Primary vascular bundle not distinct.

Codified description
26 33 35 40 44 48 54 56 72 73 74 76 80 86 88 93 98 102 103 107 — B1.1 B4 B5 B5.2 B5.3 B 7.3 B14.1 B14.3 B16 B18 — P1 P3.3 P9 P9.1 P9.3 P10.2

Juniperus phoenicea L.
(Annex 1, plate no. 2)

Evergreen tree up to 10 in height; with conical crown. Widely distributed in the Mediterranean region. Indigenous to Cyprus, occurring in costal maquis (0-500 m alt.).

Xylem
Transverse section: Growth ring boundaries distinct. Latewood tracheids thick walled (double wall thickness larger than radial lumen diameter). Axial parenchyma present, tangentially zonate.
Radial section: Pitting in radial walls of earlywood tracheids predominantly uniseriate. Torus in earlywood tracheids' pits present. Axial parenchyma transverse end walls smooth. Ray tracheids absent or very rare. End and horizontal walls of ray parenchyma cells distinctly pitted. Cross-field pitting cupressoid. Number of pits per cross-field in earlywood 1-3.
Tangential section: Average ray height very low (up to 4 cells). Rays exclusively uniseriate.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Some rays became dilated. Sclerenchyma cells both in phloem and cortex. Fibers present. Fibers scattered or irregularly dispersed. Crystal sand. Phellem homogeneous, distinct in polarized light. Layered phellem.

Pith
Pith shape polygonal. Thick walled parenchyma cells present. Pits in transverse and in longitudinal cell walls. Primary vascular bundle not distinct.

Codified description
26 33 35 40 44 55 56 72 74 76 80 86 88 93 98 102 107 — B1 B2 B3.1 B4 B5 B5.3 B7.3 B14.1 B14.3 B16 — P1.1 P3.3 P9 P9.1 P10.2

Juniperus oxycedrus L.
(Annex 1, plate no. 2)

Evergreen shrub or tree up to 8 m in height, with rounded or conical crown. Indigenous species thriving on rocky mountainsides (700-1500 m alt.). Widely distributed from southern Europe eastwards to the Caucasus and northern Iran.

Xylem
Transverse section: Growth ring boundaries distinct. Latewood tracheids thick walled (double wall thickness larger than radial lumen diameter).

Radial section: Pitting in radial walls of earlywood tracheids predominantly uniseriate. Organic deposit in heartwood tracheids present. Torus in earlywood tracheids' pits present. Ray tracheids commonly present. End walls of ray parenchyma cells distinctly pitted. Cross-field pitting cupressoid. Number of pits per cross-field in earlywood 1-3.
Tangential section: Average ray height very low (up to 4 cells). Rays exclusively uniseriate.

Bark
Groups of sieve tubes in radial rows. Collapsed sieve tubes. Distinct rays dilatations. Sclerenchyma cells both in phloem and cortex. Fibers in tangential rows. Crystal sand. With resin ducts. Phellem homogeneous, distinct in polarized light. Layered phellem.

Pith
Pith shape round. Thick walled parenchyma cells present. Cell content (gum, tannins, dark staining substances). Pits in transverse and in longitudinal cell walls. Vascular bundles in the pith. Primary vascular bundle not distinct.

Codified description
30 33 40 44 48 55 56 79 86 93 98 102 107 — B3 B4 B5 B5.2 B7.3 B10 B10.2 B11 B14.1 B14.3 B16 — P1 P3.3 P5 P9 P9.1 P10 P10.2

Pinaceae

Cedrus brevifolia (Hook. F.) Henry
(Annex 1, plate no. 2)

Evergreen trees up to 30 m in height. The crown, at first pyramidal, gradually becoming broad, with characteristics horizontal branching in older trees. Endemic to Cyprus, restricted to the Cedar Valley of the Pafos forest (900 – 1400 m alt.).

Xylem
Transverse section: Growth ring boundaries distinct. Latewood tracheids thick walled (double wall thickness larger than radial lumen diameter).
Radial section: Pitting in radial walls of earlywood tracheids predominantly uniseriate. Torus in earlywood tracheids' pits scalloped. Ray tracheids commonly present. Cell walls of ray tracheids smooth. End walls of ray parenchyma cells distinctly pitted. Horizontal walls of ray parenchyma cells distinctly pitted. Cross-field pitting taxodioid. Number of pits per cross-field in earlywood 1-3.
Tangential section: Average ray height high (from 16 to 30 cells). Rays exclusively uniseriate.

Bark
Collapsed sieve tubes. Sclerenchyma cells both in phloem and cortex. Sclereids scattered or irregularly dispersed. Prismatic crystals and crystal sand. With resin canals. Cell content in parenchyma cells. Phellem homogeneous. Phellem distinct in polarized light.

Pith
Pith shape polygonal. Thick walled parenchyma cells present. Unlignified cells. Cell content (gum, tannins, dark staining substances). With prismatic crystals. Pits in transverse and in longitudinal cell walls. Primary vascular bundle not distinct.

Codified description
30 33 40 44 55 57 79 81 86 88 94 98 104 107 — B2 B4 B6 B6.3 B7 B7.3 B10 B10.2 B11 B14.1 B14.3 — P1.1 P2 P3.3 P3.4 P5 P6 P9 P9.1 P10.2

Pinus brutia Ten.
(Annex 1, plate no. 3)

Evergreen tree up to 40 m in height. Indigenous to Cyprus, it is the dominant forest species on the island occurring almost everywhere (0-1400 m alt.). Native to southern Italy, eastwards to northern Iran and Caucasus.

Xylem
Transverse section: Growth ring boundaries distinct. Latewood tracheids thin walled (double wall thickness less than radial lumen diameter). Axial intercellular resin canals present. Epithelial cells thin-walled.
Radial section: Pitting in radial walls of earlywood tracheids predominantly uniseriate. Torus in earlywood tracheids' pits present. Ray tracheids commonly present. Cell walls of ray tracheids dentate. End walls of ray parenchyma cells distinctly pitted. Horizontal walls of ray parenchyma cells distinctly pitted. Cross-field pitting cupressoid to taxodioid. Number of pits per cross-field in earlywood 1-3. Prismatic crystals located in cells associated with intercellular canals.
Tangential section: Average ray height medium (5 to 15 cells). Rays exclusively uniseriate. Radial intercellular resin canals present.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Sclerenchyma cells both in phloem and cortex. Prismatic crystals present. With resin ducts. Cell content in parenchyma cells. Phellem homogeneous. Phellem distinct in polarized light.

Pith
Pith shape polygonal. Heterocellular pith, with sclereids. Prismatic crystals present. Pits in transverse and in longitudinal cell walls. Primary vascular bundle not distinct.

Codified description
40 44 54 56 79 82 86 88 93 94 98 103 107 109 110 117 118 119 124 — B1 B2 B4 B7 B10 B10.2 B11 B14.1 B14.3 P1.1 P3 P3.1 P6 P9 P9.1 P10.2

Pinus nigra J.F. Arnold subsp. *pallasiana* (Lamb.) Holmboe
(Annex 1, plate no. 3)

Evergreen tree up to 40 m in height. Indigenous to Cyprus, in occurs on the highest slopes of Troodos where it forms extensive forests (1100-1400 m alt.). It also occurs in the Balkan Peninsula, Turkey, Caucasia, Crimea and the Carpathians.

Xylem
Transverse section: Growth ring boundaries distinct. Latewood tracheids thick walled (double wall thickness larger than radial lumen diameter). Axial intercellular resin canals present with epithelial cells thin-walled.
Radial section: Pitting in radial walls of earlywood tracheids predominantly uniseriate. Torus in earlywood tracheids’ pits present. Ray tracheids commonly present. Cell walls of ray tracheids dentate. End walls of ray parenchyma cells smooth. Horizontal walls of ray parenchyma cells smooth (unpitted). Cross-field pitting fenestriform (“window-like”). Number of pits per cross-field in earlywood 1-2 (large fenestriform). Prismatic crystals located in cells associated with intercellular canals.
Tangential section: Average ray height medium (5 to 15 cells). Rays exclusively uniseriate. Radial intercellular resin canals present.

Bark
Groups of sieve tubes in tangential rows. Collapsed sieve tubes. Sclerenchyma cells both in phloem and cortex. Prismatic crystals. With resin ducts. Cell content in parenchyma cells. Phellem homogeneous, distinct in polarized light.

Pith
Pith shape polygonal. Heterocellular pith, with sclereids. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separated each other.

Codified description
40 44 55 56 79 82 85 87 90 97 103 107 109 110 117 118 119 124 — B1.1 B2 B4 B7 B10 B10.2 B11 B14.1 B14.3 — P1.1 P3 P3.1 P9 P9.1 P10.1

Pinus pinea L.
(Annex 1, plate no. 3)

Evergreen tree up to 30 m in height. Exotic to Cyprus, widely cultivated in gardens and plantations (0-140 m alt.). Native of the Mediterranean region and Portugal.

Xylem
Transverse section: Growth ring boundaries distinct. Latewood tracheids thin walled (double wall thickness less than radial lumen diameter). Axial intercellular resin canals present. Epithelial cells thin-walled.
Radial section: Pitting in radial walls of earlywood tracheids predominantly uniseriate. Torus in earlywood tracheids' pits present. Ray tracheids commonly present. Cell walls of ray tracheids smooth. End walls of ray parenchyma cells distinctly pitted. Horizontal walls of ray parenchyma cells distinctly pitted. Cross-field pitting cupressoid. Number of pits per cross-field in earlywood 1-3.
Tangential section: Average ray height very low (up to 4 cells). Rays exclusively uniseriate. Radial intercellular resin canals present.

Bark
Sclerenchyma cells both in phloem and cortex. Prismatic crystals. With resin ducts. Cell content in parenchyma cells. Phellem homogeneous. Phellem distinct in polarized light.

Pith
Pith shape polygonal. Cell content (gum, tannins, dark staining substances). With prismatic crystals. Pits in transverse and in longitudinal cell walls. Primary vascular bundle not distinct.

Codified description
40 44 54 56 79 81 86 88 93 98 102 107 109 110 117 — B4 B7 B10 B10.2 B11 B14.1 B14.3 — P1.1 P5 P6 P9 P9.1 P10.2

Ephedraceae

Ephedra fragilis Desf. subsp. *Campylopoda* (J.C. Mayer) Asch. et Graebn.
(Annex 1, plate no. 4)

Evergreen, erect or climbing, much branched shrub, with stem up to 3 m long. Native species in the eastern Mediterranean basin. It occurs in maquis, garigue and on rocky slope (0-900 m alt.).

Xylem

Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous, vessels predominantly solitary. Mean tangential diameter of earlywood vessels 20-50 µm, greater than 200 vessels per square millimeter in earlywood. Fibers thin to thick walled, radial flat marginal fibers. Axial parenchyma extremely rare or not to recognizable, sometimes scanty paratracheal. Rays per millimeter 4-12.
Radial section: Foraminate perforation plates. Intervessel pits medium (7-10 µm in diameter). Earlywood vessel elements length greater than 500 µm. Fibers with distinctly bordered pits (fiber tracheids). All ray cells upright or square.
Tangential section: Ray width predominant 1 to 3 cells. Dark staining substances in ray cells.

Bark

Groups of sieve tube and collapsed sieve tubes present. Only some rays become slightly dilated. Fibers and sclereids present, both scattered or irregularly dispersed. Crystal sand. Phellem homogenous. Epidermis distinct in polarized light.

Pith

Pith shape roundish. Large cells in the center, smaller at the border of the pith. Primary vascular bundle clearly separate from one other.

Codified description

1 4 9 19 26 40.2 50.2 53.2 58 62 69 70.3 75 78 97 105 115 — B1 B2 B3.1 B5 B5.3 B6 B6.3 B7.3 B14.1 B14.3 — P1.1 P4.1 P10.1

Ephedra nebrodensis Guss.
(Annex 1, plate no. 4)

Evergreen shrub up to 1 m in height. Indigenous to the Mediterranean countries and the countries eastwards to Iran, Afghanistan and central Asia. Rare in Cyprus. It occurs on rocky slopes, in maquis, and garigue (600-900 m alt.).

Xylem

Transverse section: Growth ring boundaries clearly demarcated. Wood ring porous. Vessels predominantly solitary. Mean tangential diameter of earlywood vessels less than 20 µm, 5 — 20 earlywood vessels per square millimeter. Fibers thin to thick walled. Axial parenchyma diffuse and scanty paratracheal. Apotracheal parenchyma in narrow bands or lines up to three cells wide. Rays per millimeter 4-12.
Radial section: Foraminate perforation plates. Intervessel pits large (greater than 10 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel

elements length greater than 500 μm. Fibers with distinctly bordered pits (fiber tracheids). All ray cells upright and/or square. Crystal sand where?.
Tangential section: Ray width predominant 1 to 3 cells.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Sclerenchyma cells both in phloem and cortex. Sclereids scattered or irregularly dispersed. Crystal sand. Cell content in parenchyma cells. Layered phelloderm.

Pith
Pith shape round. Medullary sheath present. Cells dimorphic. Cell content (gum, tannins, dark staining substances). Primary vascular bundle clearly separate from one other to not distinct. Axial cells arranged in regular rows (radial section).

Codified description
1 3 9 19 27 30 40.1 47 53.2 62 69 76 78 86 97 105 115 152 – B1 B2 B4 B6.3 B7.3 B11 B18 – P1 P2 P4 P5 P10.1 P10.2 P13

Aceracese

Acer obtusifolium Sibth. & Sm.
(Annex 1, plate no. 4)

Small evergreen tree or large shrub up to 10 m in height. Mediterranean species, native to Cyprus. Thriving on rocky slopes and pine forests in mountain range (0-1200 m alt.).

Xylem
Transverse section: Growth ring distinct, wood diffuse-porous. Vessels predominantly solitary or in radial multiples of 2 to 4 elements. Mean tangential diameter of earlywood vessels 20-50 μm; greater than 200 vessels per square millimeter in earlywood. Fibers thin to thick walled, marginal fibers radially flattened. Tension wood present. Axial parenchyma scanty paratracheal to vasicentric. Rays per millimeter 12-20.
Radial section: Simple perforation plates. Intervessel pits alternate, large (greater than 10 μm diameter). Vessel-ray pits with distinct borders, similar to intervessels pits in size and shape throughout the ray cell. Helical thickenings in vessel elements. Earlywood vessel elements length up to 350 μm. Fibers with simple to minutely bordered pits (libriform fibers). Central ray cells procumbent with one row of squared marginal cells. Prismatic crystals in axial parenchyma cells.
Tangential section: Rays of two distinct sizes: uniseriate and up to 5 cells wide. Some of the larger rays greater than 1 millimeter in height.

Bark
Groups of sieve tubes and collapsed sieve tubes present. Some rays become slightly dilated. Fibers and sclereids in tangential rows. Prismatic crystals. Phellem homogeneous. Epidermis distinct in polarized light.

Pith
Pith shape roundish. Parenchyma cells in to distinct shapes: most of them polygonal thin walled, and few roundish thick walled. Cell content. Prismatic crystals present. Pits in transverse and in longitudinal cell walls. Some primary vascular bundle clearly separate from one other some other not distinct. Axial cells arranged in regular rows (radial section).

Codified description
1 5 9 9.1 13 22 26 30 36 40.2 50.2 53.1 61 69 70.2 70.3 78 79 96 97 102 103 106 116.1 136 141.1 194 200 — B1 B2 B3.1 B4.1 B5 B5.2 B6.2 B7 B14.1 B14.3 — P1 P3.3 P4 P5 P6 P9 P9.1 P10.1 P10.2 P13

Acer pseudoplatanus L.
(Annex 1, plate no. 5)

Deciduous tree up to 30 m in height. Indigenous to northern and central Europe, Greece, Caucasus area and Armenia. Exotic to Cyprus. It can be found mainly in road side plantations on mountain range (1000-1700 m alt.).

Xylem
Transverse section: Growth ring distinct, wood diffuse-porous. Vessels predominantly solitary or in radial multiples of 2 to 4 elements. Mean tangential diameter of earlywood vessels 20-50 µm; greater than 200 vessels per square millimeter in earlywood. Fibers thin to thick walled, marginal fibers radially flattened. Tension wood present. Axial parenchyma scanty paratracheal to vasicentric. Rays per millimeter 12-20.
Radial section: Simple perforation plates. Intervessel pits alternate, large (greater than 10 µm diameter). Vessel-ray pits with distinct borders, similar to intervessels pits in size and shape throughout the ray cell. Helical thickenings in vessel elements. Earlywood vessel elements length up to 350 µm. Fibers with simple to minutely bordered pits (libriform fibers). Central ray cells procumbent with one row of squared marginal cells. Prismatic crystals in axial parenchyma cells.
Tangential section: Rays of two distinct sizes: uniseriate and up to 5 cells wide. Some of the larger rays greater than 1 millimeter in height.

Bark
Groups of sieve tubes and collapsed sieve tubes present. Some rays become slightly dilated. Fibers and sclereids in tangential rows. Prismatic crystals.

Phellem homogeneous. Epidermis distinct in polarized light.

Pith
Pith shape roundish. Parenchyma cells in to distinct shapes: most of them polygonal thin walled, and few roundish thick walled. Cell content. Prismatic crystals present. Pits in transverse and in longitudinal cell walls. Some primary vascular bundle clearly separate from one other some other not distinct. Axial cells arranged in regular rows (radial section).

Codified description
1 5 9 9.1 13 22 26 30 36 40.2 50.2 53.1 61 69 70.2 70.3 78 79 96 97 102 103 106 116.1 136 141.1 194 200 — B1 B2 B3.1 B4.1 B5 B5.2 B6.2 B7 B14.1 B14.3 - P1 P3.3 P4 P5 P6 P9 P9.1 P10.1 P10.2 P13

Amaranthaceae

Bosea cypria Boiss.
(Annex 1, plate no. 5)

Evergreen shrub, 1-2 m in height. Endemic to Cyprus, occurring on rocky ground old stone walls and rocky sites with open vegetation (0-650 m alt.).

Xylem
Transverse section: Growth rings distinct and recognizable. Wood diffuse-porous. Vessels solitary or in radial multiples of 2 to 4. Mean tangential diameter of earlywood vessels 20-50 μm. Greater than 200 vessels per square millimeter in earlywood. Tyloses with thin wall common. Gums and other deposits in heartwood vessels and/or fibers. Fibers thin to thick walled. Axial parenchyma scanty paratracheal, apotracheal parenchyma in marginal or in seemingly marginal bands. Rays per millimeter 12-20. Successive cambia: concentric arranged single vascular bundles. Conjunctive tissue thin walled (parenchyma).
Radial section: Simple perforation plates. Inter-vessel pitting pseudoscalariform to reticulate and alternate, small (4-7 μm in diameter). Earlywood vessel elements length 350-800 μm. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square. Prismatic crystals and druses present.
Tangential section: Rays of two distinct sizes: uniseriate and large 4 to 10 seriate rays. Wider rays height greater than 1 mm.

Bark
Groups of sieve tubes present. Fibers scattered or irregularly dispersed and grouped. Prismatic crystals and crystal sand present. Phellem/epidermis distinct in polarized light.

Pith
Pith shape round. Cells dimorphic. With prismatic crystals and druses. Pits of two distinct sizes, grouped in both longitudinal and transverse cell walls. Primary vascular bundles clearly separate from one another to not distinct. Axial cells arranged in regular rows (radial section).

Codified description
1 5 9 9.1 13 20.1 22 25 40.2 50.2 53 56 58 61 69 78 89 96 98 102 103 105 116.1 133.1 134.1 136 144 — B1 B5 B5.3 B5.4 B7 B7.3 B14.3 - P1 P4 P6 P6.2 P9 P9.1 P9.2 P9.3 P10.1 P10.2 P13

Anacardiaceae

Pistacia atlantica Desf.
(Annex 1, plate no. 5)

A robust, deciduous tree up to 15 m in height with a massive trunk. It occurs in Greece, Turkey, Caucasus area, Iran, Pakistan and north Africa; indigenous to Cyprus. Found in abandoned fields, field margins and rocky slopes (0-1500 m alt.).

Xylem
Transverse section: Growth rings distinct. Ring porous wood. Vessels solitary, in short radial multiples and in clusters. Mean tangential diameter of earlywood vessel lumina 50 — 100 µm. Fibers thin to thick walled, tension wood present. Axial parenchyma scanty paratracheal. Rays per millimeter 4-12.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessel-ray pits rounded or angular with large apertures. Helical thickenings in vessel elements present. Earlywood vessel elements length 100-200 µm. Tyloses and other deposit in heartwood vessels. Fibers with simple to minutely bordered pits (libriform fibers). Body ray cells procumbent with one to 3 rows of upright and/or square marginal cells. Prismatic crystals in ray parenchyma cells.
Tangential section: Gradual transition from uniseriate to 4 cells wide rays. Radial canals with epithelial cells.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Sclerenchyma cells both in phloem and cortex. Fibers and sclereids in tangential and in groups. Prismatic crystals. With secretory elements in ducts. Phellem homogeneous. Phellem distinct in polarized light.

Pith
Pith shape roundish. Cells dimorphic. Cell content (gum, tannins, dark staining substances). With prismatic crystals and druses. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows.

Codified description
1 3 9 9.1 11 13 22 25 31 36 41 52.3 56 58 61 69 70.2 78 96 97 105 106 107 115 130 136 136.1 – B1 B2 B3.1 B4 B5 B5.2 B5.4 B6 B6.2 B6.4 B7 B10 B10.2 B14.1 B14.3 – P1 P4 P5 P6 P6.2 P9 P9.1 P10.1 P12

Pistacia lentiscus L.
(Annex 1, plate no. 6)

Evergreen, aromatic shrub or small tree up to 4 m in height. It occur in all the Mediterranean countries, in Portugal and Atlantic islands; it is indigenous to Cyprus. Very common on rocky sites, sand dunes and pine forests (0-800 m alt.).

Xylem
Transverse section: Growth ring boundaries distinct. Wood ring porous. Vessels in radial multiples of 4 or more elements, and in clusters. Mean tangential diameter of earlywood vessel lumina 50 — 100 µm, 40 — 100 earlywood vessels per square millimeter. Fibers thin to thick walled, tension wood present. Axial parenchyma scanty paratracheal. Rays per millimeter 4-12.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessel-ray pits rounded or angular with large apertures. Helical thickenings in vessel elements present. Earlywood vessel elements length 100-200 µm. Body ray cells procumbent with one row of upright or square marginal cells. Prismatic crystals in ray parenchyma cells.
Tangential section: Rays uniseriate to 3 cells wide. Radial canals with epithelial cells.

Bark
Groups of sieve tubes. Collapsed sieve tubes. Fibers and sclereids in tangential rows. Prismatic crystals. With ducts. Phellem homogeneous, distinct in polarized light.

Pith
Pith shape roundish. Thick walled parenchyma cells scattered in the pith. With prismatic crystals. Pits of two distinct sizes in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
1 3 9 10 11 13 22 25 31 36 41 49 52.3 69 70.2 78 96 97 106 115 130 136 136.1 — B1 B2 B5 B5.2 B6 B6.2 B7 B10 B10.2 B14.1 B14.3 — P1 P3.3 P6 P9 P9.1 P9.3 P10.1 P12 P13

Rhus coriaria L.
(Annex 1, plate no. 6)

Deciduous shrub up to 3 in height. Twigs exuding milky latex when broken. It occurs throughout the Mediterranean and eastward to Iran; native to Cyprus. Common on rocky mountainsides, pine forests, maquis, garigue and vineyard sides (600-1600 m alt.).

Xylem
Transverse section: Growth ring distinct. Wood ring-porous. Vessels predominantly solitary, in diagonal and/or radial pattern. Mean tangential diameter of earlywood vessel lumina 100 — 200 µm; 20 — 40 earlywood vessels per square millimeter. Tyloses sclerotic common. Fibers thick to very thick walled; radial flat marginal fibers. Axial parenchyma diffuse in aggregates and vasicentric. Rays per millimeter 4-12.
Radial section: Simple perforation plates. Inter-vessel pits alternate, medium to large (from 7 µm to greater than 10 µm in diameter). Vessel-ray pits rounded or angular with large apertures. Helical thickenings in vessel elements present, mostly in narrower vessel elements. Earlywood vessel elements length less than 350 µm. Vascular and/or vasicentric tracheids present. Fibers with simple to minutely bordered pits (libriform fibers). Body ray cells procumbent with one row of upright and/or square marginal cells. Prismatic crystals in ray parenchyma cells.
Tangential section: Ray width predominant 1 to 3 cells.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Only some rays become dilated. Sclereids present, scattered or irregularly dispersed. Cristal druses present. With secretory elements in ducts. Phellem homogeneous.

Pith
Pith shape round. Cells dimorphic. Crystals druses present. Pits in transverse and in longitudinal cell walls (radial section). Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
1 3 7 9 13 22 26 27 31 36 39 42 48 52 57 60 61 69 70 70.3 77 79 97 106 115 136.1

— B1 B2 B3.1 B6 B6.3 B7.2 B10.2 B14.1 — P1 P4 P4.1 P4.2 P6.2 P9 P9.1 P10.1 P12 P13

Schinus molle L.
(Annex 1, plate no. 6)

Evergreen tree up to 10 m in height, with pendulous branches. A native of South America, it is cultivated in various Mediterranean countries; exotic to Cyprus. Common in road side plantations *Sideritis* and gardens (0-600 m alt.).

Xylem
Transverse section: Growth ring boundaries distinct. Diffuse porous wood. Vessels in radial multiples of 4 or more, and in clusters. Mean tangential diameter of earlywood vessels 20-50 μm. Gums and other deposits in heartwood vessels. Fibers thin to thick walled. Tension wood present. Axial parenchyma scanty paratracheal. Rays per millimeter 4-12.
Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 μm in diameter). Vessel-ray pits with large horizontal or vertical apertures. Helical thickenings in vessel elements present. Earlywood vessel elements length 200-500 μm. Vascular and/or vasicentric tracheids present. Fibers with simple to minutely bordered pits (libriform fibers). Septate fibers present. Uniseriate ray cells upright and/or square, multiseriate rays with procumbent, square and upright cells mixed throughout the ray. Prismatic crystals and dark staining substances in ray parenchyma cells.
Tangential section: Rays uniseriate and up to 3 cells wide.

Bark
Collapsed sieve tubes. Some rays become slightly dilated. Sclerenchyma cells both in phloem and cortex. Fibers scattered or irregularly dispersed sometimes grouped. Prismatic crystals. With secretory elements in ducts. Phellem homogeneous. Phellem distinct in polarized light.

Pith
Pith shape roundish. Cells dimorphic in shape and in diameter. Cell content (gum, tannins, dark staining substances). With prismatic crystals. Pits in transverse and in longitudinal cell walls. Primary vascular bundles clearly separate from one another. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
1 5 10 11 13 22 24 32 36 40.2 53.1 58 60 61 65 69 70.2 78 96 97 105 109 115 136 136.1 – B2 B3.1 B4 B5 B5.3 B5.4 B7 B10 B14.1 B14.3 – P1 P4 P5 P6 P9 P9.1 P10.1 P10.2 P12 P13

Schinus terebinthifolius Raddi
(Annex 1, plate no. 7)

Evergreen tree up to 15 m in height. A native of South America, it is cultivated in various Mediterranean countries, exotic to Cyprus. Common in road side plantation and gardens (0-400 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels solitary and in radial multiples of 2 to 6 elements. Mean tangential diameter of earlywood vessels less than 20 µm. Gums and other deposits in heartwood vessels. Fibers thin to thick walled. Tension wood present. Axial parenchyma scanty paratracheal. Rays per millimeter 4-12.
Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 µm in diameter). Vessel-ray pits with large horizontal or vertical apertures. Helical thickenings in vessel elements present. Earlywood vessel elements length 200-500 µm. Fibers with simple to minutely bordered pits (libriform fibers). Septate fibers present. Body ray cells procumbent with one row of upright marginal cells. Prismatic crystals in ray parenchyma cells.
Tangential section: Rays uniseriate and up to 3 cells wide. Intercellular radial canals with border cells.

Bark
Some rays become dilated. Sclerenchyma cells both in phloem and cortex. Fibers grouped. Sclereids scattered or irregularly dispersed. Prismatic crystals. With secretory elements in ducts. Cell content in parenchyma cells. Phellem homogeneous. Phellem distinct in polarized light.

Pith
Pith shape round. Cells dimorphic in diameter. With prismatic crystals and crystals druses. Intercellular canals with border cells. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows.

Codified description
1 5 9 9.1 13 22 24 32 36 40.1 53.1 58 61 65 69 70.2 78 96 97 106 107 115 130 136 136.1 – B3.1 B4 B5 B5.4 B6 B6.3 B7 B10 B10.2 B11 B14.1 B14.3 – P1 P4 P6 P6.2 P8 P9 P9.1 P10.1 P12

Apocynaceae

Nerium oleander L.
(Annex 1, plate no. 7)

Evergreen, laticiferous shrub 2-4 m in height. Widespread in the Mediterranean region. Native of Cyprus, very common along stream in costal areas of the island (0-900 m alt.).

Xylem

Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels solitary or in radial multiples of 2 to 4 or more elements. Mean tangential diameter of earlywood vessels 20-50 μm. Greater than 200 vessels per square millimeter in earlywood. Fibers thin to thick walled. Apotracheal parenchyma diffuse, and in narrow bands or lines up to three cells wide. Rays per millimeter 12-20.

Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 μm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 200-500 μm. Fibers with simple to minutely bordered pits (libriform fibers). Septate fibers present. Rays with procumbent, square and upright cells mixed throughout the ray. Few prismatic crystals in ray parenchyma cells.

Tangential section: Rays predominantly uniseriate. Ray width predominant 1 to 3 cells.

Bark

Groups of sieve tubes present. Sclereids scattered or irregularly dispersed. Gelatinous like fibers in groups. Prismatic crystals. With laticifers, secretory elements, oil ducts or mucilage ducts. Phellem homogeneous.

Pith

Pith disappear in polarized light. Pith shape triangular. Medullary sheath present. Heterocellular pith: sclereids present. Cell content (gum, tannins, dark staining substances). With prismatic crystals and druses. Pits in transverse and in longitudinal cell walls. Primary vascular bundles at the periphery of the pith.

Codified description

1 5 9 9.1 10 13 22 24 30 40.2 50.2 53.1 61 65 69 76 86 96.1 97 109 116.1 136 136.1 — B1 B4.1 B6 B6.3 B7 B10 B14.1 — P1.1 P1.2 P2 P3 P3.1 P5 P6 P6.2 P9 P9.1 P10

Thevetia neriifolia (L.) Juss. ex Endl.
(No photomicrographs available)

Evergreen, laticiferous shrub or small tree 3-5 m in height. Native of America, widely cultivated in many parts of Cyprus, in the lowlands (0-300 m alt.) and sometimes naturalized.

Xylem

Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels in radial multiples of 4 or more common. Mean tangential diameter of earlywood vessels 20-50 μm. Fibers thin to thick walled, tension wood present. Axial parenchyma scanty paratracheal. Rays per millimeter 12-20.

Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 μm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 100-200 μm. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.

Tangential section: Rays uniseriate to 1-3 cells wide.

Bark

Groups of sieve tube and collapsed sieve tubes present. Sclereids in tangential rows and scattered or irregularly dispersed Prismatic crystals. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith

Pith disappear in polarized light. Unilignified cells. Vascular bundles in the pith. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows.

Codified description

1 5 10 13 22 24 30 40.2 52.3 61 69 70.2 78 96.1 97 105 116.1 – B1 B2 B3.1 B6.2 B6.3 B7 B14.1 B14.3 – P1.1 P3.4 P10 P10.1 P12

Vinca major L.

(Annex 1, plate no. 7)

Evergreen creeping subshrub, up to 1 m long. Native of western and central Europe and Mediterranean countries, considered adventive in Cyprus. It is found in gardens and fallow land (0-1600 m alt.).

Xylem

Transverse section: Only one ring in the observed sample. Vessels solitary and in radial multiples of 2 to 4 elements. Mean tangential diameter of earlywood vessels 20-50 μm. Fibers thin to thick walled. Axial parenchyma absent, extremely rare or not to recognizable. Rays per millimeter 12-20.

Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 μm in diameter). Helical thickenings in vessel elements present. Earlywood vessel elements length 200-500 μm. Fibers with simple to minutely bordered pits (libriform fibers). Septate fibers present. All ray cells upright and/or square.

Tangential section: Rays exclusively uniseriate.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Sclereids in tangential rows, scattered or irregularly dispersed. Gelatinous like fibers in tangentially arranged groups. Phellem homogeneous. Epidermis distinct in polarized light.

Pith
Pith disappear in polarized light. Pith shape round. Medullary sheath present. Unilignified cells present. Pits in transverse and in longitudinal cell walls. Vascular bundles in the pith.

Codified description
9 9.1 13 22 25 36 40.2 53.1 61 65 69 75 96 105 116.1 – B1 B2 B6 B6.2 B6.3 B14.1 B14.3 – P1 P2 P3.4 P9 P9.1 P10

Araliaceae

Hedera helix subsp. *poetarum* L.
(Annex 1, plate no. 8)

Evergreen climber with aerial roots. Native to Cyprus, growing in moist sites and along streams (100-1600 m alt.). It also occurs in temperate Europe and Asia.

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood ring porous. Vessels predominantly in clusters. Mean tangential diameter of earlywood vessel lumina 50 — 100 μm. Fibers thin to thick walled. Apotracheal parenchyma diffuse to scanty paratracheal. Rays per millimeter 4-12.
Radial section: Simple perforation plates. Few inter-vessel pits scalariform. Inter-vessel pits alternate, medium (7-10 μm in diameter). Vessel-ray pits rounded or angular with large apertures. Earlywood vessel elements length 200-500 μm. Vascular and/or vasicentric tracheids present. Fibers with simple to minutely bordered pits (libriform fibers). Septate fibers present. All ray cells procumbent, upright and/or square.
Tangential section: Rays of two distinct sizes: uniseriate and up to 10 seriate. Larger rays height greater than 1 mm.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Sclereids in tangential rows, scattered or irregularly dispersed. Phellem homogeneous. Phellem distinct in polarized light.

Pith
Pith disappear in polarized light. Pith shape round. Medullary sheath present. Unilignified cells that differ in diameter between the center and the border of the pith. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other.

Codified description
1 3 11 13 20 22 26 31 41 53.1 60 61 65 69 76 78 96 98 102 103 104 105 115 – B1 B2 B6 B6.2 B6.3 B14.1 B14.3 – P1 P2 P3.4 P4 P4.1 P9 P9.1 P10.1

Aristolochiaceae

Aristolochia sempervirens L.
(Annex 1, plate no. 8)

Evergreen climber up to 1(3) m in height, with a thick root stock. An indigenous species, growing among trees and shrubs (0-1200 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood ring porous. Vessels predominantly solitary. Vessels cell wall thick (greater than 2 µm). Mean tangential diameter of earlywood vessels 20-50 µm. Vessels of two distinct diameter classes. Greater than 200 vessels per square millimeter in earlywood. Fibers thin to thick walled. Axial parenchyma scanty paratracheal. Less than 4 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, medium (7-10 µm in diameter). Earlywood vessel elements length 100-200 µm. Fibers with distinctly bordered pits (fiber tracheids). Rays with procumbent, square and upright cells mixed throughout the ray. Unlignified rays cells.
Tangential section: Larger rays commonly greater than 10 seriate. Rays disappear in polarized light.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Fibers densely arranged in a wide tangential row. Sclereids scattered or irregularly dispersed. Phellem homogeneous. Epidermis distinct in polarized light.

Pith
Unlignified cells present. Vascular bundles not distinct.

Codified description
1 3 9 13 22 26 39.1 40.2 45 50.2 52.3 62 69 78 99 100.2 109 114 – B1 B2 B5 B5.2 B6 B6.3 B14.1 B14.3 – P3.4 P10.2

Asclepiadaceae

Cyprinia gracilis (Boiss.) Browicz
(Annex 1, plate no. 8)

Deciduous, slender climber reaching greater than 8 m in height. Milky latex in twigs. The genus *Cyprinia* includes a single species, which is indigenous in Cyprus and southern Turkey. In Cyprus it is rather uncommon but not rare (0-1100 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood ring porous. Earlywood vessels mostly solitary, latewood vessels in radial multiples of 2 to 4 elements. Mean tangential diameter of earlywood vessel lumina 100 — 200 µm. Fibers thin to thick walled. Radial flat marginal fibers. Axial parenchyma scanty paratracheal and unilateral paratracheal. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 200-500 µm. Fibers with distinctly bordered pits (fiber tracheids). All ray cells upright and/or square.
Tangential section: Rays exclusively uniseriate.

Bark
Collapsed sieve tubes. Sclereids scattered or irregularly dispersed and in groups. Prismatic crystals. With laticifers, secretory elements in ducts. Phellem homogeneous, distinct in polarized light.

Pith
Pith disappear in polarized light. Pith shape roundish. Medullary sheath present. Cells dimorphic in diameter. Unlignified cells present. Large primary vascular bundle in the pith. Tracheary elements of metaxylem in distinct radial rows.

Codified description
1 3 9 9.1 13 22 25 30 42 53.1 62 69 70.3 78 84 96 105 116.2 – B2 B6 B6.3 B6.4 B7 B10 B10.3 B14.1 B14.3 – P1.1 P1 P3.4 P4 P10 P12

Asteraceae

Achillea cretica L.
(Annex 1, plate no. 9)

Much branched, neatly rounded subshrub up to 50 cm in height. Indigenous to Crete, the Aegean islands and southwest Turkey. A rare species in Cyprus, occurring on rocky slopes near the sea (0-150 m).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels in short radial multiples, and in clusters. Mean tangential diameter of earlywood vessels 20-50 µm. Vessels of two distinct diameter classes. Greater than 200 vessels per square millimeter in earlywood. Gums and other deposits in heartwood vessels. Fibers thin to thick walled. Axial parenchyma scanty paratracheal. Apotracheal parenchyma in marginal or in seemingly marginal bands. Less than 4 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vascular and/or vasicentric tracheids present. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square. Elongated crystals in ray cells.
Tangential section: Rays in a wide in gradual transition from uniseriate to 10 seriate. Larger rays more than 1 mm in height.

Bark
Groups of sieve tubes present. Larger rays become dilated. Fibers and sieve tubes in large groups between rays. Crystal sand.

Pith
Pith shape round. Crystal sand present. Primary vascular bundle clearly distinct from one other.

Codified description
1 5 9.1 11 13 22 25 40.2 45 50.2 58 60 61 69 78 89 96 97 98 102 105 114 136 136.1 – B1 B3.1 B5 B5.2 B5.4 B7.3 – P1 P6.4 P10.1

Ambrosia maritima L.
(Annex 1, plate no. 9)

Aromatic, annual or short-lived perennial herb. It occurs in the Mediterranean region, on sandy seashore or muddy canal banks (0-20 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated only along some radii. Wood diffuse porous. Vessels in radial multiples of 4 or more elements, and in clusters. Mean tangential diameter of earlywood vessels 20-50 µm. Vessels of two distinct diameter classes. Greater than 200 vessels per square millimeter in earlywood. Tyloses with thin wall common. Fibers thin to thick walled. Axial parenchyma scanty paratracheal. Apotracheal parenchyma cells in

marginal or in seemingly marginal bands, thin walled, dark in polarized light. Less than 4 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Vascular and/or vasicentric tracheids present. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright.
Tangential section: Rays of two distinct sizes: uniseriate and up to 10 seriate. Larger rays height greater than 1 mm.

Bark
Groups of sieve tubes present. Some rays become slightly dilated. Few fibers scattered or irregularly dispersed. Groups of fibers present. Prismatic crystals and crystal sand present. Phellem homogeneous. Epidermis distinct in polarized light.

Pith
Pith disappear in polarized light, round in shape. Not lignified cells trough the all pith. With prismatic crystals and crystals druses. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
1 1.1 5 10 11 13 22 25 30 40.2 45 50.2 56 60 61 69 78 89 89.1 96 98 102 103 105 114 – B1 B3.1 B5.3 B5.4 B7 B7.3 B14.1 B14.3 – P1 P3.4 P3.4 P6 P6.2 P10.1 P12 P13

Artemisia arborescens L.
(Annex 1, plate no. 9)

Aromatic shrub up to 1 m in height. Widespread in the Mediterranean region. Adventive to Cyprus, found as a relict or escaped to cultivation in hedges, dry stone walls and field borders (50-1400 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous to semi ring porous. Vessels solitary or in short radial multiples, and in clusters. Mean tangential diameter of earlywood vessels 20-50 µm. Vessels of two distinct diameter classes. Greater than 200 vessels per square millimeter in earlywood. Fibers thin to thick walled. Axial parenchyma scanty paratracheal. Rays per millimeter 4-12.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Fine helical thickenings in vessel

elements present. Vascular and/or vasicentric tracheids present. Fibers with simple to minutely bordered pits (libriform fibers). Most uniseriate rays composed by upright and/or square cells. Multiseriate rays with square, upright and few procumbent cells mixed throughout the ray.
Tangential section: Rays uniseriate to 3 cells wide.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Some rays become dilated. Sclerenchyma cells both in phloem and cortex. Fibers in groups. Sclereids scattered or irregularly dispersed and in groups. Crystal sand. Ducts with border cells. Phellem homogeneous, distinct in polarized light.

Pith
Pith shape round. With crystals druses and crystal sand. Pits grouped and of two distinct size both in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows.

Codified description
1 4 5 9 9.1 11 13 22 25 30 36 40.2 45 50.2 60 61 69 78 96 97 105 109 115 – B1 B2 B3.1 B4 B5 B5.4 B6 B6.3 B6.4 B7.3 B10 B10.2 B14.1 B14.3 – P1 P6.2 P6.4 P9 P9.1 P9.2 P9.3 P10.1 P12

Centaurea akamantis T.Georgiades et Hadjikyriakou
(Annex 1, plate no. 10)

Subshrub with hanging or sub erect shoots up to 60 cm long. A very rare endemic to Cyprus, confined to the Akamas peninsula (50-100 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated only along some radii. Wood diffuse porous. Vessels predominantly in clusters. Vessels cell wall thick (greater than 2 µm). Mean tangential diameter of earlywood vessels 20-50 µm. Vessels number in earlywood 100-200 per square millimeter. Fibers thick to very thick walled. Axial parenchyma scanty paratracheal to vasicentric. Less than 4 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Vascular and/or vasicentric tracheids present. Fibers with simple to minutely bordered pits (libriform fibers). Septate fibers present. All ray cells upright and/or square.
Tangential section: Rays of two distinct sizes: uniseriate and up to 10 seriate. Larger rays height greater than 1 mm.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Some rays become slightly dilated. Fibers grouped. Crystal sand present. Phellem homogeneous.

Pith
Pith shape roundish to pentagonal. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other. Axial cells arranged in regular rows (radial section).

Codified description
1 1.1 5 11 13 22 25 30 39.1 40.2 50.1 60 61 65 69 70 78 79 96 98 102 103 105 114 – B1 B2 B3.1 B5.4 B7.3 B14.1 – P1.1 P9 P9.1 P10.1 P13

Cichorium spinosum L.
(Annex 1, plate no. 10)

Intricately branched subshrub up to 50 cm in height. Widely distributed from the Balearics east to Cyprus. Indigenous to the island, occurring on rock-crevices by the sea, and sometimes on sandy fields near the sea (0-200 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels in radial multiples of 4 or more and in clusters. Mean tangential diameter of earlywood vessels 20-50 µm. Vessels of two distinct diameter classes. Greater than 200 vessels per square millimeter in earlywood. Axial parenchyma scanty paratracheal. Apotracheal parenchyma cells in marginal or in seemingly marginal bands, thin walled, dark in polarized light. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Vascular and/or vasicentric tracheids present. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: Rays of two distinct sizes: uniseriate and up to 3 cells wide, the latter greater than 1 mm height.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Crystal sand present. Phellem homogeneous.

Pith
Pith disappear in polarized light, polygonal in shape. Unilignified cells. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly

separated each other to not distinct. Tracheary elements of metaxylem in distinct radial rows. Axial cells arrangement in regular rows (radial section).

Codified description
1 5 10 11 13 22 25 30 40.2 45 50.2 60 61 78 89 89.1 96 97 102 103 105 116.2 – B1 B2 B7.3 B14.1 – P1.1 P3.4 P9 P9.1 P10.1 P10.2 P12 P13

Helichrysum italicum (Roth) G.Don
(Annex 1, plate no. 10)

Aromatic shrub up to 80 cm in height. Widely distributed in the Mediterranean region. Indigenous to Cyprus, occurring on rocky, usually igneous, mountainsides range (500-1800 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous to diffuse porous. Vessels in radial multiples of 2 to 4 elements, and in clusters. Mean tangential diameter of earlywood vessels 20-50 µm. Vessels of two distinct diameter classes. Greater than 200 vessels per square millimeter in earlywood. Gums and other deposits in heartwood vessels. Fibers thin to thick walled. Radial flat marginal fibers. Axial parenchyma scanty paratracheal. Apotracheal parenchyma in marginal or in seemingly marginal bands, dark in polarized light. Rays per millimeter 4-12.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Helical thickenings in vessel elements present. Vascular and/or vasicentric tracheids present. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: Rays uniseriate to greater than 10 seriate. Larger rays greater that 1 mm in height.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Some rays become slightly dilated. Sclerenchyma cells both in phloem and cortex. Fibers in tangentially arranged in large groups with sieve tubes.

Pith
Pith shape round. Unilignified cells present. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
1 4 5 9.1 11 13 22 25 30 36 40.2 45 50.2 58 60 61 69 70.3 78 89 89.1 96 99 102 105 115 – B1 B2 B3.1 B4 B5.2 B5.4 – P1 P3.4 P9 P9.1 P10.1 P12 P13

Inula crithmoides L.
(Annex 1, plate no. 11)

Subshrub up to 80 cm in height. Occurring to western European and Mediterranean coasts and to the Atlantic islands. Indigenous to Cyprus, it is found near salt lakes in costal areas (0-50 m alt.).

Xylem
Transverse section: Only one ring in the observed sample. Vessels predominantly solitary or in short radial multiples, showing a dendritic pattern. Mean tangential diameter of earlywood vessels 20-50 µm. Vessels of two distinct diameter classes. Greater than 200 vessels per square millimeter in earlywood. Fibers thin to thick walled. Axial parenchyma scanty paratracheal. Rays per millimeter 4-12.
Radial section: Simple perforation plates. Inter-vessel pits opposite and alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Vascular and/or vasicentric tracheids present. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: Rays of two distinct sizes: uniseriate and 4 to 10 seriate, the latter greater than 1 mm in height.

Bark
Groups of sieve tubes present. Some rays become dilated. Fibers grouped. Sclereids scattered or irregularly dispersed. Acicular crystals. Phellem homogeneous, distinct in polarized light.

Pith
Pith shape round. Unilignified cells present. Crystal sand present. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other. Axial cells arranged in regular rows (radial section).

Codified description
8 9 9.1 13 21 22 25 30 40.2 45 50.2 60 61 69 78 96 98 102 103 105 115 – B1 B3.1 B5 B5.4 B6 B6.3 B7.1 B14.1 B14.3 – P1 P3.4 P6.4 P9 P9.1 P10.1 P13

Inula viscosa (L.) Aiton
(Annex 1, plate no. 11)

Viscid-glutinous, aromatic subshrub up to 1.5 m in height. Indigenous to the Mediterranean region and the Atlantic islands. Very common in Cyprus, occurring on disturbed grounds, along roadsides, hillsides, often in moist sites and near springs or rivers (0-1600 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring to diffuse porous. Vessels predominantly solitary. Mean tangential diameter of earlywood vessels 20-50 µm. Greater than 200 vessels per square millimeter in earlywood. Vessels of two distinct diameter classes. Fibers thin to thick walled. Axial parenchyma scanty paratracheal. Less than 4 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 200-500 µm. Vascular and/or vasicentric tracheids present. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: Rays of two distinct sizes: uniseriate and very large, commonly from 4 up to 10 seriate. Larger ray height greater than 1 mm.

Bark
Groups of sieve tubes present. Some rays become dilated. Fibers in tangential rows, scattered or irregularly dispersed. Fibers in large groups. Acicular crystals and crystal sand. Phellem homogeneous.

Pith
Pith shape round. Cells dimorphic in diameter. Acicular crystals present. Pits grouped in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
1 4 5 9 13 22 25 30 40.2 45 50.2 53.1 60 61 69 78 96 98 102 103 105 114 — B1 B3.1 B5.2 B5.3 B5.4 B7.1 B7.3 B14.1 - P1 P4 P6.1 P9 P9.1 P9.2 P10.1 P12 P13

Otanthus maritimus (L.) Hoffmanns. et Link
(Annex 1, plate no. 11)

Subshrub up to 40 cm in height, with erect or sprawling, often much-branched stems. Indigenous to south-western Europe and the Mediterranean region. It occurs in sand dunes and sandy seashores (0 m alt.).

Xylem

Transverse section: Growth ring boundaries distinct only along some radii. Wood diffuse porous. Vessels solitary or in short radial multiples. Mean tangential diameter of earlywood vessels 20-50 µm. Vessels of two distinct diameter classes. Vessels number in early wood: 100-200 per square millimeter. Fibers thin to thick walled. Axial parenchyma scanty paratracheal. Rays per millimeter 4-12.

Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vascular and/or vasicentric tracheids present. Fibers with simple to minutely bordered pits (libriform fibers). Septate fibers present. All ray cells upright and/or square.

Tangential section: Rays of two distinct sizes: uniseriate and up to 10 seriate. Larger rays height greater than 1 mm.

Bark

Groups of sieve tubes in radial rows. Fibers in tangential rows. Crystal sand present.

Pith

Pith shape round. Unilignified cells present. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other. Axial cells arranged in regular rows (radial section).

Codified description

5 9.1 13 22 25 40.1 40.2 45 50.1 60 61 65 69 78 96 98 102 103 105 115 – B1 B1.2 B5 B5.2 B7.3 – P1 P3.4 P9 P10.1 P13

Phagnalon rupestre (L.) DC.
(Annex 1, plate no. 12)

Erected or sprawling, much-branched subshrub up to 50 cm in height. Indigenous to eastern Mediterranean region. In Cyprus it occurs in garigue, on dry and rocky sites (0-900 m alt.).

Xylem

Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels predominantly solitary. Mean tangential diameter of earlywood vessels 20 µm to 50 µm. Vessels of two distinct diameter classes. Greater than 200 vessels per square millimeter in earlywood. Gums and other deposits in heartwood vessels. Fibers thick to very thick walled. Axial parenchyma scanty paratracheal to vasicentric. Apotracheal parenchyma in marginal or in seemingly marginal bands. Rays per millimeter 4-12.

Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels

pits in size and shape throughout the ray cell. Vascular and/or vasicentric tracheids present. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: Rays of two distinct sizes: uniseriate and greater than 10 seriate. Larger rays height commonly greater than 1 mm.

Bark
Groups of sieve tubes present. Some rays become dilated. Sclerenchyma cells both in phloem and cortex. Groups of fibers and sieve tubes.

Pith
Pith shape roundish. Cells differ in diameter from the center to the border of the pith. Not lignified cells present. Cell content (gum, tannins, dark staining substances). Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other. Axial cells arranged in regular rows (radial section).

Codified description
1 5 9 13 22 25 30 40.2 45 50.2 58 60 61 69 70 78 79 89 96 99 102 103 105 115 – B1 B3.1 B4 B5.4 – P1 P3.4 P4.1 P5 P9 P9.1 P10.1 P13

Ptilostemon chamaepeuce (L.) Less. var. *cyprius* Greuter
(Annex 1, plate no. 12)

Evergreen shrub up to 1.3 m in height. The variety is endemic to Cyprus, occurring on rocky slopes and on rock fissures on calcareous and indigenous formations (50-1600 m alt.).

Xylem
Transverse section: Growth ring distinct. Wood semi-ring porous to diffuse-porous. Vessels in diagonal and/or radial pattern, predominantly in clusters. Mean tangential diameter of earlywood vessel lumina less than 50 µm. Greater than 200 vessels per square millimeter in earlywood. Tyloses with thin wall common in heartwood vessels. Gums and other deposits in heartwood vessels and fibers. Fibers very thick walled, radial flat marginal fibers. Axial parenchyma scanty paratracheal to vasicentric. Apotracheal parenchyma in marginal or in seemingly marginal bands. Rays per millimeter 4-12.
Radial section: Simple perforation plates. Inter-vessel pits alternate. Intervessel pits medium (7-10 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length less than 350 µm. Fibers with simple to minutely bordered pits (libriform fibers). Rays with procumbent, square and upright cells mixed throughout the ray.

Tangential section: Rays of two distinct sizes: uniseriate and 2-3 seriate. Larger rays greater than 1 mm in height.

Bark

Groups of sieve tube in radial rows. Collapsed sieve tubes. Fibers in tangential rows, scattered or irregularly dispersed. Phellem homogeneous.

Pith

Pith shape round. Cells differ in diameter from the center to the border of the pith. Cell content (dark staining substances). With crystals druses. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description

1 4 5 7 8 11 13 22 26 30 40 50.2 52 56 58 61 70 70.3 78 79 89 96 97 103 109 115 — B1.2 B2 B5 B5.2 B5.3 — P1 P4.1 P5 P6.2 P9 P9.1 P10.1 P12 P13

Staehelina lobelii DC.

(Annex 1, plate no. 12)

Subshrub up to 60 cm in height, with numerous erect, slender stems, branched only in the region of inflorescences. A rare indigenous species, occurring on fissures of limestone rocks (500-800 m alt.). Found also in southern Turkey, Lebanon and Crete.

Xylem

Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous. Vessels in diagonal and/or radial pattern. Vessels in radial multiples of 2 to 4, and in clusters. Mean tangential diameter of earlywood vessels 20-50 µm. Fibers thin to thick walled. Radial flat marginal fibers. Axial parenchyma scanty paratracheal to vasicentric. Apotracheal parenchyma in marginal or in seemingly marginal bands. Less than 4 rays per millimeter.

Radial section: Simple perforation plates. Inter-vessel pits opposite and alternate, small (4-7 µm in diameter). Earlywood vessel elements length 100-200 µm. Fibers with simple to minutely bordered pits (libriform fibers). Rays with procumbent, square and upright cells mixed throughout the ray. Prismatic crystals present.

Tangential section: Rays commonly 4 to 10 seriate.

Bark

Groups of sieve tubes present. Collapsed sieve tubes. Fibers in tangential rows and grouped.

Pith
Pith shape round. Thick walled parenchyma cells present. Cells dimorphic. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows.

Codified description
1 4 7 9.1 11 13 21 22 25 40.2 52.3 61 69 70.3 78 79 89 98 109 114 136 – B1 B2 B5 B5.2 B5.4 – P1 P3.3 P4 P9 P9.1 P10.1 P12

Berberidaceae

Berberis cretica L.
(Annex 1, plate no. 13)

Deciduous shrub, up to 1,5 m in height. Indigenous to Cyprus, grows in pine forests and on screen (900-1950 m alt.). It also occurs in mainland Greece, Crete, the Aegean islands and Turkey.

Xylem
Transverse section: Growth ring distinct and recognizable. Wood ring-porous. Vessels in diagonal and/or radial pattern. Vessels in radial multiples of 2 to 4, and in clusters. Mean tangential diameter of earlywood vessels 20-50 µm; 20 – 40 earlywood vessels per square millimeter. Fibers thin to thick walled. Axial parenchyma scanty paratracheal. Less than 4 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell, or rounded with large apertures. Helical thickenings only in narrower vessel elements. Earlywood vessel elements length less than 350 µm. Vascular and/or vasicentric tracheids present. Fibers with simple to minutely bordered pits (libriform fibers). Rays with procumbent, square and upright cells mixed throughout the ray.
Tangential section: Larger rays commonly greater than 10 seriate. Ray height greater than 1 mm.

Bark
Groups of sieve tube in tangential rows. Only some rays become dilated. Sclereids in tangential rows and scattered or irregularly dispersed. Lignified cells in phellem.

Pith
Pith shape round. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other. Axial cells arranged almost in regular rows (radial section).

Codified description

1 3 7 8 9.1 11 13 22 25 30 31 39 40.2 48 52 60 61 69 78 99 102 109 114 — B1 B1.1 B3.1 B6 B6.2 B6.3 B14.4 — P1 P9 P9.1 P10.1 P13

Betulaceae

Alnus orientalis Decne.
(Annex 1, plate no. 13)

Deciduous tree up to 20 m in height. Indigenous to Cyprus, found abundantly along rivers and streams (0-1550 m alt.). Also indigenous to Turkey, Syria and Lebanon.

Xylem

Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels in radial multiples of 2 to 4 or more elements, and in clusters. Mean tangential diameter of earlywood vessel lumina 50 — 100 µm, 100-200 vessels per square millimeter in earlywood. Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Fibers thin to thick walled. Tension wood present. Axial parenchyma diffuse. Apotracheal parenchyma in marginal or in seemingly marginal bands. Rays per millimeter 12-20.

Radial section: Scalariform perforation plates with greater than 10 bars. Inter-vessel pits opposite, minute (less than 4 µm in diameter). Earlywood vessels length 200-500 µm. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells procumbent.

Tangential section: Rays exclusively uniseriate.

Bark

Groups of sieve tube and collapsed sieve tube present. Fibers in tangential rows, sclereids scattered or irregularly dispersed. Prismatic crystals and druses present. Phellem homogeneous, distinct in polarized light.

Pith

Pith shape triangular. Cells dimorphic in diameter. With prismatic crystals. Pits grouped in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description

1 5 9.1 10 11 14 16 21 24 30 41 50.1 53.1 61 69 70.2 76 89 96 101 104 116.1 — B1 B2 B5.2 B6.3 B7 B7.2 B14.1 B14.3 - P1.2 P4 P6 P9 P9.1 P9.2 P10.1 P12 P13

Boraginaceae

Echium angustifolium Link ex Willk. & Lange
(Annex 1, plate no. 13)

Erect or sprawling perennial subshrub 10-60 cm high. Eastern Mediterranean plant, diffused from Greece to Egypt and Libya. Locally common on rocky and sandy seashores, roadsides, dry banks and hillside (0-1000 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels solitary and in radial multiples of 2 to 4. Mean tangential diameter of earlywood vessels 20-50 µm. Vessels of two distinct diameter classes. Gums and other deposits in heartwood vessels. Fibers thin to thick walled. Axial parenchyma scanty paratracheal. Apotracheal parenchyma cells in marginal or in seemingly marginal bands, thin walled, dark in polarized light. Rays per millimeter 4-12.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 100-200 µm. Fibers with distinctly bordered pits (fiber tracheids).
Tangential section: Larger rays commonly 4 to 10 seriate. Some rays disappear in polarized light.

Bark
Phloem uniform. Cell content in parenchyma cells.

Pith
Pith disappear in polarized light. Pith shape round. Unilignified cells. Primary vascular bundle not distinct. Tracheary elements of metaxylem in distinct radial rows.

Codified description
1 5 9 9.1 13 22 25 30 40.2 45 52.3 58 62 69 78 89 89.1 98 100.2 109 115 – B8 B11 – P1 P3.4 P10.2 P12

Lithodora hispidula (Sm.) Griseb. subsp. *versicolor* Meikle
(Annex 1, plate no. 14)

Evergreen much branched shrub, 1-1,5 m in height. Indigenous in Cyprus, very common in many areas with garigue vegetation or open forests (0-1000 m alt.). Indigenous also in Turkey and Syria.

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood semi-

ring porous to diffuse porous. Vessels in short radial multiples, and in clusters. Vessels cell wall thick (greater than 2 μm). Vessels of two distinct diameter classes. Mean tangential diameter of earlywood vessels less than 20 μm. Fibers thin to thick walled. Axial parenchyma diffuse and scanty paratracheal. Apotracheal parenchyma in marginal or in seemingly marginal bands. Less than 4 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits opposite and alternate, small (4-7 μm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Helical thickenings in vessel elements present. Earlywood vessel elements length 100-200 μm. Fibers with distinctly bordered pits (fiber tracheids). Rays with procumbent, square and upright cells mixed throughout the ray.
Tangential section: Larger rays commonly 4 to 10 seriate.

Bark
Groups of sieve tubes present. Some rays became dilated. Sclerenchyma cells both in phloem and cortex. Fibers scattered or irregularly dispersed. Sclereids in tangential rows, scattered or irregularly dispersed. Cell content in parenchyma cells.

Pith
Pith shape round. Thick walled parenchyma cells present. Cells dimorphic. Cell content (gum, tannins, dark staining substances). Pits in transverse and in longitudinal cell walls. Primary vascular bundles clearly separate from one another to not distinct. Tracheary elements of metaxylem in distinct radial rows.

Codified description
1 4 5 9.1 11 13 21 22 25 30 36 39.1 40.1 45 52.3 62 69 76 78 89 98 109 114 – B1 B3.1 B4 B5 B5.3 B6 B6.2 B6.3 B11 – P1 P3.3 P4 P5 P9 P9.1 P10.1 P10.2 P12

Onosma caespitosa Kotschy
(Annex 1, plate no. 14)

Evergreen subshrub. Endemic to Cyprus (300-900 m alt.).

Xylem
Transverse section: Growth rings indistinct or absent. Wood diffuse porous. Vessels in diagonal and/or radial pattern. Vessels solitary or in clusters. Mean tangential diameter of earlywood vessels less than 20 μm. Vessels of two distinct diameter classes. Fibers thin to thick walled. Parenchyma pervasive.
Radial section: Simple perforation plates. Inter-vessel pits opposite, minute (less than 4 μm in diameter). Helical thickenings in vessel elements present. Earlywood vessel elements length 100-200 μm.

Tangential section: wood rayless

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Sclereids scattered or irregularly dispersed. Prismatic crystals. Lignified cells in phellem.

Pith
Pith shape round. Unilignified cells. Laticifers or intercellular canals. Primary vascular bundle not distinct.

Codified description
2 5 7 9 11 13 21 24 36 40.1 45 52.3 69 79.1 – B1 B2 B6.3 B7 B14.4 – P1 P3.4 P7 P10.2

Onosma fruticosa Sm.
(Annex 1, plate no. 14)

Much branched, evergreen shrub 20-80 cm in height. Endemic of Cyprus, found in many areas with garigue vegetation (0-900 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous. Vessels in diagonal and/or radial pattern, predominantly in clusters. Mean tangential diameter of earlywood vessels 20-50 µm. Vessels of two distinct diameter classes. Gums and other deposits in heartwood vessels. Fibers thin to thick walled. Apotracheal parenchyma in marginal or in seemingly marginal bands, dark in polarized light.
Radial section: Inter-vessel pits alternate, minute (less than 4 µm in diameter). Earlywood vessel elements length 100-200 µm. Fibers with distinctly bordered pits (fiber tracheids).
Tangential section: Wood rayless.

Bark
Phloem uniform. Dark staining substances in parenchyma cells.

Pith
Pith shape polygonal. Thick walled parenchyma cells present. Cell content (gum, tannins, dark staining substances). Pits in transverse cell walls. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows.

Codified description
1 4 7 11 22 24 40.2 45 52.3 58 62 69 89 89.1 117 – B8 B11 – P1.1 P3.3 P5 P9.1 P10.1 P12

Onosma mitis Boiss. et Heldr.
(Annex 1, plate no. 15)

Subshrub, 15-50 cm in height. Native of Cyprus and southern Turkey, rather unusual (400-900 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels solitary and in radial multiples of 2 to 4 common. Mean tangential diameter of earlywood vessels less than 20 µm. Mean tangential diameter of earlywood vessels 20-50 µm. Vessels of two distinct diameter classes. Gums and other deposits in heartwood vessels. Fibers thin to thick walled. Axial parenchyma scanty paratracheal. Apotracheal parenchyma in marginal or in seemingly marginal bands. Parenchyma marginal thin walled, dark in polarized light.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Earlywood vessel elements length 100-200 µm. Fibers with simple to minutely bordered pits (libriform fibers).
Tangential section: Wood rayless.

Bark
Phloem uniform. Phellem homogeneous.

Pith
Pith disappear in polarized light. Pith shape round. Unilignified cells. Primary vascular bundle not distinct.

Codified description
1 5 9 9.1 13 22 25 40.1 40.2 45 52.3 58 61 69 78 89 89.1 117 – B8 B14.1 – P1 P3.4 P10.2

Brassicaeae

Alyssum akamasicum B.L.Burtt
(Annex 1, plate no. 15)

A subshrub or perennial herb with erect or decumbent stems up to 40 cm long. Endemic to Cyprus. It occurs on rocky mountainsides and shrubberies with serpentines and ultrabasic rocks (0-400 m alt.).

Xylem
Transverse section: Growth ring distinct. Wood diffuse porous. Vessels in radial multiples of 2 to 4 common. Vessels cell wall thick (greater than 2 µm). Mean tangential diameter of earlywood vessels less than 20 µm. Greater than 200

vessels per square millimeter in earlywood. Fibers thick to very thick walled. Axial parenchyma scanty paratracheal.
Radial section: Simple perforation plates. Inter-vessel pits opposite and alternate, small (4-7 μm in diameter). Earlywood vessel elements length 50-100 μm. Fibers with simple to minutely bordered pits (libriform fibers).
Tangential section: Wood rayless.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Sclereids in radial rows, scattered or irregularly dispersed sometimes in groups. Phellem homogeneous, distinct in polarized light.

Pith
Pith disappear in polarized light. Pith shape round. With sclereids.

Codified description
1 5 9.1 13 21 22 25 39.1 40.1 50.2 52.2 61 69 70 78 117 – B1 B2 B6.1 B6.3 B6.4 B14.1 B14.3 – P0 P1 P3.1

Alyssum troodi Boiss.
(Annex 1, plate no. 15)

A subshrub up to 30 cm in height. Endemic to Cyprus. It grows in rocky mountainsides of serpentine ultrabasic rocks (1200-1950 m alt.).

Xylem
Transverse section: Growth ring distinct. Wood diffuse porous. Vessels predominantly solitary or in radial multiples of 2 to 4. Vessels cell wall thick (greater than 2 μm). Mean tangential diameter of earlywood vessels less than 20 μm. Greater than 200 vessels per square millimeter in earlywood. Fibers thick to very thick walled. Axial parenchyma scanty paratracheal. Parenchyma marginal thin walled, dark in polarized light. Ring shake.
Radial section: Simple perforation plates. Inter-vessel pits scalariform and alternate, small (4-7 μm in diameter). Earlywood vessel elements length 50-100 μm. Fibers with simple to minutely bordered pits (libriform fibers).
Tangential section: Wood rayless.

Bark
Groups of sieve tube and collapsed sieve tubes present. Sclereids in radial rows, Sclereids scattered or irregularly dispersed or in groups. Phellem homogeneous, distinct in polarized light.

Pith
Pith disappear in polarized light. Pith shape triangular. Cells dimorphic. Pits in transverse and in longitudinal cell walls. Pits of two distinct size. Vascular bundles in the pith.

Codified description
2 5 9 9.1 13 20 22 25 39.1 40.1 50.2 52.2 61 69 70 78 89.1 89.2 — B1 B2 B6.1 B6.3 B6.4 B14.1 B14.3 — P1.1 P1.2 P4 P9 P9.1 P9.3 P10

Alyssum cypricum Nyar.
(Annex 1, plate no. 16)

A subshrub up to 30 cm in height. A species native to Cyprus. It grows on rocky mountainsides of serpentine ultrabasic rocks (1100 – 1950 m alt.). It grows also in Turkey.

Xylem
Transverse section: Growth ring distinct. Wood diffuse porous. Vessels in radial multiples of 2 to 4 or in clusters. Vessels cell wall thick (greater than 2 µm). Mean tangential diameter of earlywood vessels less than 20 µm. Gums and other deposits in heartwood vessels. Fibers very thick walled. Axial parenchyma scanty paratracheal. Less than 4 rays per millimeter. Successive cambia: concentric continuous.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Earlywood vessel elements length 50-100 µm. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: Ray width predominant 1 to 3 cells.

Bark
Collapsed sieve tubes. Fibers in radial groups.

Pith missing

Codified description
1 5 9.1 11 13 22 25 39.1 40.1 52.2 58 61 70 78 97 105 114 133.2 – B2 B5.1 – Pith missing

Arabis cypria Holmboe
(Annex 1, plate no. 16)

A subshrub up to 30 cm in height. Endemic to Cyprus, growing in crevices of limestone cliffs and rocks (300-900 m alt.).

Xylem
Transverse section: Growth rings indistinct or absent. Wood diffuse porous. Vessels solitary, in radial multiples of 2 to 4 on in clusters. Vessels cell wall thick (greater than 2 μm). Mean tangential diameter of earlywood vessels less than 20 μm. Greater than 200 vessels per square millimeter in earlywood. Fibers thick to very thick walled. Axial parenchyma vasicentric. Parenchyma marginal thin walled, dark in polarized light. Ring shake. Successive cambia: concentric continuous.
Radial section: Simple perforation plates. Inter-vessel pits scalariform, alternate, small (4-7 μm in diameter). Earlywood vessel elements length 200-500 μm. Fibers with simple to minutely bordered pits (libriform fibers).
Tangential section: Wood rayless.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith
Pith difficult to observe.

Codified description
2 5 9 9.1 11 13 20 22 25 39.1 40.1 50.2 53.1 61 69 70 79 89.1 89.2 – B1 B2 B14.1 B14.3 – Pith missing

Arabis purpurea Sibth. et Sm.
(Annex 1, plate no. 16)

A subshrub up to 30 cm in height. Locally very common Cypriot endemic. It occurs in crevices of igneous and calcareous rocks (400-1800 m alt.).

Xylem
Transverse section: Growth ring distinct. Wood diffuse porous. Vessels solitary and in clusters. Vessels cell wall thick (greater than 2 μm). Mean tangential diameter of earlywood vessels less than 20 μm. Greater than 200 vessels per square millimeter in earlywood. Fibers thin to thick walled. Axial parenchyma scanty paratracheal. Parenchyma marginal thin walled, dark in polarized light. Ring shake. Successive cambia: concentric continuous.
Radial section: Simple perforation plates. Inter-vessel pits scalariform. Inter-vessel pits alternate, small (4-7 μm in diameter). Earlywood vessel elements length 200-500 μm. Fibers with simple to minutely bordered pits (libriform fibers).
Tangential section: Wood rayless.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Sclereids in groups. Phellem homogeneous. Phellem distinct in polarized light.

Pith
Pith disappear in polarized light. Pith shape polygonal. With sclereids. Cells dimorphic. Pits in transverse and in longitudinal cell walls. Pits of two distinct size. Vascular bundles in the pith.

Codified description
1 5 9 11 13 20 22 25 39.1 40.1 50.2 53.1 61 69 78 89.1 89.2 117 133.2 – B1 B2 B6.4 B14.1 B14.3 – P1.1 P3.1 P4 P9 P9.1 P9.3 P10

Brassica hilarionis Post
(Annex 1, plate no. 17)

Erected or spreading subshrub 50-80 cm high. Endemic to Cyprus, locally common in fissures of limestone cliffs in Pentadactylos mountain range (300-850 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels solitary or in radial multiples of 2 to 4 common. Mean tangential diameter of earlywood vessels less than 20 µm, 40 — 100 earlywood vessels per square millimeter. Parenchyma scanty paratracheal, apotracheal parenchyma in marginal or in seemingly marginal bands. Parenchyma marginal thin walled, dark in polarized light. Rays per millimeter 4-12. Groups of sieve tubes into the marginal parenchyma bands.
Radial section: Simple perforation plates. Inter-vessel pits scalariform and alternate, medium (7-10 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 50-100 µm. Fibers with simple to minutely bordered pits (libriform fibers). Helical thickenings in ground tissue fibers. All ray cells upright and/or square.
Tangential section: Rays commonly 4 to 10 seriate.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Some rays become dilated. Sclerenchyma cells both in phloem and cortex. Sclereids in groups. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith
Pith shape round. Medullary sheath present. Heterocellular pith. With sclereids. Thick walled parenchyma cells present. Cells dimorphic. Cell content (gum,

tannins, dark staining substances). Pits in transverse and in longitudinal cell walls.

Codified description
1 5 9 9.1 13 20 22 26 30 40.1 49 52.2 61 64 78 89 89.1 98 105 115 – B1 B2 B3.1 B4 B6.4 B14.1 B14.3 – P2 P1 P3 P3.1 P3.3 P4 P5 P9 P9.1

Erysimum kykkoticum Hadjikyriakou et Alziar
(Annex 1, plate no. 17)

Subshrub up to 50 cm in height, including the inflorescence stalk. Rare endemic species in Cyprus. A chamaephytes which usually grows in crevices of igneous, diabase rocks, occasionally on vertical banks of abandoned tracks, of northern or eastern aspects (250-450 m alt.).

Xylem
Transverse section: Growth rings indistinct or absent. Wood diffuse porous. Vessels predominantly solitary. Vessels cell wall thick (greater than 2 µm). Mean tangential diameter of earlywood vessels less than 20 µm. Greater than 200 vessels per square millimeter in earlywood. Gums and other deposits in heartwood vessels. Fibers thin to thick walled. Ring shake. Successive cambia: concentric continuous.
Radial section: Simple perforation plates. Inter-vessel pits scalariform, minute (less than 4 µm in diameter). Fibers with simple to minutely bordered pits (libriform fibers).
Tangential section: Wood rayless.

Bark
Groups of sieve tube and collapsed sieve tubes present. Phellem homogeneous, distinct in polarized light.

Pith
Pith disappear in polarized light. Pith shape round. Unilignified cells.

Codified description
2 5 9 13 20 24 39.1 40.1 50.2 58 61 69 89.2 117 133.2 – B1 B2 B14.1 B14.3 – P1 P3.4

Caesalpiniaceae

Ceratonia siliqua L.
(Annex 1, plate no. 17)

Evergreen tree up to 10-15 m. indigenous to Cyprus, mostly a constituent of maquis forests (0-600 m alt.) as wild and up to 100 m in cultivations. Widespread in the Mediterranean from Portugal to Syria.

Xylem
Transverse section: Growth ring distinct. Wood diffuse porous. Vessels solitary, in short radial multiples, and in clusters. Mean tangential diameter of earlywood vessel lumina 50 — 100 µm. Vessels of two distinct diameter classes. Tyloses with thin wall common. Gums and other deposits in heartwood vessels. Fibers thick to very thick walled. Apotracheal parenchyma diffuse in aggregates. Paratracheal parenchyma vasicentric, sometimes confluent. Rays per millimeter 12-20.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 200-500 µm. Septate fibers present. All monoseriate rays with upright and/or square cells. Multiseriate rays composed by procumbent cells with one row of square marginal cells. Prismatic crystals in axial parenchyma cells.
Tangential section: rays width from moseriate to 10 seriate.

Bark
Groups of sieve tubes present. Distinct rays dilatation. Sclerenchyma cells both in phloem and cortex. Fibers in tangential rows and scattered or irregularly dispersed. Sclereids in tangential rows. Prismatic crystals. Cell content in parenchyma cells. Phellem homogeneous. Epidermis distinct in polarized light.

Pith
Pith shape polygonal. Cells dimorphic. Cell content (gum, tannins, dark staining substances). With prismatic crystals and crystals druses. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other and not distinct. Tracheary elements of metaxylem in distinct radial rows.

Codified description
1 5 9 9.1 11 13 22 25 30 41 45 53.1 56 58 65 69 70 77 79 83 96 98 105 106 116.1 136 141.1 – B1 B3.1 B4 B5.2 B5.3 B6.2 B7 B11 B14.1 B14.3 – P1.1 P4 P5 P6 P6.2 P9 P9.1 P10.1 P10.2 P12

Capparaceae

Capparis spinosa L.
(Annex 1, plate no. 18)

Much-branched, deciduous shrub up to 1.5 m in height. The variety *canescens* occur in Cyprus, growing on rocky slopes and in field margin, maquis, garigue and wasteland (0-900 m alt.). Also indigenous to the Mediterranean countries.

Xylem
Transverse section: Wood ring to semi-ring porous. Vessels predominantly solitary or in radial multiples of 2 to 4, or more. Mean tangential diameter of earlywood vessels 20-50 µm. Vessels of two distinct diameter classes, 40 – 100 earlywood vessels per square millimeter. Fibers thin to thick walled. Axial parenchyma scanty paratracheal. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 100-200 µm. Vascular and/or vasicentric tracheids present. Fibers with simple to minutely bordered pits (libriform fibers). Body ray cells mostly procumbent with one row of upright and/or square marginal cells. Uniseriate rays with procumbent, square and upright cells mixed throughout the ray.
Tangential section: Rays uniseriate and predominant 1 to 4 cells.

Bark
Groups of sieve tube and collapsed sieve tubes present. Only some rays become dilated. Fibers and sclereids present, scattered or irregularly dispersed. Prismatic crystals. Phellem distinct in polarized light.

Pith
Pith shape round. Pith disappear in polarized light. Medullary sheath present. Cells dimorphic center/border of the pith. With prismatic crystals. Pits of two distinct size in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
3 4 9 9.1 10 13 22 24 30 40.2 45 49 52.3 60 61 69 78 96.1 97 106 109 116.2 – B1 B2 B3.1 B5 B5.3 B6 B6.3 B7 B14.3 – P1.1 P1 P2 P4.1 P6 P9 P9.1 P9.3 P10.1 P12 P13

Caprifoliaceae

Lonicera etrusca Santi
(Annex 1, plate no. 18)

Climber with stems up to 4 m long. Indigenous to Cyprus, growing on thickets pine forests and on rocky places (300-1500 m alt.). It also occurs in Mediterranean countries.

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels solitary and in radial multiples of 2 to 4 common. Mean tangential diameter of earlywood vessels 20-50 μm. Gums and other deposits in heartwood vessels. Fibers thin to thick walled. Radial flat marginal fibers. Axial parenchyma absent or extremely rare or not to recognizable, few scatter apotracheal parenchyma cells are present. Rays per millimeter 12-20.
Radial section: Simple perforation plates, small (4-7 μm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Helical thickenings in vessel elements present. Earlywood vessel elements length 200-500 μm. Vascular and/or vasicentric tracheids present. Fibers with distinctly bordered pits (fiber tracheids). All ray cells upright and/or square. Rays with procumbent, square and upright cells mixed throughout the ray.
Tangential section: Rays uniseriate and up to 3 cells wide.

Bark
Sclerenchyma cells both in phloem and cortex. Fibers in tangential rows. Phellem homogeneous, distinct in polarized light. Lignified cells in phellem.

Pith
Pith disappear in polarized light. Pith shape round. Medullary sheath present. Unilignified cells. Cells dimorphic. Pits in transverse and in longitudinal cell walls. Pits in transverse cell walls. Pits of two distinct size. Primary vascular bundle clearly separate from one other and not distinct. Tracheary elements of metaxylem in distinct radial rows.

Codified description
1 5 9 9.1 13 25 30 36 40.2 53.1 58 60 62 69 70.3 75 76 96 97 105 109 116.1 – B4 B5.2 B14.1 B14.3 B14.4 – P1 P2 P3.4 P4 P9 P9.1 P9.3 P10.1 P10.2 P12

Lonicera japonica Thumb.
(Annex 1, plate no. 18)

Climber with stems up to 6 m long. Exotic to Cyprus occurring in gardens and hedges (0-500 m alt.). Cultivated in Mediterranean countries. Indigenous to south-east Asia.

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood ring porous. Vessels predominantly in clusters. Mean tangential diameter of earlywood vessel lumina 50 — 100 μm. Fibers thin to thick walled. Radial flat marginal fibers. Axial parenchyma scanty paratracheal. Rays per millimeter 12-20.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 μm in diameter). Vessel-ray pits rounded or angular with large apertures. Helical thickenings in vessel elements present. Earlywood vessel elements length 200-500 μm. Vascular and/or vasicentric tracheids present. Fibers with distinctly bordered pits (fiber tracheids). Body ray cells procumbent with over 4 rows of upright and/or square marginal cells. Prismatic crystals in ray parenchyma cells.
Tangential section: Rays uniseriate to 10 seriate.

Bark
Groups of sieve tubes present. Sclereids scattered or irregularly dispersed. Druses present. Cell content in parenchyma cells. Phellem homogeneous. Phellem distinct in polarized light.

Pith
Pith shape square to roundish. Medullary sheath present. Unilignified cells in the center of the pith, lignified parenchyma cells at its periphery. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other. Axial cells arranged in regular rows (radial section).

Codified description
1 3 11 13 22 25 31 36 41 53.1 60 62 69 70.3 78 96 98 108 116.1 136 136.1 – B1 B6.3 B7.2 B11 B14.1 B14.3 – P1.4 P2 P3.4 P9 P10.1 P13

Viburnum opulus L.
(Annex 1, plate no. 19)

Deciduous shrub up to 4 m in height. Exotic to Cyprus, found in gardens and hedges and elsewhere (500-1200 m alt.). Indigenous to southern Europe.

Xylem

Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels predominantly in clusters. Mean tangential diameter of earlywood vessels 20-50 μm. Greater than 200 vessels per square millimeter in earlywood. Fibers thin to thick walled. Tension wood present. Axial parenchyma diffuse and scanty paratracheal. Greater than 20 rays per millimeter.
Radial section: Scalariform perforation plates with greater than 40 bars. Inter-vessel pits opposite, small (4-7 μm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length greater than 500 μm. Fibers with distinctly bordered pits (fiber tracheids). Rays with procumbent, square and upright cells mixed throughout the ray.
Tangential section: Rays exclusively uniseriate.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Sclerenchyma cells both in phloem and cortex. Sclereids scattered or irregularly dispersed and in groups. Druses present. Phellem homogeneous. Phellem distinct in polarized light. Layered phelloderm.

Pith
Pith shape hexagonal. Medullary sheath present. Cells slightly dimorphic. With crystals druses. Pits in transverse and in longitudinal cell walls. Pits grouped. Pits of two distinct size. Primary vascular bundles clearly separate from one another to not distinct. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
1 5 11 14 18 21 25 30 40.2 50.2 53.2 62 69 70.2 76 78 96 109 116.2 – B1 B2 B4 B6.3 B6.4 B7.2 B14.1 B14.3 B18 – P1.1 P2 P4 P6.2 P9 P9.1 P9.2 P9.3 P10.1 P10.2 P12 P13

Viburnum tinus L.

(Annex 1, plate no. 19)

Evergreen shrub up to 7 m in height. Exotic to Cyprus, found in gardens and hedges and elsewhere (0-1400 m alt.). Indigenous to southern Europe.

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous to semi ring porous. Vessels solitary or in clusters. Mean tangential diameter of earlywood vessels less than 20 μm. Greater than 200 vessels per square millimeter in earlywood. Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Fibers very thick

walled, marginal flat fibers. Apotracheal parenchyma diffuse, paratracheal parenchyma scanty. Apotracheal parenchyma in narrow bands or lines up to three cells wide. Greater than 20 rays per millimeter.
Radial section: Scalariform perforation plates with 20 — 40 bars. Intervessels pits medium (7-10 µm in diameter). Helical thickenings in vessel elements present. Earlywood vessel elements length greater than 500 µm. Fibers with distinctly bordered pits (fiber tracheids). All ray cells upright and/or square.
Tangential section: Rays uniseriate up to 3 cells wide.

Bark
Groups of sieve tubes present. Fibers scattered or irregularly dispersed. Prismatic crystals and druses present. Phellem homogeneous. Lignified cells in phellem.

Pith
Pith shape round. Heterocellular pith. Thick walled parenchyma cells present. With crystals druses. Pits in transverse and in longitudinal cell walls. Pits grouped. Primary vascular bundle clearly separate from one other to not distinct. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
1 4 5 9 11 14 17 26 30 36 40.1 50.2 53.2 62 70 70.3 76 78 86 96 97 105 116.2 – B1 B5.3 B7 B7.2 B14.1 B14.4 – P1 P3 P3.3 P6.2 P9 P9.1 P9.2 P10.1 P10.2 P12 P13

Caryophyllaceae

Dianthus cyprius A.K. Jacks. et Turrill
(Photomicrographs not available)

Suffrutticose perennial, with sparse, pendulous and often curved branches, 1 m long. Endemic of Cyprus growing on limestone rocks and cliffs (350-750 m alt.).

Xylem slide miss
Transverse section: Wood diffuse porous. Vessels in radial multiples of 2 to 4 common. Vessels cell wall thick (greater than 2 µm). Mean tangential diameter of earlywood vessels less than 20 µm. Fibers thin to thick walled. Axial parenchyma scanty paratracheal. Axial parenchyma in marginal or in seemingly marginal bands. Parenchyma marginal thin walled, dark in polarized light.
Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 µm in diameter). Earlywood vessel elements length 50-100 µm. Fibers with simple to minutely bordered pits (libriform fibers).
Tangential section: wood rayless

Bark
Groups of sieve tubes present. Fibers in tangential rows. Crystal sand.

Pith
Pith disappear in polarized light. Pith shape round. Medullary sheath present. Unilignified cells. Cells dimorphic. Crystal sand present. Primary vascular bundle not distinct.

Codified description
5 9.1 13 22 24 39.1 40.1 52.2 61 69 78 89 89.1 117 – B1 B5.2 B7.3 – P1 P2 P3.4 P4 P6.4 P10.2

Silene fruticosa L.
(Annex 1, plate no. 19)

A loosely tufted subshrub, 15-50 cm in height. A native of Cyprus growing in rock crevices and on old walls, with a limited distribution, although locally common in some areas (0-600 m alt.). It is also found in Malta, Sicily, Greece and Cyrenaica.

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels predominantly solitary. Vessels cell wall thick (greater than 2 µm). Mean tangential diameter of earlywood vessels 20-50 µm. Fibers thin to thick walled. Axial parenchyma scanty paratracheal. Apotracheal parenchyma in marginal or in seemingly marginal bands, with thin walled cells, dark in polarized light.
Radial section: Simple perforation plates. Inter-vessel pits scalariform. Inter-vessel pits alternate, medium (7-10 µm in diameter). Helical thickenings only in narrower vessel elements. Earlywood vessel elements length 50-100 µm. Fibers with simple to minutely bordered pits (libriform fibers).
Tangential section: Wood rayless.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Phellem homogeneous, distinct in polarized light. Lignified cells in phellem.

Pith
Pith disappear in polarized light. Pith shape round. Heterocellular pith. Thick walled parenchyma cells present. Cells dimorphic. With crystals druses. Pits in transverse and in longitudinal cell walls. Pits in transverse cell walls. Primary vascular bundle not distinct.

Codified description
1 5 9 13 20 22 26 39 39.1 40.2 52.2 61 69 78 89 89.1 117 – B1 B2 B14.1 B14.3 B14.4 – P1 P3 P3.3 P4 P6.2 P9 P9.1 P10.2

Silene galataea Boiss.
(Annex 1, plate no. 20)

Subshrub 20-50 mm high. Endemic to Cyprus, it thrives on dry rocky slopes in Pine forests (750-1200 m alt.).

Xylem
Transverse section: Growth rings indistinct or absent. Wood diffuse porous. Vessels predominantly solitary. Vessels cell wall thick (greater than 2 μm). Mean tangential diameter of earlywood vessels less than 20 μm. Greater than 200 vessels per square millimeter in earlywood. Fibers thin to thick walled, in tangentially elongated groups. Parenchyma pervasive.
Radial section: Simple perforation plates. Inter-vessel pits scalariform, small (4-7 μm in diameter). Earlywood vessel elements length 200-500 μm.
Tangential section: Wood rayless.

Bark
Groups of sieve tube present, in tangential rows. Collapsed sieve tubes. Prismatic crystals.

Pith
Pith disappear in polarized light. Pith shape round. Cells dimorphic. Primary vascular bundle not distinct.

Codified description
2 5 9 13 20 25 39.1 40.1 50.2 53.1 69 79.1 117 – B1 B1.1 B2 B7 – P1 P4 P10.2

Chenopodiaceae

Arthrocnemum macrostachyum (Moric.) Mois et Delponte
(Annex 1, plate no. 20)

Erect, much-branched subshrub 20-70 cm in height. An indigenous halophyte, occurring on edges of salt lakes and salt marshes (0-150 m alt.). Indigenous of the Mediterranean region, Red sea, Atlantic islands and south to Senegal.

Xylem
Transverse section: Growth distinct. Wood diffuse porous. Vessels solitary and in clusters. Vessels cell wall thick (greater than 2 μm). Mean tangential

diameter of earlywood vessels less than 20 µm. Fibers thick to very thick walled. Axial parenchyma scanty paratracheal. Successive cambia: concentric arranged single vascular bundles.
Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 µm in diameter). Earlywood vessel elements length 50-100 µm.
Tangential section: Wood rayless.

Bark
Phloem uniform. Druses present. Phellem homogeneous, distinct in polarized light.

Pith
Pith disappear in polarized light. Pith shape round. Cells dimorphic. Primary vascular bundle not distinct.

Codified description
1 5 9 11 13 22 24 39.1 40.1 52.2 69 70 78 117 133.1 – B7.2 B8 B14.1 B14.3 – P1 P4 P10.2

Arthrocnemum perenne (Mill.) Moss
(Annex 1, plate no. 20)

Subshrub 10-50 in height. And indigenous halophyte, occurring on edges of alt lakes and salt marshes. Indigenous to Mediterranean region southern and western Europe, tropical and southern Africa.

Xylem
Transverse section: Growth rings indistinct or absent. Wood diffuse porous. Vessels predominantly solitary. Vessels predominantly in clusters. Vessels cell wall thick (greater than 2 µm). Mean tangential diameter of earlywood vessels less than 20 µm. Fibers thick walled to very thick walled. Axial parenchyma scanty paratracheal. Successive cambia: concentric arranged single vascular bundles, sometimes concentric continuous.
Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 µm in diameter). Earlywood vessel elements length 50-100 µm. Fibers with simple to minutely bordered pits (libriform fibers).
Tangential section: Wood rayless. Axial parenchyma and vessels storied.

Bark
Prismatic crystals. Phloem uniform. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith

Pith disappear in polarized light. Pith star shape. Unilignified cells. Pits in transverse and in longitudinal cell walls. Primary vascular bundle not distinct.

Codified description
2 5 9 11 13 22 24 39.1 40.1 52.2 61 69 70 78 117 120 133.1 133.2 – B7 B8 B14.1 B14.3 – P1 P3.4 P9 P10.2

Atriplex halimus L.
(Annex 1, plate no. 21)

Erect shrub up to 2 m in height. Indigenous species occurring on sandy and rocky seashores and sometimes in dry sites inland (0-350 m alt.). Indigenous to the Mediterranean region.

Xylem
Transverse section: Growth distinct. Wood diffuse porous. Vessels predominantly solitary. Vessels cell wall thick (greater than 2 µm). Mean tangential diameter of earlywood vessels 20-50 µm. Vessels of two distinct diameter classes. Fibers thick to very thick walled. Axial parenchyma scanty paratracheal. Successive cambia: concentric arranged single vascular bundles.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Earlywood vessel elements length 50-100 µm. Fibers with simple to minutely bordered pits (libriform fibers). Prismatic crystals present.
Tangential section: Wood rayless. Axial parenchyma and vessels storied.

Bark
Fibers in tangential rows. Prismatic crystals.

Pith
Pith shape round. Cells dimorphic. With prismatic crystals. With crystals druses. Pits in transverse and in longitudinal cell walls. Vascular bundles in the pith. Primary vascular bundle clearly separate from one other. Axial cells arranged in regular rows (radial section).

Codified description
1 5 9 13 22 25 39.1 40.2 45 52.2 61 69 70 78 117 120 133.1 136 – B5.2 B7 – P1 P4 P6 P6.2 P9 P9.1 P10 P10.1 P13

Atriplex semibaccata R.Br.
(Annex 1, plate no. 21)

Prostrate or sprawling subshrub with stem up to 50 cm long. It occur on waste ground and garigue, on brackish ground inland (30-250 m alt.). A native of Australia.

Xylem
Transverse section: Growth ring distinct. Wood diffuse porous. Vessels predominantly solitary. Vessels cell wall thick (greater than 2 µm). Vessels of two distinct diameter classes: mean tangential diameter vessels less than 20 µm and up to 50 µm. Gums and other deposits in heartwood vessels. Fibers thick walled to very thick walled. Axial parenchyma scanty paratracheal. Successive cambia: concentric arranged single vascular bundles, sometimes connected in transverse section.
Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 µm in diameter). Earlywood vessel elements length 50-100 µm. Fibers with simple to minutely bordered pits (libriform fibers). Prismatic crystals present.
Tangential section: wood rayless

Bark
Phloem uniform. Prismatic crystals. Epidermis distinct in polarized light.

Pith
Pith disappear in polarized light. Heterocellular pith. Thick walled parenchyma cells present. Cells dimorphic. With crystals druses. Pits in transverse and in longitudinal cell walls. Pits grouped. Pits of two distinct size. Vascular bundles in the pith. Primary vascular bundle clearly separate from one other.

Codified description
1 5 9 13 22 24 39.1 40.1 40.2 45 52.2 58 61 69 70 78 117 133.1 133.2 136 – B7 B8 B14.3 – P3 P3.3 P4 P6.2 P9 P9.1 P9.2 P9.3 P10 P10.1

Halimione portulacoides (L.) Aellen
(Annex 1, plate no. 21)

Sprawling much-branched subshrub 1,5 m in height. Indigenous species occurring on edges of salt lakes and sea shores. Indigenous to western Europe and the Mediterranean region.

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels solitary and in radial multiples of 2 to 4 common. Vessels cell

wall thick (greater than 2 μm). Mean tangential diameter of earlywood vessels less than 20 μm. Vessels of two distinct diameter classes. Greater than 200 vessels per square millimeter in earlywood. Fibers thick to very thick walled. Axial parenchyma scanty paratracheal. Successive cambia: concentric arranged single vascular bundles.
Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 μm in diameter). Earlywood vessel elements length 100-200 μm. Fibers with simple to minutely bordered pits (libriform fibers).
Tangential section: Wood rayless.

Bark
Fibers scattered or irregularly dispersed. Druses present. Phellem homogeneous, distinct in polarized light. Lignified cells in phellem.

Pith
Pith disappear in polarized light. Pith shape round. Heterocellular pith. Thick walled parenchyma cells present. Unilignified cells. Pits in transverse and in longitudinal cell walls. Vascular bundles in the pith. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows.

Codified description
1 5 9 9.1 13 22 24 39.1 40.1 45 50.2 52.3 61 69 70 78 117 133.1 – B5.3 B7.2 B14.1 B14.3 B14.4 – P1 P3 P3.3 P3.4 P9 P9.1 P10 P10.1 P12

Halocnemum strobilaceum (Pall.) Bieb.
(Annex 1, plate no. 22)

Erect much-branched subshrub up to 80 cm in height. An indigenous halophyte, occurring on edge of salt lakes and salt marshes. Also indigenous to the Mediterranean region and eastward to Asia.

Xylem
Transverse section: Growth rings indistinct or absent. Wood diffuse porous. Vessels in radial multiples of 2 to 4 common. Vessels predominantly in clusters. Vessels cell wall thick (greater than 2 μm). Mean tangential diameter of earlywood vessels less than 20 μm. Axial parenchyma scanty paratracheal. Successive cambia: concentric arranged single vascular bundles.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 μm in diameter). Helical thickenings in vessel elements present. Earlywood vessel elements length 50-100 μm. Fibers with simple to minutely bordered pits (libriform fibers).
Tangential section: Wood rayless.

Bark
Phloem uniform.

Pith
Pith disappear in polarized light, polygonal in shape. Unilignified cells. Cell dimorphism in diameter. Pits in transverse and in longitudinal cell walls. Vascular bundles in the pith. Primary vascular bundle clearly separated each other. Tracheary elements of metaxylem in distinct radial rows.

Codified description
2 5 9.1 11 13 22 25 36 39.1 40.1 52.2 61 78 117 133.1 – B8 – P1.1 P3.4 P4 P9 P9.1 P10 P10.1 P12

Noaea mucronata (Forssk.) Asch. et Schwinf.
(Annex 1, plate no. 22)

Erect or sprawling, much-branched subshrub up to 60 cm in height. Indigenous to Cyprus, occurring on dry pastures, costal garigue, sand dunes and rocky slopes. (0-650 m alt.). Indigenous to the eastern Mediterranean region, north Africa and eastwards to central Asia.

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels solitary and in radial multiples of 2 to 4 common. Vessels cell wall thick (greater than 2 µm). Mean tangential diameter of earlywood vessels less than 20 µm. Fibers thick to very thick walled. Axial parenchyma scanty paratracheal. Successive cambia: concentric arranged single vascular bundles.
Radial section: Simple perforation plates. Intervessel pits minute (less than 4 µm in diameter). Earlywood vessel elements length 100-200 µm. Fibers with simple to minutely bordered pits (libriform fibers).
Tangential section: Wood rayless.

Bark
Phloem uniform. Layered phelloderm. Lignified cells in phellem.

Pith
Pith shape round. Thick walled parenchyma cells present. Cells dimorphic. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other.

Codified description
1 5 9 9.1 13 24 39.1 40.1 52.3 61 69 70 78 117 133.1 – B8 B14.4 B18 – P1 P3.3 P4 P9 P9.1 P10.1

Suaeda aegyptiaca (Hasselq.) Zohary
(Annex 1, plate no. 22)

Erect, much branched subshrub up to 50 cm in height. A rare indigenous halophyte, occurring on edges of salt lakes and salt marshes (0 m alt.). It is indigenous to Palestine, Egypt, Arabia and eastwards to Iran.

Xylem
Transverse section: Growth rings indistinct or absent. Wood diffuse porous. Vessels in radial multiples of 2 to 4 or more. Vessels cell wall thick (greater than 2 µm). Mean tangential diameter of earlywood vessels 20-50 µm. Fibers thin to thick walled. Axial parenchyma scanty paratracheal to vasicentric. Rays per millimeter 4-12. Successive cambia: concentric arranged single vascular bundles.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 200-500 µm. Fibers with simple to minutely bordered pits (libriform fibers). Rays with procumbent, square and upright cells mixed throughout the ray.
Tangential section: Ray width predominant 1 to 3 cells.

Bark
Phloem uniform. Druses and crystal sand present. Lignified cells in phellem.

Pith
Pith shape round. Cells dimorphic. Pits in transverse and in longitudinal cell walls. Vascular bundles in the pith. Primary vascular bundle clearly separate from one other.

Codified description
2 5 9.1 10 13 22 25 30 39.1 40.2 53.1 61 69 78 79 97 109 115 133.1 – B7.2 B7.3 B8 B14.4 – P1 P4 P9 P9.1 P10 P10.1

Suaeda vera Forssk. ex J.F.Gmel
(Annex 1, plate no. 23)

Evergreen, erect, much-branched shrub up to 80 cm in height. An indigenous halophyte, occurring on sandy costa, edges of salt lakes and rocky slopes (0-30 m alt.). Indigenous to the southern and western Europe, the Mediterranean region and the Atlantic islands.

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels predominantly solitary. Vessels in radial multiples of 2 to 4

common. Vessels cell wall thick (greater than 2 µm). Mean tangential diameter of earlywood vessels less than 20 µm. Gums and other deposits in heartwood vessels. Fibers thin to thick walled. Axial parenchyma sometimes scanty paratracheal, often confluent and in bands greater than three cells wide. Apotracheal parenchyma in marginal or in seemingly marginal bands. Successive cambia: concentric arranged single vascular bundles.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Helical thickenings in vessel elements present. Earlywood vessel elements length 50-100 µm. Fibers with simple to minutely bordered pits (libriform fibers).
Tangential section: Wood rayless.

Bark
Phloem uniform.

Pith
Pith shape round. Cells dimorphic. Pits in transverse and in longitudinal cell walls. Vascular bundles in the pith. Primary vascular bundle clearly separate from one other.

Codified description
1 5 9 9.1 13 22 25 36 39.1 40.1 52.2 58 61 69 78 83 85 89 117 133.1 – B8 – P1 P4 P9 P9.1 P10 P10.1

Cistaceae

Cistus creticus L.
(Annex 1, plate no. 23)

Shrub up to 150 cm in height. It is indigenous to central and eastern Mediterranean countries as far as Palestine. Very common in Cyprus, growing on rocky slopes, in forests and shrub lands (0-1800 m alt.).

Xylem
Transverse section: Growth ring distinct and recognizable. Wood semi-ring porous. Vessels predominantly solitary. Mean tangential diameter of earlywood vessels 20-50 µm. Vessels of two distinct diameter classes, 20 — 40 earlywood vessels per square millimeter. Greater than 200 vessels per square millimeter in earlywood. Gums and other deposits in heartwood vessels and/or fibers. Fibers very thick walled. Axial parenchyma diffuse. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits pseudoscalariform to reticulate and alternate. Inter-vessel pits small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape

throughout the ray cell. Fibers with distinctly bordered pits (fiber tracheids). Rays with procumbent, square and upright cells mixed throughout the ray.
Tangential section: Rays of two distinct sizes: uniseriate and up to 3 cells wide.

Bark
Groups of sieve tubes present. Sclerenchyma cells both in phloem and cortex. Fibers in tangential rows. Druses present.

Pith
Pith shape round. Pith with thick walled parenchyma cells. Cells dimorphic. With crystals druses. Pits in longitudinal cell walls (radial section), transverse walls are missing. Primary vascular bundle clearly separate to not distinct each other.

Codified description
1 4 9 13 20.1 22 25 30 40.2 45 48 50.2 58 62 70 76 96 97 103 109 116.2 — B1 B4 B5 B5.2 B7.2 — P1 P3.3 P4 P6.2 P9 P10.1 P10.2

Cistus ladanifer L.
(Annex 1, plate no. 23)

Shrub up to 2 m in height. Native to western Mediterranean basin, it is a rare adventive species in Cyprus. It grows in open pine forests (250-800 m alt.)

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous. Vessels predominantly solitary. Mean tangential diameter of earlywood vessels less than 20 µm. Fibers very thick walled. Axial parenchyma diffuse and scanty paratracheal. Rays per millimeter 12-20.
Radial section: Simple perforation plates. Inter-vessel pits opposite and alternate, minute (less than 4 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 100-200 µm. Fibers with distinctly bordered pits (fiber tracheids). Rays with procumbent, square and upright cells mixed throughout the ray. Prismatic crystals in rays and in axial parenchyma cells.
Tangential section: Rays uniseriate and 1 to 3 cells wide.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Some rays become dilated. Fibers in tangential rows. Fibers grouped. Prismatic crystals. Cell content in parenchyma cells. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith

Pith shape round. Thick walled parenchyma cells present. Cells dimorphic. Cell content (gum, tannins, dark staining substances). Pits in transverse and in longitudinal cell walls. Primary vascular bundle not distinct. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description

1 4 9 13 21 22 24 30 40.1 52.3 62 70 76 78 96 97 109 116.1 136 136.1 141.1 – B1 B2 B3.1 B5.2 B5.4 B7 B11 B14.1 B14.3 – P1 P3.3 P4 P5 P9 P9.1 P10.2 P12 P13

Cistus monspeliensis L.
(Annex 1, plate no. 24)

Shrub up to 1 m in height. It occurs in the Mediterranean countries and the Atlantic islands. On Cyprus it grows on rocky slopes, in forests and in shrub lands (0-600 m alt.), Cyprus is the easternmost boundary of the distribution of the species.

Xylem

Transverse section: Growth ring distinct and recognizable. Wood semi-ring porous to diffuse-porous. Vessels predominantly solitary. Mean tangential diameter of earlywood vessels 20-50 µm. Greater than 200 vessels per square millimeter in earlywood. Tyloses with thin wall common. Gums and other deposits in heartwood vessels and/or fibers. Fibers very thick walled. Axial parenchyma diffuse. Axial parenchyma scanty paratracheal in earlywood.
Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Helical thickenings in vessel elements present. Earlywood vessel elements length 350-800 µm. Fibers with simple to minutely bordered pits (libriform fibers). Body ray cells procumbent with one row of upright and/or square marginal cells.
Tangential section: Rays uniseriate to 3 cells wide.

Bark

Groups of sieve tubes present. Fibers in tangential rows. Prismatic crystals and druses present. Phellem homogeneous and distinct in polarized light.

Pith

Pith shape oval. Medullary sheath present. Cells dimorphic in the center of the pith. With crystals druses. Pits in transverse and in longitudinal cell walls. Pits grouped in transverse walls. Pits of two distinct size. Primary vascular bundle not distinct.

Codified description
1 4 5 9 13 22 24 30 36 40.2 50.2 53 56 58 61 70 76 78 96.1 97 106 116.1 — B1 B5 B5.2 B7 B7.2 B14.1 B14.3 — P1 P2 P4.2 P6.2 P9 P9.1 P9.2 P9.3 P10.2

Cistus parvifolius Lam.
(Annex 1, plate no. 24)

Shrub up to 1 m in height. It occurs in the central and eastern Mediterranean countries. A common indigenous species to Cyprus thriving on rocky slopes, in forests and thickets (usually 0-300 m alt.).

Xylem
Transverse section: Growth ring distinct and recognizable. Wood diffuse porous. Vessels predominantly solitary. Mean tangential diameter of earlywood vessels less than 20 µm. Greater than 200 vessels per square millimeter in earlywood. Tyloses with thin wall common. Gums and other deposits in heartwood vessels and/or fibers. Fibers very thick walled. Axial parenchyma diffuse and scanty paratracheal. Axial parenchyma in narrow bands or lines up to three cells wide. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 350-800 µm. Fibers with distinctly bordered pits (fiber tracheids). All ray cells upright and/or square.
Tangential section: Rays predominantly uniseriate, rarely more than 4 seriate.

Bark
Groups of sieve tubes in tangential rows. Distinct parenchyma cells dilatation. Fibers in tangential rows and grouped. Prismatic crystals. Phellem homogeneous and distinct in polarized light.

Pith
Pith shape round. With thick walled parenchyma cells. Cells dimorphic in diameter. With crystals druses. Pits in transverse and in longitudinal cell walls. Primary vascular bundle not distinct. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
1 5 9 13 22 25 30 40.1 50.2 53 56 58 62 70 76 78 86 96.1 97 103 105 116.2 — B1.1 B3.2 B5 B5.2 B5.4 B7 B14.1 B14.3 — P1 P3.3 P4 P6.2 P9 P9.1 P10.2 P12 P13

Fumana arabica (L.) Spach.
(Annex 1, plate no. 24)

Subshrub up to 60 cm in height. Stems usually wiry, spreading, sub erect, densely hairy. It occur in countries of the central and eastern Mediterranean and eastwards to Iran. Common species to Cyprus, thrives on rocky slopes and maquis and garigue (0-1200 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous, vessels predominantly solitary. Vessels cell wall thick (greater than 2 µm). Mean tangential diameter of earlywood vessels less than 20 µm. Fibers very thick walled. Axial parenchyma scanty paratracheal. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits opposite and alternate, minute (less than 4 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 100-200 µm. Fibers with distinctly bordered pits (fiber tracheids). All ray cells upright and/or square.
Tangential section: Rays exclusively uniseriate.

Bark
Groups of sieve tube and sieve tubes present. Fibers in tangential rows, scattered or irregularly dispersed. Phellem homogeneous, distinct in polarized light.

Pith
Pith shape round. Medullary sheath present. Thick walled parenchyma cells present. Cells dimorphic in the center of the pith. Cell content (gum, tannins, dark staining substances). Pits in transverse and in longitudinal cell walls. Primary vascular bundle not distinct. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
1 5 9 13 21 22 24 30 39.1 40.1 52.3 62 70 78 96 105 116.2 — B1 B2 B5.2 B5.3 B14.1 B14.3 — P1 P2 P3.3 P4.2 P5 P9 P9.1 P10.2 P12 P13

Fumana thymifolia (L.) Verlot
(Annex 1, plate no. 25)

Subshrub up to 25 cm in height. Young stems thinly or densely hairy. It occur in countries of the Mediterranean and eastwards to Iran. Common species to Cyprus, thrives on rocky slopes, sand dunes, maquis and garigue (0-1000 m alt.).

Xylem

Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous. Vessels solitary and in clusters. Mean tangential diameter of earlywood vessels less than 20 µm. Gums and other deposits in heartwood vessels and in ray parenchyma cells. Fibers very thick walled. Axial parenchyma diffuse and scanty paratracheal. Apotracheal parenchyma in marginal or in seemingly marginal bands. Parenchyma marginal thin walled, dark in polarized light. Stem lobed. Greater than 20 rays per millimeter.

Radial section: Simple perforation plates. Inter-vessel pits opposite and alternate, minute (less than 4 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 50-100 µm. Fibers with distinctly bordered pits (fiber tracheids). All ray cells upright and/or square.

Tangential section: Rays exclusively uniseriate.

Bark

Groups of sieve tubes present. Sclereids in tangential rows or irregularly dispersed. Prismatic crystals. Cell content in parenchyma cells. Layered phelloderm.

Pith

Pith shape round to polygonal. Medullary sheath present. Thick walled parenchyma cells present. Cell content (gum, tannins, dark staining substances). Pits in transverse and in longitudinal cell walls. Primary vascular bundle not distinct.

Codified description

1 4 9 11 13 21 22 24 30 40.1 52.2 58 62 70 76 78 89 89.1 96 99.2 105 116.2 – B1 B6.2 B6.3 B7 B11 B18 – P1 P2 P3.3 P5 P9 P9.1 P10.2

Helianthemum obtusifolium Dunal
(Annex 1, plate no. 25)

Subshrub up to 25 cm in height, with densely tomentose stems. Endemic to Cyprus. It grows on rocky slopes, in maquis and garigue (0-900 m alt.).

Xylem

Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels predominantly solitary. Mean tangential diameter of earlywood vessels less than 20 µm. Gums and other deposits in heartwood vessels. Fibers thick to very thick walled. Axial parenchyma diffuse and scanty paratracheal. Apotracheal parenchyma in marginal or in seemingly marginal bands, dark in polarized light. Stem lobed. Greater than 20 rays per millimeter.

Radial section: Simple perforation plates. Inter-vessel pits opposite and alternate, minute (less than 4 µm in diameter). Earlywood vessel elements length 100-200 µm. Fibers with distinctly bordered pits (fiber tracheids). All ray cells upright and/or square.
Tangential section: Ray exclusively uniseriate.

Bark
Fibers scattered or irregularly dispersed. Prismatic crystals and druses present. Cell content in parenchyma cells.

Pith
Pith disappear in polarized light. Pith shape round to oval. Medullary sheath present. Cell content (gum, tannins, dark staining substances). Primary vascular bundle not distinct. Tracheary elements of metaxylem in distinct radial rows.

Codified description
1 5 9 13 21 22 24 40.1 52.3 58 62 69 70 76 78 89 89.1 96 99.2 105 116.2 – B5.3 B7 B7.2 B11 – P1 P2 P5 P10.2 P12

Helianthemum stipulatum (Forssk.) C.Christens.
(Annex 1, plate no. 25)

Subshrub up to 40 cm in height, with densely tomentose stems. Indigenous to Egypt, Palestine, Syria and Turkey. On Cyprus it grows on sandy beaches and rocky slopes (0-200 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous to diffuse porous. Vessels predominantly solitary. Mean tangential diameter of earlywood vessels less than 20 µm. Tyloses with thin wall common. Gums and other deposits in heartwood vessels. Fibers thick to very thick walled. Axial parenchyma diffuse, scanty paratracheal and in marginal or in seemingly marginal bands. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits opposite and alternate, minute (less than 4 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 50-100 µm. Vascular and/or vasicentric tracheids present. Fibers with distinctly bordered pits (fiber tracheids). All ray cells upright and/or square. Prismatic crystals in ray parenchyma cells.
Tangential section: Rays uniseriate to 3 cells wide.

Bark
Collapsed sieve tubes. Sclereids in tangential rows and scattered or irregularly

dispersed. Prismatic crystals. Cell content in parenchyma cells. Phellem homogeneous, distinct in polarized light.

Pith

Pith shape round. Medullary sheath present. Thick walled parenchyma cells present. Cell content (gum, tannins, dark staining substances). Pits in transverse cell walls. Primary vascular bundle not distinct. Tracheary elements of metaxylem in distinct radial rows.

Codified description

1 4 5 9 13 21 22 24 30 40.1 52.2 56 58 60 62 69 70 76 78 89 96 97 105 116.2 136 136.1 – B2 B6.2 B6.3 B7 B11 B14.1 B14.3 – P1 P2 P3.3 P5 P9.1 P10.2 P12

Helianthemum syriacum (Jacq.) Dum-Cours.

(Annex 1, plate no. 26)

Sub shrub up to 40 cm in height, with densely tomentose stems. Indigenous in the Mediterranean countries, In Cyprus it grows on sandy beaches and rocky slopes (0-800 m alt.).

Xylem

Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels solitary or in clusters. Mean tangential diameter of earlywood vessels less than 20 µm. Fibers thick to very thick walled. Axial parenchyma scanty paratracheal. Greater than 20 rays per millimeter.

Radial section: Simple perforation plates. Inter-vessel pits opposite and alternate, minute (less than 4 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 200-500 µm. Fibers with distinctly bordered pits (fiber tracheids). All ray cells upright and/or square.

Tangential section: Rays uniseriate and up to 3 cells wide.

Bark

Groups of sieve tubes present. Some rays become dilated. Fibers scattered or irregularly dispersed. Prismatic crystals and druses present. Cell content in parenchyma cells. Phellem distinct in polarized light.

Pith

Pith disappear in polarized light. Pith shape round. Medullary sheath present. Cell content (gum, tannins, dark staining substances). With prismatic crystals and crystals druses. Primary vascular bundles clearly separate from one another to not distinct. Tracheary elements of metaxylem in distinct radial rows.

Codified description
1 5 9 11 13 21 22 24 30 40.1 53.1 62 69 70 78 96.1 97 105 116.2 – B1 B3.1 B5.3 B7 B7.2 B11 B14.3 – P0.1 P1 P2 P5 P6 P6.2 P10.1 P10.2 P12

Convolvulaceae

Convolvulus dorycnium L.
(Annex 1, plate no. 26)

Erect, much branched subshrub 30-80 cm in height, with distinctly hairy stem, especially towards the base. An eastern Mediterranean species, extending eastwards to Iran. On Cyprus it occurs on dry stony places and along road sides (0-300 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous. Vessels predominantly in clusters. Vessels cell wall thick (greater than 2 μm). Mean tangential diameter of earlywood vessel lumina 50 — 100 μm. Vessels of two distinct diameter classes. Axial parenchyma scanty paratracheal to vasicentric. Axial parenchyma in marginal or in seemingly marginal bands. Parenchyma marginal thin walled, dark in polarized light. Rays per millimeter 12-20.
Radial section: Simple perforation plates. Inter-vessel pits alternate, medium (7-10 μm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Vessel-ray pits rounded or angular with large apertures. Earlywood vessel elements length 100-200 μm. Fibers with distinctly bordered pits (fiber tracheids). Rays with procumbent, square and upright cells mixed throughout the ray. Druses in ray parenchyma cells.
Tangential section: Rays of two distinct sizes: uniseriate and up to 3 seriate. Larger rays height greater than 1 mm. Rays disappear in polarized light.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Some rays become dilated. Sclereids scattered or irregularly dispersed. Druses present. Phellem homogeneous.

Pith
Pith disappear in polarized light. Pith shape polygonal. Medullary sheath present. Heterocellular pith. Fibers present. Unilignified cells. With prismatic crystals. Pits in transverse and in longitudinal cell walls. Vascular bundles in the pith. Primary vascular bundle not distinct.

Codified description
1 4 11 13 22 26 30 31 39.1 41 45 52.3 62 78 79 89 89.1 96 97 100.2 102 103 109 116.1 144 145 – B1 B2 B3.1 B6.3 B7.2 B14.1 – P0.1 P1.1 P2 P3 P3.2 P3.4 P6 P9 P9.1 P10 P10.2

Convolvulus oleifolius var. *desertii* Desr. Pamp.
(Annex 1, plate no. 26)

Subshrub up to 50 cm in height, with erect or spreading, densely hairy stems, branched from the base. It is found in Libya and Cyprus, restricted to dry, rocky, calcareous slopes (150-200 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels solitary and in clusters. Mean tangential diameter of earlywood vessels 20-50 µm. Vessels of two distinct diameter classes. Fibers thin to thick walled. Axial parenchyma diffuse. Axial parenchyma scanty paratracheal. Axial parenchyma in marginal or in seemingly marginal bands. Parenchyma marginal thin walled, dark in polarized light. Enclosed sieve tubes. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, medium (7-10 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 200-500 µm. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: Rays uniseriate and 1 to 3 cells wide.

Bark
Groups of sieve tubes present. Groups of sieve tube in radial rows. Collapsed sieve tubes. Gelatinous fibers. Druses present. With secretory elements in ducts. Phellem homogeneous.

Pith
Pith disappear in polarized light. Pith shape round. Unilignified cells. Cells dimorphic center/border of the pith.
With crystals druses. Vascular bundles in the pith. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows.

Codified description
1 5 9 11 13 22 26 30 40.2 45 53.1 61 69 76 78 89 89.1 96 97 105 116.2 – B1 B1.2 B2 B7.2 B10 B10.2 B14.1 – P1 P3.4 P4.1 P6.2 P10 P10.1 P12

Convolvulus oleifolius var. *pumilus* Desr. Pamp.
(Annex 1, plate no. 27)

Dwarf, much branched subshrub up to 15 cm in height, forming dense, rounded tufts. On Cyprus it is restricted to the costal area around Cape Greko (0-20 m alt.). Found also in Libya.

Xylem

Transverse section: Growth ring boundaries clearly demarcated. Wood ring porous. Vessels solitary and in radial multiples of 2 to 4 common. Vessels cell wall thick (greater than 2 µm). Mean tangential diameter of earlywood vessels 20-50 µm. Fibers thick to very thick walled. Axial parenchyma scanty paratracheal. Axial parenchyma in marginal or in seemingly marginal bands. Parenchyma marginal thin walled, dark in polarized light. Greater than 20 rays per millimeter.

Radial section: Simple perforation plates. Inter-vessel pits opposite and alternate, small (4-7 µm in diameter). Earlywood vessel elements length 200-500 µm. Fibers with distinctly bordered pits (fiber tracheids). All ray cells upright and/or square. Druses in ray parenchyma cells.

Tangential section: Rays of two distinct sizes: uniseriate and 2-3 cells wide. Larger rays height greater than 1 mm. Rays disappear in polarized light.

Bark

Groups of sieve tubes present. Collapsed sieve tubes. Some rays become dilated. Druses present. With secretory elements in ducts. Phellem homogeneous.

Pith

Pith disappear in polarized light. Pith shape round. Medullary sheath present. Unilignified cells. Cells dimorphic. Vascular bundles in the pith. Primary vascular bundle not distinct. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description

1 3 9 9.1 13 21 22 25 39.1 40.2 53.1 62 69 70 78 89 89.1 96 97 100.2 102 103 105 116.2 144 145 – B1 B2 B3.1 B7.2 B10 B10.2 B14.1 – P1 P2 P3.4 P4 P10 P10.2 P12 P13

Convolvulus oleifolius var. *oleifolius* Desr.
(Annex 1, plate no. 27)

Subshrub up to 50 cm in height, with erect or spreading, densely hairy stems, branched from the base. Indigenous to central eastern Mediterranean countries. On Cyprus it grows on garigue and on dry, rocky slopes (0-700 m alt.).

Xylem

Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels solitary and in clusters. Vessels cell wall thick (greater than 2 µm). Mean tangential diameter of earlywood vessels 20-50 µm. Vessels of two distinct diameter classes. Fibers thin to thick walled. Axial parenchyma scanty paratracheal. Greater than 20 rays per millimeter.

Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 200-500 µm. Fibers with distinctly bordered pits (fiber tracheids). All ray cells upright and/or square. Druses in axial parenchyma cells.

Tangential section: Rays exclusively uniseriate.

Bark

Groups of sieve tubes present. Collapsed sieve tubes. Sclereids scattered or irregularly dispersed. Druses present. Phellem homogeneous. Phellem and epidermis distinct in polarized light.

Pith

Pith disappear in polarized light. Pith shape round. Cells dimorphic center/border of the pith. With crystals druses. Pits in transverse and in longitudinal cell walls. Primary vascular bundle not distinct. Tracheary elements of metaxylem in distinct radial rows.

Codified description

1 5 9 11 13 22 25 30 39.1 40.2 45 53.1 62 69 78 96 105 116.2 144 146 – B1 B2 B6.3 B7.2 B14.1 B14.3 – P1 P4.1 P6.2 P9 P9.1 P10.2 P12

Dipsacaceae

Pterocephalus multiflorus Poech subsp. *multiflorus*
(Annex 1, plate no. 27)

Much branched, low shrub up to 1 m in height with erect or spreading branches. Endemic to Cyprus. It occurs in phrygana, on rocky slopes, maquis and open pine forests (150-1900 m alt.).

Xylem

Transverse section: Growth ring distinct and recognizable. Wood semi-ring porous. Vessels in diagonal and/or radial pattern or in clusters. Mean tangential diameter of earlywood vessels 20-50 µm. Vessels of two distinct diameter classes; 40 — 100 earlywood vessels per square millimeter. Fibers thin to thick

walled. Axial parenchyma diffuse and scanty paratracheal. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 μm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Vessel-ray pits rounded or angular with large apertures. Helical thickenings in vessel elements present. Earlywood vessel elements length 350-800 μm. Fibers with distinctly bordered pits (fiber tracheids). All ray cells upright and/or square.
Tangential section: Rays predominantly uniseriate.

Bark
Groups of sieve tube in radial rows. Prismatic crystals and acicular present.

Pith
Pith, round in shape. Cells dimorphic center/border of the pith. With crystals druses. Pits transverse and in longitudinal cell walls (radial section). Primary vascular bundle not distinct. Axial cells arranged in regular rows (radial section).

Codified description
1 4 7 11 13 22 25 30 31 36 40.2 45 49 53 62 69 76 78 96.1 105 116.2 - B1 B1.2 B7 B7.1 — P1 P4.1 P6.2 P9 P9.1 P10.2 P13

Pterocephalus multiflorus Poech. subsp. *obtusifolius* Holmboe
(Annex 1, plate no. 28)

Much branched, low shrub up to 1 m in height with erect or spreading branches. Endemic to Cyprus. It occurs on dry calcareous slopes (0-800 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood ring porous to semi-ring porous. Vessels solitary or in clusters. Mean tangential diameter of earlywood vessels less than 20 μm. Greater than 200 vessels per square millimeter in earlywood. Gums and other deposits in heartwood vessels. Fibers thin to thick walled. Axial parenchyma scanty paratracheal. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 μm in diameter). Helical thickenings in vessel elements present. Earlywood vessel elements length greater than 500 μm. Fibers with distinctly bordered pits (fiber tracheids). Helical thickenings in ground tissue fibers. All ray cells upright and/or square.
Tangential section: Rays uniseriate and 4 to 10 seriate.

Bark
Groups of sieve tubes present. Groups of sieve tube in radial rows. Collapsed

sieve tubes. Prismatic crystals. Phellem not clearly distinct.

Pith

Pith shape polygonal. Thick walled parenchyma cells present. Cells dimorphic. With crystals druses. Pits in transverse and in longitudinal cell walls. Pits in transverse cell walls. Primary vascular bundle not distinct.

Codified description

1 3 4 9 11 13 22 24 36 40.1 50.2 53.2 58 62 64 69 78 96 98 105 116.2 – B1 B1.2 B2 B7 B14 – P1.1 P3.3 P4 P6.2 P9 P9.1 P10.2

Scabiosa cyprica Post
(Annex 1, plate no. 28)

Shrub up to 1,2 m in height. An endemic species, occurring on dry slopes in garigue and open pine forests (150-1200 m alt.).

Xylem

Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous. Vessels predominantly solitary. Mean tangential diameter of earlywood vessels 20-50 µm. Fibers thin to thick walled. Radial flat marginal fibers. Axial parenchyma extremely rare, diffuse. Greater than 20 rays per millimeter.

Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 200-500 µm. Fibers with distinctly bordered pits (fiber tracheids). All ray cells upright and/or square.

Tangential section: Rays exclusively uniseriate.

Bark

Groups of sieve tubes present. Collapsed sieve tubes. Some rays become dilated. Prismatic crystals. Layered phelloderm.

Pith

Pith shape round. Cells dimorphic. Pits in transverse and in longitudinal cell walls. Pits grouped. Pits of two distinct size. Primary vascular bundles clearly separate from one another to not distinct. Tracheary elements of metaxylem in distinct radial rows.

Codified description

1 4 9 13 22 25 30 40.2 53.1 62 69 70.3 75 76 96 105 116.2 – B1 B2 B3.1 B7 B18 – P1 P4 P9 P9.1 P9.2 P9.3 P10.1 P10.2 P12

Elaeagnus angustifolia L.
(Annex 1, plate no. 28)

Deciduous shrub or small tree up to 8 m in height. An adventive species in Cyprus, naturalized on uncultivated slopes and cultivated in gardens, parks and road side plantations as ornamental (0-1400 m alt.). Native to western Asia extending eastwards up to northern China.

Xylem

Transverse section: Growth ring boundaries clearly demarcated. Wood ring porous. Vessels in diagonal and/or radial pattern, solitary, in clusters or in radial multiples of 2 to 4. Mean tangential diameter of earlywood vessel lumina 50 — 100 µm. Fibers thin to thick walled. Tension wood present. Axial parenchyma diffuse. Axial parenchyma scanty paratracheal. Axial parenchyma in narrow bands or lines up to three cells wide. Less than 4 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Helical thickenings only in narrower vessel elements. Earlywood vessel elements length 100-200 µm. Vascular and/or vasicentric tracheids present. Fibers with distinctly bordered pits (fiber tracheids). All ray cells procumbent. Body ray cells procumbent with one row of upright and/or square marginal cells.
Tangential section: Rays of two distinct sizes: uniseriate and up to 10 seriate.

Bark

Groups of sieve tubes present. Groups of sieve tubes in tangential rows. Collapsed sieve tubes. Sclereids in tangential rows and scattered or irregularly dispersed. Crystal sand. Cell content in parenchyma cells. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith

Pith shape polygonal. Cells dimorphic. Cell content (gum, tannins, dark staining substances). Crystal sand present. Pits in transverse and in longitudinal cell walls. Pits grouped. Primary vascular bundle not distinct.

Codified description

1 3 7 9 9.1 11 13 22 25 30 39 41 52.3 60 62 69 70.2 76 78 86 96 98 103 104 106 114 – B1 B1.1 B2 B6.2 B6.3 B7.3 B11 B14.1 B14.3 – P1.1 P4 P5 P6.4 P9 P9.1 P9.2 P10.2

Arbutus andrachne L.
(Annex 1, plate no. 29)

Evergreen shrub or small tree, 3-5(10) m in height, with characteristic fissured bark, variable in colour and fissures pattern long the growing season. Native to Cyprus, common in medium and high altitude (700-1500 m). Indigenous to Mediterranean countries from Albania to Palestine, and from Crimea to the Caucasus.

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous. Vessels predominantly solitary or in radial multiples of 2 to 4. Mean tangential diameter of earlywood vessels 20-50 µm, greater than 200 vessels per square millimeter in earlywood. Fibers thin to thick walled. Axial parenchyma diffuse and scanty paratracheal. Rays per millimeter 4-12.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Helical thickenings in vessel elements present. Earlywood vessel elements length 200-500 µm. Fibers with simple to minutely bordered pits (libriform fibers), septate fibers present. Ray cells upright and/or square, in some ray with 1-3 row of upright and/or square marginal cells.
Tangential section: Rays uniseriate to 3 cells wide.

Bark
Groups of sieve tubes in tangential rows. Collapsed sieve tubes present. Some rays become dilated. Sclereids scattered or irregularly dispersed. Prismatic crystals. Phellem homogeneous, distinct in polarized light.

Pith
Pith, shape round. Thick walled parenchyma cells present. Cells dimorphic.
Pits in transverse and in longitudinal cell walls. Primary vascular bundle not distinct. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
1 4 9 9.1 13 22 25 30 36 40.2 50.2 53.1 61 65 69 76 78 96 97 105 106 107 115 — B1 B1.1 B2 B3.1 B6.3 B7 B14.1 B14.3 — P1 P3.3 P4 P9 P9.1 P10.2 P12 P13

Arbutus unedo L.
(Annex 1, plate no. 29)

Evergreen shrub, 3-5 m in height, with a characteristic fissured bark. Native to Cyprus, with a limited distribution, found only in Akamas peninsula (30-80 m alt.). It is common in south-east Europe towards western Ireland and in the Mediterranean countries as far as Turkey.

Xylem

Transverse section: Growth ring distinct and recognizable. Wood semi-ring porous. Vessels predominantly in clusters. Mean tangential diameter of earlywood vessels 20-50 μm. Greater than 200 vessels per square millimeter in earlywood. Tyloses with thin wall common. Gums and other deposits in heartwood vessels and/or fibers. Fibers thin to very thick walled. Axial parenchyma scanty paratracheal. Greater than 20 rays per millimeter.

Radial section: Simple perforation plates. Inter-vessel pits alternate, large (greater than 10 μm in diameter). Vessel-ray pits rounded or angular with large apertures. Helical thickenings in vessel elements present. Earlywood vessel elements length 350-800 μm. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square. Body ray cells procumbent with one row of upright and/or square marginal cells.

Tangential section: Rays of two distinct sizes: uniseriate and 2-3 seriate. Larger rays height greater than 1 mm.

Bark

Groups of sieve tube in radial rows. Prismatic crystals present. Phellem homogeneous and distinct in polarized light.

Pith

Pith, shape round. Cells dimorphic center/border of the pith. With prismatic crystals in axial rows. Pits in transverse and in longitudinal cell walls. Pits of two distinct size in transverse cell walls. Primary vascular bundle not distinct. Axial cells arranged in regular rows (radial section).

Codified description

1 4 11 13 22 27 31 36 40.2 50.2 53 56 58 61 69 70 78 96 97 103 105 106 116.2 — B1 B1.2 B7 B14.1 B14.3 — P1 P4.1 P6 P9 P9.1 P9.3 P10.2 P13

Erica sicula Guss.

(Annex 1, plate no. 29)

Plant: Evergreen shrub up to 65 cm in height. Native to Cyprus, with limited distribution (250-850 m alt.). It is also found in Sicily, southern Turkey, Lebanon and Libya.

Xylem

Transverse section: Growth rings indistinct or absent. Wood diffuse porous. Mean tangential diameter of earlywood vessels less than 20 μm. Tyloses with thin wall common. Gums and other deposits in heartwood vessels. Fibers thick

to very thick walled. Axial parenchyma diffuse. Axial parenchyma scanty paratracheal. Axial parenchyma in narrow bands or lines up to three cells wide. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits opposite and alternate, minute (less than 4 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 100-200 µm. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square. Rays with procumbent, square and upright cells mixed throughout the ray.
Tangential section: Rays of two distinct sizes: predominant 1 to 3 cells and larger rays commonly 4 to 10 seriate.

Bark
Some rays become dilated. Sclerenchyma cells both in phloem and cortex. Fibers in tangential rows and scattered or irregularly dispersed. Cell content in parenchyma cells. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith
Pith shape square. Thick walled parenchyma cells present. Cells dimorphic. Cell content (gum, tannins, dark staining substances). Pits in transverse and in longitudinal cell walls. Primary vascular bundles clearly separate from one another to not distinct.

Codified description
2 5 13 21 22 24 30 40.1 52.3 56 58 61 69 70 76 78 86 96 97 98 103 105 109 116.2 – B3.1 B4 B5.2 B5.3 B11 B14.1 B14.3 – P1.4 P3.3 P4 P5 P9 P9.1 P10.1 P10.2

Euphorbiaceae

Euphorbia hierosolymitana Boiss.
(Annex 1, plate no. 30)

Evergreen, glabrous shrub up to 1 m in height. A very rare indigenous species to Cyprus, occurring on dry slopes in garigue and maquis (100-500 m alt.) An eastern Mediterranean species.

Xylem
Transverse section: Only one ring. Wood diffuse porous. Vessels in diagonal and/or radial pattern. Vessels in radial multiples of 4 or more common. Mean tangential diameter of earlywood vessels less than 20 µm. Fibers thin to thick walled. Axial parenchyma absent or extremely rare or not to recognizable. Greater than 20 rays per millimeter.

Radial section: Simple perforation plates. Inter-vessel pits scalariform. Inter-vessel pits opposite, minute (less than 4 µm in diameter). Vessel-ray pits with large horizontal or vertical apertures. Earlywood vessel elements length 100-200 µm. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: Rays exclusively uniseriate.

Bark
Groups of sieve tubes present. Phelloids present. Sclereids in tangential rows. Crystal sand. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith
Pith disappear in polarized light. Pith shape round. Unilignified cells. With crystals druses. Pits in transverse and in longitudinal cell walls. Vascular bundles in the pith. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows.

Codified description
5 7 10 13 20 21 24 32 40.1 52.3 61 69 75 96 105 116.2 – B1 B4.1 B6.2 B7.3 B14.1 B14.3 — P1 P3.4 P6.2 P9 P9.1 P10 P10.1 P12

Euphorbia thompsonii Holmboe
(Annex 1, plate no. 30)

Evergreen, robust, erect and tomentose subshrub. A rare indigenous species occurring on dry slope in garigue, maquis and pine forests (50-400 m alt.). An eastern Mediterranean species restricted to Cyprus and southern Turkey.

Xylem
Transverse section: Growth rings indistinct or absent. Wood diffuse porous. Vessels in diagonal and/or radial pattern. Vessels in radial multiples of 4 or more common. Mean tangential diameter of earlywood vessels less than 20 µm. Fibers thin to thick walled. Axial parenchyma diffuse. Axial parenchyma scanty paratracheal. Axial parenchyma in marginal or in seemingly marginal bands. Parenchyma marginal thin walled, dark in polarized light. Rays per millimeter 12-20.
Radial section: Simple perforation plates. Inter-vessel pits alternate, medium (7-10 µm in diameter). Vessel-ray pits rounded or angular with large apertures. Earlywood vessel elements length 100-200 µm. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: Rays exclusively uniseriate.

Bark
Pith disappear in polarized light. Pith shape round. Unilignified cells. Primary vascular bundles clearly separate from one another to not distinct.

Pith
Groups of sieve tubes present. Sclereids scattered or irregularly dispersed. Crystal sand. With secretory elements in ducts. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Codified description
2 5 7 10 13 22 26 31 40.1 52.3 61 69 76 78 89 89.1 96 105 116.1 – B1 B6.3 B7.3 B10 B10.2 B14.1 B14.3 – P1 P3.4 P10.1 P10.2

Ricinus communis L.
(Annex 1, plate no. 30)

Deciduous shrub up to 5 m in height. An adventive species, occurring on wetland all over Cyprus (0-500 m alt.). Probably native to northeast tropical Africa, but widely cultivated and naturalized in the warmest part of the world.

Xylem
Transverse section: Only one ring. Vessels solitary or in radial multiples of 2 to 4. Mean tangential diameter of earlywood vessel lumina 50 — 100 µm, 40 — 100 earlywood vessels per square millimeter. Fibers thick to very thick walled. Rays per millimeter 12-20.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 200-500 µm. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: Rays uniseriate to 3 cells wide.

Bark
Collapsed sieve tubes. Sclerenchyma cells both in phloem and cortex. Sclereids in tangential rows. Prismatic crystals. Phellem homogeneous, distinct in polarized light.

Pith
Pith shape round. Cells dimorphic center/border of the pith. With crystals druses. Pits in transverse and in longitudinal cell walls, of two distinct size.
Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows.

Codified description
9 9.1 13 22 25 30 41 49 53.1 61 69 70 96 97 105 116.1 — B2 B4 B6.2 B7 B14.1 B14.3 — P1 P4.1 P6.2 P9 P9.1 P9.3 P10.1 P12

Fagaceae

Quercus coccifera L. subsp. *calliprinos* (Webb) Holmboe
(Annex 1, plate no. 31)

Evergreen shrub or small tree up to 10 m in height. Indigenous to Cyprus, found in maquis and pine forests (100-1300 m alt.). Also native to Turkey, Syria and Palestine.

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels predominantly solitary. Vessels cell wall thick (greater than 2 µm). Mean tangential diameter of earlywood vessel lumina 50 — 100 µm, vessels number in early wood: 100-200 per square millimeter. Tyloses with thin wall common. Fibers very thick walled, tension wood present. Axial parenchyma scanty paratracheal and vasicentric. Apotracheal parenchyma in narrow bands or lines up to three cells wide.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessel-ray pits with large horizontal or vertical apertures. Earlywood vessel elements length 200-500 µm. Vascular and/or vasicentric tracheids present. Fibers with distinctly bordered pits (fiber tracheids). All ray cells procumbent. Rays with procumbent, square and upright cells mixed throughout the ray. Prismatic crystals in ray parenchyma cells and in axial parenchyma cells.
Tangential section: Rays of two distinct sizes: uniseriate and 4 to 10 seriate. Aggregate rays present.

Bark
Groups of sieve tube and collapsed sieve tubes present. Sclerenchyma cells both in phloem and cortex. Fibers and sclereids grouped. Crystal druses present. Phellem homogeneous, distinct in polarized light.

Pith
Pith shape triangular. Thick walled parenchyma cells present. Cells dimorphic center/border of the pith and cells dimorphic in the center of the pith. With prismatic crystals. Pits of two distinct size in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other or not distinct. Axial cells arranged in regular rows (radial section).

Codified description
1 5 9 13 22 25 32 39.1 41 50.1 53.1 56 60 62 70 70.2 78 79 86 96 98 101 103 104 109 116.2 136 136.1 141.1 — B1 B2 B4 B5.4 B6.4 B7.2 B14.1 B14.3 — P1.2 P3.3 P4 P4.1 P4.2 P6 P9 P9.1 P9.3 P10.1 P10.2 P13

Quercus infectoria Oliv. subsp. *veneris* (A.Kern.) Holmboe
(Annex 1, plate no. 31)

Semi-deciduous shrub or small tree up to 20 m in height. Indigenous to Cyprus, occurring in the mountains and in the lowlands (0-1700 m alt.). Indigenous to Turkey and eastwards to Iran.

Xylem
Growth ring boundaries clearly demarcated. Wood ring porous. Vessels in diagonal and/or radial pattern, predominantly solitary. Mean tangential diameter of earlywood vessel lumina 100 — 200 µm, vessels number in early wood: 100-200 per square millimeter. Tyloses with thin wall common. Fibers thin to thick walled, tension wood present. Axial parenchyma diffuse and vasicentric. Axial parenchyma in marginal or in seemingly marginal bands.
Radial section: Simple perforation plates. Inter-vessel pits alternate. Vessel-ray pits rounded or angular with large apertures. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells procumbent. Prismatic crystals present.
Tangential section: Rays of two distinct sizes: uniseriate and larger rays commonly greater than 10 seriate. The latter ray height greater than 1 mm.

Bark
Groups of sieve tube in radial rows. Collapsed sieve tubes. Sclerenchyma cells both in phloem and cortex. Fibers in tangential rows, sclereids scattered or irregularly dispersed. Prismatic crystals and druses present. Phellem homogeneous, distinct in polarized light.

Pith
Pith shape polygonal. Thick walled parenchyma cells present. Cells dimorphic. Laticifers canals. Pits grouped in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows.

Codified description
1 3 7 8 9 13 22 31 42 50.1 56 61 69 70.2 76 79 89 96 99 102 103 104 136 — B1 B1.2 B2 B4 B5.2 B6.3 B7 B7.2 B14.1 B14.3 — P1.1 P3.3 P4 P7 P9 P9.1 P9.2 P10.1 P12

Frankeniaceae

Frankenia hirsuta L.
(Annex 1, plate no. 31)

Procumbent subshrub. Indigenous to Cyprus, found along sandy shores (0-200 m alt.). Widespread in the Mediterranean.

Xylem
Transverse section: Growth rings indistinct or absent. Wood diffuse porous. Vessels predominantly solitary. Vessels cell wall thick (greater than 2 μm). Mean tangential diameter of earlywood vessels less than 20 μm. Fibers thin to thick walled. Parenchyma pervasive.
Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 μm in diameter). Earlywood vessel elements length 200-500 μm.
Tangential section: Wood rayless

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Sclereids scattered or irregularly dispersed. Prismatic crystals. Druses present. Phellem homogeneous. Phellem/epidermis distinct in polarized light. Layered phelloderm.

Pith
Pith disappear in polarized light. Pith shape round. Unilignified cells. Cells dimorphic. Primary vascular bundle not distinct.

Codified description
2 5 9 13 22 24 39.1 40.1 53.1 69 79.1 117 – B1 B2 B6.3 B7 B7.2 B14.1 B14.3 B18 – P1.1 P1 P3.4 P4 P10.2

Guttiferae

Hypericum hircinum L.
(Annex 1, plate no. 32)

Much branched, deciduous shrub up to 2 m in height. A rather rare native to Cyprus, growing mostly on shades and moist sites, often near streams (300-700 m alt.). Indigenous also in most other Mediterranean countries, and Arabia.

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood ring porous. Vessels in radial multiples of 2 to 4 common. Mean tangential diameter of earlywood vessels 20-50 μm. Gums and other deposits in heartwood vessels. Fibers thin to thick walled. Axial parenchyma diffuse. Rays per millimeter 12-20.
Radial section: Simple perforation plates. Inter-vessel pits alternate, medium (7-10 μm in diameter). Vessels-ray pits with distinct borders, similar to inter-

vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 200-500 µm. Fibers with simple and bordered pits, septate fibers present. All ray cells upright and/or square. Body ray cells procumbent with one row of upright and/or square marginal cells.
Tangential section: Rays exclusively uniseriate.

Bark
Groups of sieve tube and collapsed sieve tubes present. Some rays become dilated. With ducts. Phellem homogeneous.

Pith
Pith shape round. Thick walled parenchyma cells present. Cells dimorphic. Cell content (gum, tannins, dark staining substances). Pits in transverse and in longitudinal cell walls. Primary vascular bundle not distinct. Tracheary elements of metaxylem in distinct radial rows.

Codified description
1 3 9.1 13 22 26 30 40.2 53.1 58 61 62 65 69 76 96 105 106 116.1 — B1 B2 B3.1 B10 B10.2 B14.1 — P1 P3.3 P4 P5 P9 P9.1 P10.2 P12

Hypericum confertum (Choisy) G.Don
(Annex 1, plate no. 32)

Subshrub up to 35 cm in height. It thrives on rocky ground in pine forests (1200-1950 m alt.). Indigenous also to south and west Turkey, Syria and Lebanon.

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood ring porous to semi-ring porous. Vessels in radial multiples of 2 to 4 and in clusters. Mean tangential diameter of earlywood vessels less than 20 µm. Gums and other deposits in heartwood vessels. Fibers thin to very thick walled. Axial parenchyma diffuse. Axial parenchyma in marginal or in seemingly marginal bands composed of thin walled cells, dark in polarized light. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Helical thickenings in vessel elements present. Earlywood vessel elements length 50-100 µm. Fibers with simple and distinctly bordered pits. All ray cells upright and/or square.
Tangential section: Rays uniseriate to 1 to 3 cells wide.

Bark
Groups of sieve tube and collapsed sieve tubes present. Some rays become dilated. With secretory elements in ducts. Phellem homogeneous.

Pith
Pith disappear in polarized light, round in shape.

Codified description
1 3 4 9.1 11 13 22 24 30 36 40.1 52.2 58 61 62 69 70 76 89 89.1 96.1 97 105 116.2 — B1 B2 B3.1 B10 B10.2 B14.1 – P1.1 P1

Juglandaceae

Juglans regia L.
(Annex 1, plate no. 32)

Deciduous tree up to 25 m in height. A cultivated plant in Cyprus, but often found wild on moist sites (500-1400 m alt.). Native of the Balkan Peninsula and central Asia.

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous. Vessels solitary or in radial multiples of 2 to 4 common, mean tangential diameter of earlywood vessel lumina 100 — 200 µm, 40 — 100 earlywood vessels per square millimeter. Tyloses with thin wall common. Fibers thin to thick walled. Axial parenchyma diffuse. Axial parenchyma in narrow bands or lines up to three cells wide. Rays per millimeter 4-12.
Radial section: Simple perforation plates. Inter-vessel pits alternate, large (greater than 10 µm in diameter). All forms of vessel-ray pits: from rounded or angular with large apertures to large horizontal or vertical apertures. Earlywood vessel elements length 200-500 µm. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells procumbent.
Tangential section: Rays generally 2 to 3 seriate, rarely uniseriate or up to 10 seriate.

Bark
Groups of sieve tubes in tangential rows. Collapsed sieve tubes. Sclerenchyma cells both in phloem and cortex. Fibers in tangential rows. Fibers and sclereids scattered or irregularly dispersed. Druses present. Phellem homogeneous, distinct in polarized light.

Pith
Disappear in polarized light. Pith shape polygonal. Medullary sheath present. Pits in transverse and in longitudinal cell walls. Primary vascular bundle not distinct. Tracheary elements of metaxylem in distinct radial rows. Pith chambered (radial section).

Codified description
1 4 9 9.1 13 22 27 31 32 42 49 53.1 56 61 69 76 86 96 97 98 103 104 115 196 197 — B1 B1.1 B2 B4 B5.2 B5.3 B6.3 B7.2 B14.1 B14.3 — P1.1 P2 P9 P9.1 P10.2 P12 P14

Labiateae

Ballota integrifolia Benth.
(Annex 1, plate no. 33)

Deciduous shrub up to 150 cm in height. Endemic to Cyprus found on rocky slopes, in shrubland and field margins (0-700 m alt.).

Xylem
Transverse section: Growth ring distinct and recognizable. Wood ring porous. Vessels solitary or in clusters. Mean tangential diameter of earlywood vessels 20-50 µm. Greater than 200 vessels per square millimeter in earlywood. Fibers thin to thick walled. Axial parenchyma absent or extremely rare or not to recognizable. Axial parenchyma scanty paratracheal. Rays 12-20 to greater than 20 per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, large (greater than 10 µm in diameter). Vessel-ray pits rounded or angular with large apertures. Helical thickenings in vessel elements present. Earlywood vessel elements length less than 350 µm. Vascular and/or vasicentric tracheids present. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square. Prismatic crystals in ray parenchyma cells.
Tangential section: Rays of two distinct sizes: uniseriate and 2-3 seriate. Larger rays height greater than 1 mm.

Bark
Groups of sieve tubes present. Sclerenchyma cells both in phloem and cortex. In cortex fibers grouped. In phloem sclereids in tangential rows. Prismatic crystals present. Phellem homogeneous. In adult bark fiber not observed; sclereids in tangential rows and scattered or irregularly dispersed.

Pith
Pith, shape round. Cells dimorphic center/border of the pith. With acicular crystals. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other. Primary vascular bundle not distinct. Axial cells arranged in regular rows (radial section).

Codified description
1 3 9 11 13 22 27 31 36 40.2 50.2 52 60 61 69 75 78 96 97 102 103 105 116.1

116.2 136.1 — B1 B4 B5 B5.4 B6 B6.2 B7 B14.1 — P1 P4.1 P6.1 P9 P9.1 P10.1 P10.2 P13

Calamintha incana (Sibth. & Sm.) Boiss.
(Annex 1, plate no. 33)

Strongly aromatic, usually prostrate, much branched, deciduous subshrub with stem up to 60 cm long. Native to Cyprus, found along roadsides and on fallow land, sand dunes and rocky slopes (0-1500 m alt.) Also indigenous to the eastern Mediterranean.

Xylem
Transverse section: Growth rings indistinct or absent. Wood diffuse porous. Vessels in diagonal and/or radial pattern. Vessels in radial multiples of 2 to greater than 4 common. Mean tangential diameter of earlywood vessels 20-50 µm. Greater than 200 vessels per square millimeter in earlywood. Fibers thin to thick walled. Axial parenchyma absent or extremely rare or not to recognizable. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: Rays exclusively uniseriate.

Bark
Groups of sieve tubes present. Crystal sand. Cell content in parenchyma cells. Layered phelloderm.

Pith missing

Codified description
2 5 7 9.1 10 13 22 24 30 40.2 50.2 61 69 75 96 105 116.2 – B1 B7.3 B11 B18 – Pith missing

Lavandula angustifolia Mill.
(Annex 1, plate no. 33)

Aromatic shrub up to 100 cm in height. Adventive to Cyprus, found scattered throughout some areas but better know as an ornamental plant. Thrives on well-drained soils and in sunny places (0-1400 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood semi-

ring porous to diffuse porous. Vessels in diagonal and/or radial pattern. Vessels in radial multiples of 2 to 4 common. Mean tangential diameter of earlywood vessels less than 20 μm. Vessels number in early wood: 100-200 per square millimeter. Fibers thin to thick walled. Tension wood present. Axial parenchyma scanty paratracheal.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 μm in diameter). Vessel-ray pits rounded or angular with large apertures. Helical thickenings only in narrower vessel elements. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: Rays of two distinct sizes: uniseriate to 3 cells wide.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Sclereids scattered or irregularly dispersed. Acicular crystals. Phellem homogeneous.

Pith
Pith shape polygonal. Thick walled parenchyma cells present. Cells dimorphic. Pits in transverse and in longitudinal cell walls. Pits grouped. Pits of two distinct size. Primary vascular bundles clearly separate from one another to not distinct. Axial cells arranged in regular rows (radial section).

Codified description
1 4 5 7 9.1 13 22 25 31 39 40.1 50.1 61 69 70.2 78 96 97 103 105 116.1 116.2 – B1 B2 B6.3 B7.1 B14.1 – P1.1 P3.3 P4 P9 P9.1 P9.2 P9.3 P10.1 P10.2 P13

Micromeria nervosa (Desf.) Benth.
(Annex 1, plate no. 34)

Much branched subshrub up to 50 cm in height. Native to Cyprus, growing in thickets and phrygana (0-600 m alt.). Also indigenous to the Mediterranean countries.

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels in radial multiples of 4 or more common. Mean tangential diameter of earlywood vessels 20-50 μm. Greater than 200 vessels per square millimeter in earlywood. Fibers thin to thick walled. Axial parenchyma absent or extremely rare or not to recognizable. Greater than 20 rays per millimeter. Stem lobed.
Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 μm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: Ray exclusively uniseriate.

Bark
Groups of sieve tubes present. Phloem uniform. Cell content in parenchyma cells. Phellem/epidermis distinct in polarized light.

Pith
Pith shape square. Thick walled parenchyma cells present. Cells dimorphic. Pits in transverse cell walls. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows.

Codified description
1 5 10 13 22 24 30 40.2 50.2 61 69 75 96 99.2 105 116.2 – B1 B8 B11 B14.3 – P1.4 P3.3 P4 P9.1 P10.1 P12

Micromeria cypria Kotschy
(Annex 1, plate no. 34)

Usually prostrate, much branched subshrub up to 15 cm in height. Endemic to Cyprus, occurring in crevices of limestone rocks on the Pentadactylos mountain range (300-900 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous to diffuse porous. Vessels in radial multiples of 2 to 4 common. Mean tangential diameter of earlywood vessels 20-50 μm. Vessels of two distinct diameter classes. Greater than 200 vessels per square millimeter in earlywood. Fibers thin to thick walled. Axial parenchyma absent or extremely rare or not to recognizable. Axial parenchyma in marginal or in seemingly marginal bands. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 μm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: Rays exclusively uniseriate.

Bark
Phloem uniform.

Pith
Pith shape square. Cells dimorphic. Pits in transverse and in longitudinal cell walls. Pits grouped. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description

1 4 5 9.1 13 22 24 30 40.2 45 50.2 61 69 75 89 96 105 116.2 – B8 – P1.4 P4 P9 P9.2 P10.1 P12 P13

Micromeria chionistrae Meikle
(Annex 1, plate no. 34)

Sub erected or sprawling subshrub up to 30 cm in height. Endemic to Cyprus, very common in crevices of ophiolite rocks on the Troodos mountain range (400-1500 m alt.).

Xylem

Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous. Vessels solitary and in radial multiples of 2 to 4. Mean tangential diameter of earlywood vessels less than 20 µm. Vessels of two distinct diameter classes. Greater than 200 vessels per square millimeter in earlywood. Fibers thin to thick walled. Axial parenchyma absent or extremely rare or not to recognizable. Axial parenchyma in marginal or in seemingly marginal bands. Stem lobed. Greater than 20 rays per millimeter.

Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.

Tangential section: Rays exclusively uniseriate.

Bark

Groups of sieve tubes present. Phloem almost uniform. Phellem/epidermis distinct in polarized light.

Pith

Pith shape round. Cells dimorphic. Primary vascular bundle not distinct. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description

1 4 9 9.1 13 22 24 30 40.1 45 50.2 61 69 75 89 96 99.2 105 116.2 – B1 B8 B14.3 – P1 P4 P10.2 P12 P13

Micromeria myrtifolia Boiss. et Hohen
(Annex 1, plate no. 35)

Erect, much branched subshrub up to 50 cm in height. Indigenous to Cyprus, occurring in forests, thickets, and phrygana (0-1200 m alt.). Also indigenous to the Mediterranean countries and eastwards to Iran.

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous. Vessels solitary and in radial multiples of 2 greater than 4. Mean tangential diameter of earlywood vessels less than 20 µm. Greater than 200 vessels per square millimeter in earlywood. Gums and other deposits in heartwood vessels. Fibers thin to thick walled. Axial parenchyma absent or extremely rare or not to recognizable. Stem lobed. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: Rays exclusively uniseriate.

Bark
Phloem uniform. Cell content in parenchyma cells.

Pith
Pith shape square. Cells dimorphic. Cell content (gum, tannins, dark staining substances). Pits in transverse and in longitudinal cell walls. Pits grouped. Pits of two distinct size. Primary vascular bundle clearly separate from one other and not distinct. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
1 4 9 9.1 10 13 22 24 30 40.1 50.2 58 61 69 75 96 99.2 105 116.2 – B8 B11 – P1.4 P4 P5 P9 P9.1 P9.2 P9.3 P10.1 P10.2 P12 P13

Nepeta troodi Holmboe
(Annex 1, plate no. 35)

Erect or sprawling subshrub up to 50 cm in height. Endemic to Cyprus, locally common in rocky mountainsides and in pine forests (1000 – 1950 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous to diffuse porous. Vessels in radial multiples of 2 to 4 and in clusters. Mean tangential diameter of earlywood vessels 20-50 µm. Vessels of two distinct diameter classes. Greater than 200 vessels per square millimeter in

earlywood. Fibers thin to thick walled. Axial parenchyma absent or extremely rare or not to recognizable. Stem lobed. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Helical thickenings in vessel elements present. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: rays exclusively uniseriate.

Bark
Groups of sieve tube and collapsed sieve tubes present. Sclereids in tangential rows or scattered and irregularly dispersed. Prismatic crystals.

Pith
Pith shape round. Cells dimorphic. Pits in transverse and in longitudinal cell walls. Pits of two distinct size. Primary vascular bundle clearly separate from one other. Primary vascular bundle not distinct. Axial cells arranged in regular rows (radial section).

Codified description
1 4 5 9.1 11 13 22 24 30 36 40.2 45 50.2 61 69 75 96 99.2 105 116.2 – B1 B2 B6.2 B6.3 B7 – P1 P4 P9 P9.1 P9.3 P10.1 P10.2 P13

Origanum cordifolium (Aucher et Montbret ex Benth.) Vogel
(Annex 1, plate no. 35)

Aromatic much branched subshrub up to 60 cm in height. Endemic to Cyprus, growing on moist, rocky places along stream sides, on igneous formations (200-900 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous to diffuse porous. Vessels in diagonal and/or radial pattern. Vessels in radial multiples of 2 to 4 common. Mean tangential diameter of earlywood vessels 20-50 µm. Greater than 200 vessels per square millimeter in earlywood. Fibers thin to thick walled. Axial parenchyma scanty paratracheal. Axial parenchyma in marginal or in seemingly marginal bands. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 µm in diameter). Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: Rays exclusively uniseriate.

Bark

Groups of sieve tubes present. Druses present. Phloem uniform.

Pith

Pith shape round. Pits in transverse and in longitudinal cell walls. Pits of two distinct size. Primary vascular bundle not distinct. Axial cells arranged in regular rows (radial section).

Codified description

1 4 5 7 9.1 13 22 24 40.2 50.2 61 69 78 89 96 105 116.2 – B1 B7.2 B8 – P1 P9 P9.1 P9.3 P10.2 P13

Origanum dubium Boiss.

(Annex 1, plate no. 36)

Aromatic shrub up to 10 cm in height. Indigenous to Cyprus, growing on rocky places and in maquis, garigue and pine forests (200-1000 m alt.). Also indigenous to Turkey.

Xylem

Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous. Vessels solitary and in radial multiples of 2 to 4. Mean tangential diameter of earlywood vessels 20-50 µm. Greater than 200 vessels per square millimeter in earlywood. Fibers thin to thick walled. Radial flat marginal fibers. Axial parenchyma absent or extremely rare or not to recognizable. Axial parenchyma in marginal or in seemingly marginal bands. Greater than 20 rays per millimeter.

Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.

Tangential section: Rays exclusively uniseriate.

Bark

Acicular crystals. Phloem uniform. Cell content in parenchyma cells.

Pith

Pith shape square. Cells dimorphic. Pits in transverse and in longitudinal cell walls, grouped, of two distinct size. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description

1 4 9 9.1 13 22 25 30 40.2 50.2 61 69 70.3 75 89 96 105 116.2 – B7.1 B8 B11 – P1.4 P4 P9 P9.1 P9.2 P9.3 P12 P13

Origanum majorana L.
(Annex 1, plate no. 36)

Much branched aromatic shrub up to 100 cm in height. Endemic to Cyprus, it grows in shrubland, pine forests and rocky places (0-900 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous. Vessels predominantly solitary. Vessels in radial multiples of 2 to 4 common. Mean tangential diameter of earlywood vessels 20-50 μm. Vessels of two distinct diameter classes. Greater than 200 vessels per square millimeter in earlywood. Gums and other deposits in heartwood vessels. Fibers thin to thick walled. Axial parenchyma scanty paratracheal. Stem lobed. Rays per millimeter 12-20.
Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 μm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: Rays exclusively uniseriate.

Bark
Groups of sieve tubes present. Phloem uniform. Cell content in parenchyma cells. Phellem/epidermis distinct in polarized light.

Pith
Pith shape square. Cells dimorphic. Pits in transverse and in longitudinal cell walls. Pits grouped. Pits of two distinct size. Primary vascular bundle not distinct. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
1 4 9 9.1 13 22 24 30 40.2 45 50.2 58 61 69 78 96 99.2 105 116.1 – B1 B8 B11 B14.3 – P1.4 P4 P9 P9.1 P9.2 P9.3 P10.2 P12 P13

Phlomis brevibracteata Turril
(Annex 1, plate no. 36)

Shrub up to 1,5 m in height. Endemic to Cyprus, growing in maquis and garigue, mainly on limestone formations (300-900 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous. Vessels in diagonal and/or radial pattern. Vessels in radial multiples of 2 to 4 common. Mean tangential diameter of earlywood vessels 20-

50 µm. Vessels of two distinct diameter classes. Greater than 200 vessels per square millimeter in earlywood. Fibers thick to very thick walled. Axial parenchyma scanty paratracheal. Rays per millimeter 12-20.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Helical thickenings only in narrower vessel elements. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: Rays uniseriate to 1 to 3 cells wide.

Bark
Groups of sieve tubes present. Sclereids in tangential rows and scattered or irregularly dispersed. Crystal sand. Layered phelloderm.

Pith
Pith shape polygonal. Cells dimorphic. With acicular crystals. Pits in transverse and in longitudinal cell walls. Pits of two distinct size. Primary vascular bundle clearly separate from one other or not distinct. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
1 4 7 9.1 13 22 25 30 39 40.2 45 50.2 61 69 70 78 96 97 105 116.1 – B1 B6.2 B6.3 B7.3 B18 — P1.1 P4 P6.1 P9 P9.1 P9.3 P10.1 P10.2 P12 P13

Phlomis cypria Post. var. *cypria* Meikle
(Annex 1, plate no. 37)

Shrub up to 1.5 m in height. Endemic to Cyprus, occurring in to varieties. It occurs in shrubland and on limestone slopes in the eastern parte of the Pentadactylos range (150-750 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood ring porous. Vessels in diagonal and/or radial pattern. Vessels in radial multiples of 2 to 4 and in clusters. Mean tangential diameter of earlywood vessels 20-50 µm. Fibers thin to thick walled. Radial flat marginal fibers. Axial parenchyma scanty paratracheal to vasicentric. Rays per millimeter 12-20.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Helical thickenings in vessel elements present. Earlywood vessel elements length 100-200 µm. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: Rays uniseriate to 3 cells wide.

Bark
Fibers scattered or irregularly dispersed. Phellem/epidermis distinct in polarized light.

Pith
Pith shape square. With acicular crystals. Pits in transverse and in longitudinal cell walls. Primary vascular bundles clearly separate from one another to not distinct. Tracheary elements of metaxylem in distinct radial rows.

Codified description
1 3 7 9.1 11 13 22 25 36 40.2 52.3 61 69 70.3 78 79 96 97 105 116.1 – B5.3 B14.3 – P1.4 P6.1 P9 P9.1 P10.1 P10.2 P12

Phlomis cypria Post var. *occidentalis* Meikle
(Annex 1, plate no. 37)

Shrub up to 1.5 m in height. Endemic to Cyprus, occurring in to varieties. It occurs in shrubland mainly in ophiolite formations (150-750 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood ring porous. Vessels in diagonal and/or radial pattern or in clusters. Mean tangential diameter of earlywood vessels 20-50 µm, vessels number in early wood: 100-200 per square millimeter. Fibers thin to thick walled, radial flat marginal fibers. Axial parenchyma scanty paratracheal, apotracheal parenchyma in marginal or in seemingly marginal bands. Rays per millimeter 12-20.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Helical thickenings in vessel elements present. Earlywood vessel elements length 100-200 µm. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square. Body ray cells procumbent with mostly 2-4 rows of upright and/or square marginal cells. Rays with procumbent, square and upright cells mixed throughout the ray.
Tangential section: Rays uniseriate to 3 cells wide.

Bark
Sclereids scattered or irregularly dispersed.

Pith
Pith, shape polygonal. Cells dimorphic. With acicular crystals. Pits grouped in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
1 3 7 11 13 22 25 30 36 40.2 50.1 52.3 61 69 70.3 78 89 96 97 105 107 109 116.1 — B6.3 — P1.1 P4 P6.1 P9 P9.1 P9.2 P10.1 P12 P13

Phlomis lunariifolia Sm.
(Annex 1, plate no. 37)

Shrub up to 2 m in height. Indigenous to Cyprus, found in shrublands (0-500 m alt.). Also found in southern Turkey.

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous. Vessels in diagonal and/or radial pattern. Vessels predominantly in clusters. Mean tangential diameter of earlywood vessels 20-50 µm. Vessels of two distinct diameter classes. Greater than 200 vessels per square millimeter in earlywood. Fibers thin to thick walled. Fibers very thick walled. Radial flat marginal fibers. Axial parenchyma scanty paratracheal. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessel-ray pits rounded or angular with large apertures. Helical thickenings in vessel elements present. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: Rays uniseriate to 3 cells wide.

Bark
Groups of sieve tubes present. Sclereids scattered or irregularly dispersed. Crystal sand. Cell content in parenchyma cells.

Pith
Pith shape polygonal. Cells dimorphic. With acicular crystals. Pits in transverse and in longitudinal cell walls. Pits grouped. Pits of two distinct size. Primary vascular bundle clearly separate from one other. Primary vascular bundle not distinct. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
1 4 7 11 13 22 25 31 36 40.2 45 50.2 61 69 70 70.3 78 96 97 105 116.2 – B1 B6.3 B7.3 B11 – P1.1 P4 P6.1 P9 P9.1 P9.2 P9.3 P10.1 P10.2 P12 P13

Prasium majus L.
(Annex 1, plate no. 38)

Erect or scrambling shrub, with stem up to 4 long. Common indigenous species in Cyprus, occurring in maquis, garigue, forests and occasionally in rocky crevices (0-700 m alt.). Occurs throughout the Mediterranean.

Xylem
Transverse section: Growth ring distinct and recognizable. Wood semi-ring porous. Vessels in diagonal and/or radial pattern. Vessels solitary or in radial multiples of 2 to 4. Vessels cell wall thick (greater than 2 μm). Mean tangential diameter of earlywood vessels 20-50 μm. Vessels of two distinct diameter classes. Greater than 200 vessels per square millimeter in earlywood. Fibers thin to thick walled. Axial parenchyma absent or extremely rare or not to recognizable; axial parenchyma scanty paratracheal in earlywood. Rays per millimeter 12-20.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 μm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length less than 350 μm. Fibers with simple to minutely bordered pits (libriform fibers); septate fibers present. All ray cells upright and/or square.
Tangential section: Rays predominantly uniseriate, few 2-3 seriate.

Bark
Groups of sieve tube in tangential rows. Collapsed sieve tubes. Fibers in tangential rows and scattered or irregularly dispersed. Prismatic crystals, druses and crystal sand present. In adult bark fibers arrangement in tangential rows only.

Pith
Pith shape round. Cells dimorphic center/border of the pith. With prismatic and acicular crystals. Pits in transverse and in longitudinal cell walls. Pits of two distinct size in transverse cell walls. Primary vascular bundle not distinct. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
1 4 7 9 9.1 13 22 25 30 39.1 40.2 45 50.2 52 61 65 69 75 78 96.1 97 105 116.1 - B1 B1.1 B2 B5.2 B5.3 B7 B7.2 B7.3 — P1 P4 P4.1 P6 P6.1 P9 P9.1 P9.3 P10.2 P12 P13

Salvia fruticosa Mill.

(Annex 1, plate no. 38)

Strongly aromatic shrub up to 120 cm in height. Very common indigenous species in Cyprus, growing on rocky places, shrublands and pine forests. (0-1500 m alt.). Also occur in the eastern Mediterranean region, from Italy to Palestine.

Xylem

Transverse section: growth ring distinct and recognizable. Wood semi-ring-porous, vessels in diagonal and radial pattern, predominantly solitary. Mean tangential diameter of earlywood vessels 50 — 100 m, vessels of two distinct diameter classes. Greater than 100 earlywood vessels per square millimeter. Tyloses with thin wall common. Fibers thin to thick walled. Axial parenchyma scanty paratracheal and in marginal or in seemingly marginal bands. Stem lobed. Rays per millimeter 12-20.

Radial section: simple perforation plates. Inter-vessel pittings pseudoscalariform to reticulate or alternate. Inter-vessel pits medium (7-10 µm in diameter). Earlywood vessel elements length up to 350 µm. Vascular and vasicentric tracheids present. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.

Tangential section: rays exclusively uniseriate. Ray width predominant 1 to 3 cells.

Bark

Adult bark only: Groups of sieve tube in radial rows. Distinct rays dilatations. Sclereids in tangential rows. Prismatic crystals and druses present.

Pith

Pith shape round. Cells dimorphic center/border of the pith. Crystal sand. Pits in transverse and in longitudinal cell walls (radial section). Pits of two distinct size. Primary vascular bundles clearly separate from one another to not distinct. Axial cells arranged in regular rows (radial section).

Codified description

1 4 7 9 13 20.1 22 26 41 45 50 52 56 60 61 69 78 89 96 97 99.2 105 116.1 – bark missing – P1 P4.1 P6.4 P9 P9.1 P9.3 P10.1 P10.2 P13

Salvia willeana (Holmboe) Hedge
(Annex 1, plate no. 38)

Strongly aromatic subshrub up to 60 cm in height. Endemic to Cyprus, occurring on rocky places and in pine forests and shrublands. Confined to the ophiolite formations on the Troodos mountain range (1000-1950 m alt.).

Xylem

Transverse section: Growth ring boundaries clearly demarcated. Wood ring porous to semi-ring porous. Vessels predominantly solitary. Mean tangential diameter of earlywood vessels 20-50 µm, vessels of two distinct diameter classes. Greater than 200 vessels per square millimeter in earlywood. Tyloses with thin wall common. Gums and other deposits in heartwood vessels. Fibers thin to thick walled. Axial parenchyma absent or extremely rare or not to

recognizable. Axial parenchyma scanty paratracheal. Stem lobed. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Vessel-ray pits with large horizontal or vertical apertures. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: Rays uniseriate to cells wide. Rays of two distinct sizes.

Bark
Groups of sieve tubes present. Crystal sand. Tannins and/or other cell content in parenchyma cells. Layered phelloderm.

Pith
Pith shape round. Cells dimorphic. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other. Primary vascular bundle not distinct. Tracheary elements of metaxylem in distinct radial rows.

Codified description
1 3 4 9 13 22 24 30 32 40.2 45 50.2 56 58 61 69 75 78 96 97 99.2 103 105 116.2 — B1 B7.3 B11 B18 — P1 P4 P9 P9.1 P10.1 P10.2 P12

Salvia lanigera Poir.
(Annex 1, plate no. 39)

Strong-smelling subshrub up to 40 con in height. Indigenous to Cyprus, growing in shrublands, sandy places and san dunes (0-200 m alt.). Also occur in north Africa, Palestine and eastward to Iran and Saudi Arabia.

Xylem
Transverse section: Only one ring. Vessels in radial multiples of 2 to 4 common. Mean tangential diameter of earlywood vessels 20-50 µm. Greater than 200 vessels per square millimeter in earlywood. Fibers thin to thick walled. Axial parenchyma absent or extremely rare or not to recognizable. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pittings pseudoscalariform to reticulate. Inter-vessel pits alternate, small (4-7 µm in diameter). Earlywood vessel elements length less than 50 µm. Vascular and/or vasicentric tracheids present. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: Rays exclusively uniseriate. Rays confluent with ground tissue.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Acicular crystals. Cell content in parenchyma cells.

Pith missing

Codified description
9.1 13 20.1 22 25 40.2 50.2 52.1 60 61 69 75 96 100.1 105 116.2 – B1 B2 B7.1 B11 – Pith missing

Salvia dominica L.
(Annex 1, plate no. 39)

Strongly aromatic shrub or subshrub up to 100 cm in height. Rare, indigenous species to Cyprus, occurring on rocky places (20-150 m alt.). Also occur in Syria, Palestine and Egypt.

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels in radial multiples of 2 to 4 common. Vessels predominantly in clusters. Mean tangential diameter of earlywood vessels 20-50 µm. Vessels of two distinct diameter classes. Greater than 200 vessels per square millimeter in earlywood. Fibers thin to thick walled. Axial parenchyma scanty paratracheal. Stem lobed. Rays per millimeter 4-12.
Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Helical thickenings in vessel elements present. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square. Prismatic crystals in ray parenchyma cells.
Tangential section: Rays of two distinct sizes: uniseriate and up to 3 cells wide. Larger rays height greater than 1 mm.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Sclereids in tangential rows, scattered or irregularly dispersed. Acicular crystals.

Pith
Pith shape square. Cells dimorphic. With acicular crystals. Pits in transverse and in longitudinal cell walls. Pits of two distinct size. Primary vascular bundles clearly separate from one another to not distinct. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
1 5 9.1 11 13 22 24 30 36 40.2 45 50.2 61 69 78 96 97 99.2 102 103 105 115 136 136.1 – B1 B2 B6.2 B6.3 B7.1 – P1.4 P4 P6.1 P9 P9.1 P9.3 P10.1 P10.2 P12 P13

Satureja thymbra L.
(Annex 1, plate no. 39)

Erect, much branched aromatic shrub up to 50 cm in height. Rare, indigenous species in Cyprus, growing on limestone and igneous rocks (200-300 m alt.). It also occurs in Sardinia, Greece and countries of the eastern Mediterranean.

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood ring porous and semi-ring porous. Vessels in radial multiples of 2 to 4 and in clusters. Mean tangential diameter of earlywood vessels 20-50 µm. Vessels of two distinct diameter classes. Vessels number in early wood: 100-200 per square millimeter. Fibers thin to thick walled. Axial parenchyma scanty paratracheal. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: Rays exclusively uniseriate.

Bark
Phloem uniform. Acicular crystals. Layered phelloderm.

Pith
Pith shape round. Thick walled parenchyma cells present. Cell content (gum, tannins, dark staining substances). Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows.

Codified description
1 3 4 9.1 11 13 22 25 30 40.2 45 50.1 61 69 78 96 105 116.2 – B7.1 B8 B18 – P1 P3.3 P5 P9 P9.1 P10.1 P12

Scutellaria sibthorpii Boiss. et Reut. ex Boiss.
(Annex 1, plate no. 40)

Erect or sprawling subshrub up to 50 cm in height. Endemic to Cyprus, found o rocky calcareous hillsides, sometimes on costal garigue (0-60 m alt.).

Xylem
Transverse section: Only one ring. Vessels solitary or in radial multiples of 2 to 4. Mean tangential diameter of earlywood vessels less than 20 µm. Greater than 200 vessels per square millimeter in earlywood. Fibers thin to thick walled. Axial parenchyma absent or extremely rare or not to recognizable. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: Rays uniseriate to 3 cells wide.

Bark
Groups of sieve tubes present. Fibers scattered or irregularly dispersed. Crystal sand. Phellem homogeneous.

Pith
Pith shape round. Cells dimorphic. Pits in transverse and in longitudinal cell walls. Pits grouped
and in two distinct size. Primary vascular bundles clearly separate from one another to not distinct.

Codified description
9 9.1 13 22 25 30 40.1 50.2 61 69 75 96.1 97 105 116.2 – B1 B5.3 B7.3 B14.1 – P1 P4 P9 P9.1 P9.2 P9.3 P10.1 P10.2

Sideritis cypria Post
(Annex 1, plate no. 40)

Subshrub up to 60 cm in height. Endemic to Cyprus, growing in crevices of south-facing limestone cliffs on Pentadactylos mountain range (300-900 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous. Vessels predominantly solitary. Mean tangential diameter of earlywood vessels 20-50 µm. Vessels of two distinct diameter classes. Vessels number in early wood: 100-200 per square millimeter. Fibers thin to thick walled. Axial parenchyma absent or extremely rare or not to recognizable. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: Rays of two distinct sizes: uniseriate and up to 3 cells wide.

Bark

Groups of sieve tubes present. Collapsed sieve tubes. Crystal sand. Phellem homogeneous.

Pith

Pith shape round. Medullary sheath present. Cells dimorphic. Pits in transverse and in longitudinal cell walls. Pits of two distinct sizes. Axial cells arranged in regular rows (radial section).

Codified description

1 4 9 13 22 25 30 40.2 45 50.1 61 69 75 96 97 103 105 116.2 – B1 B2 B7.3 B14.1 – P1 P2 P4 P9 P9.1 P9.3 P13

Teucrium micropodioides Rouy
(Annex 1, plate no. 40)

Strongly aromatic subshrub up to 20 cm in height, usually forming low, domed bushes. Common, endemic species in Cyprus, found on rocky places, in maquis, garigue and pine forest (0-900 m alt.).

Xylem

Transverse section: Growth ring distinct and recognizable. Wood diffuse-porous. Vessels in radial multiples of 2 to 4 or in clusters. Mean tangential diameter of earlywood vessels less than 20 µm. Greater than 100 earlywood vessels per square millimeter. Gums and other deposits in heartwood vessels and/or fibers. Fibers thin to very thick walled. Radial flat marginal fibers. Axial parenchyma diffuse and scanty paratracheal. Axial parenchyma in marginal or in seemingly marginal bands. Greater than 20 rays per millimeter. Stem lobed.

Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 350-800 µm. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.

Tangential section: Rays exclusively uniseriate.

Bark

Collapsed sieve tubes. Acicular crystals and crystal sand present. Tannins and/or other cell content in parenchyma cells.

Pith

Pith shape round, with thick walled parenchyma cells. Cells dimorphic center/border of the pith. Cell content (dark staining substances). Pits in transverse and in longitudinal cell walls, grouped in longitudinal cell walls. Primary vascular bundle not distinct. Tracheary elements of metaxylem in distinct radial rows.

Codified description
1 5 9.1 11 13 22 25 30 40.1 50 53 58 61 69 70 70.3 76 78 89 96 99.2 105 116.2 — B2 B7.1 B7.3 B11 — P1 P3.3 P4.1 P5 P9 P9.1 P9.2 P10.2 P12

Teucrium creticum L.
(Annex 1, plate no. 41)

Shrub up to 2 m in height. Common indigenous species in Cyprus, occurring in maquis and garigue and on rocky places. (0-900 m alt.). Also occurs in the east Mediterranean region from Turkey to Lebanon.

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood ring porous to semi-ring porous. Vessels in diagonal and/or radial pattern. Vessels in radial multiples of 2 to 4 common. Mean tangential diameter of earlywood vessels 20-50 µm. Vessels of two distinct diameter classes. Greater than 200 vessels per square millimeter in earlywood. Fibers thick walled to very thick walled. Axial parenchyma absent or extremely rare or not to recognizable. Axial parenchyma scanty paratracheal. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Helical thickenings only in narrower vessel elements. Fibers with simple to minutely bordered pits (libriform fibers).
Tangential section: Rays uniseriate to 3 cells wide.

Bark
Crystal sand. Phloem uniform. Cell content in parenchyma cells.

Pith
Pith shape round. Cells dimorphic. Pits in transverse and in longitudinal cell walls. Primary vascular bundles clearly separate from one another to not distinct. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
1 3 4 7 9.1 13 22 25 30 39 40.2 45 50.2 61 69 70 75 78 96.1 97 116.2 – B7.3 B8 B11 – P1 P4 P9 P9.1 P10.1 P10.2 P12 P13

Teucrium cyprium Boiss. subsp. *cyprium*
(Annex 1, plate no. 41)

Strongly aromatic subshrub up to 10 cm in height. Endemic species in Cyprus. It occurs in two subspecies: 1) *cyprium*, restricted to rocky mountainsides and pine forests of the Troodos range (300-1900 m alt.); 2) *kyreniae*, restricted to rocky and cliffy places of the Pentadactylos mountain range (0-900 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous to diffuse porous. Vessels predominantly solitary. Mean tangential diameter of earlywood vessels less than 20 µm. Vessels of two distinct diameter classes. Greater than 200 vessels per square millimeter in earlywood. Fibers thin to thick walled. Axial parenchyma absent or extremely rare or not recognizable. Axial parenchyma scanty paratracheal. Greater than 20 rays per millimeter. Stem lobed.
Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Helical thickenings in vessel elements present. Fibers with distinctly bordered pits (fiber tracheids). Helical thickenings in ground tissue fibers. All ray cells upright and/or square.
Tangential section: Rays exclusively uniseriate.

Bark
Groups of sieve tubes present. Crystal sand. Phloem uniform. Cell content in parenchyma cells. Layered phelloderm.

Pith
Pith missing

Codified description
1 4 5 9 13 22 24 30 36 40.1 45 50.2 62 64 69 75 78 96 99.2 105 116.2 – B1 B7.3 B8 B11 B18 – pith missing

Teucrium cyprium Boiss. subsp. *kyreniae* Boiss. P.H. Davis
(Annex 1, plate no. 41)

Strongly aromatic subshrub up to 10 cm in height. Endemic species in Cyprus. It occurs in to subspecies: 1) *cyprium*, restricted to rocky mountainsides and pine forests of the Troodos range (300-1900 m alt.); 2) *kyreniae*, restricted to rocky and cliffy places of the Pentadactylos mountain range (0-900 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood semi-

ring porous. Vessels in diagonal and/or radial pattern. Vessels predominantly in clusters. Mean tangential diameter of earlywood vessels 20-50 µm. Greater than 200 vessels per square millimeter in earlywood. Gums and other deposits in heartwood vessels. Fibers thick to very thick walled. Axial parenchyma absent or extremely rare or not recognizable. Stem lobed. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Helical thickenings in vessel elements present. Fibers with distinctly bordered pits (fiber tracheids). Helical thickenings in ground tissue fibers. All ray cells upright and/or square.
Tangential section: Rays exclusively uniseriate.

Bark
Groups of sieve tubes present. Crystal sand. Phloem uniform. Cell content in parenchyma cells. Layered phelloderm.

Pith
Pith missing

Codified description
1 4 7 11 13 22 24 30 36 40.2 50.2 58 62 64 69 70 75 96 99.2 105 116.2 – B1 B7.3 B8 B11 B18 – Pith missing

Teucrium divaricatum subsp. *canescens* Heldr. (Celak.) Holmboe
(Annex 1, plate no. 42)

Subshrub up to 50 cm in height. A common endemic species to Cyprus, growing in maquis, garigue and rocky places (0-1600 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood ring porous to semi-ring porous. Vessels predominantly solitary or in radial multiples of 2 to 4 common. Mean tangential diameter of earlywood vessels 20-50 µm. Vessels of two distinct diameter classes. Greater than 200 vessels per square millimeter in earlywood. Fibers thin to thick walled. Axial parenchyma absent or extremely rare or not recognizable. Axial parenchyma scanty paratracheal. Apotracheal parenchyma in marginal or in seemingly marginal bands. Rays per millimeter 12-20.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: Rays of two distinct sizes: uniseriate to 3-4 cells wide.

Bark

Sclereids scattered or irregularly dispersed. Crystal sand. Cell content in parenchyma cells. Layered phelloderm.

Pith

Pith shape round. Cells dimorphic. Pits in transverse and in longitudinal cell walls. Primary vascular bundle not distinct. Tracheary elements of metaxylem in distinct radial rows.

Codified description

1 3 4 9 9.1 13 22 25 30 40.2 45 50.2 61 69 75 78 89 96.1 97 103 105 116.1 – B6.3 B7.3 B11 B18 – P1 P4 P9 P9.1 P10.2 P12

Teucrium kotschyanum Poech.

(Annex 1, plate no. 42)

Subshrub up to 80 cm in height. It grows on rocky, igneous mountainsides (500-1500 m alt.). Indigenous to Cyprus, it occurs also in the Aegean islands and Turkey.

Xylem

Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous. Vessels predominantly in clusters. Mean tangential diameter of earlywood vessels 20-50 μm. Greater than 200 vessels per square millimeter in earlywood. Tyloses with thin wall common. Gums and other deposits in heartwood vessels. Fibers thick walled to very thick walled. Axial parenchyma absent or extremely rare or not recognizable. Axial parenchyma scanty paratracheal. Greater than 20 rays per millimeter.

Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 μm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Helical thickenings only in narrower vessel elements. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.

Tangential section: Rays exclusively uniseriate.

Bark

Fibers scattered or irregularly dispersed. Phloem uniform. Cell content in parenchyma cells. Phellem homogeneous.

Pith

Pith shape square. Cells dimorphic. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows.

Codified description

1 4 11 13 22 24 30 39 40.2 50.2 56 58 61 69 70 75 78 96 105 116.2 – B5.3 B8 B11 B14.1 – P1.4 P4 P9 P9.1 P10.1 P12

Thymus capitatus (L.) Hoffmanns
(Annex 1, plate no. 42)

Much branches, aromatic subshrub, forming lo-domed mats, up to 50 cm in height. It is very common on rocky slopes, disturbed ground and occasionally sand dunes (0-900 m alt.). Indigenous to Cyprus, it occurs throughout the Mediterranean countries.

Xylem

Transverse section: Growth ring distinct and recognizable. Wood diffuse porous. Vessels in diagonal and/or radial pattern, predominantly in clusters. Mean tangential diameter of earlywood vessel lumina 50 — 100 µm. Greater than 200 vessels per square millimeter in earlywood. Tyloses with thin wall common. Gums and other deposits in heartwood vessels and/or fibers. Fibers thin to very thick walled. Axial parenchyma scanty paratracheal to vasicentric. Axial parenchyma in marginal or in seemingly marginal bands. Stem lobed. Rays 12-20 to greater than 20 per millimeter.

Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessel-ray pits rounded or angular with large apertures. Earlywood vessel elements length less than 350 µm. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.

Tangential section: Rays exclusively uniseriate.

Bark

Groups of sieve tubes present. Prismatic and acicular crystals present. In adult bark only few acicular crystals.

Pith

Pith shape polygonal. With thick walled parenchyma cells. Cells dimorphic center/border of the pith. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate to not distinct each other. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description

1 5 7 11 13 22 25 31 41 50.2 52 56 58 61 69 70 78 79 89 96 99.2 105 116.1 116.2 – B1 B7 B7.1 — P1.1 P3.3 P4.1 P9 P9.1 P10.1 P10.2 P12 P13

Thymus intiger Griseb.
(Annex 1, plate no. 43)

Much branched, aromatic subshrub, with erect or prostate branches, sometimes rooting, up to 10 cm in height. Endemic to Cyprus, growing on rocky slopes and in shrublands and pine forests (100-1700 m alt.).

Xylem
Transverse section: Growth ring distinct and recognizable. Wood semi-ring porous to diffuse porous. Vessels solitary or in radial multiples of 2 to 4. Mean tangential diameter of earlywood vessels 20-50 μm. Greater than 200 vessels per square millimeter in earlywood. Tyloses with thin wall common. Gums and other deposits in heartwood vessels and/or fibers. Fibers thin to thick walled. Axial parenchyma absent or extremely rare or not to recognizable. Stem lobed. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, medium (7-10 μm in diameter). Earlywood vessel elements length less than 350 μm. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: Rays exclusively uniseriate.

Bark
Phloem uniform. Prismatic and acicular crystals present.

Pith missing

Codified description
1 4 5 9 9.1 13 22 26 40.2 50.2 52 56 58 61 69 75 96 99.2 105 116.2 – B7 B7.1 B8 – Pith missing

Lauraceae

Laurus nobilis L.
(Annex 1, plate no. 43)

Evergreen, deciduous shrub or small tree up to 10 (12) m in height. Indigenous species, occurring on moist, rocky grounds, usually near streams and springs (0-1300 m alt.). Indigenous to the Mediterranean region and Crimea.

Xylem
Transverse section: distinct growth rings, diffuse porous, vessels solitary or in clusters. Mean tangential diameter of earlywood vessels lumina 50-100 m; 20-40 earlywood vessels per square millimeter. Fibers thin to thick walled, tension wood present. Axial parenchyma scanty paratracheal. 4-12 rays per millimeter.

Radial section: simple and scalariform perforation plates with less that 10 bars, small intervessels pits alternate; vessels ray pits rounded and reticulate. Earlywood vessel elements length 350 m to 800 m. Fibers with minutely pits, many septate fibers. Body ray cells procumbent with one row of square marginal cells. Prismatic and elongated crystals in ray cells.
Tangential section: rays width predominantly 1 to 3 cells. Oil cells associated with ray parenchyma.

Bark
Groups of sieve tube present, distinct rays dilatation only for some rays, groups of fibers linked by tangential rows of sclereids. With laticifers. Phellem distinct in polarized light.
In adult bark the fibers are not presents, few acicular crystals in phloem.

Pith
Pith round in shape. Cells dimorphic in the center and in the border. Elongated prismatic crystals present. Pits in transverse and longitudinal cell walls.

Codified description
1 5 9 9.1 13 14 15 22 25 31 41 48 52 53 61 65 69 70.2 78 97 106 115 124 136.1 151 — B1 B3.1 B5.4 B6.2 B10 B10.3 B14.3 — P1 P4.1 P4.2 P6 P9 P9.1

Malvaceae

Hibiscus rosa-sinensis L.
(Photomicrographs not available)

Evergreen shrub up to 4 m in height. Exotic to Cyprus, possibly native to China. Frequently cultivated in Cyprus, mostly in urban areas (0-400 m alt.).

Xylem
Transverse section: Growth rings indistinct or absent. Vessels in radial multiples of 2 to 4 common. Mean tangential diameter of earlywood vessel lumina 100 — 200 µm. Greater than 200 vessels per square millimeter in earlywood. Fibers very thick walled. Axial parenchyma diffuse and vasicentric.
Radial section: Simple perforation plates. Inter-vessel pits alternate. Fibers with simple to minutely bordered pits (libriform fibers). Body ray cells procumbent with one row of upright and/or square marginal cells.
Tangential section: Ray width predominant 1 to 3 cells. Larger rays commonly 4 to 10 seriate.

Bark
Groups of sieve tubes present. Some rays become dilated. Sclerenchyma cells

both in phloem and cortex. Fibers in tangential rows and grouped. Prismatic crystals. Phellem homogeneous, distinct in polarized light.

Pith
Pith shape round. Heterocellular pith. Cells dimorphic in the center of the pith. Cell content (gum, tannins, dark staining substances). With crystals druses. Laticifers or intercellular canals. Pits in transverse and in longitudinal cell walls. Pits grouped. Pits of two distinct size. Primary vascular bundle not distinct. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
2 9.1 13 22 42 50.2 61 70 76 79 97 98 106 – B1 B3.1 B4 B5.2 B5.4 B7 B14.1 B14.3 – P1 P3 P4.2 P5 P6.2 P7 P9 P9.1 P9.2 P9.3 P10.2 P12 P13

Lavatera bryoniifolia Mill.
(Annex 1, plate no. 43)

Erect subshrub, up to 1 m in height. Native to Cyprus, growing on dry slopes with garigue vegetation and near streams (100-800 m alt.). Indigenous also to Greece and Palestine.

Xylem
Transverse section: Growth ring distinct and recognizable. Wood diffuse porous. Vessels in radial multiples of 2 to 4 or in clusters. Mean tangential diameter of earlywood vessels 20-50 μm. Greater than 200 vessels per square millimeter in earlywood. Fibers thin to thick walled. Axial parenchyma vasicentric and confluent. Rays per millimeter 4-12.
Radial section: Simple perforation plates. Inter-vessel pits opposite, large (greater than 10 μm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length less than 350 μm. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: Rays of two distinct sizes: uniseriate and 4 to 10 seriate. Larger rays height greater than 1 mm.

Bark
Groups of sieve tube in radial rows. Only some rays become dilated. Fibers grouped. Druses present. Phellem homogeneous and distinct in polarized light.

Pith
Pith, shape round. Cells dimorphic. With crystals druses. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one

other. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
1 5 9.1 11 13 21 27 30 40.2 50.2 52 61 69 79 83 96 98 102 103 105 115 — B1 B1.2 B3.1 B5 B5.4 B7.2 B14.1 B14.3 — P1 P4 P6.2 P9 P9.1 P10.1 P12 P13

Mimosaceae

Acacia saligna (Labill.) H.L.Wendl.
(Annex 1, plate no. 44)

Evergreen shrub or tree, about 3-5 m in height. Native to Australia, in Cyprus it can be found in most of the cities in the lowlands, especially along road (0-700 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels solitary and in radial multiples of 2 to 4. Vessels cell wall thick (greater than 2 μm). Mean tangential diameter of earlywood vessel lumina 50 — 100 μm. Vessels of two distinct diameter classes. Gums and other deposits in heartwood vessels. Fibers thin to thick walled. Tension wood present. Radial flat marginal fibers. Axial parenchyma vasicentric, confluent. Rays per millimeter 4-12.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 μm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 100-200 μm. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells procumbent. Prismatic crystals in axial parenchyma cells.
Tangential section: Rays uniseriate and up to 3 cells wide.

Bark
Groups of sieve tubes present. Some rays become dilated. Sclerenchyma cells both in phloem and cortex. Fibers grouped. Sclereids in tangential rows. Prismatic crystals. Cell content in parenchyma cells. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith
Pith shape round. Cells dimorphic center/border of the pith. Cell content (gum, tannins, dark staining substances). With prismatic crystals. Pits in transverse and in longitudinal cell walls. Pits grouped. Vascular bundles in the pith. Primary vascular bundle clearly separate from one other.

Codified description
1 5 9 9.1 13 22 25 30 39.1 41 45 52.3 58 61 69 70.2 70.3 79 83 96.1 97 104 115 136 141.1 – B1 B3.1 B4 B5.4 B6.2 B7 B11 B14.1 B14.3 – P1 P4.1 P5 P6 P9 P9.1 P9.2 P10 P10.1

Prosopis fracta (Banks & Sol.) J.F.Macbr.
(Annex 1, plate no. 44)

Deciduous, spiny shrub, 30-100 cm in height. Indigenous to Cyprus, very common on field sides in Mesaoria central plain (0-700 m alt.). It is also indigenous to Egypt, Libya, Turkey and eastwards to Afghanistan.

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous. Vessels in intra-annual tangential bands showing a dendritic pattern. Vessels predominantly solitary. Vessels cell wall thick (more than 2 µm). Mean tangential diameter of earlywood vessel lumina 50 — 100 µm. More than 200 vessels per square millimeter in earlywood. Tyloses with thin wall common. Fibers very thin walled. Tension wood present. Axial parenchyma diffuse. Axial parenchyma scanty paratracheal. Axial parenchyma in marginal or in seemingly marginal bands. Ring shake.
Radial section: Simple perforation plates. Inter-vessel pits scalariform. Inter-vessel pits opposite, small (4-7 µm in diameter). Septate fibers present. Rays with procumbent, square and upright cells mixed throughout the ray. Acicular crystals.
Tangential section: Aggregate rays.

Bark
Groups of sieve tubes in radial rows. Fibers in radial rows and grouped. Sclereids in tangential rows. Laticifers or intercellular canals. Phellem not clearly distinct.

Pith
Fibers present. Crystal sand present. Laticifers or intercellular canals with border cells. Pits in transverse and in longitudinal cell walls. Pits grouped. Primary vascular bundle clearly separated each other. Tracheary elements of metaxylem in distinct radial rows. Axial cells arrangement in regular rows (radial section). Pith chambered (radial section).

Codified description
1 4 6 8 9 19 20 21 25 39.1 41 50.2 56 65 68 70.2 76 78 89 89.2 101 109 150 — B1.2 B5.1 B5.4 B6 B6.2 B10.3 B14 P3.2 — P6.4 P7 P8 P9 P9.2 P10.1 P12 P13 P14

Moraceae

Ficus carica L.
(Annex 1, plate no. 44)

Deciduous shrub or tree, 4-6 m in height. Indigenous to Cyprus, cultivated at 0-1500 m altitudes. Wild plants common on moist, cold cave or rocky sites and close to streams.

Xylem
Transverse section: Growth ring distinct and recognizable. Wood diffuse-porous. Vessels in radial multiples of 2 to 4 common. Vessels cell wall thick (greater than 2 μm). Mean tangential diameter of earlywood vessel lumina 50 — 100 μm, in some rings 100 — 200 μm; 40 — 100 earlywood vessels per square millimeter. Fibers thin to thick walled. Tension wood present. Axial parenchyma vasicentric. Axial parenchyma bands greater than three cells wide. Rays per millimeter 4-12.
Radial section: Simple perforation plates. Inter-vessel pits alternate, medium (7-10 μm in diameter). Vessel-ray pits rounded or angular with large apertures. Earlywood vessel elements length less than 350 μm. Fibers with simple to minutely bordered pits (libriform fibers). Rays with procumbent, square and upright cells mixed throughout the ray. Prismatic crystals in axial parenchyma cells.
Tangential section: Rays of two distinct sizes: uniseriate and 4 to 10 seriate. Larger rays height greater than 1 mm.

Bark
Groups of sieve tube in tangential rows. Only some rays become dilated. Prismatic crystals present. With laticifers, secretory elements, oil ducts or mucilage ducts. Tannins and/or other cell content in parenchyma cells. Phellem homogeneous and distinct in polarized light.

Pith
Pith round in shape. Pith disappear in polarized light. Cells dimorphic center/border of the pith. With prismatic crystals. Primary vascular bundles clearly separate from one another to not distinct. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section). Pith chambered (radial section).

Codified description
1 5 9.1 13 22 26 31 39.1 41 42 49 52 61 69 70.2 79 85 96 98 102 103 109 115 — B1 B1.1 B3.1 B7 B10 B11 B14.1 B14.3 — P1.1 P1 P4.1 P6 P10.1 P10.2 P12 P13 P14

Ficus sycomorus L.
(Annex 1, plate no. 45)

Mostly evergreen tree (sometimes leafless for a short time), 8-20 m in height. Native to Ethiopia and north east Africa, cultivated in Cyprus since a long time (0-200 m alt.).

Xylem
Transverse section: Growth rings indistinct or absent. Vessels solitary or in radial multiples of 2 to 4. Mean tangential diameter of earlywood vessel lumina 100 — 200 µm. Less than 5 earlywood vessels per square millimeter. Fibers thin to thick walled. Tension wood present. Apotracheal parenchyma diffuse. Axial parenchyma vasicentric often confluent or in bands greater than three cells wide. Rays per millimeter 4-12.
Radial section: Inter-vessel pits alternate, minute (less than 4 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell, with large horizontal or vertical apertures. Earlywood vessel elements length 200-500 µm. Fibers with simple to minutely bordered pits (libriform fibers). Body ray cells procumbent with one to 4 rows of upright and/or square marginal cells. Prismatic crystals present in axial parenchyma cells.
Tangential section: Rays of two distinct sizes, larger rays commonly 4 to 10 seriate.

Bark
Some rays become dilated. Sclereids scattered or irregularly dispersed. Prismatic crystals. With laticifers, secretory elements, oil ducts or mucilage ducts. Cell content in parenchyma cells. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith
Pith shape round. Heterocellular pith. Thick walled parenchyma cells present. Unilignified cells. Cells dimorphic center/border of the pith. With prismatic crystals. With crystals druses. Pits in transverse and in longitudinal cell walls. Pits in transverse cell walls. Pits of two distinct size. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows.

Codified description
2 9 9.1 22 24 30 32 42 46 53.1 61 69 70.2 76 79 83 85 98 103 106 107 115 136 141.1 – B3.1 B6.3 B7 B10 B10.2 B11 B14.1 B14.3 – P1 P3 P3.3 P3.4 P4.1 P6 P6.2 P9 P9.1 P9.3 P10.1 P12

Morus alba L.
(Annex 1, plate no. 45)

Deciduous tree up to 15 m in height. Native to China, commonly found as wild in many areas of Cyprus. Very commonly cultivated in the island (0-1400 m alt.).

Xylem

Transverse section: Growth ring boundaries clearly demarcated. Wood ring porous. Vessels solitary and in clusters. Vessels number in early wood: 100-200 per square millimeter. Tyloses with thin wall common. Fibers thin to thick walled. Tension wood present. Axial parenchyma scanty paratracheal to vasicentric, sometimes confluent. Rays per millimeter 4-12.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessel-ray pits rounded or angular with large apertures. Helical thickenings only in narrower vessel elements. Earlywood vessel elements length 100-200 µm. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square. Body ray cells procumbent with over 4 rows of upright and/or square marginal cells. Prismatic crystals in ray and in axial parenchyma cells.
Tangential section: Rays uniseriate and 4 to 10 seriate.

Bark

Groups of sieve tubes present. Collapsed sieve tubes. Sclerenchyma cells both in phloem and cortex. Sclereids in tangential rows and in groups. Prismatic crystals and crystal sand. With laticifers, secretory elements, oil ducts or mucilage ducts. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith

Pith shape round. Unilignified cells. With prismatic crystals. Pits in transverse and in longitudinal cell walls. Primary vascular bundles clearly separate from one another to not distinct. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description

1 3 9 11 13 22 25 31 39 50.1 52.3 56 61 69 70.2 78 79 83 96 98 105 108 115 136 136.1 141.1 – B1 B2 B4 B6.2 B6.4 B7 B7.3 B10 B14.1 B14.3 – P1 P3.4 P6 P9 P9.1 P10.1 P10.2 P12 P13

Myrtaceae

Callistemon lanceolatus DC.
(Annex 1, plate no. 45)

Evergreen tree up to 10 m in height. Exotic to Cyprus, found mainly in parks and gardens (0-300 m alt.). Native to Australia.

Xylem

Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous. Vessels predominantly solitary. Mean tangential diameter of earlywood vessels 20-50 μm, greater than 200 vessels per square millimeter in earlywood. Fibers thin to thick walled. Axial parenchyma diffuse. Rays per millimeter 4-12.

Radial section: Simple perforation plates. Inter-vessel pits opposite, small (4-7 μm in diameter). Vessel-ray pits rounded or angular with large apertures. Earlywood vessel elements length 200-500 μm. Fibers with simple to minutely bordered pits (libriform fibers). Rays with procumbent, square and upright cells mixed throughout the ray.

Tangential section: Rays uniseriate to 3 cells wide. Oil cells associated with ray parenchyma.

Bark

Groups of sieve tubes present. Some rays become dilated. Sclerenchyma cells both in phloem and cortex. Sclereids in tangential rows and scattered or irregularly dispersed. Prismatic crystals. Phellem homogeneous, distinct in polarized light.

Pith

Pith shape polygonal. Heterocellular pith, with sclereids. Cell content (gum, tannins, dark staining substances). With prismatic crystals. Pits in transverse and in longitudinal cell walls. Primary vascular bundle not distinct. Axial cells arranged in regular rows (radial section).

Codified description

1 4 9 13 21 25 31 40.2 50.2 53.1 61 69 76 96 97 109 115 124 — B1 B3.1 B4 B6.2 B6.3 B7 B14.1 B14.3 — P1.1 P3 P3.1 P5 P6 P9 P9.1 P10.2 P13

Eucalyptus camaldulensis Dehnh.

(Annex 1, plate no. 46)

Evergreen tree up to 30 m in height. Exotic to Cyprus, native to Australia, cultivated almost elsewhere in Cyprus (0-650 m alt.).

Xylem

Transverse section: Growth rings indistinct or absent. Wood diffuse porous. Vessels solitary and in radial multiples of 2 to 4 common. Vessels number in early wood: 100-200 per square millimeter. Tyloses with thin wall common.

Gums and other deposits in heartwood vessels. Fibers thick to very thick walled. Axial parenchyma diffuse and scanty paratracheal. Rays per millimeter 12-20.
Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 μm in diameter). Vessel-ray pits rounded or angular with large apertures. Earlywood vessel elements length 100-200 μm. Fibers with distinctly bordered pits (fiber tracheids). All ray cells procumbent. Prismatic crystals in axial parenchyma cells.
Tangential section: Rays uniseriate up to 3 cells wide.

Bark
Groups of sieve tubes present. Groups of sieve tubes in tangential rows. Collapsed sieve tubes. Some rays become dilated. Sclerenchyma cells both in phloem and cortex. Fibers in tangential rows. Sclereids scattered or irregularly dispersed. Prismatic crystals. With secretory elements in ducts. Cell content in parenchyma cells.

Pith
Pith disappear in polarized light. Pith shape polygonal. Medullary sheath present. Heterocellular pith. Fibers present. Unilignified cells. Cell content (gum, tannins, dark staining substances). With prismatic crystals and crystals druses. Intercellular canals with border cells. Pits in transverse and in longitudinal cell walls. Vascular bundles in the pith. Primary vascular bundle clearly separate from one other. Primary vascular bundle not distinct. Tracheary elements of metaxylem in distinct radial rows.

Codified description
2 5 9 9.1 13 22 24 31 50.1 52.3 56 58 62 69 70 76 78 96 97 104 116.1 136 141.1 – B1 B1.1 B2 B3.1 B4 B5.2 B6.3 B7 B10 B10.2 B11 — P1.1 P2 P3 P3.2 P3.4 P5 P6 P6.2 P8 P9 P10 P10.1 P10.2 P12

Eucalyptus gomphocephala DC.
(Annex 1, plate no. 46)

Evergreen tree up to 45 m in height. Native to western Australia, found in plantations (0-500 m alt.).

Xylem
Transverse section: Growth rings indistinct or absent. Wood diffuse porous. Vessels in diagonal and/or radial pattern, solitary and in radial multiples of 2 to 4. Mean tangential diameter of earlywood vessel lumina 50 — 100 μm. Vessels of two distinct diameter classes. Gums and other deposits in heartwood vessels. Fibers thick to very thick walled. Axial parenchyma diffuse and scanty paratracheal. Greater than 20 rays per millimeter.

Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessel-ray pits rounded or angular with large apertures. Earlywood vessel elements length 200-500 µm. Fibers with distinctly bordered pits (fiber tracheids). Body ray cells procumbent with one row of upright and/or square marginal cells. Prismatic crystals in axial parenchyma cells.
Tangential section: Rays uniseriate and up to 3 cells wide.

Bark
Sclerenchyma cells both in phloem and cortex. Fibers grouped. Sclereids scattered or irregularly dispersed. Prismatic crystals. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith
Pith disappear in polarized light. Pith shape polygonal. Medullary sheath present. Heterocellular pith. Fibers present. Unilignified cells. Cell content (gum, tannins, dark staining substances). With prismatic crystals. Intercellular canals with border cells. Pits in transverse and in longitudinal cell walls. Vascular bundles in the pith. Primary vascular bundles clearly separate from one another to not distinct. Tracheary elements of metaxylem in distinct radial rows.

Codified description
2 5 7 9 9.1 13 22 25 31 41 45 53.1 58 62 69 70 76 78 96 97 106 116.2 136 141.1 – B4 B5.4 B6.3 B7 B14.1 B14.3 – P1.1 P2 P3 P3.2 P3.4 P5 P6 P8 P9 P10 P10.1 P10.2 P12

Eucalyptus salubris F.Muell.
(Annex 1, plate no. 46)

Evergreen tree up to 20 m in height. Exotic to Cyprus, found in plantation (0-300m alt.). Native to western Australia.

Xylem
Transverse section: Growth rings indistinct or absent. Wood diffuse porous. Vessels predominantly solitary. Mean tangential diameter of earlywood vessels less than 20 µm. Vessels of two distinct diameter classes. Gums and other deposits in heartwood vessels. Fibers very thick walled. Axial parenchyma diffuse. Axial parenchyma scanty paratracheal. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessel-ray pits rounded or angular with large apertures. Earlywood vessel elements length 200-500 µm. Fibers with distinctly bordered pits (fiber tracheids). All ray cells upright and/or square. Body ray cells procumbent with one row of upright and/or square marginal cells.

Tangential section: Rays exclusively uniseriate.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Sclerenchyma cells both in phloem and cortex. Fibers scattered or irregularly dispersed. Prismatic crystals. With secretory elements in ducts. Cell content in parenchyma cells. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith
Pith disappear in polarized light. Pith shape triangular. Medullary sheath present. Heterocellular pith. Fibers present. Unilignified cells. Cell content (gum, tannins, dark staining substances). With crystals druses. Intercellular canals with border cells. Pits in transverse and in longitudinal cell walls. Primary vascular bundle not distinct. Tracheary elements of metaxylem in distinct radial rows.

Codified description
2 5 9 13 22 25 31 40.1 45 53.1 58 62 70 76 78 96 105 106 116.2 – B1 B2 B4 B5.3 B7 B10 B10.2 B11 B14.1 B14.3 – P1.1 P1.2 P2 P3 P3.2 P3.4 P5 P6.2 P8 P9 P10.2 P12

Eucalyptus torquata Luehm.
(Annex 1, plate no. 47)

Evergreen tree up to 10 m in height. Native from Australia, found in plantations (0-300 m alt.).

Xylem
Transverse section: Growth rings indistinct or absent. Wood diffuse porous. Vessels predominantly solitary. Vessels cell wall thick (greater than 2 µm). Mean tangential diameter of earlywood vessels less than 20 µm. Vessels of two distinct diameter classes. Gums and other deposits in heartwood vessels. Fibers very thick walled. Axial parenchyma diffuse and scanty paratracheal. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessel-ray pits rounded or angular with large apertures. Earlywood vessel elements length 200-500 µm. Fibers with distinctly bordered pits (fiber tracheids). All ray cells upright and/or square. Body ray cells procumbent with one row of upright and/or square marginal cells.
Tangential section: Rays exclusively uniseriate.

Bark
Fibers scattered or irregularly dispersed. Prismatic crystals. Cell content in

parenchyma cells. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith
Pith disappear in polarized light. Pith shape round. Medullary sheath present. Heterocellular pith. Fibers present. Unilignified cells. Cell content (gum, tannins, dark staining substances). With prismatic crystals. Intercellular canals with border cells. Pits in transverse and in longitudinal cell walls. Vascular bundles in the pith. Primary vascular bundle not distinct. Tracheary elements of metaxylem in distinct radial rows.

Codified description
2 5 9 13 22 25 31 39.1 40.1 45 53.1 58 62 70 76 78 96 105 106 116.2 – B5.3 B7 B11 B14.1 B14.3 – P1 P2 P3 P3.2 P3.4 P5 P6 P8 P9 P10 P10.2 P12

Melaleuca almillaris (Sol. ex Gartn.) Sm.
(Annex 1, plate no. 47)

Evergreen shrub or tree up to 14 m in height. Native to Australia, found in parks (0-200 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels predominantly solitary. Mean tangential diameter of earlywood vessels 20-50 µm. Vessels of two distinct diameter classes. Fibers thick to very thick walled. Axial parenchyma diffuse to scanty paratracheal and unilateral paratracheal. Rays per millimeter 12-20.
Radial section: Simple perforation plates. Inter-vessel pits opposite and alternate, minute (less than 4 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 200-500 µm. Vascular and/or vasicentric tracheids present. Fibers with distinctly bordered pits (fiber tracheids). Body ray cells procumbent with one to 4 rows of upright and/or square marginal cells.
Tangential section: Rays exclusively uniseriate.

Bark
Groups of sieve tubes present. Some rays become dilated. Sclerenchyma cells both in phloem and cortex. Fibers in tangential rows. Prismatic crystals. Cell content in parenchyma cells. Phellem homogeneous. Layered phelloderm.

Pith
Pith disappear in polarized light. Pith shape polygonal. Medullary sheath present. Fibers present. Thick walled parenchyma cells present. Cells dimorphic. Cell content (gum, tannins, dark staining substances). Pits in

transverse and in longitudinal cell walls. Primary vascular bundles clearly separate from one another to not distinct. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
1 5 9 13 21 22 24 30 40.2 45 53.1 60 62 69 70 76 78 84 96 106 107 116.1 – B1 B3.1 B4 B5.2 B7 B11 B14.1 B18 – P1.1 P2 P3.2 P3.3 P4 P5 P9 P9.1 P10.1 P10.2 P12 P13

Myrtus communis L.
(Annex 1, plate no. 47)

Evergreen shrub up to 3 m in height. Indigenous to Cyprus, occurring throughout the island, along river banks, near spring and moist places (0-1500 m alt.). It also occurs in the Mediterranean countries and eastwards to India.

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels predominantly solitary. Mean tangential diameter of earlywood vessels 20-50 μm, vessels of two distinct diameter classes, vessels number in early wood: 100-200 per square millimeter. Fibers thick to very thick walled, radial flat marginal fibers. Axial parenchyma diffuse (sometimes close to vessels: scanty paratracheal) and in narrow bands or lines up to three cells wide. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 μm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Helical thickenings in vessel elements present. Earlywood vessel elements length 200-500 μm. 68, 69, 70?? Fibers with distinctly bordered pits (fiber tracheids). All ray cells upright and/or square. Body ray cells procumbent with mostly 2-4 rows of upright and/or square marginal cells.
Tangential section: Rays uniseriate and 1 to 3 cells wide.

Bark
Groups of sieve tubes in tangential rows. Sclerenchyma cells both in phloem and cortex. Sclereids scattered or irregularly dispersed. Druses present. Phellem homogeneous, distinct in polarized light.

Pith
Pith disappear in polarized light, shape round. Heterocellular pith. With sclereids. With acicular crystals and druses. Pits in transverse and in longitudinal cell walls. Primary vascular bundle not distinct. Tracheary elements of metaxylem in distinct radial rows.

Codified description
1 5 9 13 22 25 30 36 40.2 45 50.1 53.1 62 69 70 70.3 76 78 86 96 97 105 107 116.2 — B1 B1.1 B4 B6 B6.3 B7.2 B14.1 B14.3 — P1.1 P1 P3 P3.1 P6.1 P6.2 P9 P9.1 P10.2 P12

Oleaceae

Olea europaea L.
(Annex 1, plate no. 48)

Evergreen shrub or tree 2-10(15) m in height. Native to Cyprus, growing wild in many areas (0-1000 m alt.). It is also widely cultivated in all the part to the island up to 700 m alt. Widespread in the Mediterranean region.

Xylem
Transverse section: Growth rings indistinct or absent. Wood diffuse porous. Vessels in radial multiples of 2 to 4 common. Mean tangential diameter of earlywood vessels 20-50 µm, greater than 200 vessels per square millimeter in earlywood. Tyloses with thin wall common, gums and other deposits in heartwood vessels and/or fibers. Fibers thick to very thick walled. Axial parenchyma vasicentric.
Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 100-200 µm. Fibers with simple to minutely bordered pits (libriform fibers). Rays with procumbent, square and upright cells mixed throughout the ray.
Tangential section: Rays of two distinct sizes: uniseriate to 3 cells wide.

Bark
Groups of sieve tubes present. Some rays become dilated. Fibers in tangential rows. Crystal sand. Phellem homogeneous, distinct in polarized light.

Pith
Pith shape round. Thick walled parenchyma cells present. Cells dimorphic. Pits grouped, of two distinct size, both in transverse and in longitudinal cell walls. Primary vascular bundle not distinct. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
2 5 9.1 13 22 24 30 40.2 50.2 52.3 56 58 61 69 70 79 96 97 103 109 — B1 B3.1 B5.2 B7.3 B14.1 B14.3 — P1 P3.3 P4 P9 P9.1 P9.2 P9.3 P10.2 P12 P13

Phillyrea latifolia L.
(Annex 1, plate no. 48)

Evergreen shrub or small tree up to 4 m in height. A rare native to Cyprus (400-800 m alt.). Widespread in the Mediterranean region.

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels in diagonal and in dendritic pattern. Mean tangential diameter of earlywood vessels 20-50 μm. Vessels number in early wood: 100-200 per square millimeter. Fibers thin to thick walled. Axial parenchyma differently arranged: scanty paratracheal, vasicentric, sometimes confluent. Marginal or in seemingly marginal bands of axial parenchyma. Rays per millimeter 4-12.
Radial section: Inter-vessel pits alternate, small (4-7 μm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 200-500 μm. Vascular and/or vasicentric tracheids present
Fibers with simple to minutely bordered pits (libriform fibers). Body ray cells procumbent with one row of upright and/or square marginal cells.
Tangential section: Rays uniseriate or 1 to 3 cells wide.

Bark
Groups of sieve tube and collapsed present. Sclerenchyma cells both in phloem and cortex. Fibers in groups, sclereids in tangential rows. Phellem homogeneous, distinct in polarized light.

Pith
Pith shape round. Thick walled parenchyma cells present. Cells dimorphic. Pits in transverse and in longitudinal cell walls.
Primary vascular bundle not distinct. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
1 5 7 8 22 25 30 40.2 50.1 53.1 60 61 69 78 79 83 89 96 97 106 115 — B1 B2 B4 B5 B5.4 B6 B6.2 B14.1 B14.3 — P1 P3.3 P4 P9 P9.1 P10.2 P12 P13

Syringa vulgaris L.
(Annex 1, plate no. 48)

Deciduous shrub 4-7 m in height. Native to the Balkan peninsula and eastern Europe, grown in gardens, mainly in mountainous areas (100-1700 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood semi-

ring porous. Vessels solitary and radial multiples of 2 to 4. Mean tangential diameter of earlywood vessels 20-50 µm. Vessels of two distinct diameter classes. Fibers thick to very thick walled. Radial flat marginal fibers. Axial parenchyma absent or extremely rare or not to recognizable. Axial parenchyma scanty paratracheal. Rays per millimeter 12-20.
Radial section: Simple perforation plates????. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 200-500 µm. Body ray cells procumbent with one row of upright and/or square marginal cells.
Tangential section: Rays uniseriate and up to 3 cells wide.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Sclerenchyma cells both in phloem and cortex. Fibers in tangential rows. Sclereids scattered or irregularly dispersed. Prismatic crystals. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith missing

Codified description
1 4 9 9.1 13 22 25 30 40.2 45 53.1 69 70 70.3 75 78 96 97 106 116.1 – B1 B2 B4 B5.2 B6.3 B7 B14.1 B14.3 – Pith missing

Papilionaceae

Alhagi graegorum Boiss.
(Annex 1, plate no. 49)

Xylem
Transverse section: Growth rings indistinct or absent. Vessels solitary and in radial multiples of 2 to 4. Mean tangential diameter of earlywood vessel lumina 50 — 100 µm. Vessels of two distinct diameter classes. Tyloses with thin wall common. Gums and other deposits in heartwood vessels. Fibers thin to thick walled. Axial parenchyma scanty paratracheal. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 100-200 µm. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square. Prismatic crystals in ray parenchyma cells.
Tangential section: Rays of two distinct sizes: uniseriate an 2-3 cells wide. Larger rays height greater than 1 mm.

Bark missing

Pith missing

Codified description
2 9 9.1 13 22 25 30 41 45 52.3 56 58 61 69 78 96 97 102 103 105 116.2 136 136.1 – Bark missing – Pith missing

Alhagi maurorum Medik.
(Annex 1, plate no. 49)

Xylem
Transverse section: Growth rings indistinct or absent. Vessels solitary and in radial multiples of 2 to 4. Mean tangential diameter of earlywood vessel lumina 50 — 100 µm. Vessels of two distinct diameter classes. Fibers thin to thick walled. Axial parenchyma scanty paratracheal to vasicentric, sometimes confluent. Rays per millimeter 12-20.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 100-200 µm. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: Rays of two distinct sizes: uniseriate and greater than 10 seriate.

Bark
Groups of sieve tubes present. Some rays become dilated. Sclerenchyma cells both in phloem and cortex. Fibers grouped. Prismatic crystals. With laticifers, secretory elements, oil ducts or mucilage ducts. Cell content in parenchyma cells. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith
Pith shape round to polygonal. Cells dimorphic center/border of the pith. Cell content (gum, tannins, dark staining substances). With prismatic crystals. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows.

Codified description
2 9 9.1 13 22 25 30 41 45 52.3 61 69 78 79 83 96 98 103 105 116.1 – B1 B3.1 B4 B5.4 B7 B10 B11 B14.1 B14.3 – P1 P1.1 P4.1 P5 P6 P9 P10.1 P12

Anagyris foetida L.
(Annex 1, plate no. 49)

Deciduous shrub up to 3 m in height. Native to Cyprus, usually occurring on limestone slopes with shrubby vegetation (0-1200 m alt.). Indigenous also in many others Mediterranean countries and eastwards to Iran and Arabia.

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous. Mean tangential diameter of earlywood vessel lumina 50 — 100 µm. Vessels of two distinct diameter classes. Gums and other deposits in heartwood vessels. Fibers very thick walled. Axial parenchyma diffuse. Axial parenchyma vasicentric. Axial parenchyma confluent. Axial parenchyma in marginal or in seemingly marginal bands. Rays per millimeter 4-12.
Radial section: Earlywood vessel elements length 100-200 µm. Vascular and/or vasicentric tracheids present. Fibers with simple to minutely bordered pits (libriform fibers). Body ray cells procumbent with one row of upright and/or square marginal cells. Rays with procumbent, square and upright cells mixed throughout the ray. Prismatic crystals in ray parenchyma cells.
Tangential section: Rays commonly 4 to 10 seriate.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Sclerenchyma cells both in phloem and cortex. Fibers grouped. Sclereids in groups. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith
Pith shape round. Thick walled parenchyma cells present. Cells dimorphic. Pits in transverse and in longitudinal cell walls. Pits in transverse cell walls. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
1 4 41 45 52.3 58 60 61 70 76 79 83 89 98 106 109 115 136 136.1 – B1 B2 B4 B5.4 B6.4 B14.1 B14.3 – P1 P3.3 P4 P9 P9.1 P10.1 P12 P13

Argyrolobium uniflorum (Dec.) Jaub. & Spach
(Annex 1, plate no. 50)

Subshrub 5-20 cm in height. A rare native to Cyprus, recorded in garigue vegetation in northern Cyprus (0-100 m alt.). Indigenous to north Africa, Syria, Palestine, Lebanon and Turkey.

Xylem

Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels in diagonal and/or radial pattern. Vessels in radial multiples of 2 to 4 common. Mean tangential diameter of earlywood vessels less than 20 µm. Fibers very thick walled. Axial parenchyma scanty paratracheal. Greater than 20 rays per millimeter.

Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 50-100 µm. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square. Prismatic crystals in ray parenchyma cells.

Tangential section: Rays of two distinct sizes: uniseriate and greater than 10 seriate. Larger rays height greater than 1 mm.

Bark

Collapsed sieve tubes. Fibers scattered or irregularly dispersed. Prismatic crystals. Phellem homogeneous. Phellem/epidermis distinct in polarized light. Layered phelloderm.

Pith

Pith shape triangular. Thick walled parenchyma cells present. Cells dimorphic. Pits in transverse and in longitudinal cell walls. Primary vascular bundles clearly separate from one another to not distinct. Axial cells arranged in regular rows (radial section).

Codified description

1 5 7 9.1 13 22 25 30 40.1 52.2 61 70 78 96 99 102 103 105 116.2 136 136.1 – B2 B5.3 B7 B14.1 B14.3 B18 – P1.2 P3.3 P4 P9 P9.1 P10.1 P10.2 P13

Astragalus echinus subsp. *echinus* DC.
(Annex 1, plate no. 50)

A much branched subshrub, up to 60 cm in height. It occurs in to subspecies: *chionistrae* which is endemic and restricted to the highest part of Troodos forests (1800-1900 m alt.), and *echinus*, which is locally common at mid altitudes (400-1250 m alt.): it is also indigenous to Syria, Lebanon and Palestine.

Xylem

Transverse section: Growth ring distinct and recognizable to indistinct. Wood ring-porous to semi-ring porous. Vessels predominantly in clusters. Vessels cell wall thick (greater than 2 µm). Mean tangential diameter of earlywood vessel lumina 50 — 100 µm; vessels of two distinct diameter classes; 5 — 20 earlywood vessels per square millimeter. Fibers thin to very thick walled. Apotracheal parenchyma diffuse in aggregates or in narrow bands or lines up to three cells

wide. Paratracheal parenchyma scanty paratracheal. Axial parenchyma in marginal or in seemingly marginal bands. Less than 4 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits scalariform to alternate, large (greater than 10 μm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length less than 350 μm. Body ray cells procumbent with over 4 rows of upright and/or square marginal cells. Prismatic crystals in ray parenchyma cells.
Tangential section: Larger rays commonly greater than 10 seriate, height greater than 1 mm. Rays disappear in polarized light.

Bark
Groups of sieve tubes present. Distinct rays dilatations. Sclerenchyma cells both in phloem and cortex. Sclereids in tangential rows. Prismatic crystals. Phellem homogeneous and layered.

Pith
Pith shape round. Cells dimorphic. Cell content, dark staining substances. Axial cells arranged in regular rows (radial section).

Codified description
1 2 3 4 11 13 20 22 27 30 39.1 41 45 47 52 69 70 77 78 86 89 99 100.2 102 108 114 — B1 B3 B4 B6 B6.2 B7 B14.1 B16 — P1 P4 P5 P13

Calycotome villosa (Poir.) Link
(Annex 1, plate no. 50)

Deciduous, spinose shrub up to 3 m in height. Native to Cyprus, locally very frequent (0-1000 m alt.). Widespread in the Mediterranean countries.

Xylem
Transverse section: Growth ring distinct and recognizable, but clearly demarcated rings only along some radii. Wood semi-ring porous. Vessels in intra-annual tangential bands and in diagonal and/or radial pattern. Vessels in radial multiples of 4 or more common or in clusters. Vessels cell wall thick (greater than 2 μm). Mean tangential diameter of earlywood vessel lumina less than 50 μm. Vessels of two distinct diameter classes; 20 — 40 earlywood vessels per square millimeter. Gums and other deposits in heartwood vessels. Fibers very thick walled. Axial parenchyma diffuse in aggregates and vasicentric to confluent. Rays per millimeter 4-12.
Radial section: Simple perforation plates. Inter-vessel pits alternate, medium (7-10 μm in diameter). Helical thickenings in vessel elements present. Earlywood vessel elements length less than 350 μm. Vascular and/or vasicentric tracheids present. Fibers with simple to minutely bordered pits (libriform

fibers). Rays with procumbent, square and upright cells mixed throughout the ray.
Tangential section: Ray width predominant 1 to 3 cells. Rays of two distinct sizes.

Bark
Groups of sieve tube in radial rows. Sclereids scattered or irregularly dispersed. Prismatic crystals. Tannins and/or other cell content in parenchyma cells. Phellem homogeneous. In adult bark sclereids in tangential rows and phellem heterogeneous.

Pith
Pith shape round. Cells dimorphic center/border of the pith. Pits in transverse and in longitudinal cell walls (radial section). Primary vascular bundle clearly separate from one other. Axial cells arranged in regular rows (radial section).

Codified description
1 1.1 4 6 7 10 11 13 22 26 36 39.1 40 45 48 52 58 60 61 70 77 79 83 97 103 109 115- B1 B1.2 B6 B6.3 B7 B11 B14.1 — P1 P4.1 P9 P9.1 P10.1 P13

Coronilla emerus L. subsp. *emeroides* (Boiss. et Spruner.) Holmboe
(Annex 1, plate no. 51)

Erect and much branched shrub up to 2 m in height. It occurs on shades cliffs and in crevices of limestone rocks in Pentadactylos range (300-800 m alt.). Indigenous in the Mediterranean region from south Italy to west Syria.

Xylem
Transverse section: Growth rings indistinct or absent. Wood diffuse porous. Vessels in diagonal and/or radial pattern. Mean tangential diameter of earlywood vessels 20-50 µm. Vessels of two distinct diameter classes. Gums and other deposits in heartwood vessels. Fibers very thick walled. Apotracheal parenchyma diffuse, paratracheal parenchyma vasicentric. Axial parenchyma in marginal or in seemingly marginal bands. Rays per millimeter 12-20.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Helical thickenings in vessel elements present. Earlywood vessel elements length 100-200 µm. Rays with procumbent, square and upright cells mixed throughout the ray.
Tangential section: Rays uniseriate and 1 to 3 cells wide.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Distinct rays dilatations.

Sclereids scattered or irregularly dispersed and in groups. Prismatic crystals. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith

Pith disappear in polarized light. Pith shape round. Unilignified cells. Cells dimorphic. Pits in transverse and in longitudinal cell walls. Pits in transverse cell walls. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows.

Codified description

2 5 7 13 22 25 30 36 40.2 45 52.3 58 70 76 79 89 96 97 109 116.1 – B1 B2 B3 B6.3 B6.4 B7 B14.1 B14.3 – P1.1 P1 P3.4 P4 P9 P9.1 P10.1 P12

Genista sphacelata Decne subsp. *crudelis* (Meikle) Chrtek & B.Slavík
(Annex 1, plate no. 51)

Much branched, armed, erected shrub up to 3 m in height. Native to Cyprus, it occurs in two subspecies: *crudelys* is and endemic to Cyprus, confined to Troodos (1200-1800 m alt.); *sphacelata* has a much wider distribution on the island (0-1000 m alt.). It is also indigenous to the Aegean islands, Lebanon and Palestine.

Xylem

Transverse section: Growth rings indistinct or absent. Vessels solitary or in clusters. Mean tangential diameter of earlywood vessels 20-50 µm. Vessels of two distinct diameter classes. Gums and other deposits in heartwood vessels. Fibers very thick walled. Axial parenchyma confluent. Axial parenchyma bands greater than three cells wide. Rays per millimeter 4-12.
Radial section: Simple perforation plates. Inter-vessel pits opposite, small (4-7 µm in diameter). Vessel-ray pits rounded or angular with large apertures. Helical thickenings in vessel elements present. Earlywood vessel elements length 100-200 µm. Fibers with simple to minutely bordered pits (libriform fibers). Body ray cells procumbent with one row of upright and/or square marginal cells. Rays with procumbent, square and upright cells mixed throughout the ray.
Tangential section: Ray width predominant 1 to 3 cells.

Bark

Some rays become dilated. Sclerenchyma cells both in phloem and cortex. Fibers and sclereids in tangential rows.

Pith

Pith shape round. Thick walled parenchyma cells present. Cells dimorphic. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
2 9 11 13 21 25 31 36 40.2 45 52.3 58 61 70 83 85 97 106 109 115 — B3.1 B4 B5.2 B6.2 — P1 P3.3 P4 P9 P9.1 P10.1 P12 P13

Genista sphacelata Decne subsp. *sphacelata*
(Annex 1, plate no. 51)

Much branched, armed, erected shrub up to 3 m in height. Native to Cyprus, it occurs in two subspecies: *crudelys* is and endemic to Cyprus, confined to Troodos (1200-1800 m alt.); *sphacelata* has a much wider distribution on the island (0-1000 m alt.). It is also indigenous to the Aegean islands, Lebanon and Palestine.

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous. Vessels in diagonal and/or radial pattern or in clusters. Vessels cell wall thick (greater than 2 μm). Vessels of two distinct diameter classes, mean tangential diameter of earlywood vessels 20-50 μm, 40 — 100 earlywood vessels per square millimeter. Gums and other deposits in heartwood vessels. Fibers thick to very thick walled, radial flat marginal fibers. Axial parenchyma scanty paratracheal. Rays per millimeter 4-12.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 μm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Helical thickenings in vessel elements present. Earlywood vessel elements length 100-200 μm. Fibers with simple to minutely bordered pits (libriform fibers). Parenchyma-like fiber bands alternating with ordinary fibers. Body ray cells procumbent with one row of upright and/or square marginal cells.
Tangential section: Ray width predominant 1 to 3 cells. Rays of two distinct sizes. Low rays storied, high rays not storied. Axial parenchyma and/or vessel elements storied.

Bark
Groups of sieve tubes present. Some rays become dilated. Sclerenchyma cells both in phloem and cortex. Fibers and sclereids in tangential rows. Acicular crystals present. With ducts. Phellem homogeneous, distinct in polarized light. Layered phelloderm.

Pith
Pith shape round. Cells dimorphic. With crystals druses. Pits in transverse and

in longitudinal cell walls. Primary vascular bundle clearly separate from one other. Axial cells arranged in regular rows (radial section).

Codified description
1 4 7 11 13 22 25 30 36 39.1 40.2 45 49 52.3 58 61 67 69 70 70.3 78 97 103 106 115 119 120 — B1 B3.1 B4 B5.2 B6.2 B7.1 B10 B10.2 B14.1 B14.3 B18 — P1 P4 P6.2 P9 P9.1 P10.1 P13

Glycyrrhiza glabra L.
(Annex 1, plate no. 51)

Erect subshrub up to 1 m in height. An adventive species, present in Cyprus as a relict of cultivations (0-300 m alt.). Widespread in the Mediterranean coastal countries.

Xylem
Transverse section: Only one ring. Vessels predominantly solitary and in radial multiples of 2 to 4 common or in clusters. Vessels cell wall thick (greater than 2 µm). Mean tangential diameter of earlywood vessels 20-50 µm. Greater than 200 vessels per square millimeter in earlywood. Fibers thin to thick walled. Tension wood present. Axial parenchyma scanty paratracheal. Rays per millimeter 12-20.
Radial section: Simple perforation plates. Inter-vessel pits opposite and alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Vascular and/or vasicentric tracheids present. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: Rays of two distinct sizes: uniseriate and 2-3 cells wide. Larger rays height greater than 1 mm.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Some rays become dilated. Sclerenchyma cells both in phloem and cortex. Fibers scattered, irregularly dispersed or in small groups. Prismatic crystals. With laticifers. Cell content in parenchyma cells. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith
Pith shape round. Medullary sheath present. Heterocellular pith. Thick walled parenchyma cells present. Cell content (gum, tannins, dark staining substances). Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other to not distinct. Tracheary elements of metaxylem in distinct radial rows.

Codified description
9 9.1 11 13 21 22 25 30 39.1 40.2 50.2 60 61 69 70.2 78 96 97 102 103 105 116.1 – B1 B2 B3.1 B4 B5.3 B5.4 B7 B10 B11 B14.1 B14.3 – P1 P2 P3 P3.3 P5 P9 P9.1 P10.1 P10.2 P12

Hedysarum cyprium Boiss.
(Annex 1, plate no. 52)

Erect or sub erect subshrub up to 30 cm in height. An endemic species to Cyprus, occurring on eroded limestone or sand-stone slopes with garigue vegetation (150-600 m alt.)

Xylem
Transverse section: Growth rings indistinct or absent. Wood diffuse porous. Vessels predominantly solitary. Vessels cell wall thick (greater than 2 µm). Mean tangential diameter of earlywood vessels less than 20 µm. Fibers very thick walled. Parenchyma pervasive. Rays per millimeter 4-12.
Radial section: Simple perforation plates. Inter-vessel pits scalariform, large (greater than 10 µm in diameter). Vessel-ray pits with large horizontal or vertical apertures. Earlywood vessel elements length 50-100 µm. Rays with procumbent, square and upright cells mixed throughout the ray. Prismatic crystals present.
Tangential section: Rays commonly 4 to 10 seriate. Rays disappear in polarized light.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Sclerenchyma cells both in phloem and cortex. Fibers in tangential rows. Sclereids scattered or irregularly dispersed. Prismatic crystals. Lignified cells in phellem.

Pith
Pith disappear in polarized light. Pith shape round. Heterocellular pith. Thick walled parenchyma cells present. Unilignified cells. Primary vascular bundles clearly separate from one another to not distinct.

Codified description
2 5 9 13 20 27 32 39.1 40.1 52.2 70 79.1 98 100.2 109 115 136 – B1 B2 B4 B5.2 B6.3 B7 B14.4 – P1 P3 P3.3 P3.4 P10.1 P10.2

Ononis spinosa L. (Boiss.) subsp. *leiosperma* Sirjaev
(Annex 1, plate no. 52)

Erect subshrub up to 80 cm in height. Native to Cyprus, common locally on moist, but also dry and stony soils (0-1300 m alt.).It is also found in other east Mediterranean countries towards Iran.

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood ring porous. Vessels solitary and in radial multiples of 2 to 4 common. Mean tangential diameter of earlywood vessels 20-50 µm. Fibers very thick walled. Axial parenchyma diffuse and scanty paratracheal to vasicentric. Apotracheal parenchyma in narrow bands or lines up to three cells wide. Rays per millimeter 4-12.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 200-500 µm. Fibers with simple to minutely bordered pits (libriform fibers). Rays with procumbent, square and upright cells mixed throughout the ray. Prismatic crystals in rays and in axial parenchyma cells.
Tangential section: Rays of two distinct sizes: uniseriate and 4 to 10 seriate. Larger rays height greater than 1 mm. Axial parenchyma and/or vessel elements storied. Fibers storied.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Some rays become dilated. Fibers in tangential rows. Prismatic crystals. Phellem/epidermis distinct in polarized light.

Pith
Pith shape round. Cells dimorphic center/border of the pith. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows.

Codified description
1 3 9 9.1 13 22 25 30 40.2 53.1 61 70 76 78 79 86 96 98 102 103 109 115 120 121 136 136.1 141.1 – B1 B2 B3.1 B5.2 B7 B14.3 – P1 P4.1 P9 P9.1 P10.1 P12

Spartium junceum L.
(Annex 1, plate no. 52)

Deciduous scoparioid shrub up to 2 m in height. Native of the Mediterranean countries, a constituent of the xerophytic, sclerophyllous maquis vegetation. In Cyprus it is found only as cultivated for ornament (0-1500 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood semi-

ring porous. Vessels in dendritic pattern. Vessels predominantly in clusters. Mean tangential diameter of earlywood vessel lumina 50 — 100 µm. Vessels number in early wood: 100-200 per square millimeter. Gums and other deposits in heartwood vessels. Fibers thin to thick walled. Tension wood present. Axial parenchyma vasicentric. Axial parenchyma in marginal or in seemingly marginal bands.
Radial section: Simple perforation plates. Inter-vessel pits alternate. Helical thickenings in vessel elements present. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells procumbent.
Tangential section: Ray width predominant 1 to 3 cells. Larger rays commonly 4 to 10 seriate. Axial parenchyma and vessel elements storied.

Bark
Groups of sieve tube and collapsed sieve tubes present. Sclerenchyma cells both in phloem and cortex. Fibers in tangential rows and grouped. Sclereids scattered or irregularly dispersed. Prismatic crystals. Phellem/epidermis distinct in polarized light.

Pith
Pith shape round. Cells dimorphic. With prismatic crystals. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
1 4 8 11 13 22 36 41 50.1 58 61 69 70.2 79 89 97 98 104 120 – B1 B2 B4 B5.2 B5.4 B6.3 B7 B14.3 – P1 P4 P6 P9 P9.1 P10.1 P12 P13

Phytolaccaceae

Phytolacca pruinosa Fenzi
(Annex 1, plate no. 53)

Erect deciduous subshrub up to 1.5 m in height. Indigenous to Cyprus, occurring on rocky slopes and open forests in the Troodos range (800-1750 m alt.). An eastern Mediterranean species it occurs in Lebanon, Syria, and Turkey.

Xylem
Transverse section: Only one ring. Vessels solitary and in radial multiples of 2 to 4 common. Mean tangential diameter of earlywood vessels 20-50 µm. Fibers thin to thick walled. Axial parenchyma scanty paratracheal. Rays per millimeter 12-20.
Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 µm in diameter). Vessels-ray pits with distinct borders, similar to

inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 200-500 µm. Vascular and/or vasicentric tracheids present. All ray cells upright and/or square. Prismatic crystals present.
Tangential section: Rays uniseriate to 3 cells wide.

Bark
Groups of sieve tubes present. Some rays become dilated. Fibers in tangential rows. Acicular crystals. Crystal sand. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith
Pith disappear in polarized light. Pith shape round. Heterocellular pith. Unilignified cells. Pits in transverse and in longitudinal cell walls. Vascular bundles in the pith. Tracheary elements of metaxylem in distinct radial rows.

Codified description
9 9.1 13 22 24 30 40.2 53.1 60 69 78 96 97 105 116.1 136 – B1 B3.1 B5.2 B7.1 B7.3 B14.1 B14.3 – P1 P3 P3.4 P9 P9.1 P10 P12

Platanaceae

Platanus orientalis L.
(Annex 1, plate no. 53)

Deciduous tree, more than 30 m in height. Native to Cyprus, growing along streams and other moist places (0-1700 m alt.). It is also indigenous to southern Europe and western Asia as far as Kashmir.

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels in radial multiples of 2 to 4 or in clusters. Mean tangential diameter of earlywood vessel lumina 50 — 100 µm, greater than 200 vessels per square millimeter in earlywood. Fibers thin to thick walled, radial flat marginal fibers. Axial parenchyma diffuse and scanty paratracheal. Less than 4 rays per millimeter.
Radial section: Simple and scalariform perforation plates, scalariform perforation plates with 20 — 40 bars. Inter-vessel pits alternate, medium (7-10 µm in diameter). Vessel-ray pits rounded or angular with large apertures. Earlywood vessel elements length 200-500 µm, fibers with distinctly bordered pits (fiber tracheids). Body ray cells procumbent with one row of upright and/or square marginal cells. Prismatic crystals in ray parenchyma cells.
Tangential section: Larger rays commonly greater than 10 seriate. Ray height greater than 1 mm.

Bark
Groups of sieve tube and collapsed sieve tubes present. Fibers in tangential rows. Prismatic crystals. Phellem homogeneous, distinct in polarized light.

Pith
Pith round in shape. Cells dimorphic. With prismatic crystals and druses. Pits grouped in transverse cell walls. Primary vascular bundle clearly separate from one other. Axial cells arranged in regular rows (radial section).

Codified description
1 5 9.1 11 13 14 17 22 26 31 41 50.2 53.1 62 69 70 70.3 76 78 99 102 106 114 136 136.1 — B1 B2 B5 B5.2 B7 B14.1 B14.3 — P1 P4 P6 P6.2 P9.1 P9.2 P10.1 P13

Plumbaginaceae

Plumbago auriculata Lam.
(Annex 1, plate no. 53)

Evergreen, sub erected or scrambling shrub, with up to 2 m long shoots. Native to south Africa, frequently grown in gardens and park in Cyprus (0-500 m alt.).

Xylem
Transverse section: Only one ring. Wood semi-ring porous. Vessels in radial multiples of 4 or more common. Vessels cell wall thick (greater than 2 µm). Mean tangential diameter of earlywood vessels less than 20 µm. Vessels of two distinct diameter classes. Fibers thick walled to very thick walled. Axial parenchyma scanty paratracheal. Rays per millimeter 12-20.
Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Helical thickenings in vessel elements present. Earlywood vessel elements length 100-200 µm. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: Ray width predominant 1 to 3 cells.

Bark
Groups of sieve tubes present. Some rays become dilated. Fibers grouped. Sclereids in tangential rows. Phellem homogeneous, distinct in polarized light.

Pith
Pith shape round. Cells dimorphic. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
4 10 13 22 24 30 36 39.1 40.1 45 52.3 61 69 70 78 97 105 116.1 – B1 B3.1 B5.4 B6.2 B14.1 B14.3 – P1 P4 P9 P9.1 P10.1 P12 P13

Plumbago europaea L.
(Annex 1, plate no. 54)

Perennial, sub erected subshrub up to 1 m in height. Native to Cyprus, not very common, found along field boundaries, and road sides (0-1000 m alt.). It is also indigenous in southern Europe and other Mediterranean countries as far as Afghanistan.

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels predominantly solitary. Vessels cell wall thick (greater than 2 µm). Mean tangential diameter of earlywood vessels less than 20 µm. Vessels of two distinct diameter classes. Gums and other deposits in heartwood vessels. Fibers thin to thick walled. Axial parenchyma scanty paratracheal.
Radial section: Simple perforation plates. Inter-vessel pits scalariform, small (4-7 µm in diameter). Helical thickenings in vessel elements present. Earlywood vessel elements length 100-200 µm. Vascular and/or vasicentric tracheids present. Fibers with simple to minutely bordered pits (libriform fibers).
Tangential section: Wood rayless.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Fibers in tangential rows.

Pith missing

Codified description
1 5 9 13 20 25 36 39.1 40.1 45 52.3 58 60 61 69 78 117 – B1 B2 B5.2 – Pith missing

Polygonaceae

Polygonum equisetiforme Sm.
(Photomicrographs not available)

Sprawling or decumbent subshrub with 50-100 cm long shoots. A species indigenous to Cyprus, common on field margins, costal areas and on stony slopes (0-1000 m alt.). A Mediterranean species extending eastwards to Iran.

Xylem

Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels solitary and in radial multiples of 2 to 4 common. Mean tangential diameter of earlywood vessels 20-50 µm. Vessels of two distinct diameter classes. Fibers thin to thick walled. Axial parenchyma scanty paratracheal.

Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 µm in diameter). Earlywood vessel elements length 100-200 µm. Fibers with simple to minutely bordered pits (libriform fibers). Septate fibers present.

Tangential section: Rays uniseriate to 3 cells.

Bark

Groups of sieve tube and collapsed sieve tubes present. Sclerenchyma cells both in phloem and cortex. Fibers in radial rows. Druses present. With laticifers, secretory elements, oil ducts or mucilage ducts.

Pith

Pith disappear in polarized light. Pith shape round. Unilignified cells. Cells dimorphic. Primary vascular bundle not distinct.

Codified description

1 5 9 9.1 13 22 24 40.2 45 52.3 61 65 69 78 96 97 — B1 B2 B4 B5.1 B7.2 B10 – P1 P3.4 P4 P10.2

Punicaceae

Punica granatum L.

(Annex 1, plate no. 54)

Much branched, deciduous, spinose shrub up to 7 m in height. Adventive to Cyprus, it occurs on field margins and roadsides (0-1200 m alt.). Native to Iran, Afghanistan, and south east Turkey.

Xylem

Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels solitary and in radial multiples of 2 to 4 common. Mean tangential diameter of earlywood vessels 20-50 µm. Fibers thin to thick walled. Tension wood present. Axial parenchyma scanty paratracheal. Rays per millimeter 12-20.

Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 100-200 µm. Fibers with simple to minutely bordered pits

(libriform fibers). Septate fibers present. All ray cells upright and/or square. Prismatic crystals in ray and in axial parenchyma cells.
Tangential section: Rays exclusively uniseriate.

Bark
Some rays become dilated. Sclereids scattered or irregularly dispersed. Druses present. Cell content in parenchyma cells. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith
Pith disappear in polarized light. Pith shape square. Unilignified cells. Cell content (gum, tannins, dark staining substances). With prismatic crystals. With crystals druses. Primary vascular bundle not distinct. Tracheary elements of metaxylem in distinct radial rows.

Codified description
1 5 9 9.1 13 22 24 30 40.2 52.3 61 65 69 70.2 78 96 105 116.1 136 136.1 141.1 – B3.1 B6.3 B7.2 B11 B14.1 B14.3 – P1.1 P1.4 P3.4 P5 P6 P6.2 P10.2 P12

Ranunculaceae

Clematis cirrhosa L.
(Annex 1, plate no. 54)

Climber, evergreen with stems up to 5 m long. A common, native species to Cyprus, which occur in forests, maquis, and garigue (0-900 m alt.). Also native to the Mediterranean countries and eastwards to Syria.

Xylem
Transverse section: Growth rings indistinct or absent. Wood diffuse porous. Vessels solitary and in clusters. Mean tangential diameter of earlywood vessel lumina 50 — 100 µm. Vessels of two distinct diameter classes. Fibers thin to thick walled. Axial parenchyma diffuse and scanty paratracheal to vasicentric. Axial parenchyma in narrow bands or lines up to three cells wide. Less than 4 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 µm in diameter). Vessel-ray pits rounded or angular with large apertures. Earlywood vessel elements length 100-200 µm. Vascular and/or vasicentric tracheids present
Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: Larger rays commonly 4 to 10 seriate.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Fibers grouped. Sclereids in tangential rows and scattered or irregularly dispersed. Layered phellem.

Pith
Pith shape round. Thick walled parenchyma cells present. Cells dimorphic. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other. Axial cells arranged in regular rows (radial section).

Codified description
2 5 9 11 13 22 24 31 41 45 52.3 60 61 69 76 78 79 86 98 105 114 – B1 B2 B5.4 B6.2 B6.3 B16 – P1 P3.3 P4 P9 P9.1 P10.1 P13

Clematis vitalba L.
(Annex 1, plate no. 55)

A climber with 8-10 m long stems. Adventive species to Cyprus, restricted to ravines and hedges (0-1600 m alt.). Indigenous to central and south Europe and eastwards to Afghanistan.

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Growth rings indistinct or absent. Wood ring porous. Vessels solitary and in clusters. Vessels cell wall thick (greater than 2 μm). Mean tangential diameter of earlywood vessel lumina 100 — 200 μm. Fibers thin to thick walled. Axial parenchyma scanty paratracheal. Less than 4 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits opposite and alternate, minute (less than 4 μm in diameter). Vessel-ray pits with large horizontal or vertical apertures. Earlywood vessel elements length 100-200 μm. Vascular and/or vasicentric tracheids present. Fibers with distinctly bordered pits (fiber tracheids). Rays with procumbent, square and upright cells mixed throughout the ray.
Tangential section: Rays commonly greater than 10 seriate. Rays disappear in polarized light. Ray height greater than 1 mm.

Bark
Some rays become dilated. Sclerenchyma cells both in phloem and cortex. Phelloids present. Sclereids in tangential rows. Phellem/epidermis distinct in polarized light.

Pith
Pith shape round. Cells dimorphic. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other.

Codified description
1 2 3 9 11 13 21 22 24 32 39.1 42 52.3 60 62 69 78 99 100.2 102 109 114 – B3.1 B4 B4.1 B6.2 B14.3 – P1 P4 P9 P9.1 P10.1

Rhamnaceae

Rhamnus alaternus L.
(Annex 1, plate no. 55)

Evergreen shrub or small tree up to 4 m in height. Indigenous to Cyprus, occurring on maquis and pine forests (0-1100 m alt.). It also occurs in the Mediterranean countries.

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels in dendritic pattern, predominantly solitary. Mean tangential diameter of earlywood vessels less than 20 μm, greater than 200 vessels per square millimeter in earlywood. Fibers thick to very thick walled. Axial parenchyma vasicentric sometimes confluent. Apotracheal parenchyma in marginal or in seemingly marginal bands. Rays per millimeter 12-20.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 μm in diameter). Vessel-ray pits rounded or angular with large apertures. Earlywood vessel elements length 200-500 μm. Vascular and/or vasicentric tracheids present. Body ray cells procumbent with mostly 2-4 rows of upright and/or square marginal cells. Acicular crystals.
Tangential section: Ray width predominant 1 to 3 cells.

Bark
Groups of sieve tube, collapsed sieve tubes present. Sclereids in groups. Acicular crystals. Phellem homogeneous, distinct in polarized light.

Pith
Pith shape polygonal. Cells dimorphic. With acicular crystals. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other and not distinct. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
1 5 8 9 13 22 25 31 40.1 50.2 53.1 60 69 70 79 83 89 97 107 116.1 150 — B1 B2 B6 B6.4 B7.1 B14.1 B14.3 — P1.1 P4 P6.1 P9 P9.1 P10.1 P10.2 P12 P13

Rhamnus oleoides sub sp. *graecus* (Boiss. Et Reut.) Holmboe
(Annex 1, plate no. 55)

Semi-evergreen shrub up to 3 m in height. A common indigenous plant to Cyprus, growing on rocky mountainsides shrublands and pine forests (0-1000 m alt.). It also occurs in Greece and Turkey.

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels in diagonal and in dendritic pattern. Mean tangential diameter of earlywood vessels 20-50 µm, vessels number in early wood: 100-200 per square millimeter. Tyloses with thin wall common. Fibers thick to very thick walled, tension wood present. Axial parenchyma scanty paratracheal to vasicentric, confluent in latewood.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Helical thickenings in vessel elements present. Earlywood vessel elements length 100-200 µm. Fibers with simple to minutely bordered pits (libriform fibers). Parenchyma-like fiber bands alternating with ordinary fibers. Body ray cells procumbent with one row of upright and/or square marginal cells. Prismatic crystals in ray parenchyma cells.
Tangential section: Rays uniseriate to 3 cells wide.

Bark
Groups of sieve tube and collapsed sieve tubes present. Some rays become dilated. Sclereids in groups. Prismatic crystals present. Phellem homogeneous, distinct in polarized light.

Pith
Pith shape round. Thick walled parenchyma cells present. Cells dimorphic. Pits only in transverse cell walls, grouped. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows.

Codified description
1 5 7 8 13 22 25 30 36 40.2 50.1 52.3 56 61 67 69 70 70.2 78 79 83 96 97 106 116.2 136 136.1 — B1 B2 B3.1 B6.4 B7 B14.1 B14.3 — P1 P3.3 P4 P9.1 P9.2 P10.1 P12

Zizyphus lotus (L.) Lam.
(Annex 1, plate no. 56)

Deciduous shrub up to 2 m in height. A very common indigenous species to Cyprus, which occur in fields wastelands and roadsides (0-500 m alt.). Also indigenous to other Mediterranean countries.

Xylem

Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels solitary and in radial multiples of 2 to 4 common. Vessels cell wall thick (greater than 2 μm). Mean tangential diameter of earlywood vessel lumina 50 — 100 μm, 20 — 40 earlywood vessels per square millimeter. Fibers thick to very thick walled. Axial parenchyma scanty paratracheal to vasicentric. Rays per millimeter 12-20.

Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 μm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 100-200 μm. Vascular and/or vasicentric tracheids present. Fibers with simple to minutely bordered pits (libriform fibers). Rays with procumbent, square and upright cells mixed throughout the ray. Prismatic crystals in ray parenchyma cells.

Tangential section: Rays exclusively uniseriate.

Bark

Groups of sieve tubes present. Collapsed sieve tubes. Some rays become dilated. Sclerenchyma cells both in phloem and cortex. Fibers in tangential and grouped. Sclereids scattered or irregularly dispersed and in groups. Prismatic crystals. Cell content in parenchyma cells. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith

Pith shape round. Cells dimorphic center/border of the pith. Cell content (gum, tannins, dark staining substances). With prismatic crystals. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description

1 5 9 9.1 13 22 24 30 39.1 41 48 52.3 60 61 69 70 78 79 96 109 116.1 136 136.1 – B1 B2 B3.1 B4 B5.2 B5.4 B6.3 B6.4 B7 B11 B14.1 B14.3 – P1 P4.1 P5 P6 P10.1 P12 P13

Zizyphus spina-christi (L.) Willd.

(Annex 1, plate no. 56)

Evergreen tree up to 14 in height. Rare, adventive species to Cyprus, found in plantations (0-200 m alt.). It also occurs in Egypt, Ethiopia, Somalia, the Middle East and eastern India.

Xylem

Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous to diffuse porous. Vessels solitary and in radial multiples of 2 to 4

common. Mean tangential diameter of earlywood vessels 20-50 µm. Vessels of two distinct diameter classes. Fibers thick to very thick walled. Axial parenchyma absent or extremely rare or not to recognizable. Axial parenchyma scanty paratracheal. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Helical thickenings only in narrower vessel elements. Earlywood vessel elements length 200-500 µm. Fibers with simple to minutely bordered pits (libriform fibers). Rays with procumbent, square and upright cells mixed throughout the ray.
Tangential section: Rays uniseriate and 1 to 3 cells wide.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Sclereids in tangential rows. Prismatic crystals. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith
Pith shape round. Heterocellular pith. Cells dimorphic. Cell content (gum, tannins, dark staining substances). With prismatic crystals. Pits in transverse and in longitudinal cell walls. Primary vascular bundle not distinct. Tracheary elements of metaxylem in distinct radial rows.

Codified description
1 4 5 9 9.1 13 22 25 30 39 40.2 45 53.1 61 69 70 75 78 96 97 109 116.2 – B1 B2 B6.2 B7 B14.1 B14.3 – P1 P3 P4 P5 P6 P9 P9.1 P10.2 P12

Zizyphus zizyphus (L.) Meikle
(Annex 1, plate no. 56)

Deciduous shrub or small tree up to 7 m in height. Adventive to Cyprus, occurring in hedges and gardens (0-500 m alt.). Possibly indigenous to central and east Asia.

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels predominantly solitary or in radial multiples of 2 to 4. Mean tangential diameter of earlywood vessel lumina 50 — 100 µm. Fibers thin to thick walled. Axial parenchyma scanty paratracheal
to vasicentric. Rays per millimeter 12-20.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length

100-200 µm. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: Rays uniseriate to 3 cells wide.

Bark
Groups of sieve tubes present. Sclerenchyma cells both in phloem and cortex. Fibers in tangential rows. Prismatic crystals and druses present. Tannins and/or other cell content in parenchyma cells. Phellem homogeneous, distinct in polarized light.

Pith
Pith disappear in polarized light. Pith shape round. Cells dimorphic. Laticifers or intercellular canals. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other or not distinct. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
1 5 9 9.1 13 22 25 30 41 52.3 61 69 78 79 96.1 97 105 116.1 — B1 B4 B5.2 B7 B7.2 B11 B14.1 B14.3 — P1.1 P1 P4 P7 P9 P9.1 P10.1 P10.2 P12 P13

Rosaceae

Cotoneaster racemiflorus (Desf.) C.Koch var. *nummularius* (Fisch. et Meyer) Dippel
(Annex 1, plate no. 57)

Deciduous or semi evergreen shrub up to 2 m in height. An indigenous plant, restricted to the highest part of Troodos (1000-1950 m alt.). It also occurs in Greece, Turkey, Caucasia, Syria, Lebanon northern Iraq and western Iran.

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous. Vessels predominantly solitary. Mean tangential diameter of earlywood vessels 20-50 µm, vessels of two distinct diameter classes. Greater than 200 vessels per square millimeter in earlywood. Fibers thick walled to very thick walled. Axial parenchyma diffuse and scanty paratracheal. Apotracheal parenchyma in narrow bands or lines up to three cells wide. Rays per millimeter 12-20.
Radial section: Simple perforation plates. Inter-vessel pits opposite and alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell and rounded or angular with large apertures. Helical thickenings in vessel elements present. Fibers with distinctly bordered pits (fiber tracheids). All ray cells

upright and/or square. Rays with procumbent, square and upright cells mixed throughout the ray.
Tangential section: Rays uniseriate to 3 cells wide.

Bark
Collapsed sieve tubes. Some rays become dilated. Sclerenchyma cells both in phloem and cortex. Sclereids in tangential rows or irregularly dispersed. Prismatic crystals. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith
Pith shape round. Thick walled parenchyma cells present. Cells dimorphic. Cell content (gum, tannins, dark staining substances). With prismatic crystals. Pits in transverse cell walls present, pits in longitudinal cell walls not observed. Primary vascular bundle not distinct. Tracheary elements of metaxylem in distinct radial rows.

Codified description
1 4 9 13 21 22 25 30 31 36 40.2 45 50.2 62 69 70 76 78 86 96 97 105 109 116.1 — B2 B3.1 B4 B6.2 B6.3 B7 B14.1 B14.3 — P1 P3.3 P4 P5 P6 P9.1 P10.2 P12

Crataegus azarolus L.
(Annex 1, plate no. 57)

Deciduous small tree or shrub up to 10 m in height. An indigenous species, common almost everywhere (0-1500 m alt.). Also found in the Mediterranean region and eastwards to Iran.

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels predominantly solitary. Mean tangential diameter of earlywood vessels 20-50 µm, greater than 200 vessels per square millimeter in earlywood. Fibers thin to thick walled. Axial parenchyma diffuse, scanty paratracheal. Axial parenchyma in narrow bands or lines up to three cells wide. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessel-ray pits rounded or angular with large apertures. Helical thickenings in vessel elements present. Earlywood vessel elements length 200-500 µm. Fibers with distinctly bordered pits (fiber tracheids). Body ray cells procumbent with one row of upright and/or square marginal cells. Prismatic crystals in axial parenchyma cells.
Tangential section: Rays uniseriate to 3 cells wide.

Bark

Groups of sieve tubes in tangential rows. Collapsed sieve tubes. Sclerenchyma cells both in phloem and cortex. Fibers and screeds in tangential rows. Prismatic crystals present. Phellem homogeneous, distinct in polarized light.

Pith

Pith shape round. Thick walled parenchyma cells present. With prismatic crystals. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other. Axial cells arranged in regular rows (radial section).

Codified description

1 5 9 13 22 25 31 36 40.2 50.2 53.1 62 69 76 78 86 96 97 106 116.2 136 141.1 — B1 B1.1 B2 B4 B5 B5.2 B6 B6.2 B7 B14.1 B14.3 — P1 P3.3 P6 P9 P9.1 P10.1 P13

Crataegus monogina Jacq.
(Annex 1, plate no. 57)

Deciduous, spreading shrub up to 7 m in height. An indigenous species occurring almost everywhere in Cyprus (0-1800 m alt.). It occurs also in Europe and western Asia.

Xylem

Transverse section: Growth ring distinct and recognizable. Wood diffuse-porous. Vessels predominantly solitary or in clusters. Mean tangential diameter of earlywood vessel lumina 50 — 100 μm; 40 — 100 earlywood vessels per square millimeter. Fibers thin to very thick walled. Axial parenchyma diffuse. Rays per millimeter 12-20.

Radial section: Simple perforation plates. Inter-vessel pits, small (4-7 μm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 350-800 μm. Fibers with simple to minutely bordered pits (libriform fibers). Body ray cells procumbent with one row of upright and/or square marginal cells. Prismatic crystals in axial parenchyma cells.

Tangential section: Ray width predominant 1 to 3 cells.

Bark

Groups of sieve tubes present. Collapsed sieve tubes. Fibers grouped. Sclereids in tangential rows. Prismatic crystals. Phellem homogeneous. In adult bark fibers mostly scattered or irregularly dispersed.

Pith
Pith shape round. Cells dimorphic. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other. Axial cells arranged in regular rows (radial section).

Codified description
1 5 9 11 13 22 25 30 41 49 53 61 69 70 76 97 106 116.1 141.1 — B1 B2 B5 B5.4 B6 B6.2 B7 B14.1 — P1 P4 P9 P9.1 P10.1 P13

Crataegus sinaica Boiss.
(Annex 1, plate no. 58)

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels predominantly solitary. Mean tangential diameter of earlywood vessels 20-50 μm. Fibers thick to very thick walled. Axial parenchyma diffuse to scanty paratracheal. Axial parenchyma in narrow bands or lines up to three cells wide. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 μm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 200-500 μm. Fibers with distinctly bordered pits (fiber tracheids). Body ray cells procumbent with one row of upright and/or square marginal cells. Prismatic crystals in axial parenchyma cells.
Tangential section: Rays uniseriate to 3 cells wide.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Sclerenchyma cells both in phloem and cortex. Fibers in tangential rows. Prismatic crystals. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith
Pith shape round. Thick walled parenchyma cells present. Cells dimorphic center/border of the pith. With crystals druses. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
1 5 9 13 22 25 30 40.2 53.1 62 69 70 76 78 86 96 97 106 116.2 136 141.1 – B1 B2 B4 B5.2 B7 B14.1 B14.3 – P1 P3.3 P4.1 P6.2 P9 P9.1 P10.1 P12 P13

Cydonia oblonga Mill.
(Annex 1, plate no. 58)

Deciduous small tree or shrub up to 10 m in height. Indigenous in Caucasia, Turkey and Iran. Cultivated in Cyprus for its fruits. Wild plants are noted (200 — 1200 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous. Vessels predominantly solitary. Mean tangential diameter of earlywood vessels 20-50 μm. Greater than 200 vessels per square millimeter in earlywood. Fibers thin to thick walled. Radial flat marginal fibers. Axial parenchyma diffuse. Axial parenchyma in narrow bands or lines up to three cells wide. Rays per millimeter 12-20.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 μm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Helical thickenings in vessel elements present. Earlywood vessel elements length 200-500 μm. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells procumbent. Body ray cells procumbent with one row of upright and/or square marginal cells.
Tangential section: Rays uniseriate to 1-2 cells wide.

Bark
Sclerenchyma cells both in phloem and cortex. Fibers in tangential rows. Prismatic crystals. Phellem homogeneous, distinct in polarized light. Layered phelloderm.

Pith
Pith shape round. Thick walled parenchyma cells present. Cells dimorphic. Cell content (gum, tannins, dark staining substances). Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other or not distinct. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
1 4 9 13 22 25 30 36 40.2 50.2 53.1 61 69 70.3 76 86 96 97 104 106 116.1 – B4 B5.2 B7 B14.1 B14.3 B18 – P1 P3.3 P4 P5 P9 P9.1 P10.1 P10.2 P12 P13

Prunus armeniaca L.
(Annex 1, plate no. 58)

Deciduous tree up to 8 m in height. Native of central Asia, an adventive species in Cyprus, widely cultivated for its edible fruits (0-900 m alt.).

Xylem

Transverse section: Growth ring boundaries clearly demarcated. Wood ring porous. Vessels solitary and in radial multiples of 2 to 4 common. Mean tangential diameter of earlywood vessel lumina 50 — 100 μm, 40 — 100 earlywood vessels per square millimeter. Tyloses with thin wall common. Fibers thick to very thick walled. Axial parenchyma diffuse and scanty paratracheal. Greater than 20 rays per millimeter.

Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 μm in diameter). Helical thickenings in vessel elements present. Fibers with simple to minutely bordered pits (libriform fibers) and with distinctly bordered pits (fiber tracheids). Rays with procumbent, square and upright cells mixed throughout the ray.

Tangential section: Rays of two distinct sizes: uniseriate and up to 10 cells wide.

Bark

Collapsed sieve tubes. Some rays become dilated. Sclerenchyma cells both in phloem and cortex. Sclereids scattered or irregularly dispersed. Prismatic crystals. Druses present. Cell content in parenchyma cells. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith

Pith shape round. Cells dimorphic. With prismatic, acicular crystals and druses. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description

1 3 9 9.1 13 22 25 36 41 49 56 61 62 69 70 76 78 96 98 103 109 116.2 – B2 B3.1 B4 B6.3 B7 B7.2 B11 B14.1 B14.3 – P1 P4 P6 P6.1 P6.2 P9 P9.1 P10.1 P12 P13

Prunus dulcis (Mill.) D.A.Webb
(Annex 1, plate no. 59)

Deciduous shrub or tree up to 8 m in height, sometimes with spine-tipped twigs (especially in wild specimens). Native to central and northwest Asia, it is cultivated in Cyprus for its fruits, frequently found as an escape from cultivations (0-1600 m alt.).

Xylem

Transverse section: Growth ring distinct and recognizable. Wood semi-ring porous. Vessels solitary and in radial multiples of 4 or more. Mean tangential diameter of earlywood vessel lumina 50 — 100 μm; 40 — 100 earlywood vessels

per square millimeter. Fibers very thick walled. Axial parenchyma diffuse and scanty paratracheal. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, medium (7-10 μm in diameter). Vessel-ray pits rounded or angular with large apertures. Helical thickenings in vessel elements present. Earlywood vessel elements length less than 350 μm. Fibers with distinctly bordered pits (fiber tracheids). Body ray cells procumbent with mostly 2-4 rows of upright and/or square marginal cells. Druses in ray parenchyma cells.
Tangential section: Rays of two distinct sizes: uniseriate and 4 to 10 seriate. Larger rays height greater than 1 mm.

Bark
Groups of sieve tubes present. Only some rays become dilated. Prismatic crystals and druses present. Tannins and/or other cell content in parenchyma cells. Phellem homogeneous.

Pith
Pith shape round. With thick walled parenchyma cells. Cells dimorphic. With crystals druses. Pits in transverse and in longitudinal cell walls. Primary vascular bundles clearly separate from one another to not distinct. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
1 4 9 10 13 22 26 31 36 41 49 52 62 70 76 78 96 98 102 103 107 116.2 — B1 B3.1 B7 B7.2 B11 B14.1 — P1 P3.3 P4 P6.2 P9 P9.1 P10.1 P10.2 P12 P13

Pyracantha coccinea M.Roem.
(Annex 1, plate no. 59)

Evergreen, spiny shrub up to 3 m in height. Native of southern Europe eastward to Iran. Cultivated in Cyprus as ornamental in gardens and parks (0-1400 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous. Vessels predominantly solitary. Mean tangential diameter of earlywood vessels less than 20 μm, vessels number in early wood: 100-200 per square millimeter. Fibers thick to very thick walled. Axial parenchyma diffuse and scanty paratracheal. Axial parenchyma in narrow bands or lines up to three cells wide. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 μm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell, sometimes rounded or angular

with large apertures. Fibers with distinctly bordered pits (fiber tracheids). Rays with procumbent, square and upright cells mixed throughout the ray.
Tangential section: Rays uniseriate to 3 cells wide.

Bark
Collapsed sieve tubes. Fibers grouped. Phellem homogeneous. Phellem and epidermis distinct in polarized light.

Pith
Pith shape round. Thick walled parenchyma cells present. Cells dimorphic. With prismatic crystals. Pits in transverse and in longitudinal cell walls. Pits in transverse cell walls. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
1 4 9 13 22 25 30 31 40.1 50.1 62 69 70 76 78 86 96.1 97 109 116.2 — B2 B5.4 B14.1 B14.3 — P1 P3.3 P4 P6 P9 P9.1 P10.1 P12 P13

Pyrus communis L.
(Photomicrographs not available)

Deciduous tree up to 10 m in height. In Cyprus it is cultivated on a limited scale, especially in the more elevated valleys (200-1700 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous to diffuse porous. Vessels predominantly in clusters. Mean tangential diameter of earlywood vessels less than 20 μm. Vessels of two distinct diameter classes. Greater than 200 vessels per square millimeter in earlywood. Fibers thick to very thick walled. Radial flat marginal fibers. Axial parenchyma diffuse and scanty paratracheal. Apotracheal parenchyma in narrow bands or lines up to three cells wide. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 μm in diameter) to medium (7-10 μm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Vessel-ray pits rounded or angular with large apertures. Fibers with distinctly bordered pits (fiber tracheids). Body ray cells procumbent with mostly 2-4 rows of upright and/or square marginal cells. Rays with procumbent, square and upright cells mixed throughout the ray. Prismatic crystals present.
Tangential section: Rays uniseriate to 3 cells wide.

Bark
Groups of sieve tube and collapsed sieve tubes present. Sclerenchyma cells both in phloem and cortex. Sclereids in tangential rows and scattered or irregularly dispersed. Prismatic crystals. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith
Pith shape round. Thick walled parenchyma cells present. Cells dimorphic. Cell content (gum, tannins, dark staining substances). With prismatic crystals and crystals druses. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other and not distinct. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
1 4 5 11 13 22 25 26 30 31 40.1 45 50.2 62 69 70 70.3 76 78 86 96 97 107 109 116.2 136 – B1 B2 B4 B6.2 B6.3 B7 B14.1 B14.3 – P1 P3.3 P4 P5 P6 P6.2 P9 P9.1 P10.1 P10.2 P12 P13

Pyrus malus L.
(Annex 1, plate no. 59)

Deciduous tree up to 10 m in height. Native throughout Europe, the Caucasus, Turkey and northern Iran. Cultivated in Cyprus for its edible fruits, especially at high altitudes. Wild plants are found along roadsides on the Troodos range (100-1800 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous. Vessels predominantly solitary. Mean tangential diameter of earlywood vessels 20-50 µm. Vessels of two distinct diameter classes. Greater than 200 vessels per square millimeter in earlywood. Fibers thick to very thick walled. Axial parenchyma diffuse and scanty paratracheal. Axial parenchyma in narrow bands or lines up to three cells wide. Rays per millimeter 12-20.
Radial section: Simple perforation plates. Inter-vessel pits opposite and alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Vessel-ray pits rounded or angular with large apertures. Fibers with distinctly bordered pits (fiber tracheids). All ray cells upright and/or square. Body ray cells procumbent with mostly 2-4 rows of upright and/or square marginal cells.
Tangential section: Rays of two distinct sizes: uniseriate or 2-4 cells wide.

Bark

Groups of sieve tube and collapsed sieve tubes present. Sclerenchyma cells both in phloem and cortex. Sclereids in tangential row and scattered or irregularly dispersed. Prismatic crystals. Phellem homogeneous, distinct in polarized light.

Pith

Pith shape round. Thick walled parenchyma cells present. Cells dimorphic. With prismatic crystals and crystals druses. Pits in transverse and in longitudinal cell walls. Pits grouped. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description

1 4 9 13 21 22 25 30 31 40.2 45 50.2 62 69 70 76 78 86 96 97 103 105 107 116.1 – B1 B2 B4 B6.2 B6.3 B7 B14.1 B14.3 – P1 P3.3 P4 P6 P6.2 P9 P9.1 P9.2 P10.1 P12 P13

Pyrus syriaca Boiss.

(Annex 1, plate no. 60)

Deciduous tree up to 10 m in height, with rounded or spreading crown. Indigenous to eastern Mediterranean region, eastwards to Iran. In Cyprus it thrives on hillsides, river banks and fields (100-1500 m alt.).

Xylem

Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous to diffuse porous. Vessels solitary or in clusters. Vessels of two distinct diameter classes. Mean tangential diameter of earlywood vessels 20-50 μm. Greater than 200 vessels per square millimeter in earlywood. Fibers thick to very thick walled. Axial parenchyma diffuse and scanty paratracheal. Apotracheal parenchyma in narrow bands or lines up to three cells wide. Greater than 20 rays per millimeter.

Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 μm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Vessel-ray pits rounded or angular with large apertures. Fibers with distinctly bordered pits (fiber tracheids). Ray cells procumbent and square mixed. Prismatic crystals in axial parenchyma cells.

Tangential section: Rays uniseriate to 3 cells wide.

Bark

Groups of sieve tube and collapsed sieve tubes present. Sclerenchyma cells both in phloem and cortex. Fibers in tangential rows and grouped. Prismatic crystals. Phellem homogeneous, distinct in polarized light.

Pith
Pith shape round. Thick walled parenchyma cells present. Cells dimorphic. Cell content (gum, tannins, dark staining substances). With prismatic crystals and crystals druses. Its in transverse and in longitudinal cell walls. Primary vascular bundles clearly separate from one another to not distinct. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
1 4 5 9 11 13 22 25 30 31 40.2 45 50.2 62 69 70 76 78 86 96.1 97 104 105 116.2 136 141.1 – B1 B2 B4 B5.2 B5.4 B7 B14.1 B14.3 – P1 P3.3 P4 P5 P6 P6.2 P9 P9.1 P10.1 P10.2 P12 P13

Rosa canina L.
(Annex 1, plate no. 60)

Deciduous shrub up to 4 m in height. Branches erected or arched, strongly armed with curved or hooked prickles. Indigenous to Europe and western Asia, in Cyprus it occurs on the Troodos range (600-1900 m alt.).

Xylem
Transverse section: Growth ring distinct and recognizable. Wood ring-porous; vessel predominantly in clusters. Mean tangential diameter of earlywood vessel lumina 100 — 200 μm; 5 — 20 earlywood vessels per square millimeter. Tyloses with thin wall common. Fibers thin to thick walled. Fibers very thick walled. Axial parenchyma diffuse and scanty paratracheal. Rays per millimeter 12-20.
Radial section: Simple perforation plates. Inter-vessel pits alternate, medium (7-10 μm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Helical thickenings in vessel elements present. Earlywood vessel elements length 350-800 μm. Vascular and/or vasicentric tracheids present. Fibers with distinctly bordered pits (fiber tracheids). Body ray cells procumbent with mostly 2-4 rows of upright and/or square marginal cells. Prismatic crystals present in ray parenchyma cells.
Tangential section: Rays uniseriate and 4 to 10 seriate. Ray height greater than 1 mm. Rays of two distinct sizes.

Bark
Collapsed sieve tubes. Only some rays become dilated. Fibers grouped and sclereids in tangential rows. Druses present. Phellem homogeneous and distinct in polarized light.

Pith

Pith round in shape. Cells dimorphic in the center of the pith. With crystals druses. Pits in transverse and in longitudinal cell walls (radial section). Primary vascular bundles clearly separate from one another to not distinct.

Codified description

1 3 4 9 21 22 25 30 39 40.2 50.2 52 60 62 69 70 76 78 96 98 102 103 105 109 116.2 136 — B2 B3.1 B5 B5.4 B6.2 B7.2 B14.1 B14.3 — P1 P4 P4.2 P6.2 P9 P9.1 P10.1 P10.2

Rosa chionistrae H. Lindb.
(Annex 1, plate no. 60)

Deciduous shrub up to 3 m in height. Branches erected or arched, armed with curved or hooked prickles. Endemic to Cyprus, restricted to the Troodos area (1100-1950 m alt.).

Xylem

Transverse section: Growth rings boundaries clearly demarcated, ring porous, vessels predominantly solitary. Mean tangential diameter of earlywood vessels lumina 100-200 m, 20-40 earlywood vessels per square millimeter. Tyloses with thin wall present. Fibers very thick walled, radial flat marginal fibers. Axial parenchyma diffuse and scanty paratracheal. 4-12 rays per millimeter.

Radial section: Simple perforation plates, medium size alternate intervessel pits, vessels-rays pits with distinct border and similar to intervessel pits in shape and size. Helical thickenings in vessels element, Earlywood vessel elements length 350-800 m. Vascular and vasicentric tracheids present, fibers with distinct border pits. Body ray cells procumbent with 1-3 rows of square marginal cells. Prismatic crystals in ray parenchyma cells.

Tangential section: Larger rays commonly 8-10 seriate, rays height greater than 1 millimeter, rays dimorphism.

Bark

Groups of sieve tube present, only few rays become dilated, fibers in tangential rows, crystal druses, phellem homogeneous, distinct in polarized light.
In adult bark sclerenchyma cells in both phloem and cortex.

Pith

Pith round to polygonal, visible to naked eyes. Cells dimorphic, crystal druses, pits in cell walls, axial arrangement of cells in regular rows. Primary vascular bundles clearly separate from one other.

Codified description

1 3 9 13 22 26 30 36 41 48 53 56 60 62 69 70 70.3 76 78 98 102 103 106 107 115 136 136.1 — B1 B3.1 B5.2 B7.2 B14.1 B14.3 — P1 P4 P6.2 P9 P9.1 P10.1 P13

Rosa damascena Mill.
(Annex 1, plate no. 61)

Deciduous shrub up to 3 m in height. Branches erected or arched, armed with strong, curved or hooked prickles. Widely cultivated in Cyprus, it occurs as a relict of cultivation in several places (0-1700 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood ring porous to semi-ring porous. Vessels solitary and in clusters. Mean tangential diameter of earlywood vessel lumina 50 — 100 µm. Vessels number in early wood: 100-200 per square millimeter. Fibers thick to very thick walled. Axial parenchyma diffuse and scanty paratracheal. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Helical thickenings in vessel elements present. Vascular and/or vasicentric tracheids present. Fibers with distinctly bordered pits (fiber tracheids). Helical thickenings in ground tissue fibers. All ray cells upright and/or square. Rays with procumbent, square and upright cells mixed throughout the ray. Prismatic crystals present.
Tangential section: Rays of two distinct sizes: uniseriate and 4 to 10 seriate. Larger rays height greater than 1 mm.

Bark
Collapsed sieve tubes. Some rays become dilated. Sclerenchyma cells both in phloem and cortex. Fibers grouped. Sclereids scattered or irregularly dispersed. Prismatic crystals. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith
Pith shape round. Cells dimorphic. Pits in transverse and in longitudinal cell walls. Pits grouped. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
1 3 4 9 11 13 22 25 30 36 41 50.1 60 62 64 69 70 76 78 96 98 102 103 105 109 116.2 136 – B2 B3.1 B4 B5.4 B6.3 B7 B14.1 B14.3 – P1 P4 P9 P9.1 P9.2 P10.1 P12 P13

Rubus discolor Weihe et Nees
(Annex 1, plate no. 61)

Evergreen shrub up to 2 m in height. An adventive species in Cyprus, occurring mainly in the Troodos area (800-1800 m alt.). A native of Europe, the Caucasus, Turkey and Lebanon.

Xylem

Transverse section: Growth ring boundaries clearly demarcated. Wood ring porous. Wood semi-ring porous. Vessels solitary and in radial multiples of 2 to 4 or in clusters. Mean tangential diameter of earlywood vessel lumina 50 — 100 μm. Vessels of two distinct diameter classes. Vessels number in early wood: 100-200 per square millimeter. Fibers thick to very thick walled. Axial parenchyma scanty paratracheal. Rays per millimeter 12-20.

Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 μm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Vascular and/or vasicentric tracheids present. Fibers with distinctly bordered pits (fiber tracheids). All ray cells upright and/or square. Rays with procumbent, square and upright cells mixed throughout the ray.

Tangential section: Rays of two distinct sizes: uniseriate and 4 to 10 seriate. Larger rays height greater than 1 mm.

Bark

Groups of sieve tubes present. Collapsed sieve tubes. Some rays become dilated. Sclereids in tangential rows. Prismatic crystals and druses present. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith

Pith shape pentagonal. Cells dimorphic. With prismatic crystals. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description

1 3 4 9 9.1 11 13 22 25 30 41 45 50.1 60 62 69 70 78 96 98 102 103 105 109 116.1 – B1 B2 B3.1 B6.2 B7 B7.2 B14.1 B14.3 – P1.3 P4 P6 P9 P9.1 P10.1 P12 P13

Rubus sanctus Schreb
(Annex 1, plate no. 61)

Shrub up to 2 m in height, with spiny and distinct angled stem. Indigenous to western and central Europe eastward to Afghanistan. A common species growing in Cyprus in moist places, in almost every part of the island (0-1600 m alt.).

Xylem

Transverse section: Growth ring distinct and recognizable. Wood ring-porous to semi-ring porous. Vessels solitary or in radial multiples of 2 to 4. Mean tangential diameter of earlywood vessel lumina 50 — 100 μm. Vessels of two distinct diameter classes; 40 — 100 earlywood vessels per square millimeter. Fibers thin to very thick walled. Axial parenchyma diffuse and scanty paratracheal. Rays per millimeter 4-12.

Radial section: Simple perforation plates. Inter-vessel pits alternate, medium (7-10 μm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 350-800 μm. Vascular and/or vasicentric tracheids present. Fibers with distinctly bordered pits (fiber tracheids). Rays with procumbent, square and upright cells mixed throughout the ray. Prismatic crystals in ray parenchyma cells.

Tangential section: Rays of two distinct sizes: uniseriate; larger rays commonly greater than 10 seriate. Larger ray height greater than 1 mm.

Bark

Groups of sieve tubes present. Fibers in tangential rows. Prismatic crystals and druses present. Phellem homogeneous and distinct in polarized light. In adult bark some radii become dilated.

Pith

Pith shape pentagonal. Cells dimorphic. With prismatic crystals. Pits in transverse and in longitudinal cell walls (radial section). Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows.

Codified description

1 3 4 9 9.1 13 22 26 30 41 45 49 53 60 62 69 70 76 78 96 99 102 103 109 115 136.1 — B1 B5 B5.2 B7 B7.2 B14.1 B14.3 — P1.3 P4 P6 P9 P9.1 P10.1 P12

Sarcopoterium spinosum (L.) Spach

(Annex 1, plate no. 62)

Small, much branched shrub up to 1,5 m in height. Widely distribute in the eastern Mediterranean, and eastwards to Sardinia. In Cyprus it thrives in garigue and impoverished areas, where it is frequently the dominant species. It is very common in most part of the island (0-1250 m alt.).

Xylem

Transverse section: Growth ring distinct and recognizable. Wood semi-ring porous to diffuse porous. Vessels in diagonal and/or radial pattern and in

clusters. Mean tangential diameter of earlywood vessels 20-50 µm. Greater than 200 vessels per square millimeter in earlywood. Tyloses with thin wall common. Fibers thin to very thick walled. Axial parenchyma extremely rare or not to recognizable, diffuse and scanty paratracheal in earlywood.
Radial section: Simple perforation plates. Inter-vessel pits alternate, large (greater than 10 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length less than 350 µm. Vascular and/or vasicentric tracheids present. Fibers with simple to minutely bordered pits (libriform fibers). Septate fibers present. All ray cells upright and/or square. Prismatic crystals in ray parenchyma cells.
Tangential section: Rays of two distinct sizes: uniseriate and 4 to 10 seriate. Larger rays height greater than 1 mm.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Few prismatic crystals present. Phellem/epidermis distinct in polarized light. In adult bark: groups of sieve tubes in radial rows, some rays become dilated, fibers scattered or irregularly dispersed or in groups.

Pith
Pith shape round. With thick walled parenchyma cells. Cells dimorphic center/border of the pith. With small prismatic crystals and few druses. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate to not distinct each other. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
1 4 5 7 11 13 22 27 30 40.2 50.2 52 56 60 61 65 69 70 75 76 78 96 98 102 103 105 136.1 — B1 B2 B7 B14.3 — P1 P3.3 P4.1 P6 P6.2 P9 P9.1 P10.1 P10.2 P12 P13

Sorbus aria (L.) Crantz subsp. *cretica* (Lindl.) Holmboe
(Annex 1, plate no. 62)

Deciduous shrub or small tree up to 15 m in height, with broadly ovoid or pyramidal crown. Native to south Europe and east Mediterranean, in Cyprus it is restricted to the highest parts of Troodos (1000-1950 m alt.).

Xylem
Transverse section: Growth ring distinct and recognizable. Wood diffuse-porous with vessel predominantly in clusters. Mean tangential diameter of earlywood vessel lumina 50 — 100 µm. Vessels of two distinct diameter classes; 40 — 100 earlywood vessels per square millimeter. Fibers thin to very thick walled. Axial parenchyma diffuse. Rays per millimeter 4-12.

Radial section: Simple perforation plates. Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Helical thickenings in vessel elements present. Earlywood vessel elements length 350-800 µm. Fibers with simple to minutely bordered pits (libriform fibers). Body ray cells procumbent with one row of upright and/or square marginal cells.
Tangential section: Ray width predominant 1 to 3 cells.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Fibers scattered or irregularly dispersed. Sclereids in tangential rows. Prismatic crystals. Phellem homogeneous. Tannins and/or other cell content in phellem cells.

Pith
Pith shape roundish to polygonal. With thick walled parenchyma cells. Cells dimorphic center/border of the pith. Pits in transverse and in longitudinal cell walls. Pits in transverse cell walls. Primary vascular bundle clearly separate from one other. Axial cells arranged in regular rows (radial section).

Codified description
1 5 11 13 30 36 41 45 49 53 61 69 70 76 97 106 115 — B1 B2 B5 B5.3 B6 B6.2 B7 B11 B14.1 — P1 P3.3 P4.1 P9 P9.1 P10.1 P13

Rubiaceae

Asperula cypria Ehrend.
(Annex 1, plate no. 62)

Much branched subshrub up to 60 cm in height. A very common endemic in Cyprus, occurring in hillsides and mountain range all over the islands (0-1200 m alt.).

Xylem
Transverse section: Growth ring distinct and recognizable. Wood semi-ring porous to diffuse-porous. Vessels in diagonal and/or radial pattern. Vessels in radial multiples of 2 to 4 or in clusters. Mean tangential diameter of earlywood vessels less than 20 µm. Vessels of two distinct diameter classes; 40 — 100 earlywood vessels per square millimeter. Fibers thin to thick walled. Axial parenchyma absent or extremely rare or not to recognizable. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessel-ray pits rounded or angular with large apertures. Earlywood vessel elements length less than 350 µm. Fibers with distinctly bordered pits (fiber tracheids). All ray cells upright and/or square.

Tangential section: Rays exclusively uniseriate.

Bark
Groups of sieve tubes present. Collapsed sieve tubes.

Pith
Pith shape polygonal. Cells dimorphic center/border of the pith. Pits in transverse cell walls, longitudinal cell walls missing.

Codified description
1 4 5 7 9.1 11 13 22 25 31 40.1 45 49 52 62 69 75 96 105 116.2 – B1 B2 — P1.1 P4.1 P9.1

Putoria calabrica (L.f.) DC.
(Annex 1, plate no. 63)

Small, much branched, prostate shrubs usually less than 15 cm in height. In occurs in the Mediterranean countries, in Cyprus it thrives on mountain range (300-1500 m alt.).

Xylem
Transverse section: Growth ring distinct and recognizable. Wood semi-ring porous. Vessels solitary or in clusters. Mean tangential diameter of earlywood vessel lumina less than 50 µm. Vessels of two distinct diameter classes. Vessels number in early wood: 100-200 per square millimeter. Gums and other deposits in heartwood vessels and/or fibers. Fibers thin to thick walled. Axial parenchyma scanty paratracheal. Axial parenchyma in marginal or in seemingly marginal bands. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, medium (7-10 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 350-800 µm. Vascular and/or vasicentric tracheids present. Fibers with distinctly bordered pits (fiber tracheids). All ray cells upright and/or square.
Tangential section: Rays predominantly uniseriate, some up to 3 cells wide.

Bark
Phloem uniform.

Pith
Pith shape round. Cells dimorphic center/border of the pith. Pits in transverse and longitudinal cell walls (radial section), sometimes grouped.

Codified description
1 4 9 11 13 22 26 30 40 45 50.1 53 58 60 62 69 78 89 96.1 97 105 116.2 – B8 — P1 P4.1 P9 P9.1 P9.2

Rubia laurae (Holmboe) Airy Shaw
(Annex 1, plate no. 63)

Trailing or climbing species up to 100 cm long. Endemic to Cyprus, growing in pine forests and thickets (0-1400 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels solitary and in radial multiples of 2 to 4. Mean tangential diameter of earlywood vessels less than 20 µm. Fibers thin to thick walled. Axial parenchyma scanty paratracheal. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits opposite and alternate, small (4-7 µm in diameter). Helical thickenings in vessel elements present. Earlywood vessel elements length 100-200 µm. All ray cells procumbent.
Tangential section: Rays exclusively uniseriate.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Crystal sand. Phellem/epidermis distinct in polarized light. Lignified cells in phellem.

Pith
Pith shape round. Heterocellular pith. Unilignified cells. Cells dimorphic center/border of the pith. With crystals druses. Primary vascular bundle not distinct.

Codified description
1 5 9 9.1 13 21 22 25 36 40.1 52.3 69 78 96 104 116.2 – B1 B2 B7.3 B14.3 B14.4 – P1 P3 P3.4 P4.1 P6.2 P10.2

Rubia tenuifolia d'Urv.
(Annex 1, plate no. 63)

Climbing shrub with tetragonal stems up to 3 m long. It occur in Greece, Turkey, Syria and Iraq. It thrives almost all over Cyprus (0-1500 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood ring porous. Vessels solitary or in clusters. Mean tangential diameter of earlywood vessels 20-50 µm. Fibers thin to thick walled, radial flat marginal fibers. Axial

parenchyma diffuse and scanty paratracheal. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, medium (7-10 μm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Helical thickenings in vessel elements present. Earlywood vessel elements length 200-500 μm. Fibers with distinctly bordered pits (fiber tracheids). All ray cells upright and/or square.
Tangential section: Rays exclusively uniseriate.

Bark
Groups of sieve tube and sieve tubes present. Phelloids present. Acicular crystals and crystal sand. Layered phelloderm.

Pith
Pith shape round. Medullary sheath present. Cells dimorphic. Primary vascular bundle not distinct.

Codified description
1 3 9 11 13 22 26 30 36 40.2 53.1 62 69 70.3 76 78 96 105 116.2 — B1 B2 B4.1 B7.1 B7.3 B18 — P1 P2 P4 P10.2

Rutaceae

Citrus aurantium L.
(Annex 1, plate no. 64)

Evergreen up to 6 m in height. Native to tropical and subtropical Asia, but it is cultivated since ancient times in all Mediterranean countries. Cultivated species found in gardens all over Cyprus (0-1000 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous to diffuse porous. Vessels predominantly solitary. Vessels cell wall thick (greater than 2 μm). Mean tangential diameter of earlywood vessels 20-50 μm. Vessels of two distinct diameter classes. Gums and other deposits in heartwood vessels. Fibers thick to very thick walled. Axial parenchyma diffuse and scanty paratracheal. Axial parenchyma in narrow bands or lines up to three cells wide. Rays per millimeter 4-12.
Radial section: Simple perforation plates. Inter-vessel pits opposite and alternate, minute (less than 4 μm in diameter). Earlywood vessel elements length 200-500 μm. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells procumbent. Body ray cells procumbent with one row of

upright and/or square marginal cells. Prismatic crystals in axial parenchyma cells.
Tangential section: Rays uniseriate to 3 cells wide.

Bark
Groups of sieve tube and collapsed sieve tubes present. Some rays become dilated. Sclerenchyma cells both in phloem and cortex. Fibers in tangential rows and grouped. Sclereids scattered or irregularly dispersed. Prismatic crystals. With laticifers or intercellular canals. Phellem/epidermis distinct in polarized light.

Pith
Pith shape triangular. Thick walled parenchyma cells present. Cells dimorphic in the center of the pith. Cell content (gum, tannins, dark staining substances). With prismatic crystals. Pits in transverse and in longitudinal cell walls. Primary vascular bundles clearly separate from one another to not distinct. Tracheary elements of metaxylem in distinct radial rows.

Codified description
1 4 5 9 13 21 22 24 39.1 40.2 45 53.1 58 61 69 70 76 78 86 96 97 104 106 115 136 141.1 – B1 B2 B3.1 B4 B5.2 B5.4 B6.3 B7 B10 B10.3 B14.3 – P1.2 P3.3 P4.2 P5 P6 P9 P9.1 P10.1 P10.2 P12

Citrus limon (L.) Burm.f.
(Annex 1, plate no. 64)

Evergreen tree up to 6 m in height. A cultivated species, with great economic importance for Cyprus. Sometimes planted in gardens, and street in urban areas (0 — 600 m alt.).

Xylem
Transverse section: Growth rings indistinct or absent. Wood semi-ring porous. Vessels predominantly solitary. Vessels cell wall thick (greater than 2 μm). Mean tangential diameter of earlywood vessels 20-50 μm. Greater than 200 vessels per square millimeter in earlywood. Fibers very thick walled. Axial parenchyma diffuse. Axial parenchyma in marginal or in seemingly marginal bands.
Radial section: Simple perforation plates. Inter-vessel pits alternate. Helical thickenings in vessel elements present. Vascular and/or vasicentric tracheids present. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square. Body ray cells procumbent with over 4 rows of upright and/or square marginal cells.
Tangential section: Rays exclusively uniseriate.

Bark
Groups of sieve tube and collapsed sieve tubes present. Some rays become dilated. Sclerenchyma cells both in phloem and cortex. Fibers in tangential rows and grouped. Prismatic crystals. With secretory elements in ducts. Phellem homogeneous, distinct in polarized light.

Pith
Pith shape triangular. Cells dimorphic center/border of the pith. With prismatic and acicular crystals. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other. Primary vascular bundle not distinct. Tracheary elements of metaxylem in distinct radial rows.

Codified description
2 4 9 13 22 36 39.1 40.2 50.2 60 61 70 76 89 96 105 108 – B1 B2 B3.1 B4 B5.2 B5.4 B7 B10 B10.2 B14.1 B14.3 – P1.2 P4.1 P6 P6.1 P9 P9.1 P10.1 P10.2 P12

Citrus sinensis (L.) Osbeck
(Annex 1, plate no. 64)

Evergreen tree up to 6 m in height. A cultivated species, with great economic importance for Cyprus. Sometimes planted in gardens, and street in urban areas (0 — 600 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels predominantly solitary. Vessels in radial multiples of 2 to 4 common. Mean tangential diameter of earlywood vessels 20-50 μm. Vessels of two distinct diameter classes. Gums and other deposits in heartwood vessels. Fibers thick to very thick walled. Axial parenchyma diffuse and scanty paratracheal. Axial parenchyma in marginal or in seemingly marginal bands.
Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 μm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 100-200 μm. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells procumbent. Body ray cells procumbent with one row of upright and/or square marginal cells. Prismatic crystals in axial parenchyma cells.
Tangential section: Rays uniseriate to 1 to 3 cells wide.

Bark
Groups of sieve tube and collapsed sieve tubes present. Some rays become dilated. Fibers grouped. Prismatic crystals. With secretory elements in ducts. Phellem homogeneous, distinct in polarized light.

Pith

Pith shape triangular. Thick walled parenchyma cells present. Cells dimorphic. Cell content (gum, tannins, dark staining substances). With prismatic crystals. With crystals druses. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other. Primary vascular bundle not distinct. Tracheary elements of metaxylem in distinct radial rows.

Codified description

1 5 9 9.1 13 22 24 30 40.2 45 52.3 58 61 69 70 76 78 89 96 97 104 106 136 141.1 – B1 B2 B3.1 B5.4 B7 B10 B10.2 B14.1 B14.3 – P1.2 P3.3 P4 P5 P6 P6.2 P9 P9.1 P10.1 P10.2 P12

Ruta chalepensis L.

(Annex 1, plate no. 65)

Foetid smelling subshrub up to 80 cm in height. Native to Mediterranean countries and Atlantic islands. In Cyprus it occurs on rocky places and cliffs (0-800 m alt.).

Xylem

Transverse section: Growth rings indistinct or absent. Wood diffuse porous. Vessels in diagonal and/or radial pattern. Vessels in radial multiples of 2 to 4 common. Vessels predominantly in clusters. Mean tangential diameter of earlywood vessels less than 20 µm. Gums and other deposits in heartwood vessels. Fibers thin to thick walled. Axial parenchyma scanty paratracheal. Rays per millimeter 12-20.

Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Helical thickenings in vessel elements present. Earlywood vessel elements length 100-200 µm. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square. Druses present.

Tangential section: Rays of two distinct sizes: uniseriate and up to 3 cells wide.

Bark

Groups of sieve tubes present. Collapsed sieve tubes. Some rays become dilated. Fibers scattered or irregularly dispersed. Druses present. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith

Pith shape round. Cells dimorphic. Cell content (gum, tannins, dark staining substances). With crystals druses. Pits in transverse and in longitudinal cell walls. Primary vascular bundles clearly separate from one another to not distinct.

Codified description

2 5 7 9.1 11 13 22 25 30 36 40.1 52.3 58 61 69 78 96 97 103 105 116.1 144 – B1 B2 B3.1 B5.3 B7.2 B14.1 B14.3 – P1 P4 P5 P6.2 P9 P9.1 P10.1 P10.2

Salicaceae

Salix alba L.

(Annex 1, plate no. 65)

Deciduous tree up to 30 m in height. Native of Europe, Mediterranean countries and eastward to central Asia. In Cyprus it thrives in most places, along streams and rivers (0-1400 m alt.).

Xylem

Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous. Vessels solitary or in radial multiples of 2 to 4 common. Mean tangential diameter of earlywood vessels 20-50 μm. Gums and other deposits in heartwood vessels. Fibers very thin walled. Tension wood present. Axial parenchyma scanty paratracheal. Rays per millimeter 12-20.

Radial section: Simple perforation plates. Inter-vessel pits alternate, medium (7-10 μm in diameter). Vessel-ray pits rounded or angular with large apertures. Earlywood vessel elements length greater than 500 μm. Fibers with simple to minutely bordered pits (libriform fibers). Body ray cells procumbent with one row of upright and/or square marginal cells.

Tangential section: Rays exclusively uniseriate.

Bark

Groups of sieve tubes present. Collapsed sieve tubes. Sclerenchyma cells both in phloem and cortex. Fibers in tangential rows. Sclereids scattered or irregularly dispersed. Prismatic crystals. Druses present. Cell content in parenchyma cells. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith

Pith shape round. Cells dimorphic. Cell content (gum, tannins, dark staining substances). With prismatic crystals. With crystals druses. Primary vascular bundles clearly separate from one another to not distinct. Axial cells arranged in regular rows (radial section).

Codified description

1 4 9 9.1 13 22 26 31 40.2 53.2 58 61 68 70.2 78 96 106 116.1 – B1 B2 B4 B5.2 B6.3 B7 B7.2 B11 B14.1 B14.3 – P1 P4 P5 P6 P6.2 P10.1 P10.2 P13

Sapindaceae

Dodonaea viscosa (L.) Jacq.
(Annex 1, plate no. 65)

Evergreen shrub up to 4 m in height. Indigenous to tropical and subtropical zones, especially of Australia. Adventive to Cyprus that occurs in hedges, field margins, roadsides and sometimes in scrublands (0-500 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels in radial multiples of 2 to upon 4 common. Vessels cell wall thick (greater than 2 μm). Mean tangential diameter of earlywood vessels 20-50 μm. Gums and other deposits in heartwood vessels. Fibers very thick walled. Axial parenchyma scanty paratracheal. Rays per millimeter 12-20.
Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 μm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Helical thickenings in vessel elements present. Vascular and/or vasicentric tracheids present. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: Rays exclusively uniseriate.

Bark
Groups of sieve tubes present. Sclerenchyma cells both in phloem and cortex. Fibers in tangential rows. Prismatic crystals. Phellem/epidermis distinct in polarized light. Layered phelloderm.

Pith
Pith shape round. Medullary sheath present. Cells dimorphic center/border of the pith. Cell content (gum, tannins, dark staining substances). With prismatic crystals. Pits in transverse and in longitudinal cell walls. Pits grouped. Primary vascular bundle not distinct. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
1 5 9.1 10 13 22 24 30 36 39.1 40.2 58 60 61 70 78 96 105 116.1 – B1 B4 B5.2 B7 B14.3 B18 – P1 P2 P4.1 P5 P6 P9 P9.1 P9.2 P10.2 P12 P13

Scrophulariaceae

Antirrhinum majus L.
(Annex 1, plate no. 66)

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels predominantly solitary or in radial multiples of 2 to 4 common and in clusters. Mean tangential diameter of earlywood vessels 20-50 µm. Vessels of two distinct diameter classes. Fibers thin to thick walled. Axial parenchyma scanty paratracheal. Less than 4 rays per millimeter.

Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 100-200 µm. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square. Prismatic crystals in ray parenchyma cells.

Tangential section: Rays of two distinct sizes: ray width predominant 1 to 3 cells. Larger rays commonly greater than 10 seriate. Ray height greater than 1 mm. Rays of two distinct sizes.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Fibers in tangential rows. Phellem homogeneous.

Pith
Pith shape round. Cells dimorphic. Pits in transverse and in longitudinal cell walls. Pits grouped. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
1 5 9 9.1 11 13 22 25 30 40.2 45 52.3 61 69 78 97 99 102 103 105 114 136 136.1 – B1 B2 B5.2 B14.1 – P1 P4 P9 P9.1 P9.2 P10.1 P12 P13

Odontites cypria Boiss.
(Annex 1, plate no. 66)

Subshrub 15-60 cm in height, with branched stem which are often violet or purple. An endemic species, occurring in garigue and pine forest (0-1600 m alt.).

Xylem
Transverse section: Growth ring distinct and recognizable. Wood semi-ring porous. Vessels predominantly solitary, or in radial multiples of 2 to greater

than 4 common. Mean tangential diameter of earlywood vessels less than 20 µm. Vessels of two distinct diameter classes; 40 — 100 earlywood vessels per square millimeter. Gums and other deposits in heartwood vessels and/or fibers. Fibers thin to thick walled. Axial parenchyma absent or extremely rare or not to recognizable. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, medium (7-10 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length less than 350 µm. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: Ray width predominant 1 to 3 cells.

Bark
Phloem uniform.

Pith
Pith shape round. Cells dimorphic center/border of the pith. Cell content. With prismatic crystals. Axial cells arranged in regular rows (radial section).

Codified description
1 4 9 9.1 10 13 22 26 30 40.1 45 49 52 58 61 69 70.2 75 97 105 116.2 – B8 — P1 P4.1 P5 P6 P13

Solanaceae

Lycium ferocissimum Miers
(Annex 1, plate no. 66)

Much branched shrub up to 6 m in height, with twigs modified into spines. A naturalized adventive species, native to south Africa, usually occurring in costal area and inland (0-200 m alt.). Introduced to Cyprus near the beginning of the 20^{th} century.

Xylem
Transverse section: Growth ring distinct and recognizable. Wood diffuse-porous. Vessels in diagonal and/or radial pattern and in clusters. Mean tangential diameter of earlywood vessels 20-50 µm. Greater than 100 earlywood vessels per square millimeter. Fibers thin to thick walled. Axial parenchyma diffuse and scanty paratracheal. Rays per millimeter 12-20.
Radial section: Simple perforation plates. Inter-vessel pits alternate, medium (7-10 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Helical thickenings in vessel elements present. Earlywood vessel elements length 350-800 µm. Fibers

with distinctly bordered pits (fiber tracheids). All ray cells upright and/or square. Crystal sand present.
Tangential section: Rays exclusively uniseriate.

Bark
Phloem uniform. Crystal sand present. Phellem homogeneous. In adult bark collapsed sieve tubes.

Pith
Pith shape round. Pith disappear in polarized light. Heterocellular pith: unlignified parenchyma cells with a group of few sclereids in the center of the pith. Cells dimorphic. Crystal sand present. Primary vascular bundle not distinct. Axial cells arranged in regular rows (radial section).

Codified description
1 5 7 8 11 13 22 26 30 36 40.2 50 53 62 69 76 78 96 105 116.1 — B7.3 B8 B14.1 — P1.1 P1 P3 P4 P6.4 P10.2 P13

Nicotiana glauca Graham
(Annex 1, plate no. 67)

Evergreen, loosely branched shrub 6-10 m in height. An adventive species in Cyprus, naturalized along roadsides and waste ground (0-800 m alt.). Native to south America.

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous to diffuse porous. Vessels in diagonal and/or radial pattern. Vessels in radial multiples of 4 or more common. Mean tangential diameter of earlywood vessels 20-50 µm. Fibers thick to very thick walled. Axial parenchyma diffuse. Axial parenchyma in narrow bands or lines up to three cells wide. Rays per millimeter 12-20.
Radial section: Simple perforation plates. Inter-vessel pits scalariform. Inter-vessel pits alternate, minute (less than 4 µm in diameter). Vessel-ray pits rounded or angular with large apertures. Earlywood vessel elements length 200-500 µm. Vascular and/or vasicentric tracheids present. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: Rays uniseriate and up to 3 cells wide.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Some rays become dilated. Fibers scattered or irregularly dispersed. Crystal sand. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith
Pith disappear in polarized light. Fibers present. Unilignified cells. Cells dimorphic. With rawhides. Pits in transverse and in longitudinal cell walls. Pits grouped. Vascular bundles in the pith. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
1 4 5 7 10 13 20 22 24 31 40.2 53.1 60 61 68 69 76 86 96 97 105 116.1 – B1 B2 B3.1 B5.3 B7.3 B14.1 B14.3 – P3.2 P3.4 P4 P6.3 P9 P9.1 P9.2 P10 P12 P13

Withania somnifera (L.) Dunal
(Annex 1, plate no. 67)

Erect shrub up to 1.5 m in height, steams not much-branched, densely covered with stellate hairs. Native to the southern Europe, western Asia, the Atlantic islands and throughout Africa. In Cyprus it occurs in waste ground (mainly at archaeological sites) (0-200 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous, vessel predominantly in clusters. Mean tangential diameter of earlywood vessel lumina 50 — 100 µm, in two distinct diameter classes. Fibers thin to thick walled. Axial parenchyma scanty paratracheal and vasicentric. Rays per millimeter 12-20.
Radial section: Inter-vessel pits alternate, small (4-7 µm in diameter). Vessel-ray pits rounded or angular with large apertures. Earlywood vessel elements length 200-500 µm. Vascular and/or vasicentric tracheids present. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: Ray width predominant 1 to 3 cells.

Bark
Groups of sieve tube and collapsed sieve tubes present. Some rays become dilated. Crystal sand. Phellem/epidermis distinct in polarized light.

Pith
Pith disappear in polarized light. Pith shape square. Cells dimorphic. Pits in transverse and in longitudinal cell walls. Vascular bundles in the pith.

Codified description
1 5 11 22 25 31 41 45 53.1 60 61 69 78 79 97 105 116.1 - B1 B2 B3.1 B7.3 B14.3 - P1.1 P1.4 P4 P9 P9.1 P10

Styracaceae

Styrax officinalis L.
(Annex 1, plate no. 67)

Deciduous shrub or small tree, 2-6 m in height, with sub-spherical crown. Widespread in the Mediterranean from France eastward to Palestine. In Cyprus locally common in many areas (0-1300 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels solitary or in clusters. Mean tangential diameter of earlywood vessel lumina 50 — 100 µm, vessels of two distinct diameter classes. Greater than 200 vessels per square millimeter in earlywood. Tyloses with thin wall common. Fibers thin to thick walled, radial flat marginal fibers. Axial parenchyma diffuse, apotracheal parenchyma scanty paratracheal. Axial parenchyma in narrow bands or lines up to three cells wide. Rays per millimeter 4-12.
Radial section: Scalariform perforation plates with less than 10 bars. Inter-vessel pits alternate. Intervessel pits small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length greater than 500 µm. Fibers with simple to minutely bordered pits (libriform fibers). Body ray cells procumbent with mostly 2-4 rows of upright and/or square marginal cells. Prismatic crystals present in axial parenchyma cells.
Tangential section: Rays mostly uniseriate, some ray 1 to 3 cells wide. Larger rays commonly 4 to 10 seriate.

Bark
Only some rays become dilated. Prismatic crystals. Phloem uniform. Phellem homogeneous, distinct in polarized light.

Pith
Pith shape round. Cells dimorphic center/border of the pith. Pits in transverse and in longitudinal cell walls. Pits in transverse cell walls. Pits of two distinct size. Primary vascular bundle not distinct.

Codified description
1 5 9 11 14 15 22 25 30 41 45 50.2 53.2 56 61 69 70.3 76 78 86 96 97 98 107 115 136 141.1 — B3.1 B7 B8 B14.1 B14.3 — P1 P4.1 P9 P9.1 P9.3 P10.2

Tamaricaceae

Tamarix ahpylla (L.) H.Karst
(Annex 1, plate no. 68)

Evergreen tree up to 12 m in height, with narrow, sometimes columnar crown. An exotic species, introduced in the 1940', native of Egypt and the Arabian peninsula. In Cyprus, it is cultivated mostly as a wind break on farmlands, on the lowlands (0-600 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels in diagonal and/or radial pattern. Vessels predominantly in clusters. Mean tangential diameter of earlywood vessel lumina 50 — 100 μm. Gums and other deposits in heartwood vessels. Fibers thin to thick walled. Axial parenchyma scanty paratracheal. Less than 4 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 μm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 100-200 μm. Vascular and/or vasicentric tracheids present. Fibers with simple to minutely bordered pits (libriform fibers). Body ray cells procumbent with 1-4 row of upright and/or square marginal cells. Prismatic crystals in ray parenchyma cells.
Tangential section: Rays of two distinct sizes: uniseriate and greater than 10 seriate. Axial parenchyma and/or vessel elements storied.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Sclerenchyma cells both in phloem and cortex. Fibers in tangential rows and grouped. Sclereids scattered or irregularly dispersed. Cell content in parenchyma cells. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith
Pith shape polygonal. Heterocellular pith. With sclereids. Cell content (gum, tannins, dark staining substances). Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other.

Codified description
1 5 7 11 13 22 24 30 41 52.3 58 60 61 69 78 96 99 103 106 107 114 120 136 136.1 – B1 B2 B4 B5.2 B5.4 B6.3 B11 B14.1 B14.3 – P1.1 P3 P3.1 P5 P9 P9.1 P10.1

Tamarix dalmatica Baum
(Annex 1, plate no. 68)

A shrub up to 1,5-3 in height. An apparently rare native to Cyprus, recorded at the southern costal area (0-200 m alt.). It is also native in other east Mediterranean countries.

Xylem

Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous. Vessels in radial multiples of 2 to 4 common. Vessels cell wall thick (greater than 2 μm). Mean tangential diameter of earlywood vessel lumina 50 — 100 μm. Fibers thin to thick walled. Axial parenchyma scanty paratracheal. Rays per millimeter 4-12.

Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 μm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Helical thickenings in vessel elements present. Earlywood vessel elements length 50-100 μm. Vascular and/or vasicentric tracheids present. All ray cells procumbent.

Tangential section: Larger rays commonly greater than 10 seriate. Axial parenchyma and/or vessel elements storied.

Bark

Groups of sieve tubes present. Some rays become dilated. Sclerenchyma cells both in phloem and cortex. Fibers in tangential rows or grouped. Sclereids in radial rows and scattered or irregularly dispersed. Cell content in parenchyma cells. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith missing

Codified description

1 4 9.1 13 22 24 30 36 39.1 41 52.2 60 69 78 99 104 115 120 – B1 B3.1 B4 B5.2 B5.4 B6.1 B6.3 B11 B14.1 B14.3 – Pith missing

Tamarix smyrnensis Bunge
(Annex 1, plate no. 68)

A lax, deciduous shrub or small tree up to 4 m in height. Native of southern Europe and the eastern Mediterranean as far as Afghanistan. In Cyprus it grows along streams, marshy grounds and moist places on sand dunes, rocky areas and along roadsides (0-1400 m alt.).

Xylem

Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous to diffuse porous. Vessels solitary and in radial multiples of 2 to 4 common. Vessels cell wall thick (greater than 2 μm). Mean tangential diameter of earlywood vessels 20-50 μm. Vessels number in early wood: 100-200 per

square millimeter. Fibers thin to thick walled. Axial parenchyma scanty paratracheal to parenchyma vasicentric. Rays per millimeter 4-12.
Radial section: Simple perforation plates. Inter-vessel pits scalariform and alternate, minute (less than 4 µm in diameter) and large (greater than 10 µm in diameter)???? Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 100-200 µm. Fibers with simple to minutely bordered pits (libriform fibers). Rays with procumbent, square and upright cells mixed throughout the ray.
Tangential section: Larger rays commonly 4 to 10 seriate. Ray height greater than 1 mm. Axial parenchyma and/or vessel elements storied. Fibers storied.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Sclerenchyma cells both in phloem and cortex. Fibers in tangential rows. Fibers scattered or irregularly dispersed. Sclereids scattered or irregularly dispersed. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith
Thick walled parenchyma cells present. Cells dimorphic. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other.

Codified description
1 4 5 9 9.1 13 20 22 24 27 30 39.1 40.2 50.1 52.3 61 69 78 79 98 102 109 115 120 121 – B1 B2 B4 B5.2 B5.3 B6.3 B14.1 B14.3 – P3.3 P4 P9 P9.1 P10.1

Tamarix tetragyna Ehrenb.
(Annex 1, plate no. 69)

Deciduous shrub or small tree, 5-15 m in height. Indigenous to Egypt, Palestine, Turkey and eastwards to Afghanistan. In Cyprus it grown on damp sites with fresh or saline water, mostly by streams and marshy ground (0-300 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous. Vessels solitary and in clusters. Mean tangential diameter of earlywood vessels 20-50 µm. Gums and other deposits in heartwood vessels. Fibers thin to thick walled. Axial parenchyma scanty paratracheal to vasicentric. Rays per millimeter 4-12.
Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length less than 50 µm. Fibers with simple to minutely bordered pits

(libriform fibers). All ray cells procumbent. Prismatic crystals in ray parenchyma cells.
Tangential section: Larger rays commonly 4 to 10 seriate. Axial parenchyma and/or vessel elements storied.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Sclerenchyma cells both in phloem and cortex. Fibers in tangential rows. Fibers scattered or irregularly dispersed. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith
Pith shape round. Thick walled parenchyma cells present. Cells dimorphic. Cell content (gum, tannins, dark staining substances). Pits in transverse and in longitudinal cell walls
Pits in transverse cell walls.

Codified description
1 4 9 11 13 22 24 30 40.2 52.1 58 61 69 78 79 98 104 115 120 136 136.1 – B1 B2 B4 B5.2 B5.3 B14.1 B14.3 – P1 P3.3 P4 P5 P9 P9.1

Tamarix tetrandra Pall. ex Bieb.
(Annex 1, plate no. 69)

Deciduous shrub, 1,5 – 3 m in height. Indigenous to southern Russia, the Balkan peninsula, Turkey, Palestine and Egypt. In Cyprus it is locally common along (0-400 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous. Vessels solitary and in radial multiples of 2 to 4 common. Vessels predominantly in clusters. Vessels cell wall thick (greater than 2 µm). Mean tangential diameter of earlywood vessel lumina 50 — 100 µm. Vessels of two distinct diameter classes. Fibers thin to thick walled. Axial parenchyma scanty paratracheal. Less than 4 rays per millimeter. Rays per millimeter 4-12.
Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 50-100 µm. Vascular and/or vasicentric tracheids present.
Tangential section: Larger rays commonly greater than 10 seriate.

Bark
Groups of sieve tubes present. Groups of sieve tube in radial rows. Sclerenchyma cells both in phloem and cortex. Fibers in tangential rows.

Sclereids in radial rows. Sclereids scattered or irregularly dispersed. Crystal sand. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith
Pith shape round. Thick walled parenchyma cells present. Cells dimorphic. Cell content (gum, tannins, dark staining substances). Pits in transverse and in longitudinal cell walls. Primary vascular bundle not distinct. Tracheary elements of metaxylem in distinct radial rows.

Codified description
1 4 9 9.1 11 13 22 24 30 39.1 41 45 52.2 60 69 78 99 114 115 – B1 B1.2 B4 B5.2 B6.1 B6.3 B7.3 B14.1 B14.3 – P1 P3.3 P4 P5 P9 P9.1 P10.2 P12

Thymelaeaeceae

Thymelaea hirsuta (L.) Endl.
(Annex 1, plate no. 69)

Erected or sprawling, evergreen, shrub up to 1.5 m in height. A Mediterranean species, indigenous to Cyprus occurring on sandy banks and grass steppes (0-50 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous. Vessels in diagonal or in dendritic pattern, vessels in radial multiples of 4 or more common. Mean tangential diameter of earlywood vessels less than 20 µm. Gums and other deposits in heartwood vessels. Fibers thick to very thick walled. Axial parenchyma diffuse and scanty paratracheal. Apotracheal parenchyma in narrow bands or lines up to three cells wide. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 100-200 µm. Vascular and/or vasicentric tracheids present. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: Rays exclusively uniseriate.

Bark
Groups of sieve tube and collapsed sieve tubes present. Some rays become dilated. Prismatic crystals.

Pith
Pith disappear in polarized light. Pith shape triangular. Fibers present. Unilignified cells. Cells dimorphic. Vascular bundles in the pith.

Codified description
1 4 7 8 10 13 22 25 30 40.1 52.3 58 60 61 69 70 76 78 86 96 105 116.2 – B1 B2 B3.1 B7 — P1.1 P1.2 P3.2 P3.4 P4 P10

Thymelaea tartonraira subsp. *argentea* L.
(Photomicrographs not available)

Evergreen, much branched shrub up to 1 m in height, with compact, scoparioid form. An eastern Mediterranean species, in Cyprus it occurs on slope with garigue and maquis vegetation (0-800 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood semi-ring porous. Vessels in diagonal and/or in dendritic pattern. Vessels predominantly in clusters. Vessels cell wall thick (greater than 2 μm). Mean tangential diameter of earlywood vessels less than 20 μm. Vessels of two distinct diameter classes, 40 — 100 earlywood vessels per square millimeter. Fibers very thick walled. Axial parenchyma diffuse and scanty paratracheal. Axial parenchyma in narrow bands or lines up to three cells wide. Rays per millimeter 12-20.
Radial section: Simple perforation plates. Inter-vessel pits opposite, small (4-7 μm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Helical thickenings in vessel elements present. Earlywood vessel elements length 50-100 μm. Fibers with simple to minutely bordered pits (libriform fibers).
Tangential section: Rays exclusively uniseriate.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Sclerenchyma cells both in phloem and cortex. Fibers scattered or irregularly dispersed. Sclereids scattered or irregularly dispersed. Prismatic crystals. Phellem/epidermis distinct in polarized light.

Pith
Pith disappear in polarized light. Pith shape triangular. Cells dimorphic. Cell content (gum, tannins, dark staining substances). Primary vascular bundle not distinct.

Codified description
1 4 7 8 11 13 21 25 30 36 39.1 40.1 45 49 52.2 61 70 76 78 86 96 109 116.1 — B1 B2 B4 B5.3 B6.3 B7 B14.3 — P1.1 P1.2 P4 P5 P10.2

Ulmaceae

Celtis australis L.
(Annex 1, plate no. 70)

Deciduous tree up to 20 m in height. Indigenous to Cyprus, with limited distribution, although in some parts it is locally common (0-1400 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood ring porous. Vessels solitary or in clusters. Mean tangential diameter of earlywood vessel lumina 100 — 200 μm, 40 — 100 earlywood vessels per square millimeter. Tyloses with thin wall common. Fibers thin to thick walled, tension wood observed. Axial parenchyma vasicentric and confluent, parenchyma bands greater than three cells wide. Less than 4 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, medium size (7-10 μm in diameter). Vessel-ray pits rounded or angular with large apertures. Helical thickenings in vessel elements present. Earlywood vessel elements length 100-200 μm. Fibers with simple to minutely bordered pits (libriform fibers). Body ray cells procumbent with mostly 2-4 rows of upright and/or square marginal cells. Prismatic crystals present in ray parenchyma cells.
Tangential section: Rays of two distance size: uniseriate and greater than 10 seriate. Later rays height greater than 1 mm.

Bark
Collapsed sieve tubes. Some rays become dilated. Sclerenchyma cells both in phloem and cortex. Fibers in tangential rows. Sclereids mostly in groups. Prismatic crystals. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith
Pith shape round. Pith disappear in polarized light. Cells dimorphic. With prismatic crystals. Pits of two distinct size in transverse and in longitudinal cell walls. Primary vascular bundle not distinct. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
1 3 9 11 13 22 26 31 36 42 49 52.3 56 61 69 70.2 79 83 85 96 99 102 103 107 114 136 136.1 — B2 B3.1 B4 B5 B5.2 B6 B6.4 B7 B14.1 B14.3 — P1.1 P1 P4 P6 P9 P9.1 P9.3 P10.2 P12 P13

Celtis tournefortii Lam.
(Annex 1, plate no. 70)

Deciduous tree or shrub, 2-8 m in height. Indigenous in the eastern Mediterranean countries, it rarely occur in Cyprus (600-1400 m alt.).

Xylem

Transverse section: Growth ring boundaries clearly demarcated. Wood ring porous. Vessels in diagonal and/or radial pattern. Vessels predominantly in clusters. Mean tangential diameter of earlywood vessel lumina 50 — 100 µm. Fibers thin to thick walled. Tension wood present. Axial parenchyma diffuse in aggregates. Axial parenchyma vasicentric. Axial parenchyma confluent. Rays per millimeter 4-12.

Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Helical thickenings only in narrower vessel elements. Earlywood vessel elements length 100-200 µm. Fibers with simple to minutely bordered pits (libriform fibers). Body ray cells procumbent with one row of upright and/or square marginal cells. Prismatic crystals in ray parenchyma cells.

Tangential section: Rays uniseriate and up to 10 seriate.

Bark

Groups of sieve tubes present. Collapsed sieve tubes. Sclerenchyma cells both in phloem and cortex. Sclereids in tangential rows. Sclereids in groups. Prismatic crystals. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith

Pith shape round. Cells dimorphic. With prismatic crystals. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description

1 3 7 11 13 22 25 30 39 41 52.3 61 69 70.2 77 79 83 96 98 106 115 136 136.1 – B1 B2 B4 B6.2 B6.4 B7 B14.1 B14.3 – P1 P4 P6 P9 P10.1 P12 P13

Ulmus canescens Melville
(Annex 1, plate no. 70)

Deciduous tree, 5-10 m in height, with open crown. Indigenous in Mediterranean countries from Italy to Palestine. A rare indigenous tree in Cyprus (0-500 m alt.).

Xylem

Transverse section: Growth ring boundaries clearly demarcated. Wood diffuse porous. Vessels in diagonal and/or radial pattern. Vessels predominantly in clusters. Mean tangential diameter of earlywood vessel lumina 100 — 200 µm. Fibers thick to very thick walled. Axial parenchyma scanty paratracheal to vasicentric sometimes confluent. Less than 4 rays per millimeter.

Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Helical thickenings in vessel elements present. Earlywood vessel elements length 200-500 µm. Vascular and/or vasicentric tracheids present. All ray cells procumbent. Prismatic crystals in axial parenchyma cells.

Tangential section: Larger rays commonly 4 to 10 seriate.

Bark

Fibers in tangential rows. Fibers scattered or irregularly dispersed. Prismatic crystals. Cell content in parenchyma cells. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith

Pith shape round. Medullary sheath present. Thick walled parenchyma cells present. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other. Tracheary elements of metaxylem in distinct radial rows.

Codified description

1 5 7 11 13 22 25 30 36 42 53.1 60 69 70 78 79 83 98 104 114 136 141.1 – B5.2 B5.3 B7 B11 B14.1 B14.3 – P1 P2 P3.3 P9 P9.1 P10.1 P12

Verbenaceae

Lantana camara L.
(Annex 1, plate no. 71)

Evergreen shrub up to 2 m in height. Branches angular, hairy, frequently prickly with very short, recurved prickles. Native to tropical America, in Cyprus it is commonly cultivated as ornamental and sporadically found as an escape from cultivation (0-1200 m alt.).

Xylem

Transverse section: Growth rings indistinct or absent. Wood diffuse porous. Vessels solitary or in radial multiples of 2 to 4 or more. Vessels cell wall thick (greater than 2 µm). Mean tangential diameter of earlywood vessels 20-50 µm.

Vessels of two distinct diameter classes. Fibers thin to thick walled. Axial parenchyma scanty paratracheal. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 μm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 200-500 μm. Fibers with simple to minutely bordered pits (libriform fibers). All ray cells upright and/or square.
Tangential section: Rays uniseriate to 3 cells wide.

Bark
Groups of sieve tubes present. Collapsed sieve tubes. Sclerenchyma cells both in phloem and cortex. Fibers scattered or irregularly dispersed. Cell content in parenchyma cells. Phellem homogeneous.

Pith
Pith shape square. Cells dimorphic. With crystals druses. Pits grouped in transverse and in longitudinal cell walls. Primary vascular bundles clearly separate from one another to not distinct. Tracheary elements of metaxylem in distinct radial rows. Axial cells arranged in regular rows (radial section).

Codified description
2 5 9 9.1 10 13 22 24 30 39.1 40.2 45 53.1 61 69 78 96.1 97 105 116.2 — B1 B2 B4 B5.3 B11 B14.1 — P1.4 P4 P6.2 P9 P9.1 P9.2 P10.1 P10.2 P12 P13

Vitex agnus-castus L.
(Annex 1, plate no. 71)

Deciduous, aromatic shrub 1-3 m in height. Native to southern Europe and the Mediterranean region. In Cyprus it is locally common in moist places (0-800 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood ring porous to semi-ring porous. Vessels in radial multiples of 2 to 4 or in clusters. Vessels of two distinct diameter classes, mean tangential diameter of earlywood vessel lumina 100 — 200 μm, vessels number in early wood: 100-200 per square millimeter. Fibers thick to very thick walled. Axial parenchyma scanty paratracheal. Rays per millimeter 4-12.
Radial section: Simple perforation plates. Inter-vessel pits alternate, small (4-7 μm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Helical thickenings in vessel elements present. Earlywood vessel elements length 100-200 μm. Fibers with simple to minutely bordered pits (libriform fibers), septate fibers present. Body

ray cells procumbent with one row of upright and/or square marginal cells. Raphides present.
Tangential section: Ray width predominant 1 to 3 cells.

Bark
Groups of sieve tube and collapsed sieve tube present. Some rays become dilated. Fibers grouped, sclereids scattered or irregularly dispersed. Crystal sand. Phellem homogeneous, distinct in polarized light.

Pith
Pith shape polygonal. Cells dimorphic. With prismatic and acicular crystals. Pits in transverse and in longitudinal cell walls. Primary vascular bundle not distinct. Tracheary elements of metaxylem in distinct radial rows.

Codified description
1 3 4 9.1 11 13 22 25 30 36 42 45 50.1 52.3 61 65 69 70 78 97 106 115 149 — B1 B2 B3.1 B5.4 B6.3 B7.3 B14.1 B14.3 — P1.1 P4 P6 P6.1 P9 P9.1 P10.2 P12

Vitaceae

Vitis vinifera L.
(Annex 1, plate no. 71)

Deciduous climber with stem up to 6 m long, distinctly swollen at the nodes. It is supposed to be indigenous to southeast and central Europe and the countries of the Caucasus area. It also occurs in the Mediterranean countries, were it is cultivated since Romans time. It occurs in Cyprus as an adventive and a cultivated plant (0-1500 m alt.).

Xylem
Transverse section: Growth ring boundaries clearly demarcated. Wood ring porous. Vessels predominantly solitary. Vessels in radial multiples of 2 to 4 common. Mean tangential diameter of earlywood vessel lumina greater than 200 μm. Fibers thin to thick walled. Radial flat marginal fibers. Axial parenchyma diffuse, scanty paratracheal and vasicentric. Less than 4 rays per millimeter.
Radial section: Simple perforation plates. Inter-vessel pits scalariform, large (greater than 10 μm in diameter). Vessel-ray pits with large horizontal or vertical apertures. Earlywood vessel elements length greater than 500 μm. Vascular and/or vasicentric tracheids present. Fibers with simple to minutely bordered pits (libriform fibers). Septate fibers present.
Tangential section: Rays of two distinct sizes: uniseriate and greater than 10 seriate.

Bark
Sclerenchyma cells both in phloem and cortex. Fibers in tangential rows. Prismatic crystals. Phellem homogeneous. Phellem/epidermis distinct in polarized light.

Pith
Pith shape round. Cells dimorphic. With acicular crystals. Pits in transverse and in longitudinal cell walls. Primary vascular bundle clearly separate from one other.

Codified description
1 3 9 9.1 13 20 27 32 43 53.2 60 61 65 69 70.3 76 78 79 96 99 103 114 – B4 B5.2 B7 B14.1 B14.3 – P1 P4 P6.1 P9 P10.1

Zygophyllaceae

Fagonia cretica L.
(Annex 1, plate no. 72)

Sprawling or scrambling subshrub, 20-50 cm in height. Common in the Mediterranean region and the Atlantic islands. Indigenous to Cyprus, with a limited distribution, growing on dry slopes with maquis or garigue vegetation (0-300 m alt.).

Xylem
Transverse section: Only one ring. Wood diffuse porous. Vessels predominantly solitary. Vessels cell wall thick (greater than 2 µm). Mean tangential diameter of earlywood vessels 20-50 µm. Greater than 200 vessels per square millimeter in earlywood. Fibers thin to thick walled. Axial parenchyma scanty paratracheal. Greater than 20 rays per millimeter.
Radial section: Simple perforation plates. Intervessels pits minute (less than 4 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Earlywood vessel elements length 200-500 µm. Fibers with distinctly bordered pits (fiber tracheids). All ray cells upright and/or square.
Tangential section: Rays exclusively uniseriate.

Bark
Groups of sieve tubes present. Some rays become dilated. Fibers grouped. Prismatic crystals.

Pith
Pith disappear in polarized light. Pith shape round. Medullary sheath present.

Unilignified cells. Pits in transverse and in longitudinal cell walls. Pits grouped. Pits of two distinct size. Primary vascular bundle not distinct.

Codified description
5 9 13 24 30 39.1 40.2 50.2 53.1 62 69 78 96 105 116.2 – B1 B3.1 B5.4 B7 — P1 P2 P3.4 P9 P9.1 P9.2 P9.3 P10.2

Zygophyllum album L.
(Annex 1, plate no. 72)

Much branched shrub up to 2 m in height, with open crown. Widespread in the Mediterranean towards Arabia and northern Africa. Indigenous to Cyprus common locally on rocky and sandy seashores and salt-marshes by the cost (0 m alt.).

Xylem
Transverse section: Growth rings indistinct or absent. Wood diffuse porous. Vessels predominantly solitary. Vessels in radial multiples of 2 to 4 common. Mean tangential diameter of earlywood vessels less than 20 µm. Vessels of two distinct diameter classes. Fibers thin to thick walled. Axial parenchyma diffuse and scanty paratracheal. Axial parenchyma in narrow bands or lines up to three cells wide. Rays per millimeter 12-20.
Radial section: Simple perforation plates. Inter-vessel pits alternate, minute (less than 4 µm in diameter). Vessels-ray pits with distinct borders, similar to inter-vessels pits in size and shape throughout the ray cell. Helical thickenings only in narrower vessel elements. Earlywood vessel elements length 100-200 µm. Fibers with distinctly bordered pits (fiber tracheids). All ray cells upright and/or square. Rays with procumbent, square and upright cells mixed throughout the ray.
Tangential section: Rays uniseriate to 3 cells wide.

Bark
Groups of sieve tube and collapsed sieve tubes present. Some rays become dilated. Sclerenchyma cells both in phloem and cortex. Fibers scattered or irregularly dispersed. Druses present. Phellem homogeneous, distinct in polarized light.

Pith missing

Codified description
2 5 9 9.1 13 22 24 30 39 40.1 45 52.3 62 69 76 78 86 96 97 105 109 116.1 – B1 B2 B3.1 B4 B5.3 B7.2 B14.1 B14.3 – Pith missing

3. Ecological wood and bark anatomy of trees and shrubs from Cyprus

Scientists often make correlations between wood anatomical features and physical and biotic factors in the nearby environment. These relationships form a basis to hypothesize adaptive strategies as drivers of much of the wood anatomical diversity that has resulted through evolution (Carlquist 1975). The extensive material collected and anatomically described in this thesis offered a unique opportunity to analyze the anatomies of trees, shrubs, dwarf shrubs, and climbers for ecological trends.

The current study applied these principles to the entire woody flora of a geographically well-defined region, in order to investigate the diversity of wood and bark anatomy in relation to biological and ecological factors.

The provenance of these species ranges in elevation from the sea level to 1952 m above it. Depending on rainfall and substrate, the sites from which the plants were collected range from very dry and hot to wet and cold, and include coastal habitats where high salinity causes physiological drought despite an apparently wet habitat to rocky sites. Plant life forms range from woody chamaephyte, nanophanerophyte, to phanerophyte, and climbers. The number of sampled species, and the ecological range in the material studied is certainly large enough to justify such an analysis.

Detailed wood anatomical comparisons have been made for ecologically defined florulas in Australia (Carlquist 1977), Southern California (Carlquist & Hoekman 1985), and Israel (Baas *et al*. 1983, Fahn *et al*. 1986).

The aim of this analysis is to show how the products of the secondary growth vary in relation to taxonomy, life form, and ecology.

Materials and methods

Range descriptions in the standard reference of the Cyprus' woody flora (Meikle 1979, 1985; Tsintides *et al*. 2003) were used to chose a sampling area that was representative of the geographic distribution and habitat range for each species, and then at that site, we sampled one individual. The individual chosen appeared normal, healthy, and was one of the tallest individuals of that species at that site. A portion of one stem was cut near the plant's base (with the height dependent on the plant's stature), and from this location we took a segment 5-8 cm tall including bark. A 5-8 cm tall segment of a 2-5 years old twig was also cut to have juvenile bark and pith. The disks were stored in a sealed plastic bag to which we added several drops of 40% ethanol and kept at 3-4°C until they were sectioned.

The samples were from woody chamaephytes (perennial dwarf shrubs with a woody stem with plant height less than 80 cm), nanophanerophyte (plants 80-300 cm in height, shrub), phanerophyte (plant height greater than 300 cm, tree), and climbers (not self-supporting plants).

We made thin sections (15-25 μm) using disposable blades and a sliding Reichert microtome in each of two wood anatomy laboratories: at the Dept. Land, Environment, Agriculture and Forestry – University of Padova in Italy, and at the Swiss Federal Institute for Forest, Snow and Landscape Research (WSL) in Switzerland. The sections were stained with astra blue and safranin, dehydrated with alcohol and xylene, and mounted in Canada balsam (Chaffey 2002; Schweingruber 2007). General wood anatomy was described, including wood IAWA characters (Wheeler *et al*. 1989). General bark anatomy was also described by following a specific codified bark anatomical feature list (Crivellaro 2012) which comprehends 33 anatomical features.

For this paper, we report only on few wood anatomical characters grouped by three main stem biological functions defined as conductive, mechanical, and storage one. For each one of them we selected some representative wood anatomical features that define wood properties related to each specific function. Wood hydraulic features were described by wood porosity (ring-porous, semi-ring porous, and diffuse porous wood), vessel groupings (vessels mostly solitary, vessels in radial multiples, and vessel in clusters), presence or absence of helical thickenings, and vessel diameters. Classification of vessel diameters was listed following IAWA features, adding the two following classes: 40.1 — tangential diameter of earlywood vessels less than 20 μm, and 40.2 — tangential diameter of earlywood vessels 20–50 μm (instead of IAWA feature number 40).

Fiber wall thickness (after Wheeler *et al*. 1989), presence of tension wood, and number of rays per millimeter were listed to describe stem mechanical features.

Storage features involved axial and radial parenchyma tissues describing axial parenchyma presence, and its association with vessels (apotracheal or paratracheal) in any distribution form. Radial parenchyma was described by raylessness, ray width classes, the presence of rays of two distinct sizes, and ray cellular composition (homogenous and/or heterogeneous rays).

Wood density was measured on stem sample portions after the bark and the pith were removed. Fresh wood volume was measured using Archimedes' principal by immersing the segment in a beaker containing distilled water on a balance. Once fresh wood volume was measured, the sample was dried at 100°C for 48 hours, and after that the wood anhydrous mass was determined. Wood density was calculated on anhydrous mass/fresh volume ratio basis (g/cm^3).

Bark anatomical features describe sieve tube morphology and distribution, sclerenchyma tissue presence and arrangement, ray features, presence of crystals and secretory structures, features related to appearance under polarized light, and phellem and phelloderm structures (Annex 3).

We then compared the presence or the absence of wood and bark anatomical features in relation to ecological, biological and taxonomical factors.

The ecological factors considered were mean annual temperature (MAT, °C), mean annual precipitation (MAP, mm) collected from the nearest meteorological station to each sampling site, and habitat. Meteorological data comes from Cyprus Meteorological Service website (2011) and were the mean values of the last 20 years. The habitats were defined as follow:

- moist sites (A): shaded and moist sites, stream and river banks, salt lakes and wet seashores;
- ruderal sites (B): fields, cultivations, ruderal and semi-ruderal places;
- rocky sites (C): rocks, rock faces, cliffs, rocky and sandy dry seashores;
- shrub-lands and forests (D): shrub-lands, garrigues and maquis, and forests.

Some species occurring over a wide ecological range were assigned to the zone where they are most frequent.

The biological factors taken into account were life form after Ellenberg and Mueller-Dombois (1967) classification, plant height of the sampled plant (cm), and level of endemism to Cyprus. The level of endemism was categorized after Tsintides *et al*. (2007) as:

- species strictly endemic to Cyprus (A),
- close to endemic species (B),
- eastern Mediterranean species (C),
- Mediterranean species (D),
- more than Mediterranean species (E).

Taxonomical factors consider Lamiaceae family as categorical variable. Lamiaceae family is the larger family in our dataset, and it is known to be a wood anatomically homogenous family with small vessels, paratracheal parenchyma, heterogeneous rays, and with simple pitted fibers (Carlquist 1992a, Metcalfe & Clark 1950).

Data analysis was carried out at first describing the frequency distribution or the statistical variability of each anatomical variable and each attribute. After that we cross-related the anatomical variables to each other. Then we verified the presence of a relationship between each attribute to each anatomical feature. The continuous variables plant height, MAP, and MAT were categorized as short, dry, and cold if the species came from a site with plant height, MAP, and MAT less than or equal to the median for the all species pooled; otherwise, it was listed as tall, wet, and hot respectively. Wood density was classified following IAWA hardwood feature list (Wheeler *et al*. 1989). In this way all the variables in this study were categorical and the relationship was tested by chi-squared tests or exact Fisher tests to detect statistically significant relationships between the anatomical features and the other variables, and visualized significant relationships with association plots. Association plots (Choen 1980, Friendly 1991) indicate deviations from independence of rows and columns in a contingency table (Crawley 2009). Association plots visualize the table of Pearson residuals: each cell is represented by a rectangle that has (signed) height proportional to the corresponding Pearson residual, and width proportional to the square root of the expected counts (Meyer *et al*. 2003). Thus area of each box is made proportional to observed less expected frequencies. Cells with observed frequencies greater than expected frequencies rise above the independence dotted line (an are black filled), cells that contain less than the expected frequencies fall below the line (and are white shaded).

The software R (R Development Core Team, 2009) was applied to perform chi-squared tests and to draw graphs.

Results: ecological wood anatomy

Ecological wood and bark anatomy results will be presented in two distinct sections. Annex 2 shows the wood anatomical features analized.

Ecological wood anatomy plant material consists of 179 species, which belong to 53 families and represent 118 genera. *Labiateae* is the family with the greater number of species (31, 17.6% of the total number of species), followed by *Asteraceae* (13, 7.4%), *Papilionaceae* and *Rosaceae* (11, 6.2%), *Cistaceae* (10, 5.7%), *Chenopodiaceae* (9, 5.1%), *Brassicaceae* (8, 4.5%), and *Boraginaceae* (6, 3.4%). These families all together represent half of the species studied. The other families are represented by less than 5 species each one.

Species distribution in life form categories show 65 (36.3%) woody chamaephyte, 91 (50.8%) nanophanerophyte, 14 (7.8%) phanerophytes, and 9 (5.0%) climbers. Plant height reflects the life form species frequencies distribution, in fact, even if the measured plant height range from 4 to 2200 cm, the mean value is 152.8 cm (s.d. 262.5 cm), and median 60 cm (Fig. 1a).

The levels of endemism show that almost 1/3 of the species are endemic (41 species, 22.9%) or close to endemic (14, 7.8%), almost 1/3 are typically eastern Mediterranean species (54, 30.2%), one more third designate species with an all over Mediterranean range distribution (59, 33.0%). Only 11 species (6.1%) has a range distribution outside the Mediterranean basin.

Mean annual precipitation ranges from 308.0 to 1109.0 mm, with a mean value of 592.3 mm (s.d. 245.0 mm; median 714.3 mm). The mean annual temperature shows a mean value of 17.4°C (s.d. 2.6°C, median 17.2 °C), and it ranges from 10.8 to 20.4°C. Mean annual precipitation and mean annual temperature are strictly negatively correlated (r^2 = 0.89, P<0.01) (Fig. 1b).

Sampled plants come predominantly from lower elevation of sampling (Fig. 1c).

Habitats are predominantly represented by rocky soil sites both in mountain ranges (59 species, 33.0%) and on seashores or cliff (15, 8.4%). A total number of 50 species (27.9%) occurs in garrigues, maquis, and forests; 28 (15.6%) species occurs in fields, cultivations, and semi-ruderal places; and few in moist sites (19, 10.6%) or wet seashores and salt lakes (8, 4.5%).

Wood basic density range from 0.23 to 1.00 g/cm^3. The mean value is 0.56 g/cm^3 (s.d. 0.15 g/cm^3, median 0.57 g/cm^3) (Fig. 1d).

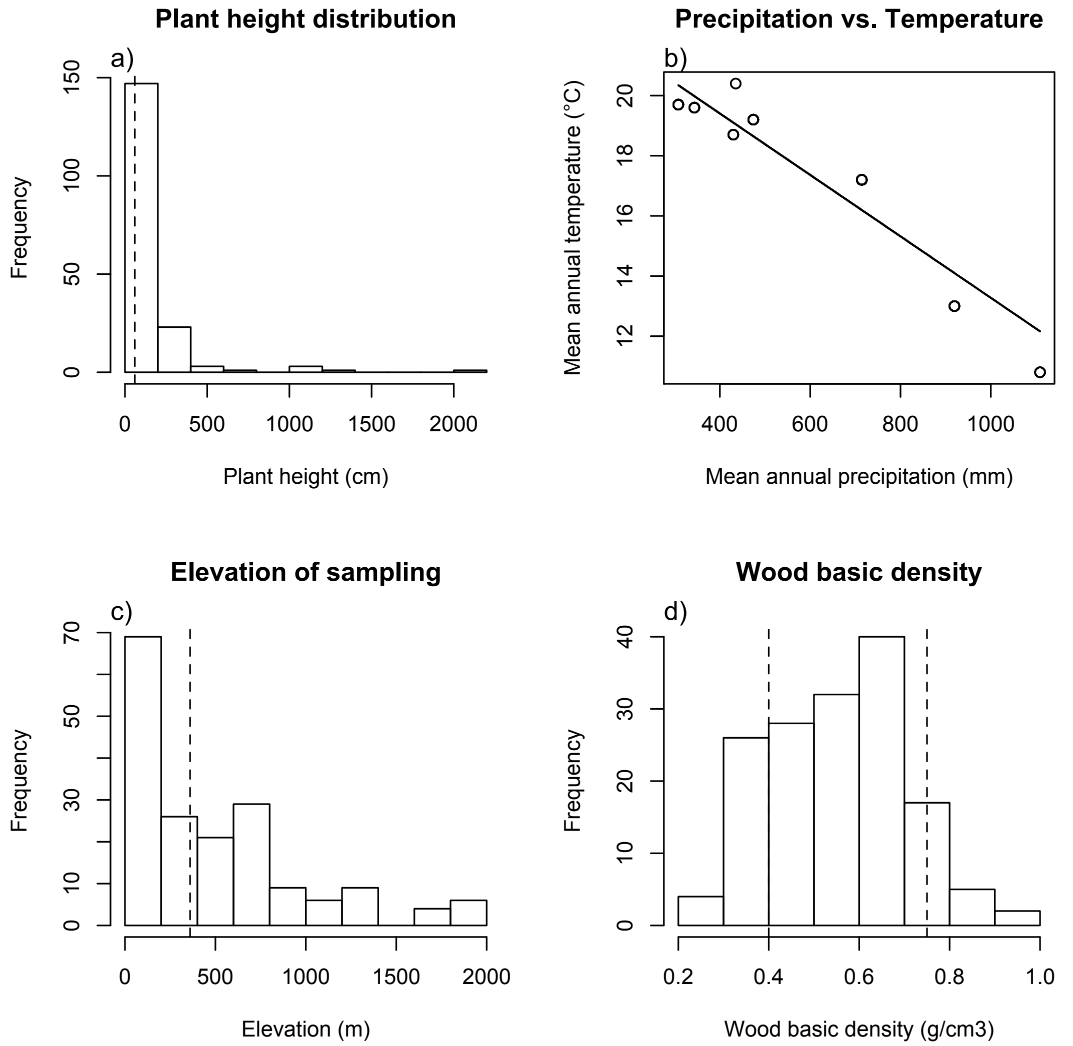


Fig. 1. a) Plant height frequency distribution, b) mean annual precipitation vs. mean annual temperature, c) elevation of sampling frequency distribution, d) wood density frequency distribution in the woody flora of Cyprus. Vertical dashed lines define class limits. In a) the vertical dashed line is the median value for plant height and it divides short to tall species. In c) the vertical dashed line is the median value for elevation of sampling and it divides low to high sampling sites. In d) the two vertical lines are the IAWA feature list (Wheeler *et al*. 1989) limits for wood density. See text for details.

Most of the species of the Cyprus' woody flora are diffuse porous (111, 62.0%), 30 species (16.8%) are clearly ring porous, and 38 (21.2%) are semi-ring porous (Fig. 2a). Vessel diameter classes frequency distribution for all species shows a predominance of small vessels: 53 species (29.6%) has earlywood vessel diameter less than 20 µm, 91 species (50.8%) showed earlywood vessels diameter greater than 20 µm but smaller than 50 µm (Fig. 2b).

Solitary vessels are typical anatomical feature for 74 species (41.3%), vessels in clusters for 75 species (41.9%), and vessel in radial multiples for 30 species (16.8%) (Fig. 2c). Helical thickenings were recorded in 56 species (31.3%) (Fig. 2d).

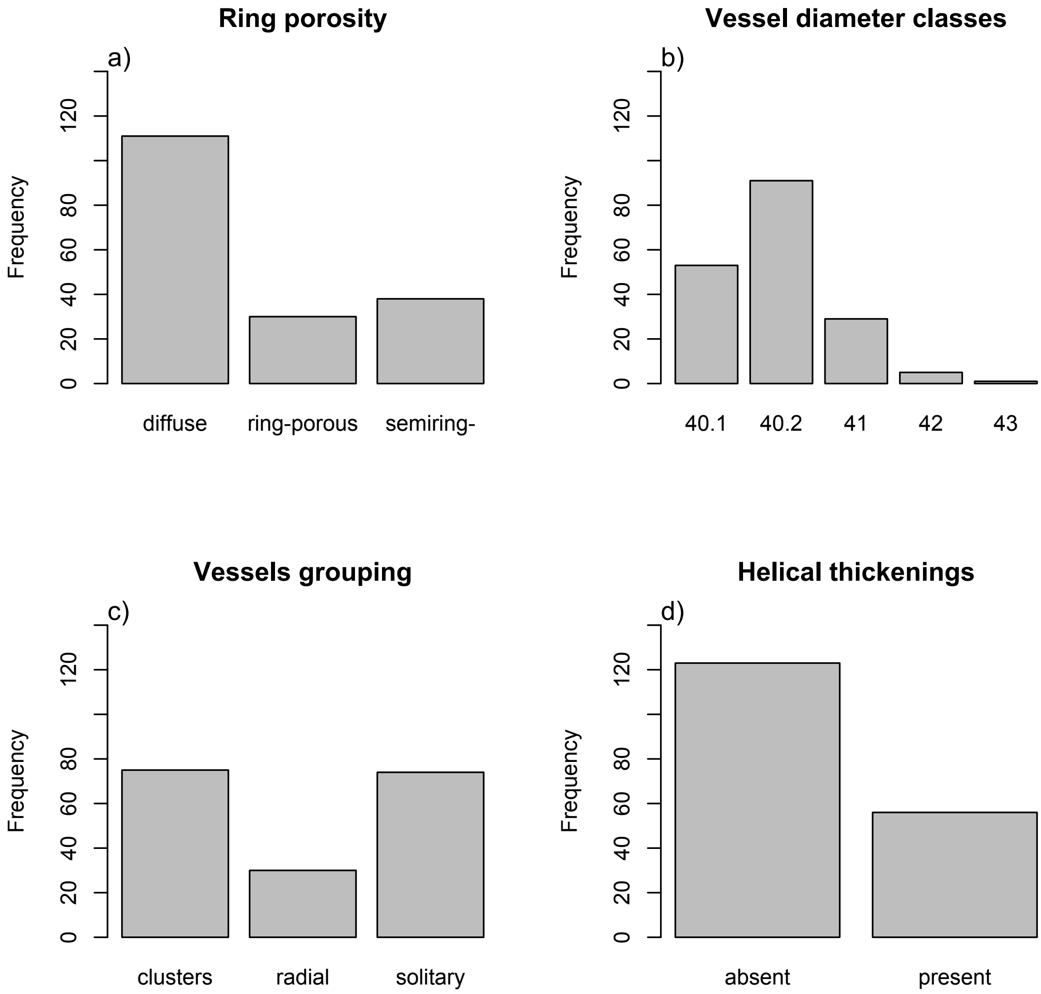


Fig. 2. a) Frequency distribution in diffuse, ring-porous and semi ring porous species, b) frequency distribution in relation to vessel diameter (40.1: vessel diameter less than 20 µm, 40.2: vessel diameter 20-50 µm, 41: vessel diameter 50-100µm, 42: vessel diameter 100-200µm, 43: vessel diameter greater than 200µm), c) frequency distribution in relation to vessel grouping, d) frequency distribution in relation to helical thickening absence and presence in the woody species of Cyprus.

Most of the sampled species showed thin walled fibers (105 species, 58.6%), 48 species (26.8%) thin to thick walled fibers, and 26 (14.5%) thick walled fibers (Fig. 3a). Tension wood was observed in 18 species (Fig. 3b). The number of ray per millimeter is greater in the class with more than 20 rays per millimeter (63 species, 35,2%), and smaller in the class with less than 4 rays per millimeter (20 species, 11,2%) (Fig. 3c). Raylessness was observed in 21 species (11.7%) (Fig 3c).

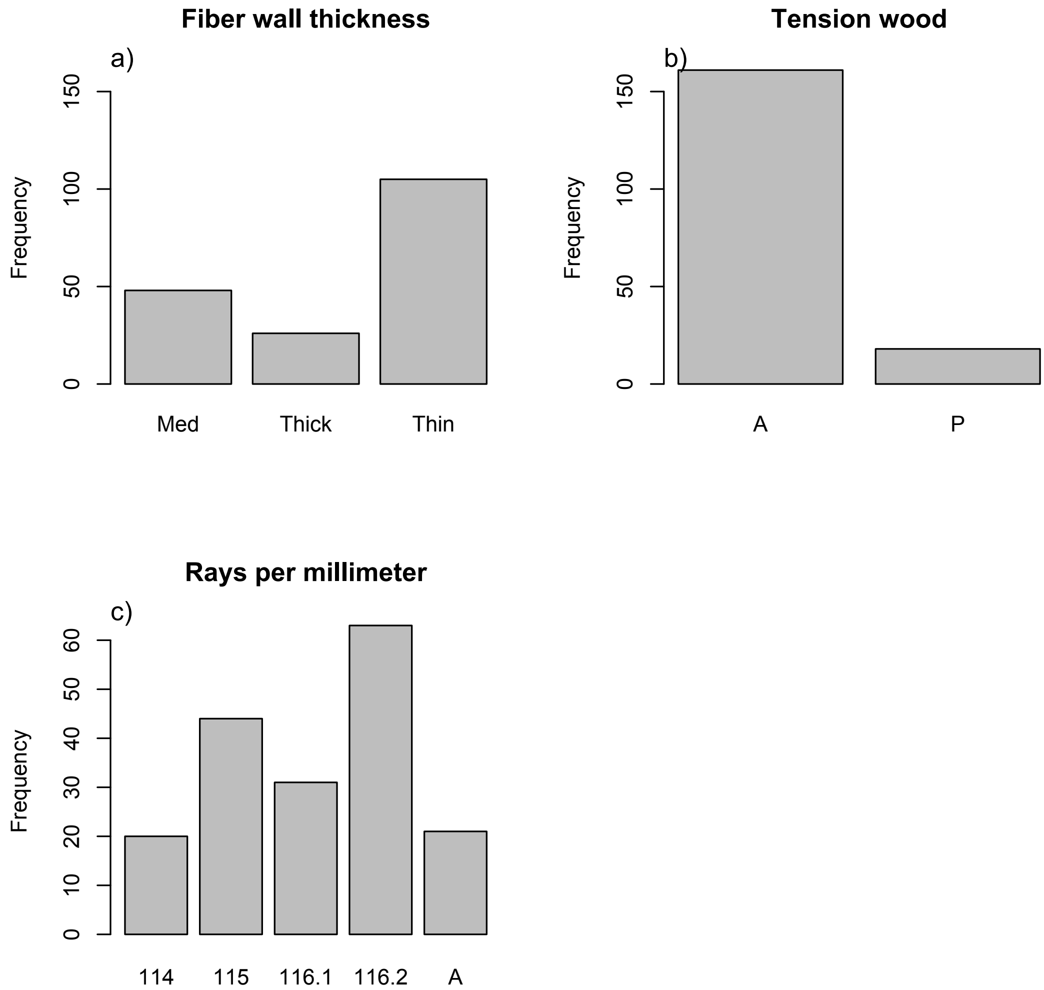


Fig. 3. a) Frequency distribution in fiber wall thickness classes, b) frequency distribution in relation to tension wood presence, c) frequency distribution in relation to rays per millimeter classes (114: less than 4 ray per mm, 115: 4-12 rays per mm, 116.1: 12-20 rays per mm, 116.2: greater than 20 rays per mm, A: rayless species) in the woody species from Cyprus.

Axial parenchyma was paratracheal in most of the species (111 species, 62%), apotracheal in 37 (20.7%), and rare or difficult to observe in 31 (17.3%) species (Fig. 4a). Rays width distribution show a predominance of rays large 1 to 3 cells and uniseriate rays (Fig. 4b).

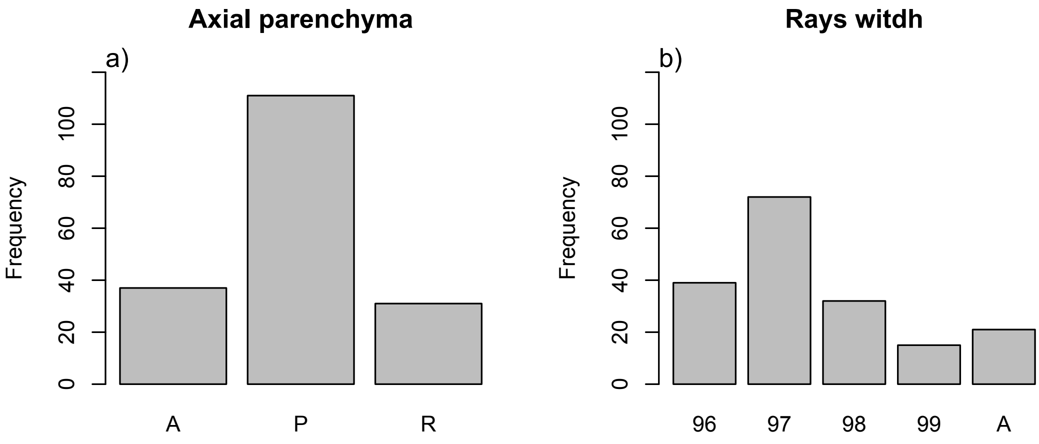


Fig. 4. a) Frequency distribution in species with apotracheal parenchyma (A), paratracheal parenchyma (P), and rare parenchyma (R), b) frequency distribution in relation to rays width classes (96: uniseriate rays, 97: rays 1-3 seriate, 98: rays 4-20 seriate, rays greater than 10 seriate, A: rayless) in the woody species from Cyprus.

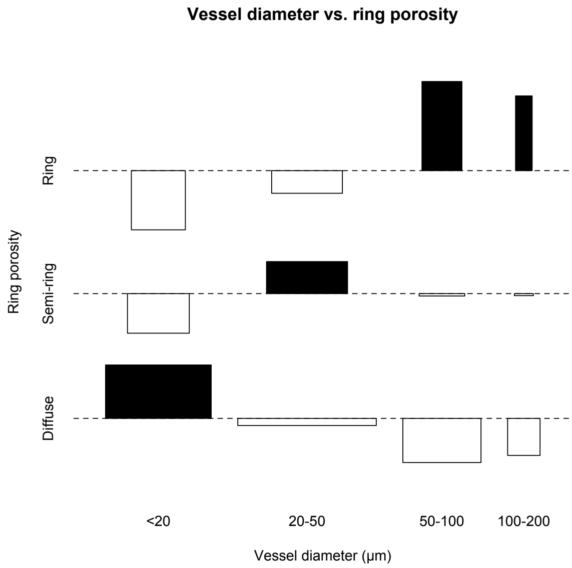
The following table 1 shows statistical test results for anatomical feature relationships. The relationship between each anatomical feature to each one of the other were tested for they significance (with α = 0.05). The table 1 show the results of these tests: a table cell contain an "X" when the relationship between the variables in the row and column are significantly related.

	Ring porosity	Vessel diameter	Vessel grouping	Helical thickenings	Fiber wall thickness	Tension wood	Rays per millimeter	Apotracheal parenchyma	Rays width	Raylessness	Rays of two sizes	Rays composition
Vessel diameter	X	-	-	-	-	-	-	-	-	-	-	-
Vessel grouping			-	-	-	-	-	-	-	-	-	-
Helical thickenings	X		X	-	-	-	-	-	-	-	-	-
Fiber wall thickness			X		-	-	-	-	-	-	-	-
Tension wood	X	X	X			-	-	-	-	-	-	-
Rays per millimeter		X				X	-	-	-	-	-	-
Apotracheal parenchyma	X				X		X	-	-	-	-	-
Ray width	X	X	X				X	X	-	-	-	-
Raylessness	X	X						X		-	-	-
Rays of two sizes	X		X				X	X			-	-
Ray composition		X	X			X	X	X	X			-

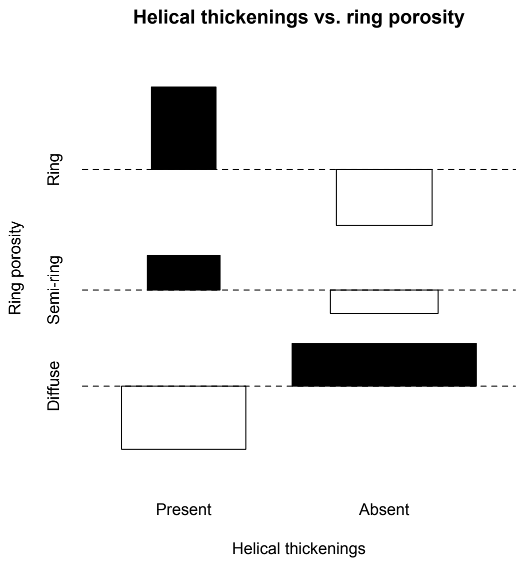
Tab 1. Relationships between anatomical features as categorical variables, "X" was noted only for statistically significant relationships after chi-squared of Fisher exact tests.

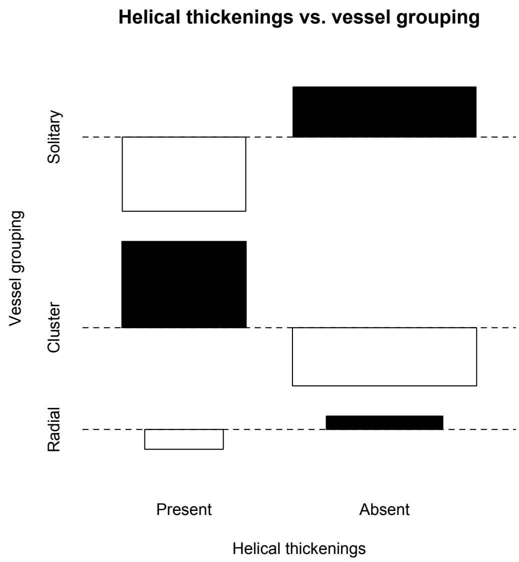
The following charts show the way in which the hydraulic anatomical features are related.

Vessel diameters vs. ring porosity chart showed a clear trend in vessel diameter from diffuse, semi-ring porous species, to ring porous species.

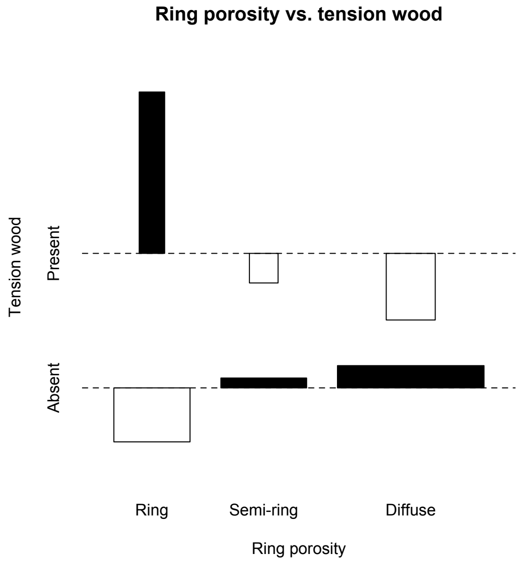


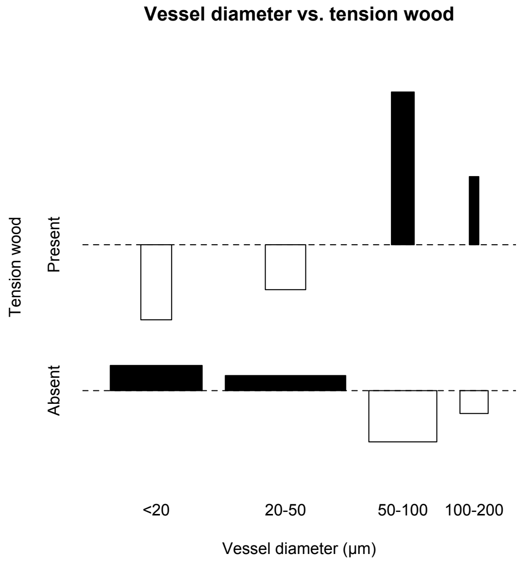
Helical thickenings presence was related to semi-ring and ring porous woods and with vessels grouping in clusters.



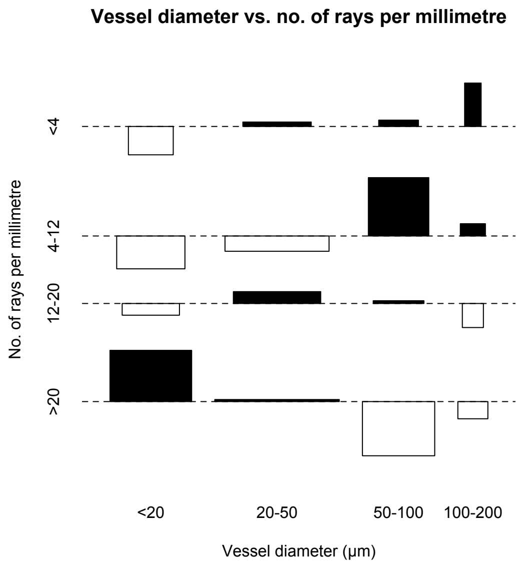


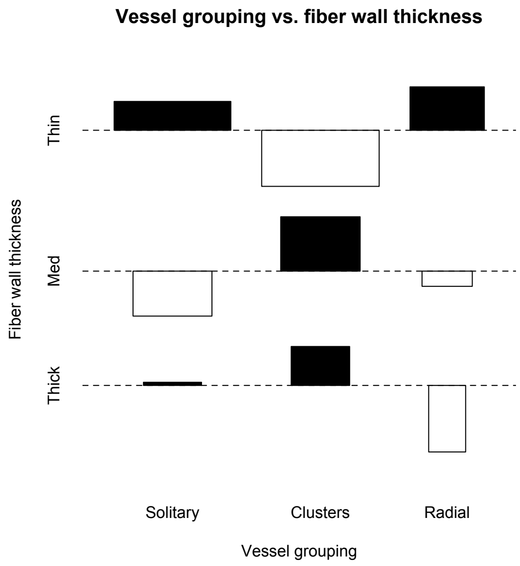
Tension wood presence was related to ring porous species, to species with vessel diameter greater than 50 µm and to species with vessels in radial multiples (the latter association do not show in charts).





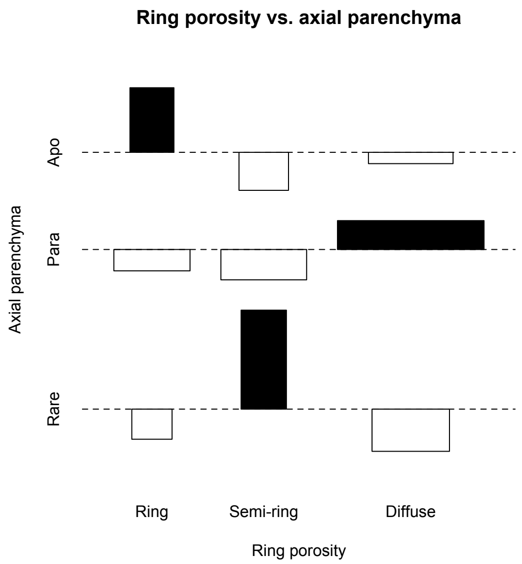
Vessel diameter vs. number of rays per millimeter showed a clear trend: greater the vessels diameter is, the lower the number of rays per millimeter. Thin walled fibers were associated with solitary vessels and radial grouping; species with vessels in clusters displayed a clear association with medium and thick walled fibers.

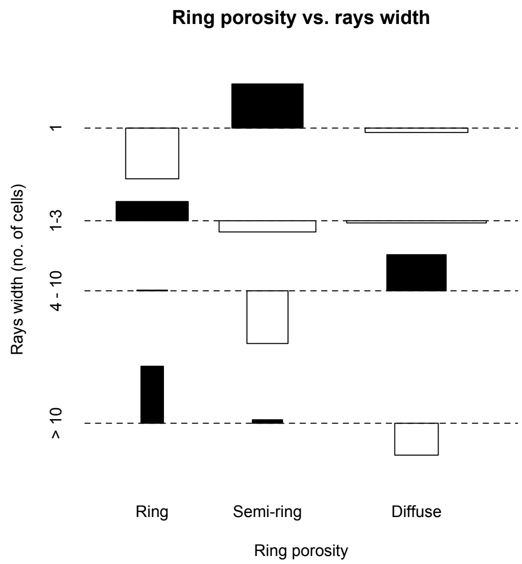




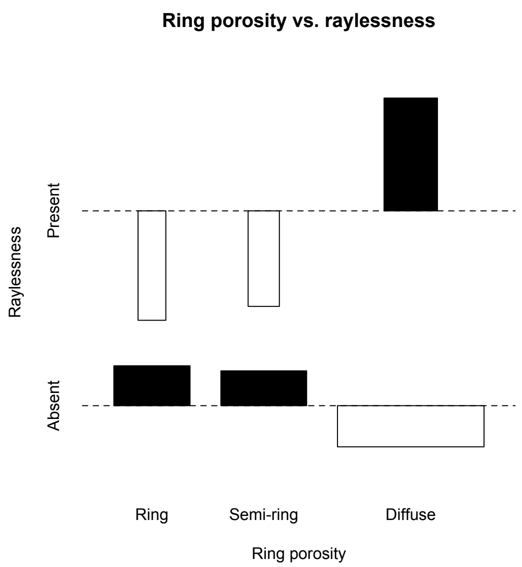
Axial parenchyma arrangements showed a clear association with ring porosity: apotracheal parenchyma was related to ring porous species, paratracheal parenchyma was related to diffuse porous species. Axial parenchyma was rarely observed in semi-ring porous species.

The association plot showing the relationship between ring porosity and rays width displayed a distribution of uniseriate rays predominantly in semi-ring porous species, and rays commonly greater than 10 seriate to ring porous species.

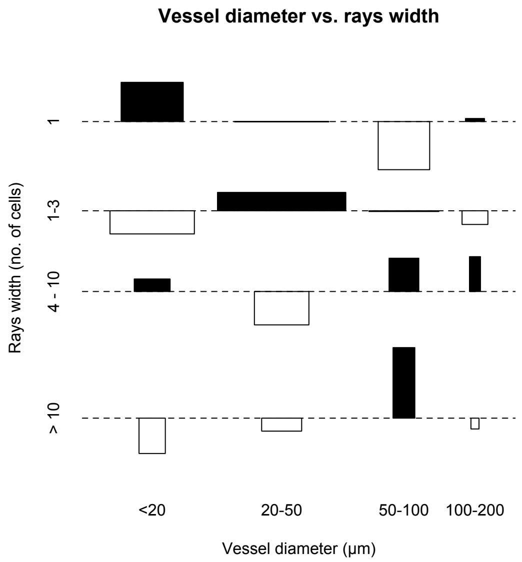


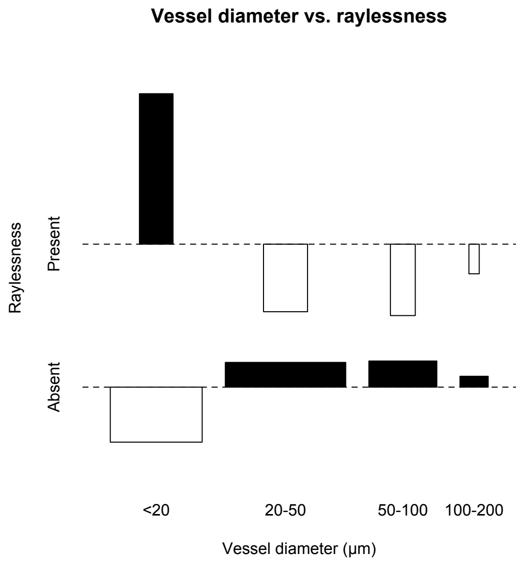


All rayless species were diffuse porous. Presence of rays of two distinct sizes was associate to ring porous species.

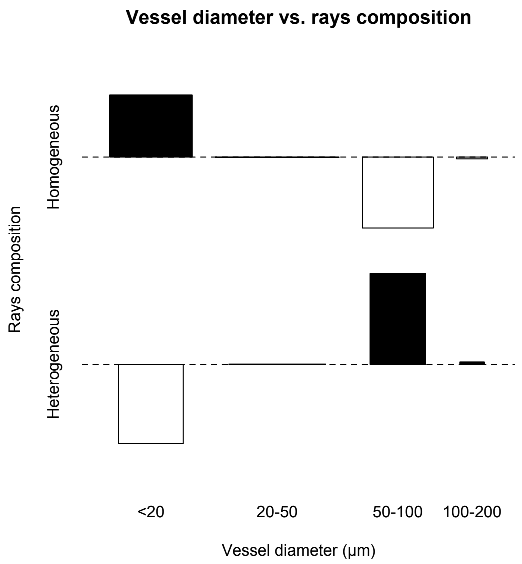


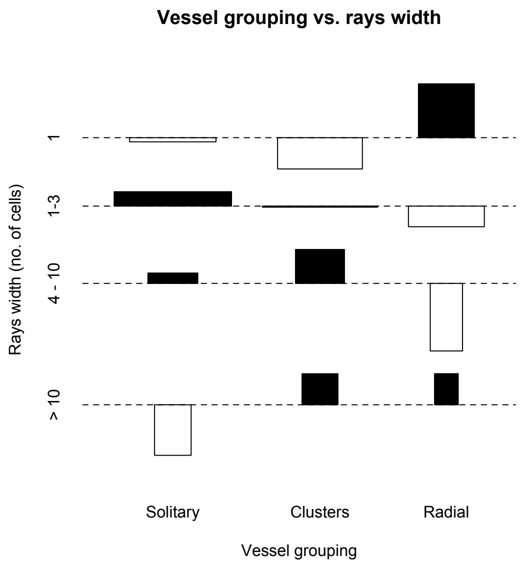
The relationships between vessel diameters and ray widths showed a positive trend: greater is the vessels diameter, larger are the rays. Raylessness was associated to species with very small vessels (less than 20 µm).



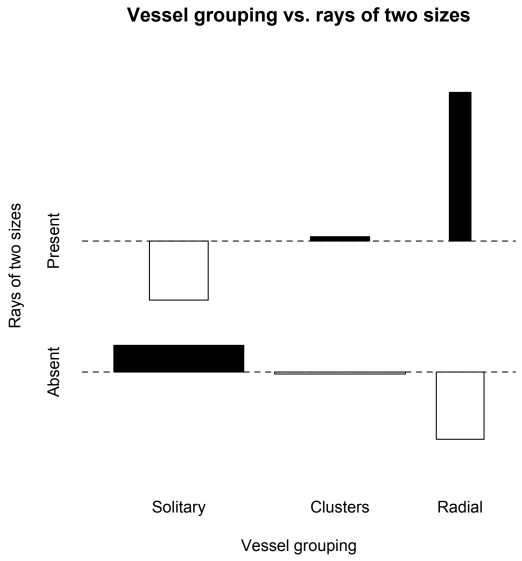


Rays were homogeneous in species with small vessels. The association plot vessel grouping vs. rays width showed that uniseriate rays and rays greater than 10 seriate are associate to radial vessel grouping, intermediate large rays seem to be more associated with solitary vessels, and larger rays to cluster vessel grouping.

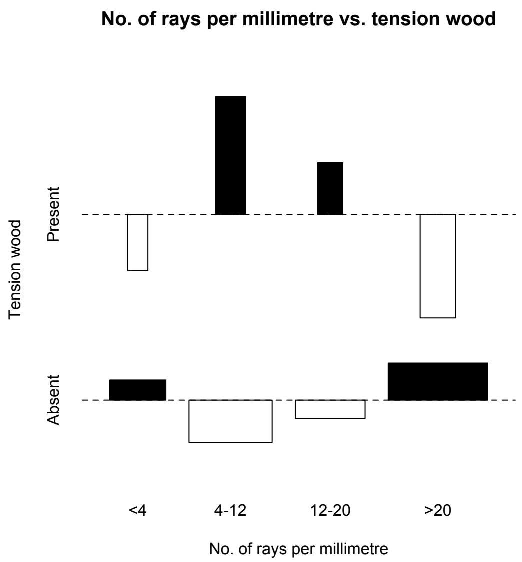


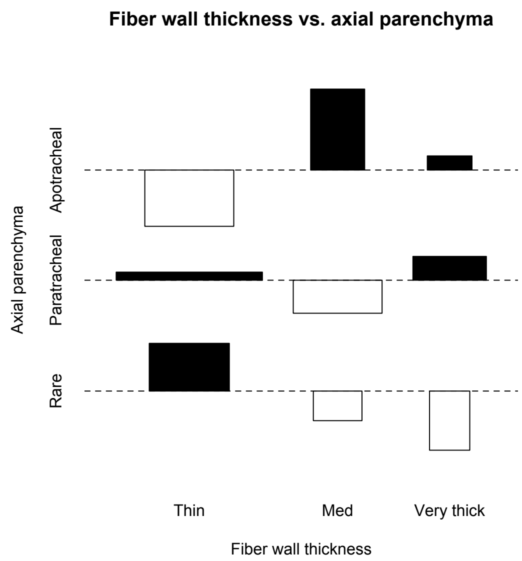


Rays of two distinct sizes were associated to radial vessel grouping. Heterogeneous rays were associated to radial vessels grouping, homogeneous rays to solitary vessels and vessels in clusters.

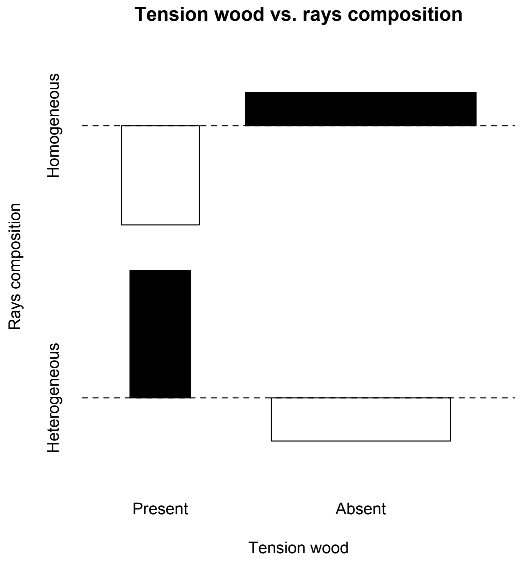


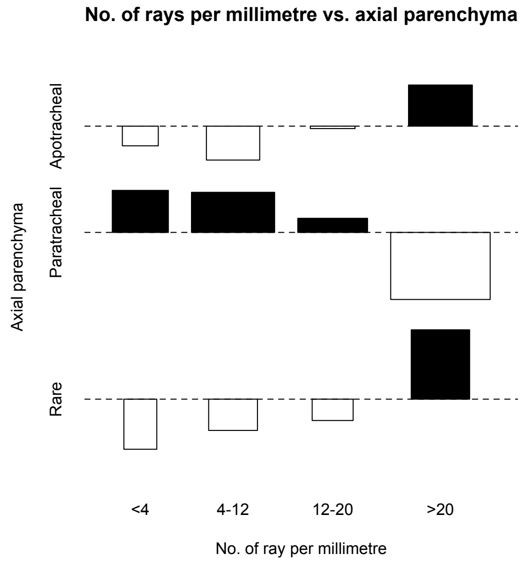
Tension wood tended to be lacking in species with few rays per millimeter and in species with greater than 20 rays per millimeter. The relationship between fiber wall thickness and axial parenchyma arrangement is not of clear interpretation.



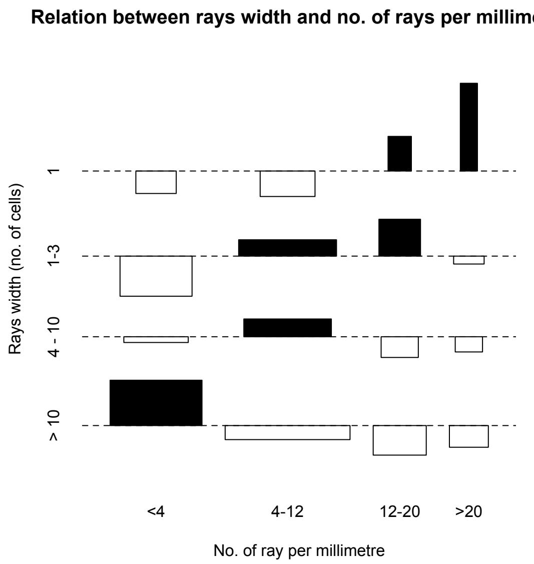


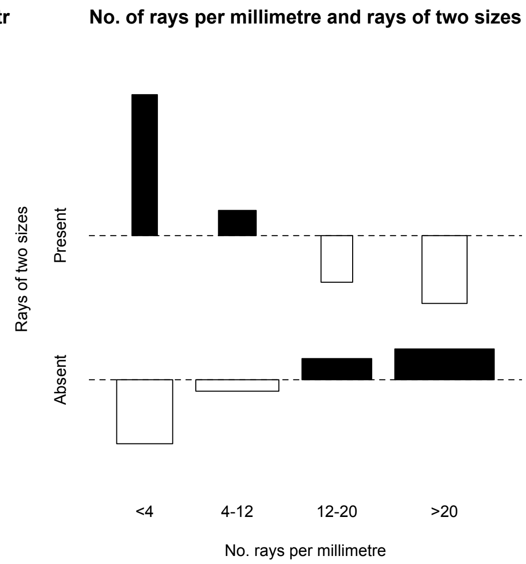
Tension wood is associated to heterogeneous rays. Species with greater than 20 rays per millimeter showed a good association with apotracheal and rare axial parenchyma.



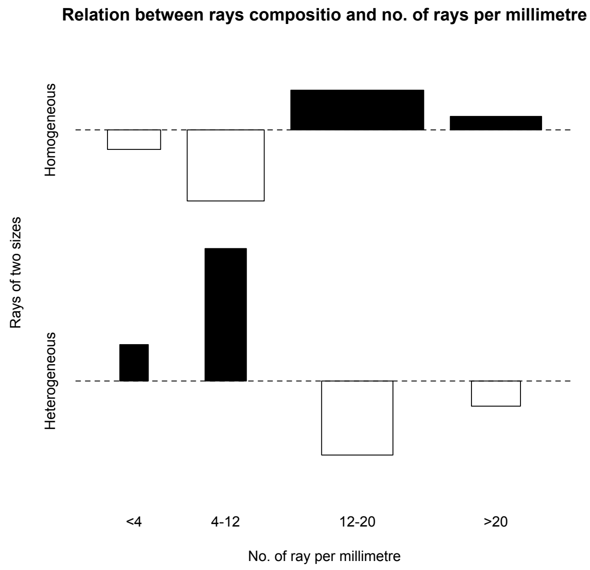


Rays width and rays per millimeter are inversely related: greater is the number of rays per millimeter, lower is rays width. Rays of two distinct sizes were observed in species with no more than 4-12 rays per millimeter.





Ray composition showed a relation to number of rays per millimeter: heterogeneity in rays is associated to less rays per millimeter.

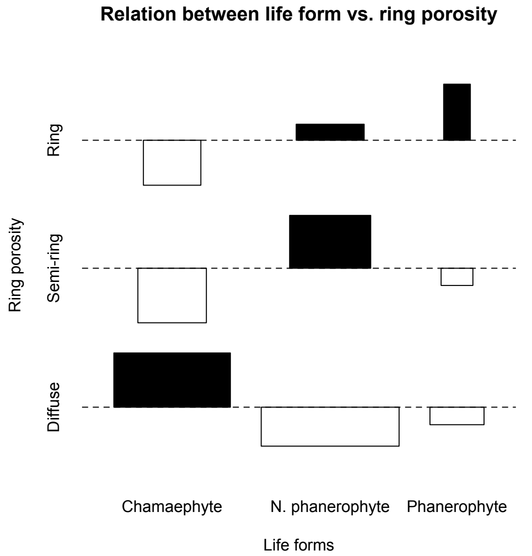


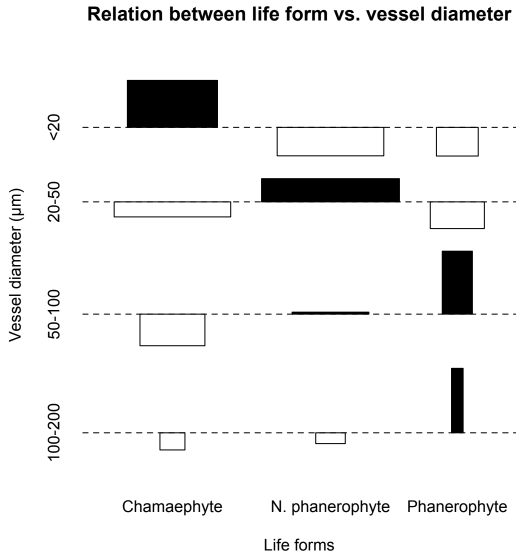
The following table 3 shows the relationships between anatomical features and the biological, ecological and taxonomical attributes.

	Hydraulic				Mechanic				Storage				
	Ring porosity	Vessel diameter	Vessel grouping	Helical thickenings	Fiber wall thickness	Tension wood	Rays per millimeter	Bark sclerenchyma	Apotracheal parenchyma	Rays width	Raylessness	Rays of two sizes	Rays composition
Life form	X	X		X		X	X		X	X	X		X
Plant height	X	X		X		X	X	X	X	X	X		X
Endemism level	X					X		X	X		X		X
MAP & MAT	X												X
Elevation													X
Habitat	X			X		X	X	X	X		X		X
Lamiaceae family	X	X			X	X	X	X	X	X	X	X	X
Wood density				X	X			X					

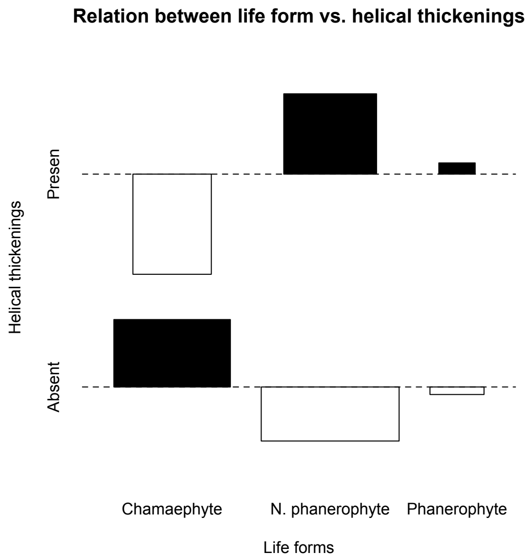
Tab 4. Relationships between anatomical features and attributes as categorical variables, "X" was noted only for statistically significant relationships after chi-squared of Fisher exact tests.

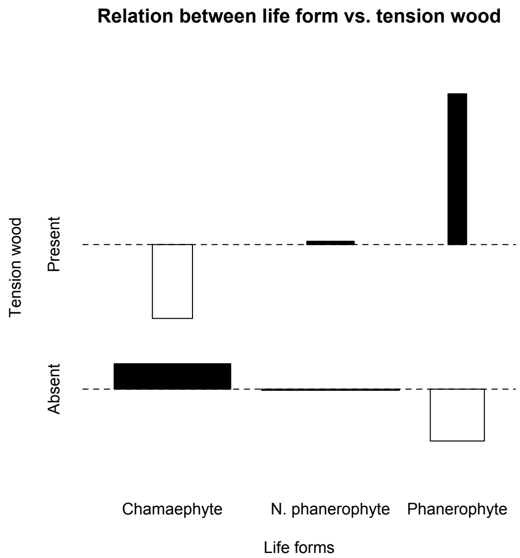
The following charts describe the way in which these variables are associated. Diffuse porous structure was associated to woody chamaephytes, semi ring and rig porous anatomies were typically observed in nanophanerophytes and phanerophytes. A trend in vessel diameter linked small vessels to woody chamaephyte and greater vessels to phanerophyte.



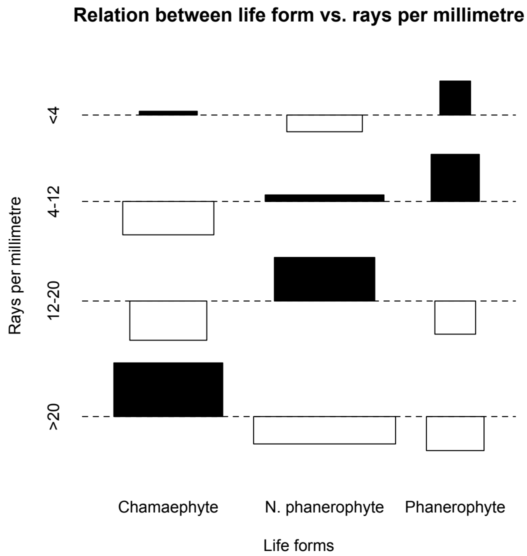


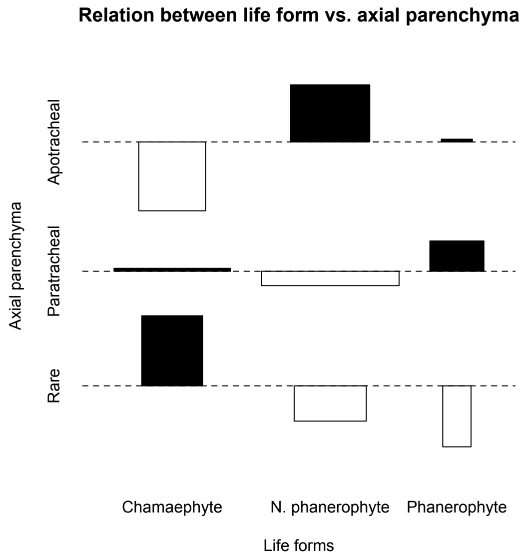
A lack of helical thickenings was associated to woody chamaephytes. The presence of tension wood to phanerophytes.



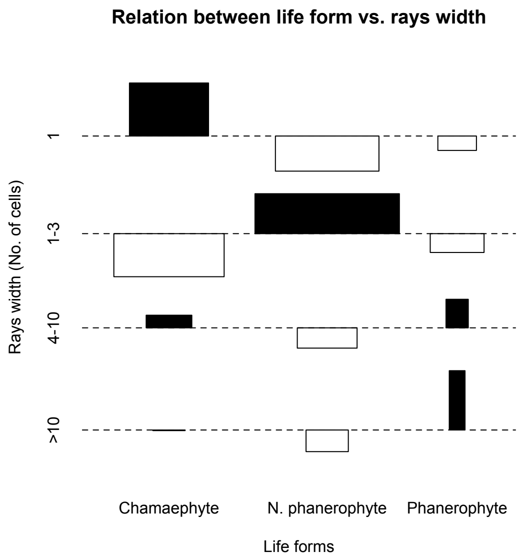


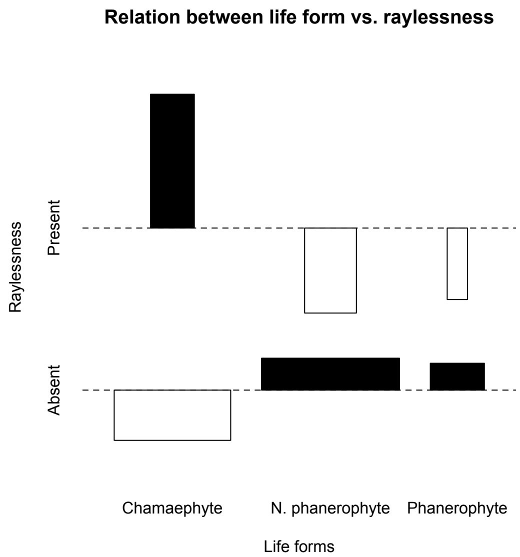
The number of rays per millimeter decreased from woody chamaephytes to phanerophytes. The axial parenchyma was rare in woody chamaephytes, apotracheal in nanophanerophytes and mainly paratracheal in phanerophytes.



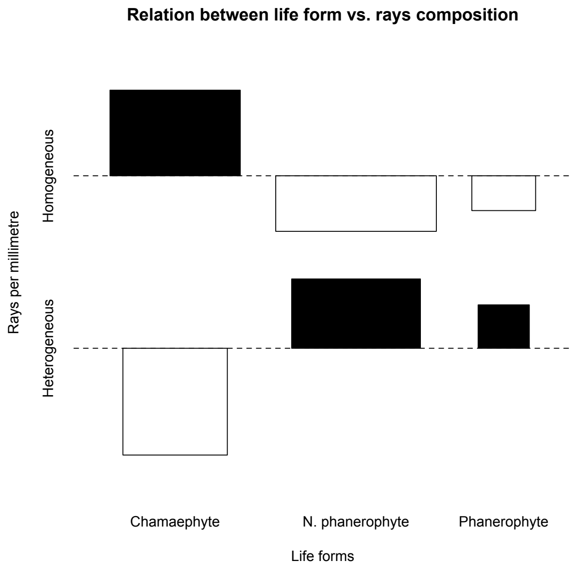


Rays become larger moving from woody chamaephytes to phanerophytes. Raylessness was clearly associated to woody chamaephytes.

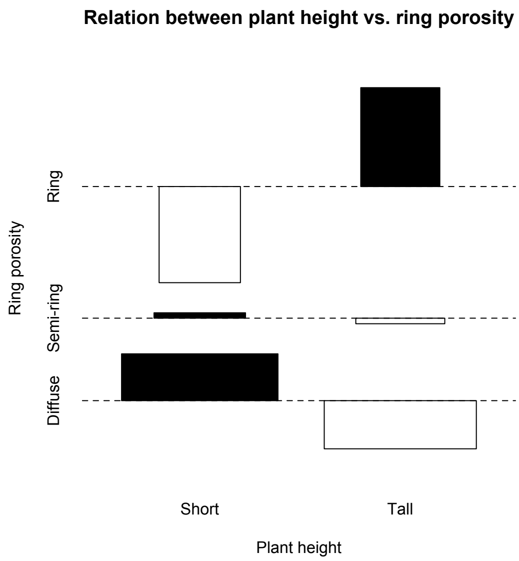


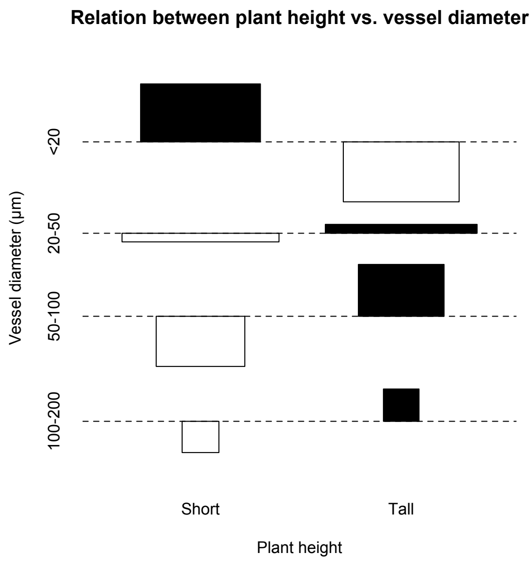


Homogeneous ray composition was associated to woody chamaephytes, heterogeneous ray composition was associated to nanophanerophytes and phanerophytes.

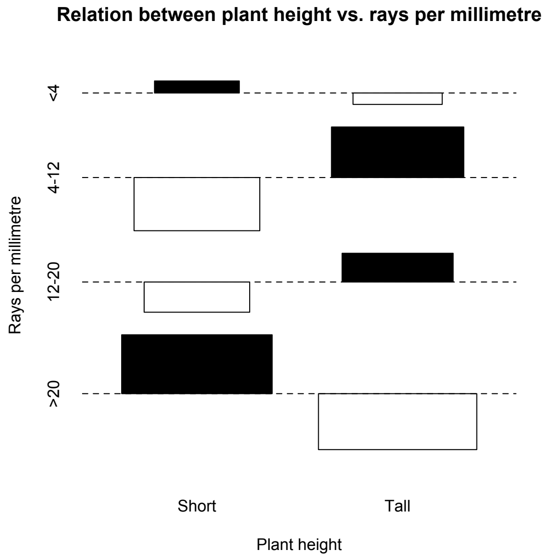


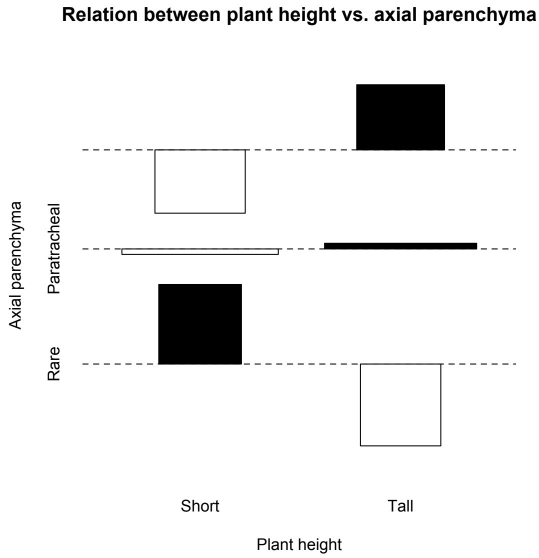
Taller plants showed a clear association to ring porous structure, and shorter species to diffuse porous woods. Short plants has very small vessels.



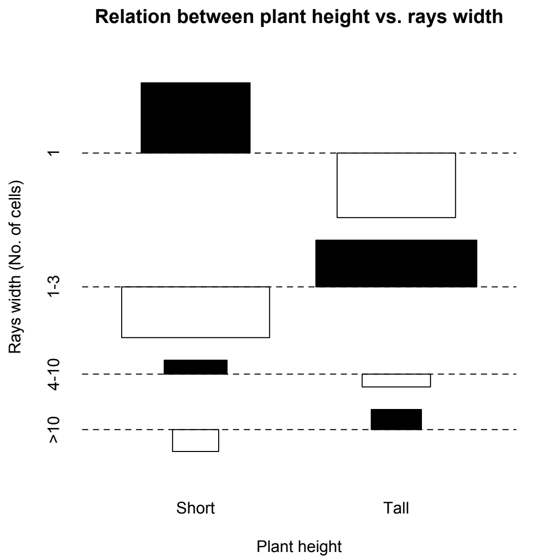


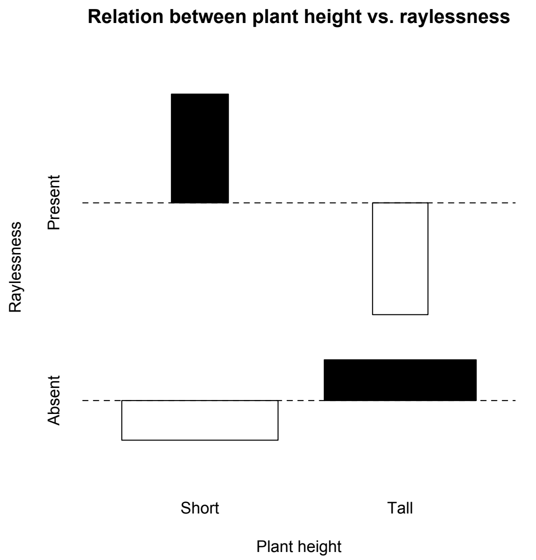
Helical thickenings and tension wood presence were associated to taller species (association plots not displayed).
Short plants showed an association with both few rays per millimeter and more than 20 rays per millimeter. Axial parenchyma was rare or difficult to observe in short plants, and apotracheal in tall species.





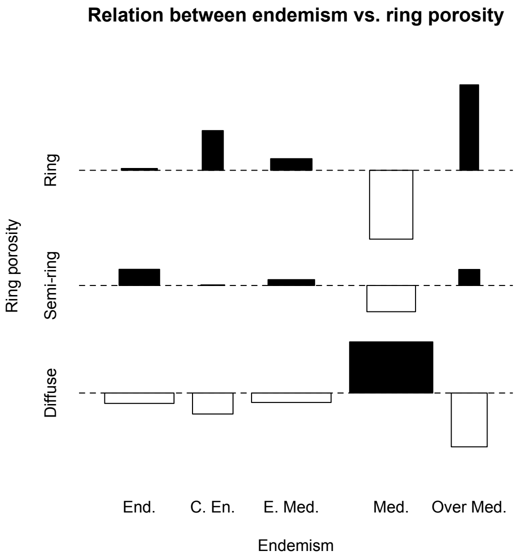
Short plants and uniseriate rays were strongly associated, 4 to 10 cells large rays were also associated to short plants. Tall plants displayed an association to 1-3 cells wide rays and to rays greater than 10 cells in width.

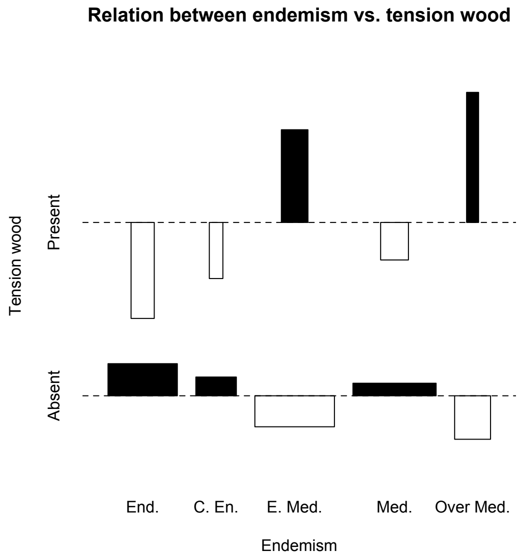




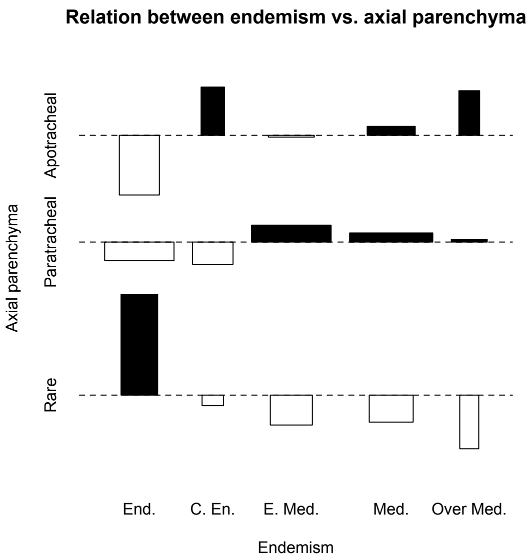
Homogenous ray were associated to short plants, heterogeneous rays to tall plants (charts not shown).

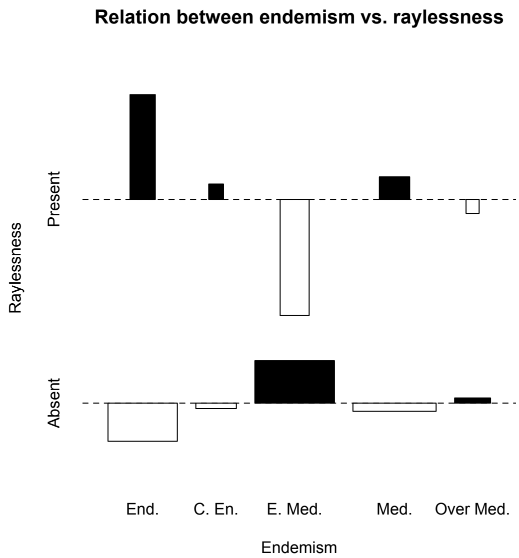
Species endemic to Cyprus and to Eastern Mediterranean region were associated to semi-ring and diffuse porous woods, in contrast Mediterranean species growing in Cyprus showed a strong association to diffuse porous structure. Tension wood tended to be lacking in endemic and close to endemic species, it was noted in Mediterranean species.



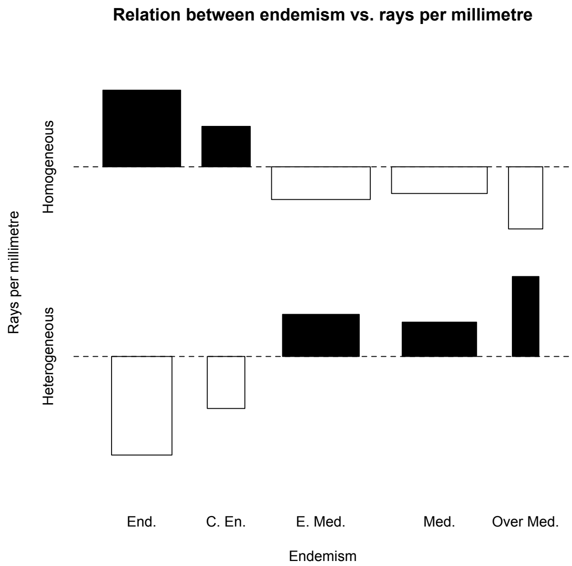


The absence of parenchyma was linked to species endemic to Cyprus, but close to endemic species showed an association to apotracheal parenchyma. Raylessness was not associated to Eastern Mediterranean species, but endemic and close to endemics species showed an association to raylessness.

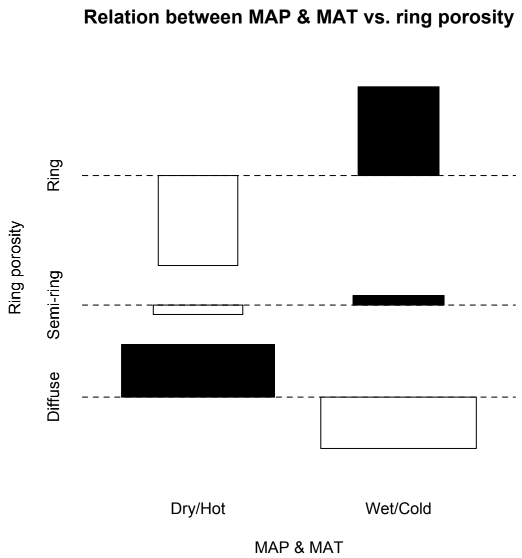


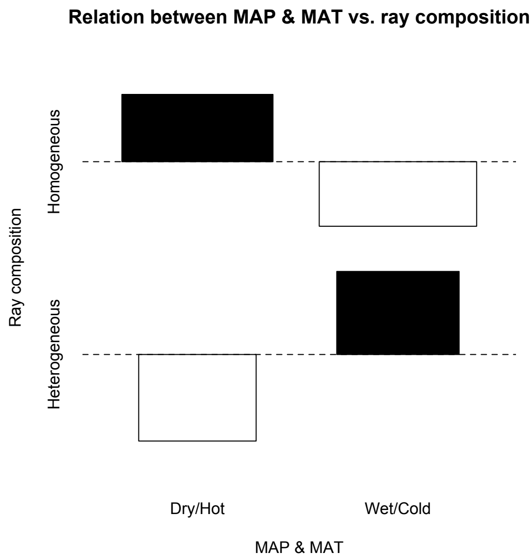


Endemic and close to endemic species showed a strong association to homogenous rays. The other species from Eastern Mediterranean to over Mediterranean distribution range showed association to heterogeneous rays.



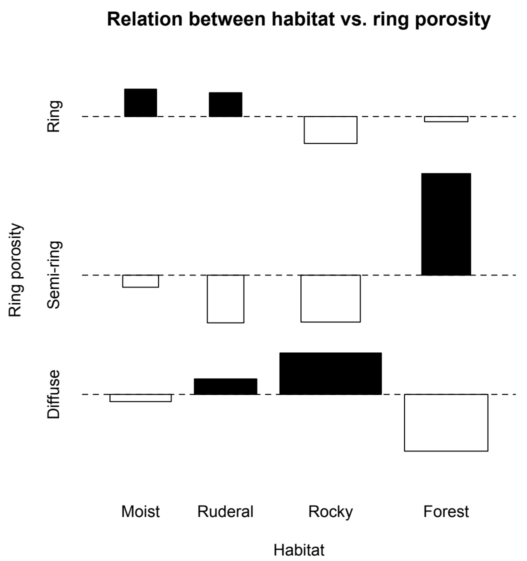
Precipitation and temperature were associated only to two anatomical features. We recorded a predominance of diffuse porous species in dry/hot site, and the presence of ring porous species in wet/cold sites. Ray composition varied from homogenous in dry/hot sites to heterogeneous in wet/cold sites. The same relation was observed in the elevation vs. ray composition association plot (chart do not showed).

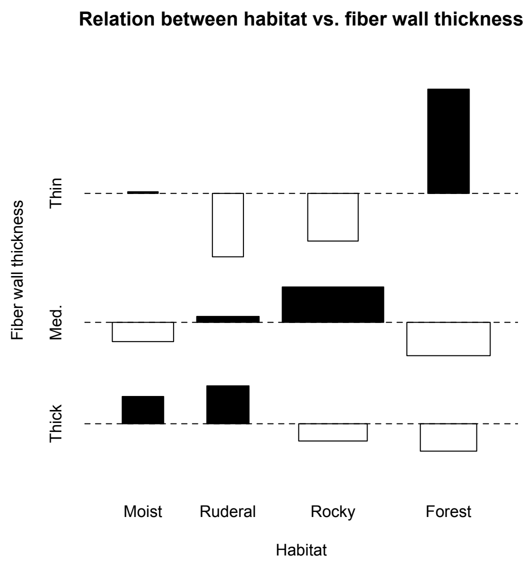




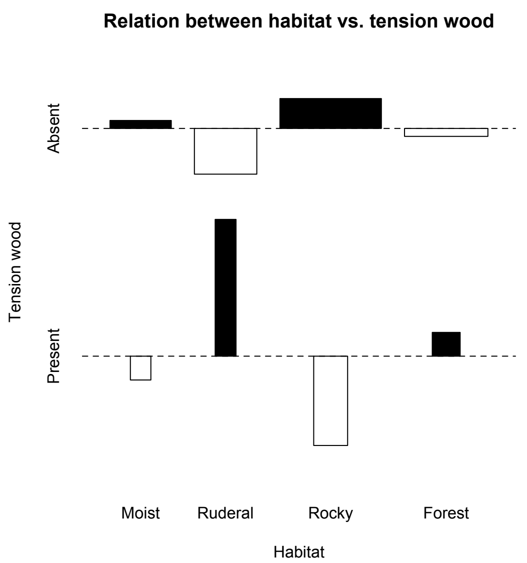
Habitat relationships to ring porosity showed a clear association of ring porous woods to moist sites, and to ruderal sites too, but in the latter diffuse porous woods were also associated. Diffuse porous structures were associated to rocky and sandy sites, and semi-ring porous woods to forest and shrubland habitats.

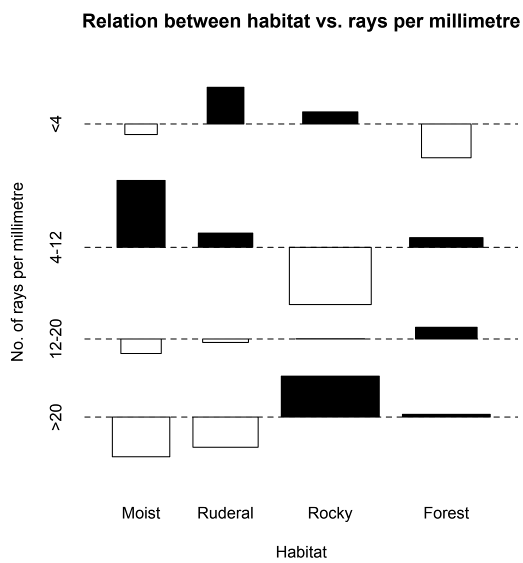
Thick walled fiber species were associated to moist and ruderal habitats, thin walled fibers to forest and shrubland species.



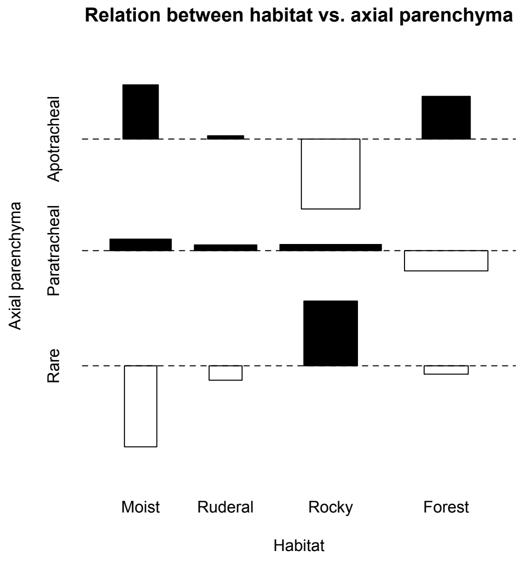


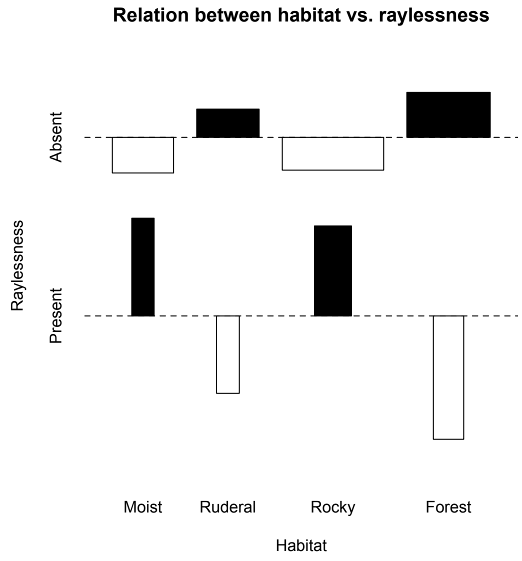
The presence of tension wood was associated to ruderal and forests habitat. The relationships between number of rays per millimeter and habitat does not seem to be clear, but in moist habitats there was a clear association with 4-12 cells wide rays and in rocky and sandy habitats with larger rays.



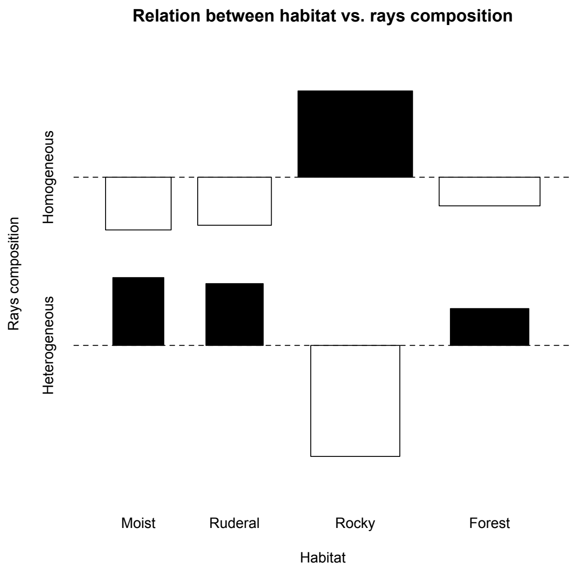


At the same way the relationships of habitat vs. axial parenchyma arrangement is not clear. Apotracheal parenchyma was linked to moist and forest habitats, the lacking of parenchyma to rocky and sandy sites. Raylessness was associated to moist sites and to rocky sites.

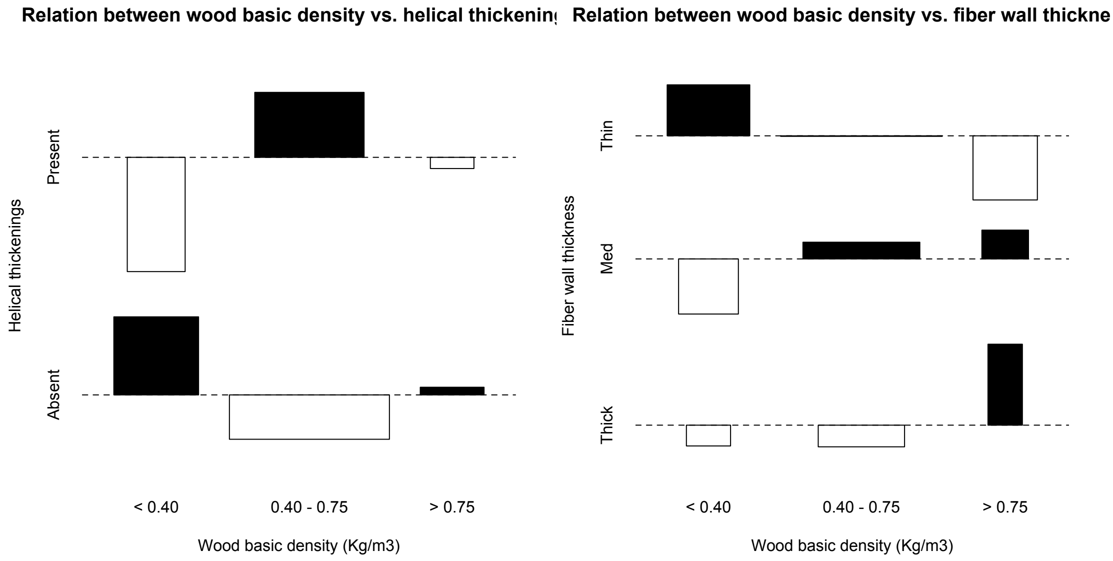




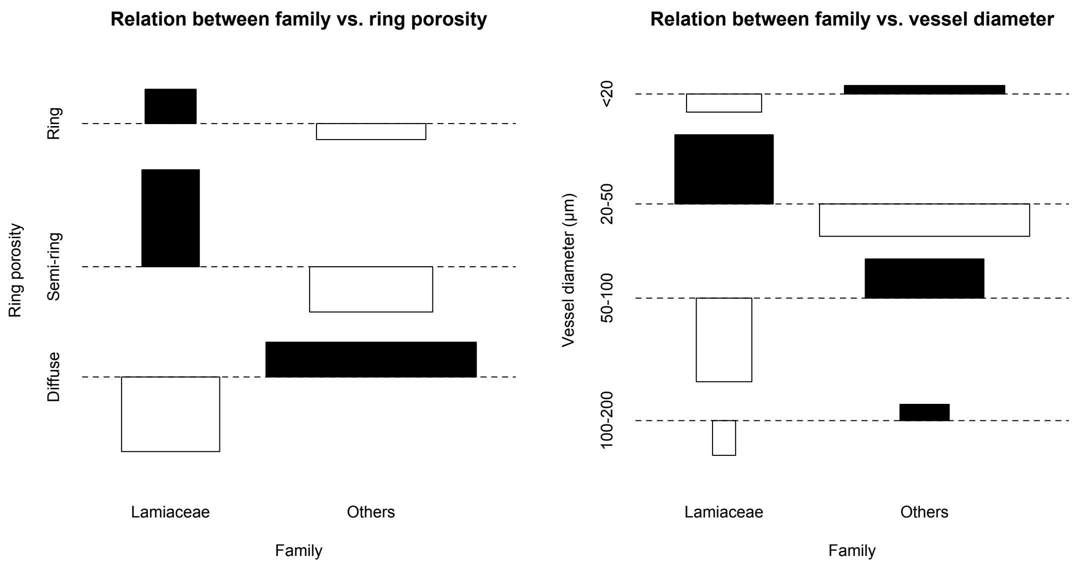
A strong association was observed between ray homogeneity and rocky sites.



The only two statistically significant relationships between wood density and anatomical features showed an association between helical thickenings presence and medium dense woods. A clear trend was observed in fiber wall thickness vs. wood density: the greater the fiber wall thickness is, the greater is the wood density.



The analysis on Lamiaceae family compared to the all datasets showed an association between ring and semi-ring porosity to Lamiaceae. Vessels diameter of 20-50 μm was clearly associated to the analyzed family.



In Lamiaceae the presence of thin walled fibers and the absence of tension wood were common, rays were uniseriate and their proportion was greater than 12 per millimeter, and axial parenchyma was rare. Raylessness and rays of two sizes were not associated with Lamiaceae family, and rays composition showed an association with homogeneous rays (association plots do not shown).

Discussion: ecological wood anatomy

The goals of this study were to describe association patterns between wood anatomical features to ecological and biological factors. No specific hypotheses were tested.

We observed diffuse porous structure was associated to the shortest life form studied in this work, the woody chamaephytes. We detected semi-ring and ring porous xylems related to nanophanerophytes and phanerophytes. Taller plants show a clear association to ring porous structure, and shorter species to diffuse porous woods. At the same time a trend is vessel diameter show small vessels associated to woody chamaephyte and greater vessel diameters to phanerophyte. Our results comparing life form and plant height (short/tall) to hydraulic anatomical features are in line with those from another comparative study of 207 woody species in California, in which trees were found to have larger vessels (Carlquist & Hoekman, 1985). Results from many other investigations of height and vessel characteristics are not directly comparable to the present study because they were based on direct plant height measurements (e.g. Phillips *et al*. 2003, Preston *et al*. 2006, Koch *et al*. 2004), we in stead estimated plant height by life form classification. Nevertheless, those studies generally found that vessel lumen area increased as individuals grew taller, thereby counteracting some of the increased hydraulic resistance associated with height (Mencuccini *et al*. 2011).

A functional interpretation of the association between helical thickenings and tall plants (which also show greater vessels) confirm the possible role of helical thickenings in providing information on adaptive morphology of vessels elements (Baas 1973, Nair 1987, Schmid & Baas 1984).

To our knowledge the relationship between presence of tension wood associated to phanerophytes and to taller species was never showed.

Rays features seem to be associate to space filling in wood, and the rays dimensional features seems to be constrained by vessels. In fact, rays became larger moving from woody chamaephytes to phanerophytes, and the numbers of rays per millimeter decrease moving from woody chamaephytes to phanerophytes allowing vessels to be greater in taller life forms.

Raylessness is clearly associated to woody chamaephytes. Raylessness may cause the loss of radial conduction of assimilates and possibly water and hormones, and occurs only in stems that have relatively small diameters.

Raylessness can also be regarded as a means of achieving a rapid substitution of mechanical tissue for ray tissue (Carlquist 2001).

Rays composition vary from homogeneous in woody chamaephytes, to heterogeneous in nanophanerophytes and phanerophytes. At the same time homogenous rays are associated to short plants, heterogeneous ray to tall plants.

The axial parenchyma was rare in woody chamaephytes, apotracheal in nanophanerophytes and mainly paratracheal in phanerophytes. Axial parenchyma was rare or difficult to observe in short plants, and apotracheal is frequent in tall species. Axial parenchyma arrangements in relation to growth forms was discussed in Schweingruber & Poschlod (2005) and in Schweingruber *et al*. (2011) and other studies, but no functional or ecological interpretations were possible.

Level of endemism to Cyprus allow us to evaluate certain anatomical feature which evolved in the island and tell the difference to the other wider range distribution species.

Endemic and close to endemic species showed absence of axial parenchyma, raylessness, homogeneous rays, and did not show association to tension wood. This can be explained by endemic and close to endemic plants being short and mainly woody chamaephytes.

We recorded a predominance of diffuse porous species in dry/hot site, and the presence of ring porous species in wet/cold sites in line with most of the past studies (Carlquist & Hoekman 1985, Fahn *et al*. 1986, Martínez-Cabrera *et al*. 2011, Preston *et al*. 2006, Schweingruber & Bass 1987).

Habitat relationships to ring porosity showed a clear association of ring porous woods to moist sites, and to ruderal sites too, but in the latter diffuse porous woods were also associated. Diffuse porous structures were associated to rocky and sandy sites, and semi-ring porous woods to forest and shrublands habitats. This findings support the studies that suggest small vessels associated to arid sites.

Thick walled fibers species were associated to moist and ruderal habitats, thin walled fibers to forest and shrubland species. Climate variables were more intimately associated with fibers than with vessel traits in 61 shrub species from North and South America (Martínez-Cabrera *et al*. 2009). A clear trend was observed in fiber wall thickness vs. wood density: greater in the fiber wall thickness, greater is the wood density.

The analysis on Lamiaceae family showed that the wood anatomy of the family con be describe by association with ring and semi-ring porosity, vessel diameter 20-50 µm, presence of thin walled fibers, absence of tension wood, rays proportion greater than 12 per millimeter, axial parenchyma rare, and uniseriate rays. Raylessness and rays of two sizes were not associated with Lamiaceae family. These results are in line with previous findings of Baas & Schweingruber (1987), Carlquist (1985a), Carlquist (1982), Carlquist & Hoekman (1985). A deeper taxonomic explanation was not possible because we don't have enough material from other families than Lamiaceae.

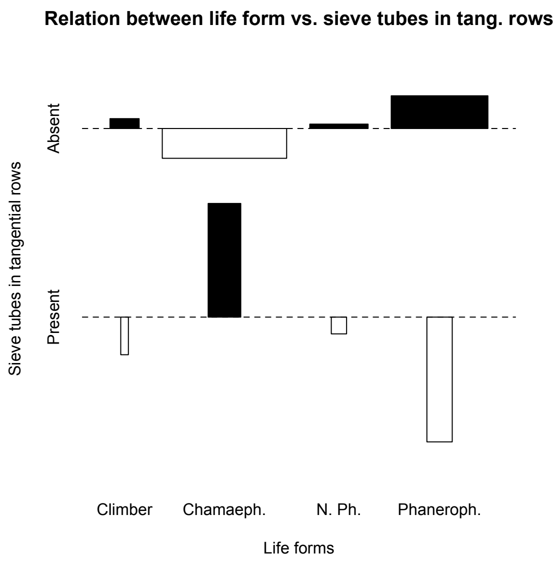
Results: ecological bark anatomy

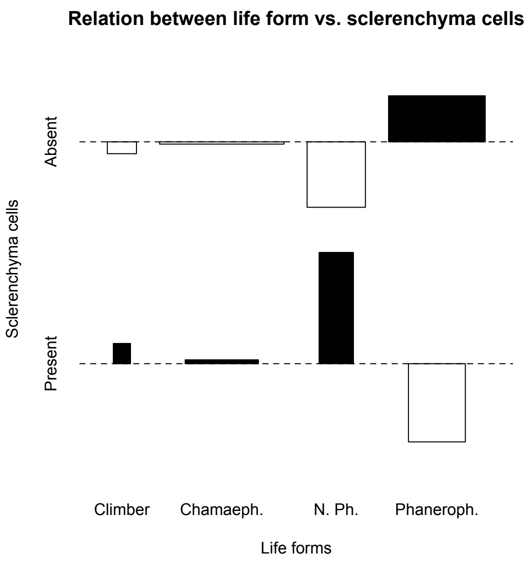
The annex 3 shows the dataset for ecological bark anatomy analysis. The following table 5 shows the statistically significant relationships between bark anatomical features to life forms, level of endemism, and habitat.

	Sieve tube in clusters	Sieve tube in tang. rows	Sieve tube in rad. rows	Sieve tube collapsed	Some ray dilated	Sclerenchyma cells	Fibers	Fiber in rad. rows	Fiber in tang. rows	Fiber scattered	Fiber grouped	Sclereids	Sclereids in rad. rows	Sclereids in tang. rows	Sclereids scattered	Sclereids grouped	Prismatic crystals	Acicular crystals	Druses crystals	Crystal sand	Phloem uniform	Laticifers structure	Laticifers in ducts	Cell content	Phellem not distinct	Phellem homogeneous	Phellem heterogeneous	Phellem distinct pol. light	Lignified cells in phellem	Phellem layered	Phelloderm layered
Life form		X				X	X		X			X					X				X							X		X	X
Endemism					X	X	X		X								X									X		X			X
Habitat					X	X						X		X	X		X		X							X		X			X

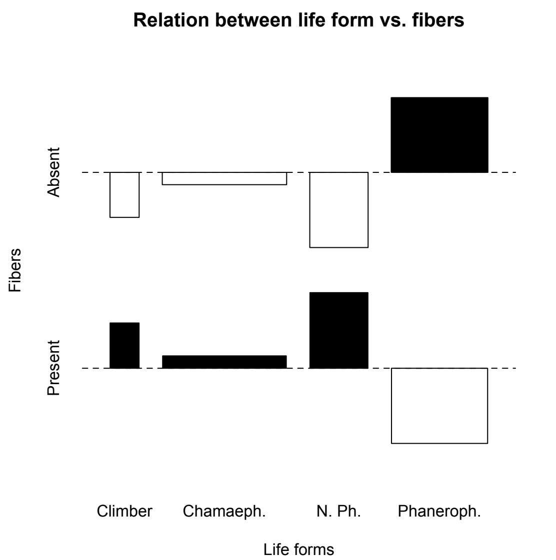
Tab. 5. Statistically significant relationships between bark anatomical features to life form, level of endemism and habitat.

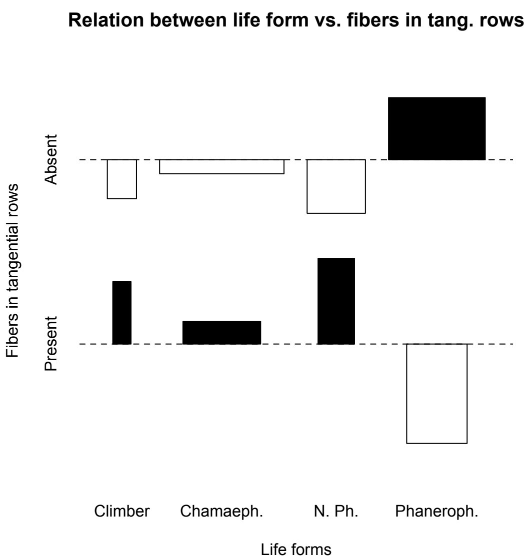
A number of relations involve life forms and bark anatomical features. Sieve tubes arrangement in tangential rows was associated to woody chamaephytes, the lack of sieve tubes in tangential rows was associated to the tallest life form, and to climbers. Sclerenchyma cells presence was associated to shorter life forms (woody chamaephytes and nanophanerophytes) and to climbers, and a lack of sclerenchyma cells was associated to phanerophytes.



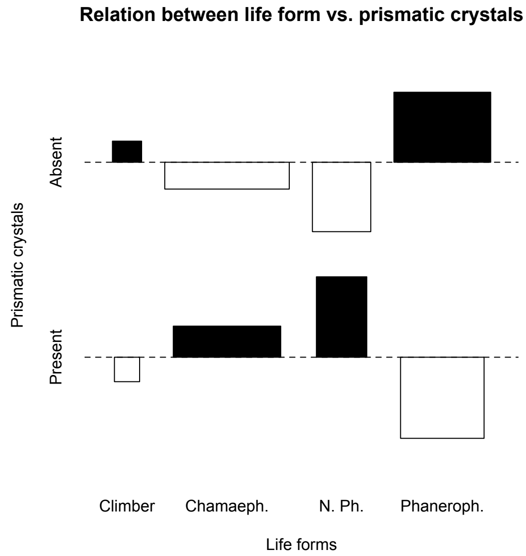


Fibers presence and fibers arrangement in tangential rows follows the same association described for sclerenchyma cells.

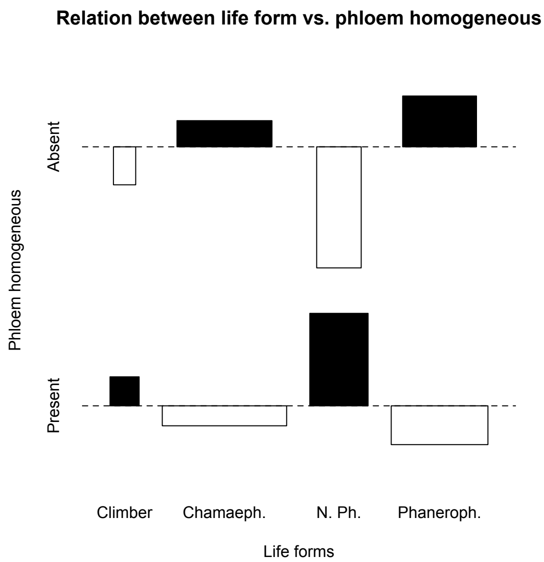


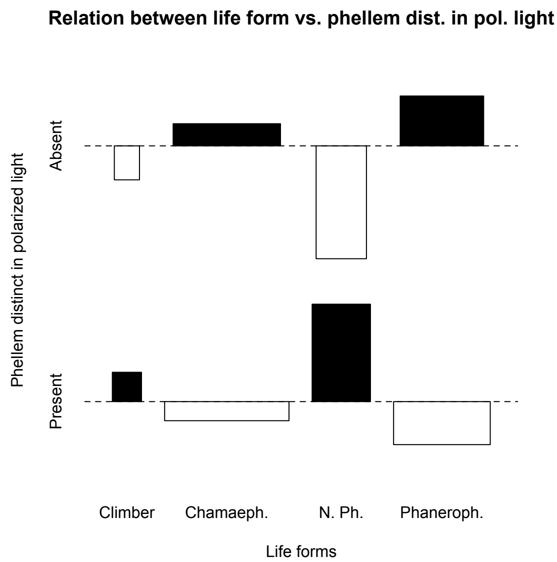


A lack of sclereids was associated to phanerophytes. Prismatic crystals were associated to woody chamaephytes and nanophanerophytes; the absence of prismatic crystals was related to climbers and phanerophytes.

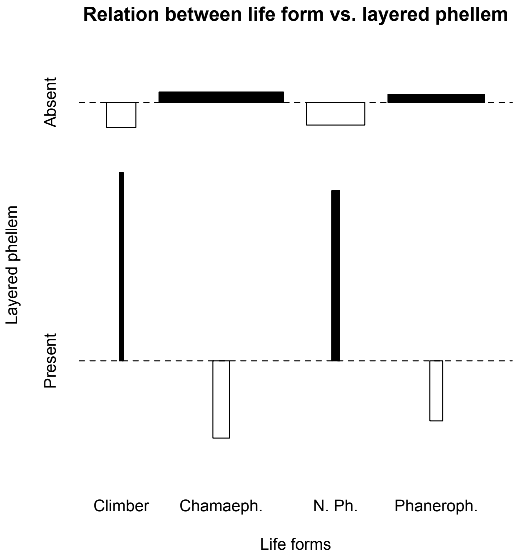


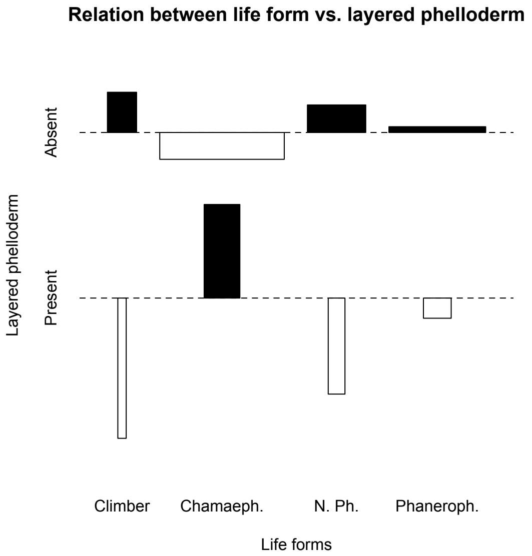
Phloem structure was homogenous for climbers and nanophanerophytes, and not homogeneous for woody chamaephytes and phanerophytes. The same association was observed for phellem disappearing in polarized light.



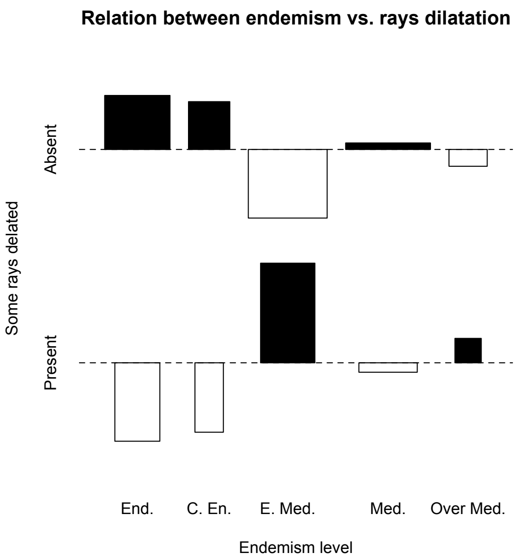


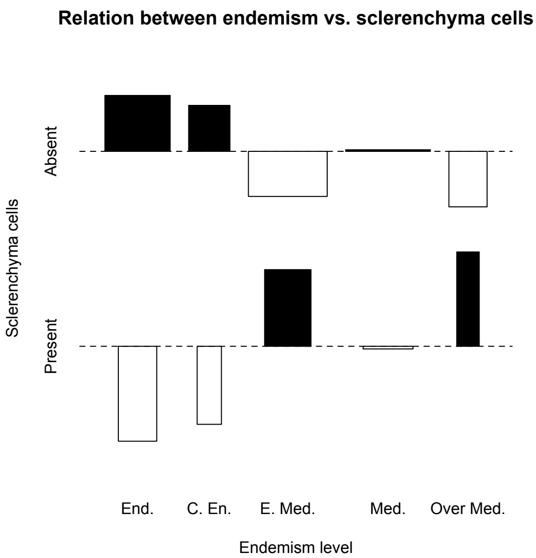
A layered structure for phellem was associated to climbers and nanophanerophytes. Layered phelloderm was associated to woody chamaephytes.



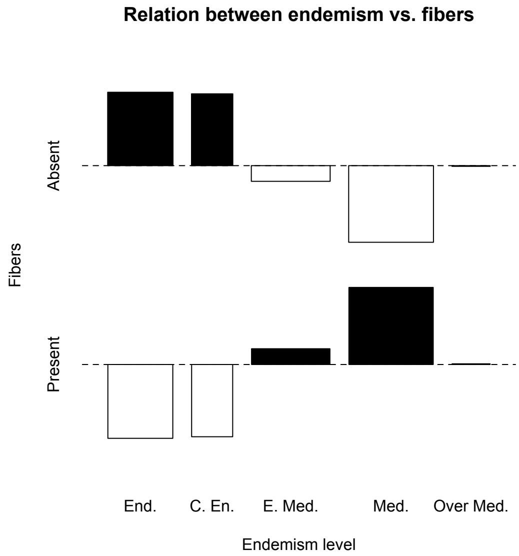


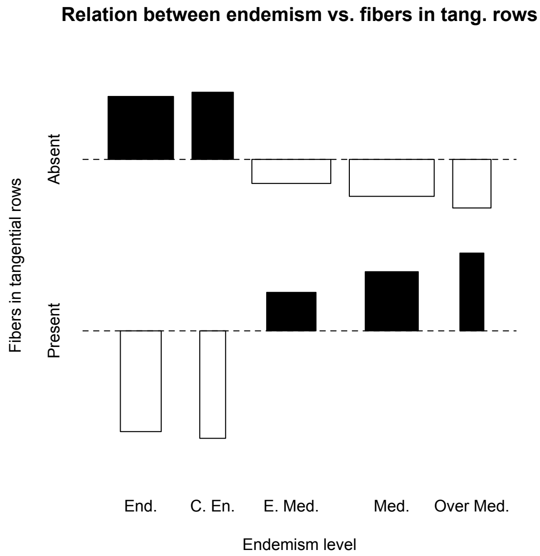
Endemic and close to endemic species showed a lack of rays dilated, eastern Mediterranean species were strongly associated to the presence of dilated rays. Sclerenchyma cells were absent in endemic and close to endemic species, but associated to eastern Mediterranean plants.



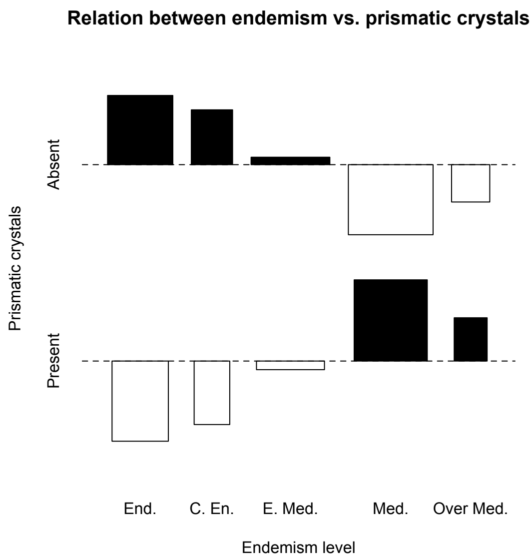


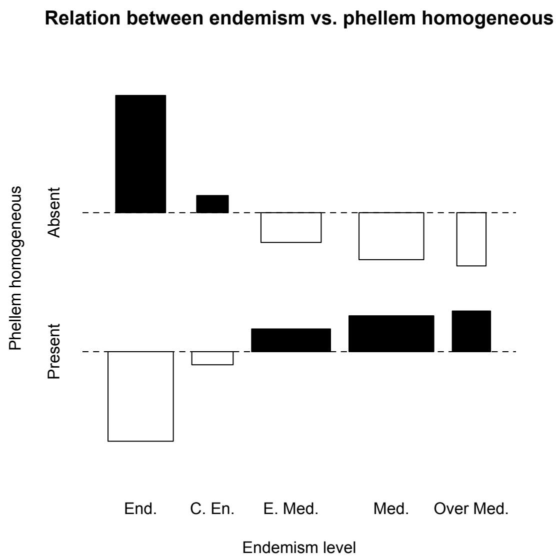
Fibers presence and fibers arrangement in tangential rows were not present in endemic and close to endemic species, but associated with all the species with a distribution range wider than the island of Cyprus.



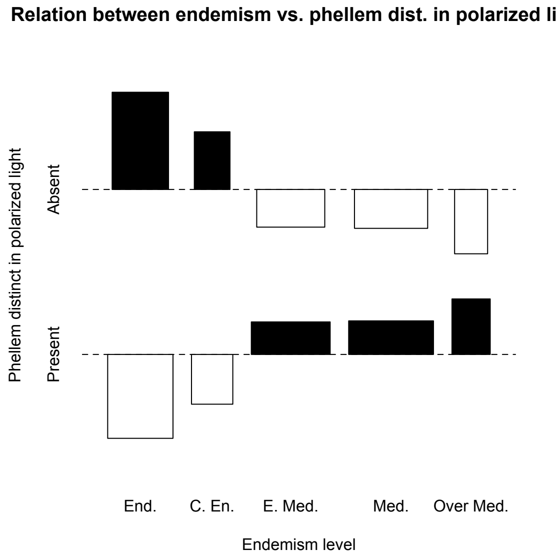


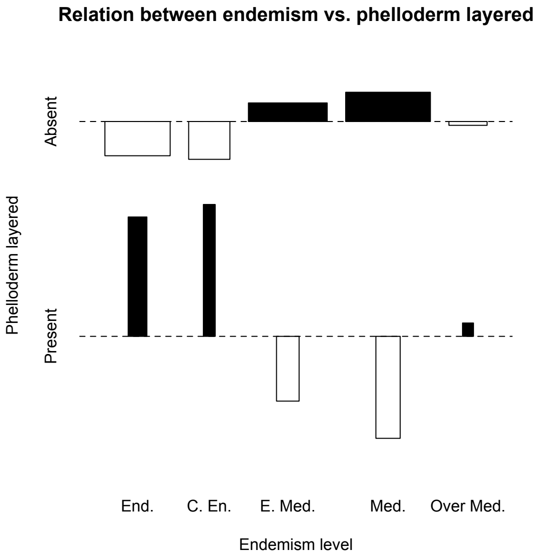
An association lack was recorded for prismatic crystals in endemic to eastern Mediterranean species, the presence of prismatic crystals in bark was related to Mediterranean and over Mediterranean species.



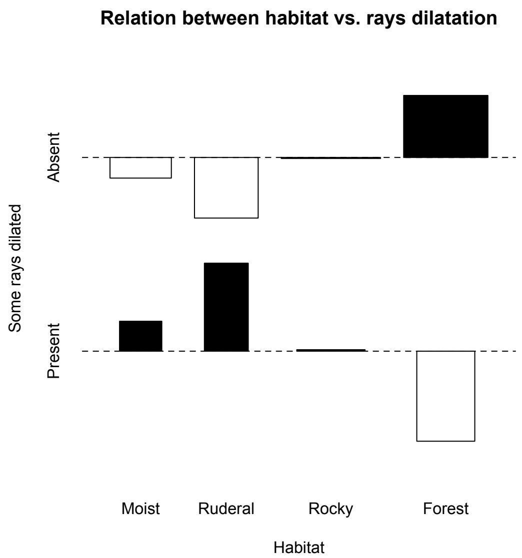


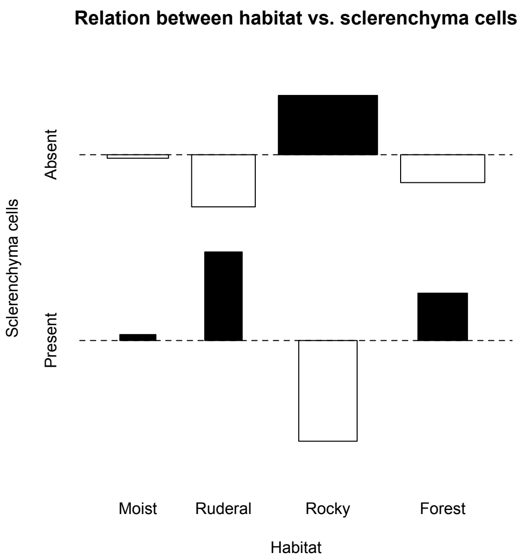
Distinctness of phellem in polarized light was related to eastern Mediterranean and to over Mediterranean range distribution species. The presence of phelloderm with a distinct layered structure was associated to endemic and close to endemic species to Cyprus.



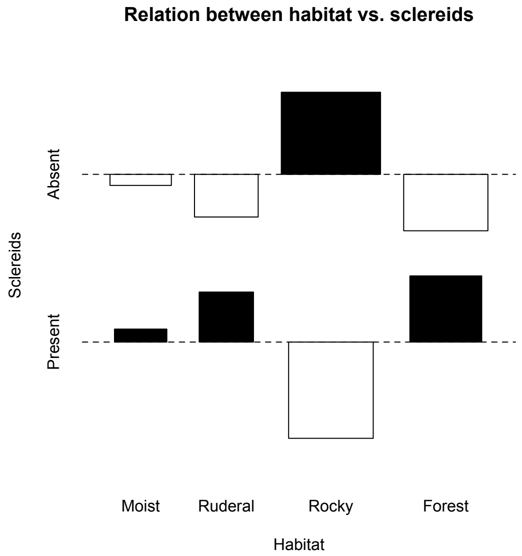


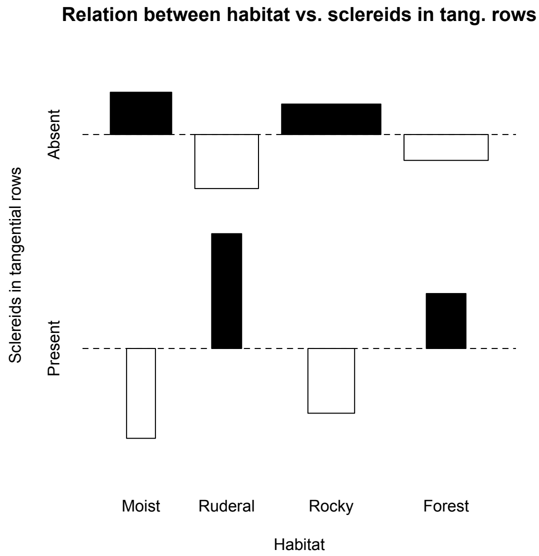
Relationships between habitat and bark features showed an association of dilated rays to moist and ruderal sites, and a lack of rays dilated in forest habitats. Sclerenchyma cells presence was associated with the all habitat considered, but not with rocky sites.



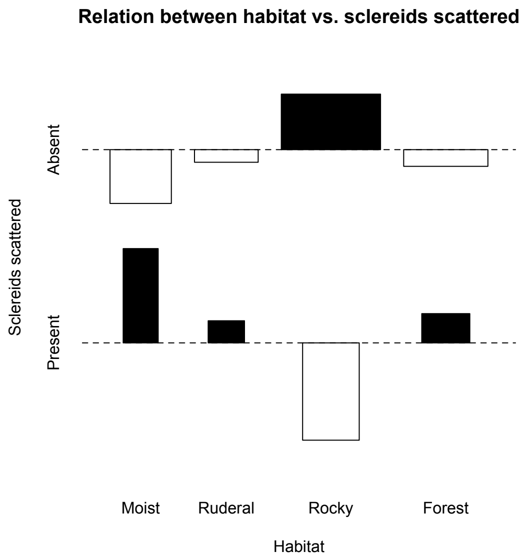


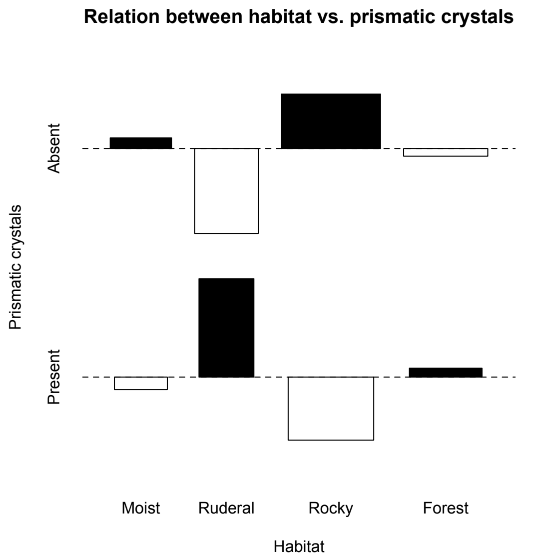
Sclereids presence followed the same association patter described for sclerenchyma cells. The arrangement of sclereids in tangential rows was related to ruderal and forest sites.



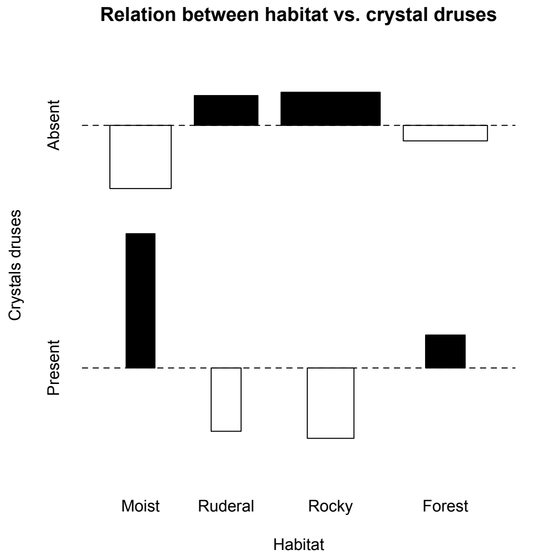


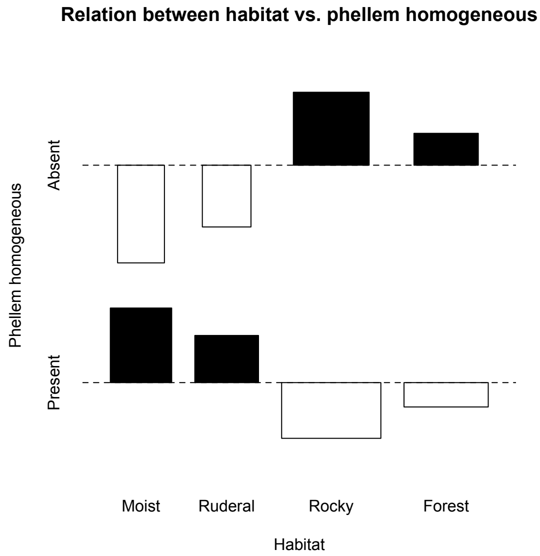
Scattered sclereids were associated to all habitats beside rocky and sandy sites. Prismatic crystals presence was associate to ruderal species, a lack of prismatic crystals to rocky sites.



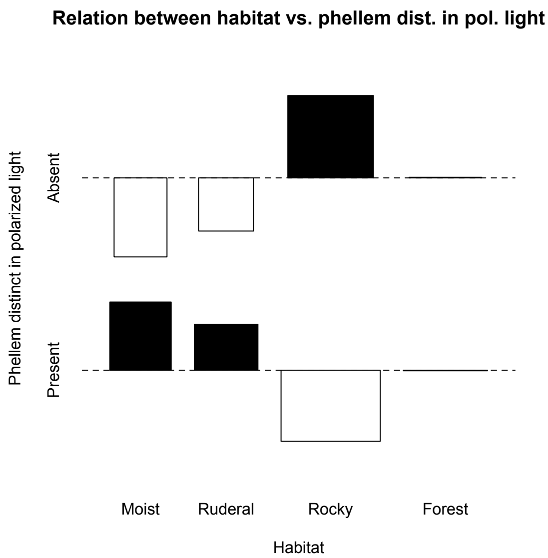


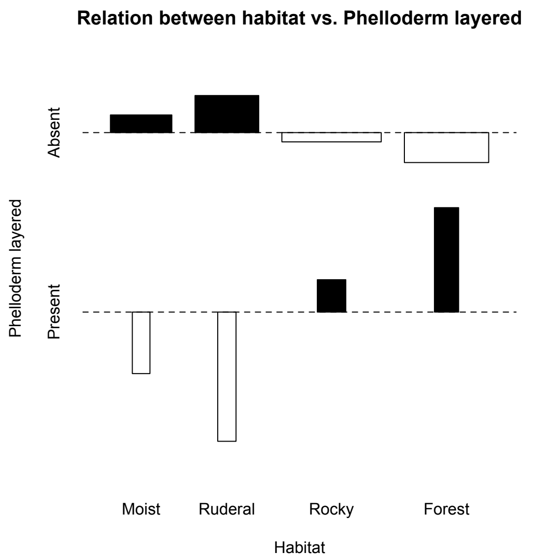
Crystals druses were related to moist sites and to forest habitat. Phellem homogeneous was associated to moist and ruderal sites.





Phellem not distinct in polarized light was associated to moist and ruderal sites. Layered phelloderm was associated to rocky and forest sites.





Discussion: ecological bark anatomy

A lack of sieve tubes in tangential rows, and of sclerenchyma cells were associated to the tallest life form, and to climbers. Prismatic crystals were associated to woody chamaephytes and nanophanerophytes. Sieve tube arrangement in tangential rows was associated to woody chamaephytes. Sclerenchyma cells and fibers presence was associated to shorter life forms (woody chamaephytes and nanophanerophytes) and to climbers. A lack of sclereids was associated to phanerophytes. Phloem structure was homogenous

for climbers and nanophanerophytes, and not homogeneous for woody chamaephytes and phanerophytes. The same association was observed for the feature "phellem disappearing in polarized light".
Endemic and close to endemic species showed a lack of dilated rays, eastern Mediterranean species were strongly associated to the presence of dilated rays. Sclerenchyma cells were absent in endemic and close to endemic species, but associated to eastern Mediterranean plants. Fibers presence and fibers arrangement in tangential rows were not present in endemic and close to endemic species, but associated with all the species with a distribution range wider than the island of Cyprus. An association lack was recorded for prismatic crystals in endemic to eastern Mediterranean species, the presence of prismatic crystals in bark was related to Mediterranean and over Mediterranean species. Distinctness of phellem in polarized light was related to eastern Mediterranean and to over Mediterranean range distribution species. The presence of phelloderm with a distinct layered structure was associated to endemic and close to endemic species to Cyprus.
Relationships between habitat and bark features showed an association of dilated rays to moist and ruderal sites, and a lack of rays dilated in forest habitats. Sclerenchyma cells presence was associated with all the habitats considered, but not with rocky sites. Sclereids presence followed the same association pattern described for sclerenchyma cells. The arrangement of sclereids in tangential rows was related to ruderal and forest sites.
Scattered sclereids were associated to all habitats beside rocky and sandy sites. Prismatic crystals presence was associated to ruderal species, and a lack of prismatic crystals to rocky sites. Crystal druses were related to moist sites and to forest habitats. Phellem homogeneous was associated to moist and ruderal sites. Phellem not distinct in polarized light was associated to moist and ruderal sites. Layered phelloderm was associated to rocky and forest sites.
The association of sclerenchyma with lifeform suggests a biomechanical role, especially for young twigs. The level of endemism and the species' habitat were strongly linked to a number of bark features opening new fields of ecophyletic and ecophysiological investigation.The huge amount of results make it interesting in driving future studies on this field.

Conclusions

The ecological wood anatomy results showed in this research mostly confirm previous findings, but also addressed some new interesting research questions. As an example: how the presence of tension wood is related to plant height, to taxonomical groups, and to environmental conditions? How raylessness effect conductive and mechanical functions in plants? What are the ecological and functional interpretation of axial parenchyma presence and distribution in relation to life form, to plant height, to environment?

The statistical approach applied here is new in the field of ecological anatomy and it seemed to be easy to apply and to interpret.

Since no hypothesis were tested it was not possible to underline a general or specific interpretation of the ecological relationships between the investigated anatomical features and ecological attributes. This is especially true for ecological bark anatomy which is an unexplored area in plant anatomy research. New questions need to be answered e.g.: how is the presence of crystals in wood related the presence of crystals in bark? What about the distribution of sclerenchyma tissues in bark, and how is it in relation to wood fibers? How is the sieve tubes distribution pattern related to phloem conductive functions and to ecological factors?

4. Wood anatomy relative to apparent mechanical and hydraulic needs of woody climbers vs. subshrubs on the island of Cyprus

The structure of secondary xylem in a given species is a reflection of both its evolved, adaptive features, and the constraints on that evolution that have canalized which features were most likely to evolve. Moreover, those evolved adaptive features may be intrinsically controlled (developmentally fixed) or they may be extrinsically controlled (plastic) (Day *et al*. 2002). By comparing the wood structure of taxa of differing growth forms and from different habitats, we can infer the environmental factors that were important in shaping the evolution of the growth forms and taxa. For example, if we observe a consistent difference in wood structure between taxa growing in dry vs. wet sites, we could infer that moisture is of strong importance in the evolution of these taxa's wood structures.

This study looks at the mechanical, hydraulic, and ecological wood anatomy of 10 species of woody climber and 25 species of woody subshrubs growing on the island of Cyprus in the eastern Mediterranean Sea. The goals are to better understand the suites of anatomical characteristics in each of the growth forms, to learn which growth forms exhibit more variability with changing site characteristics, and to infer the environmental factors responsible, over an evolutionary time frame, for these relationships.

Climbing species have less need to provide their own support than do self-supporting species (e.g., Darwin 1865, Isnard & Silk 2009), and a number of studies have compared the wood anatomy of climbers to self-supporters. In this study, climbers were compared to subshrubs because in a larger study on the ecological wood anatomy of over 250 woody taxa of Cyprus (Crivellaro 2012), subshrubs as a group showed less variability (in plant height and stem diameter) than did the other self-supporting taxa, and so appeared to be a more cohesive growth form for this comparison. Climbers typically have relatively large-diameter vessels and a high proportion of the cross-section devoted to vessel lumen and parenchyma compared to self-supporters

(Carlquist 1985). Among the self-supported plants, subshrubs in particular often have diffuse-porous wood, small diameter vessels, and high variability in axial parenchyma arrangements (Schweingruber & Poschlod 2005, Schweingruber *et al*. 2011). Because of the partial release from the need to provide mechanical support, climbers can have wood with lower strength and stiffness (e.g., Gartner 1991b). Wood density is a good index of mechanical support: the higher the density, the more mass a given unit of wood can support (Kollmann & Côte 1968, Niklas 1992). Fibers provide much of the mechanical support in woody stems. Therefore, we expect that subshrubs will have higher wood density and a higher proportion of fibers than climbers.

A second expectation is that climbers will have anatomy in which their vessel diameters and frequencies are closer to the 'packing limit' than will subshrubs. The packing limit is the maximum number of vessels that can fit in an area for a given mean vessel cross-sectional area: it is often represented by a line on a graph of area weighted vessel diameter vs. vessel frequency (in number per mm^2) (McCulloh *et al*. 2010). The negative correlation between these two parameters means that species with wide vessels have very few of them in a given area relative to species with narrower vessels. Because fewer and wider vessels are theoretically more efficient at water conduction than more numerous, narrower ones (Gartner 1991a, Zanne *et al*. 2010; Tyree and Zimmermann 2002), more efficiently conductive species will approach the theoretical maximum packing limit (McCulloh *et al*. 2010). Again, because climbers have less need to provide their own mechanical support, one could expect their wood to be more optimized for water transport. The higher wood-area-specific hydraulic conductivity of climbers than self-supporters has been well documented in the wet and dry tropics (Bamber 1984, Ewers & Fisher 1989, Ewers *et al*. 1990, Gartner *et al*. 1990, Gallenmüllen *et al*. 2001, Gallenmüllen *et al*. 2004), and the temperate zone (Baas & Schweingruber 1987, Gartner 1991a, Chiu & Ewers 1992, Tibbetts & Ewers 2000). The packing function of climbers vs. self-supporting species has not been reported, to our knowledge.

A third expectation is that the wood anatomy of a species will be adaptive for the habitat in which it is growing, and this expectation forms the basis of extensive reviews (e.g., Baas 1982, 1986, Baas & Miller 1985, Carlquist 1988, Tyree & Zimmermann 2002). Given that climbers and self-supporters have different relative hydraulic and mechanical constraints, one would not expect the same habitat/anatomy relationship across the growth forms. Ring-porosity, for example, is more common in climbers than in self-supporting taxa (Baas & Schweingruber 1987, Carlquist 1985, 1991).

The three hypotheses tested in this paper are the following: 1) climbers have less dense wood and a lower proportion of their cross-section devoted to fibers than subshrubs. 2) Vessel size and frequencies are closer to the packing limit in climbers than in subshrubs. 3) Wood anatomy (degree of ring- or diffuse-porosity, vessel diameter, vessel frequency) is related to site characteristics (temperature and water availability), and these relationships are different in climbers and subshrubs. These hypotheses are tested by comparing values from a census of species anatomies using data from one individual of each of the climbing species and most of the subshrub species on the island of Cyprus. The basic xylem traits compared here, such as wood-porosity, raylessness, and possession of successive cambia (successive layers of xylem and phloem, common in the subshrubs) are species traits and as such this census method is appropriate and allows a large sample size. Whereas the quantitative traits such as vessel and fiber diameter, vessel frequency, and tissues area will vary among individuals, the use of numerous species provides replication at the species level.

Materials and methods

The field sampling was carried out in the island of Cyprus (Fig. 1), which lies at the easternmost end of the Mediterranean basin (33° 2’’ E, 35° 12’’ N; 9251 km^2; maximum elevation 1952 m).

The overall climate is Mediterranean, but it is strongly influenced locally by geographical position relative to relief and the Mediterranean Sea. Annual rainfall averages about 480 mm, with 60% falling between the months of December and February. It ranges from about 300 mm in the central plain to about 1100 mm in the central upper Troodos Mountain Range. The mean daily temperature in July and August range between 29 °C on the central plain and 22 °C at the higher altitudes in the Troodos, whereas the respective mean daily temperatures in January are 10 °C and 3 °C (Cyprus Meteorological Service, 2011).

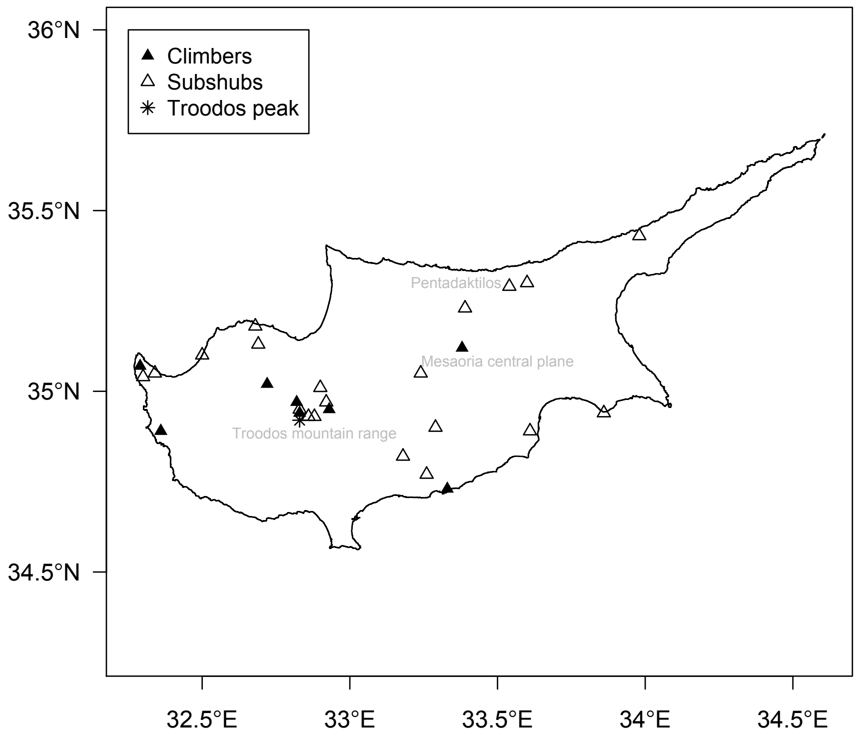


Fig. 1. Location of sampling sites for climbers and subshrubs on the island of Cyprus.

In March and September 2009 we sampled all of the endemic and indigenous climbers (10 species) and most of the subshrubs (25 of approximately 40 species) belonging to the flora of Cyprus. We used the range descriptions in the standard references of Cyprus' woody flora (Meikle 1979, 1985; Tsintides *et al.* 2002) to choose a sampling area that was representative of the geographic distribution and habitat range for each species, and then at that site, sampled one individual. The individual chosen appeared normal and healthy, and was one of the tallest individuals of that species at the site. A portion of one stem was cut near the plant's base (with the height dependent on the plant's stature, Annex 4), and from this location we took a segment 5-8 cm tall including bark. The segment was stored in a sealed plastic bag to which we added several drops of 40% ethanol and kept it at 3-4°C until it was sectioned.

During harvest, we recorded plant height, height of the midpoint from which the segment was taken, and diameter at that point (under bark) for each sample. Elevation and coordinates of the site (from a GPS unit) and site name (from the nearest geographic feature) were recorded. We also described the site location relative to natural features such as bodies of water, position along the slope, and physical features of the surrounding landscape.

Stem samples were sawed to expose the wood at the segment's mid-point for sectioning. We made transverse and longitudinal sections (15-25 μm) using a disposable blade and a sliding Reichert microtome in each of two wood anatomy laboratories: the Dept. Land, Environment, Agriculture and Forestry – University of Padova (TeSAF — UNIPD) in Italy, and the Swiss Federal Institute for Forest, Snow and Landscape Research (WSL) in Birmensdorf — CH. The sections were stained with Astra blue and safranin, dehydrated with alcohol and xylene, and mounted in Canada balsam (Schweingruber 2008). The cell walls richer in cellulose stained blue, and cell walls richer in lignin stained red. With this double staining, parenchyma cells were usually blue and the remainders of the cells were usually red, facilitating the study the wood patterns in the cross-sections. General anatomy was described (Crivellaro 2012) including the IAWA characters (Wheeler *et al*. 1989). For this paper, we report presence of absence of successive cambia, presence or absence of rays, and the type of wood porosity (ring-porous, semi-ring-porous, or diffuse-porous).

Sections were imaged at Oregon State University in Corvallis, USA using a digital camera mounted on a Nikon Eclipse E400 compound microscope, and analyzed with the image-analysis program ImageJ v. 1.45d (National Institutes of Health, Bethesda, MD, USA; http://rsb.info.nih.gov/ij/). Under the microscope, we characterized a zone of the transverse section that included the outer complete growth ring between two rays and that was large enough to contain at least 80 vessels. For this zone, we estimated lumen area of all vessels, and then converted these areas to lumen diameters, assuming vessels were circular in cross-section. Next, we estimated the total area of the zone (excluding one of the two side rays). Then, knowing the number of vessels it contained, we calculated vessel frequency as number of vessels per mm^2 transverse area. The mean vessel hydraulic diameter was calculated as $d_h = (\Sigma d^4/n)^{1/4}$, where d is the diameter of each vessel and n is the number of conduits measured. The area-weighted mean vessel diameter (d_A) was calculated as $d_A = (\Sigma d^2/n)^{0.5}$ (McCulloh *et al*. 2010) to allow us to examine the packing function, d_A vs. vessel frequency.

We estimated the proportion of this same zone that was occupied by vessel, fiber, and parenchyma (axial plus ray) (termed vessel area, fiber area, and parenchyma area) by using a line tool. We manually drew multiple polygons that enclosed each tissue type, and determined the area of that tissue using ImageJ. Knowing the total area we could then calculate proportion of transverse area occupied by each tissue. Lastly, we measured the tangential outer wall diameters of 15 earlywood fibers from this same zone.

Wood density was measured on stem sample portions after the bark and the pith were removed. Fresh wood volume was measured using Archimedes' principal by immersing the segment in a beaker containing distilled water on a balance, recording the grams of water displaced, and converting that value to volume using the relationship of 1g water at room temperature is equal to 1 cm^3 volume. After fresh wood volume was measured, the sample was dried at 100 °C for 48 hours, and then weighed. Wood density was calculated on a dry mass/fresh volume basis (g/cm^3).

From the GPS information, we found the closest meteorological data (Cyprus Meteorological Service, 2011) for each of the 35 species sampling sites and calculated mean annual precipitation (MAP) and mean annual temperature (MAT). We developed three site characteristics for each species. Site water availability was listed as dry if the species came from a site with MAP less than or equal to the median MAP for the 35 species pooled (714 mm); otherwise, it was listed as wet. Site temperature was listed as cold if the species came from a site with MAT less than or equal to the median MAT for the 35 species pooled (17.2 °C); otherwise, it was listed as hot. Site water equability (the degree to which water would be available during the growing season) was determined by observing the very local plant growing conditions at the sampling site. Water equability was listed as low when it appeared water would be removed slowly enough to keep the soil moist for a significant part of growing season, and high when the soil is would be moist only for short periods following precipitation. For example, a sample growing on the edge of a pond or year-round creek would be listed as having high water equability but a sample growing on a slope, which would be presumed to have wet soil in the rainy season and dry soil in the dry season, would be listed as having low water equability. Lastly, we recorded leaf persistence during the adverse season (evergreen, deciduous) from the standard references of the woody flora of Cyprus (Meikle 1979, 1985; Tsintides *et al*. 2002).

We plotted the relationships between pairs of anatomical and geometric variables for climbers and subshrubs separately, and then compared the curves between these growth forms statistically. These paired variables included outer fiber diameter vs. stem diameter, distance from the apex, and vessel lumen diameter; vessel lumen diameter vs. distance from apex; and vessel lumen diameter vs. both vessel frequency and the value -2, which is the slope of the theoretical packing limit. We also analyzed vessel area vs. fiber area. These variables could have different degrees of correlation in the two growth forms, even though there are constraints on the correlation because the sum of vessel area, fiber area and parenchyma area is 100%.

We used a Standardized Major Axis (SMA) line-fitting method to estimate the relationship between the two variables. We used the software SMATR (Warton *et al*. 2006, http://www.bio.mq.edu.au/ecology/SMATR/) to test for differences in slope between climbers and subshrubs.

Next, we compared the relationships of two anatomical factors (vessel lumen diameter, fiber diameter) with two stem characteristics (stem diameter and distance of sample from the stem apex) for climbers and subshrubs. Slopes were compared as above. Means were compared using student t-tests with the software R (R Development Core Team, 2009). Lastly, we categorized each taxon by four criteria: the three environmental factors (site water availability, site temperature, site water equability), and wood porosity. For each of the categories within each criterion, we plotted vessel diameter, vessel frequency, and fiber diameter of climbers and subshrubs. Means were compared as above using Student's t-tests. We also inspected plots qualitatively to learn the extent to which climbers and subshrubs had the same pattern of wood variation with these environmental factors.

Results

Climbers were much taller than the subshrubs, and generally were sampled at much higher locations above ground (Annex 4). Sample diameters were similar in the two growth forms (Annex 4, Table 2).

	Climbers			Subshrubs			
	mean ± s.d.	min	max	mean ± s.d.	min	max	P
Stem diameter (mm)	8.4 ± 4.9	2.5	18.0	4.1 ± 2.3	1.2	11.7	0.02
Wood density (g/cm^3)	0.44 ± 0.15	0.29	0.83	0.59 ± 0.2	0.33	1.00	0.03
Fiber area (%)	29.4 ± 11.3	16.0	51.0	49.3 ± 15.0	17.0	82.0	< 0.01
Vessel area (%)	44.5 ± 12.9	26.0	64.0	22.9 ± 9.3	8.0	47.0	< 0.01
Parenchyma area (%)	25.9 ± 14.7	6.0	56.0	27.7 ± 12.3	6.0	51.0	0.72
Fiber diameter (µm)	14.4 ± 2.60	11.86	19.9	9.69 ± 1.6	6.9	14.0	< 0.01
Vessel diameter, d_h (µm)	63.3 ± 46.3	23.3	165.9	19.0 ± 6.7	8.0	34.0	0.01
Vessel frequency ($no./mm^2$)	368 ± 367	28	1199	631 ± 364	153	1520.	0.07

Table 2. Sample characteristics of climbers (n = 10 species) vs. subshrubs (n = 25 species); probabilities are from paired T-tests.

None of the climbers had successive cambia or lacked rays but six of the subshrubs had successive cambia, and five of the subshrubs were rayless. Most of the climber species were ring-porous and most of the subshrub species were diffuse-porous (Annex 4). The 10 climber species represented eight families, whereas the 25 climber species represented only 8 families.

Compared to subshrubs (Table 2), climbers had significantly less dense wood. The climber wood had lower fiber area but greater fiber diameters, greater vessel area, greater vessel diameters, and lower vessel frequency (Table 2).

In climbers, vessel anatomy did not appear to be related to fiber anatomy: vessel lumen diameter had no relationship with fiber diameter (Fig. 2a, r^2 = 0.04, P = 0.57), and vessel area (the percentage of the cross-section comprised of vessels) had no relationship with fiber area (the percentage of the cross-section comprised of fibers, Fig. 2b, r^2 = 0.08, P = 0.44). The three climbers with the largest diameter vessels, all of which were ring-porous, drove the relationship of vessel lumen diameter vs. fiber diameter, but not the relationship of vessel area vs. fiber area (Fig. 2a, 2b).

In subshrubs, in contrast, vessel anatomy was strongly related to fiber anatomy within a sample, showing that the subshrub cambium tends to make wider fibers in species that have wider vessels. In subshrubs, vessel lumen diameter was positively correlated with fiber diameter (Fig. 2a, r^2 = 0.60, P < 0.01), and vessel area (%) was negatively correlated with mean fiber area (%) (Fig. 2b, r^2 = 0.33, P < 0.01).

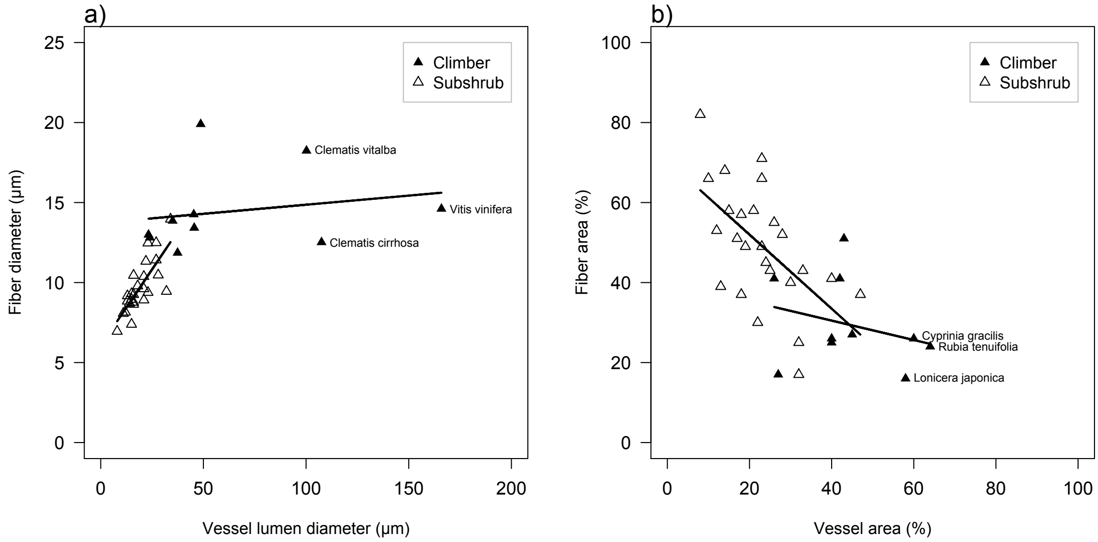


Fig. 2. Fiber diameter vs. vessel lumen diameter a), and the percent of the wood area comprised of fiber area vs. vessel area b), in climbers vs. subshrubs from the island of Cyprus. Each data point represents a species. The symbols for three species are identified to emphasize their relative influence on the overall pattern of each graph.

There was no significant relationship for either growth form between fiber diameter and stem diameter (Fig. 3a). However, vessel diameter and stem diameter were correlated and the relationship was significant for climbers (r^2 = 0.70, P < 0.01) but not for subshrubs (r^2 = 0.19, P = 0.03) (Fig. 3b). Climbers and subshrubs showed a common slope for vessel diameter vs. distance from the apex (P = 0.30, Fig. 3c), but had different y-intercepts (P < 0.01). Fiber diameter vs. distance to the stem apex also showed a common slope in climbers and subshrubs (P = 0.36, Fig. 3d), and had different y-intercepts (P = 0.02).

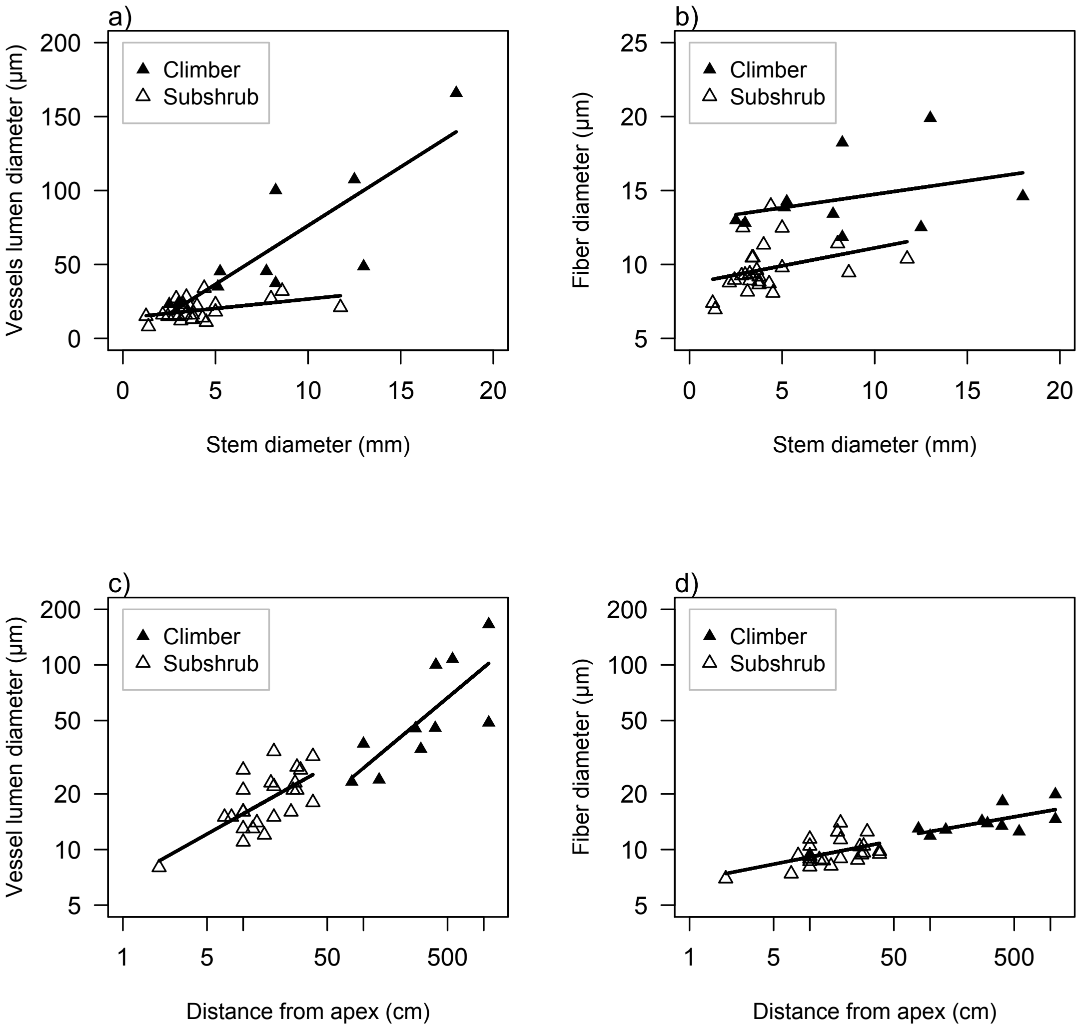


Fig. 3. a) Vessel lumen diameter vs. stem diameter, b) fiber diameter vs. stem diameter, c) vessel lumen diameter vs. distance from the stem apex, and d) fiber diameter vs. distance from the stem apex in climbers vs. subshrubs from the island of Cyprus. Each data point represents one species. The axes in c) and d) are shown on log-log plots.

Vessel frequency was plotted against vessel lumen diameter (d_A) to examine the packing functions of the climbing vs. the subshrub species (Fig. 4). The slope of the relationship did not differ significantly between the two growth forms nor did either slope differ from the slope of the packing limit, which is -2 ($P = 0.46$). Climbers had a stronger correlation between vessel diameter and frequency than did subshrubs ($r^2 = 0.95$, $P < 0.01$, and 0.47, $P < 0.01$, respectively), suggesting more constraints on packing limit in climbers than subshrubs.

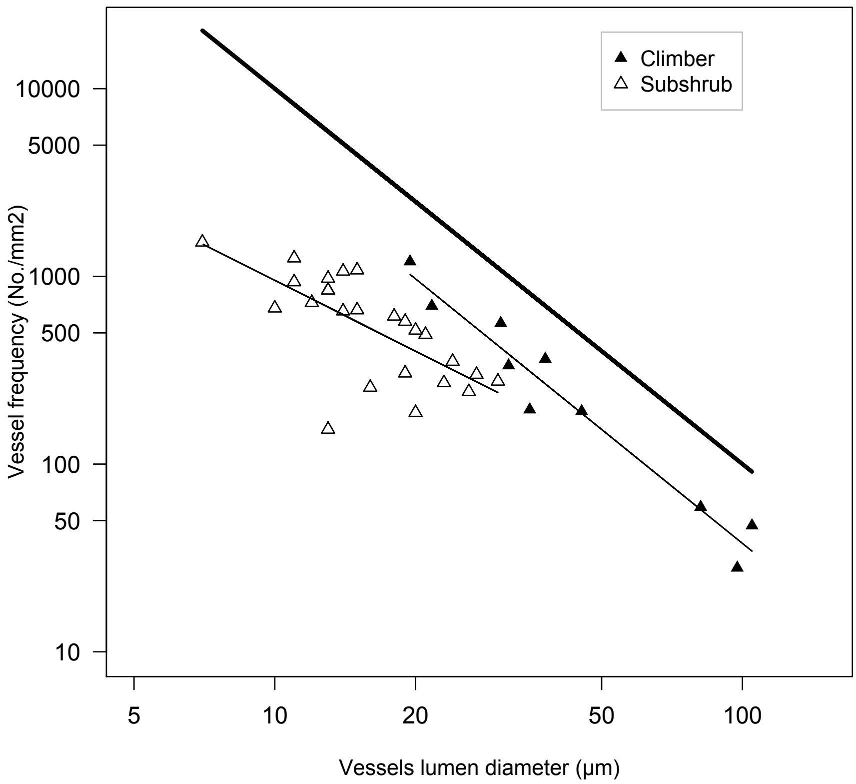


Fig. 4. Vessel frequency vs. vessel diameter (dA) in climbers vs. subshrubs from the island of Cyprus. Each data point represents one species. Heavy solid line shows the packing function limit. The axes are shown on log-log plots.

Climbers differed markedly in vessel diameter or vessel frequency across environmental and anatomical categories (Fig. 5), showing the wide variation in climber anatomical structure. In climbers fiber diameter was not significantly different across these categories (Fig. 6). In contrast, subshrubs had remarkably constant values for vessel diameter, vessel frequency and fiber diameter across the categories (Figs. 5 and 6).

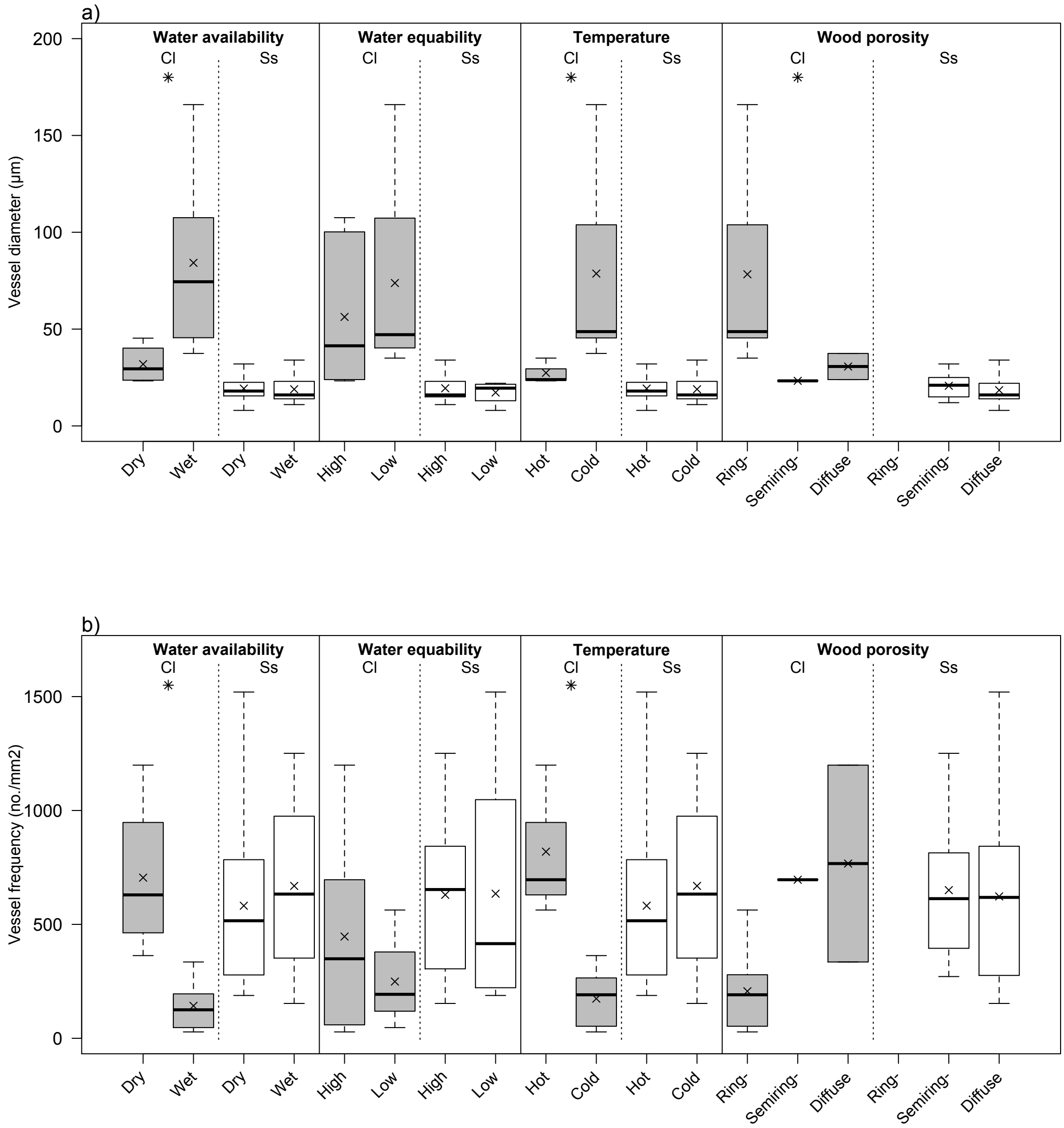


Fig 5. Vessel lumen diameters and vessel frequency vs. site water availability, site water equability, site temperature, and wood porosity in climbers and subshrubs. Box and whisker diagrams, where the heavy bars show the median, the x shows the mean, the extent of the box show 50% of the variance, and the light bars show the maximum and minimum values. Asterisks indicate significant differences within the growth form (T-test, $P<0.05$).

Climbers were significantly taller in wet relative to dry sites (mean plant height of 725 vs. 250 cm, respectively, $t = 2.73$, $df = 7.14$, $P = 0.03$) and in cold relative to hot sites (664 vs. 233 cm, respectively, $t = 2.38$, $df = 7.47$, $P = 0.04$). No statistically significant plant height differences were observed on the basis of water equability in climbers vs. subshrubs.

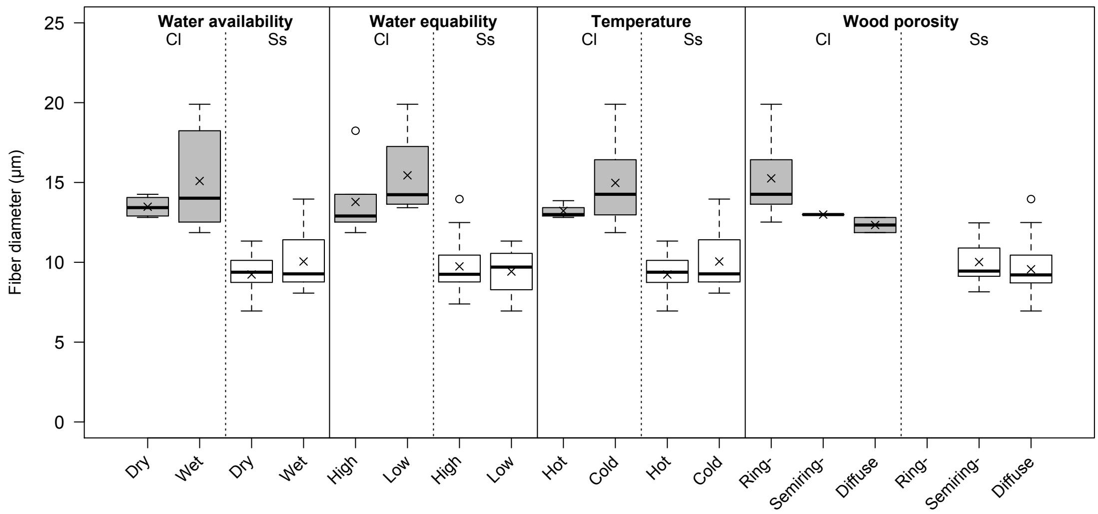


Fig. 6. Fiber diameter vs. site water availability, site water equability, site temperature, and wood porosity in climbers and subshrubs. Box and whisker diagrams where the heavy bars show the median, the x shows the mean, the extent of the box shows 50% of the variance, and the bars show the maximum and minimum values.

Discussion

The analysis of all the woody climbers and many of the woody subshrubs of the island of Cyprus supported all the hypotheses in this study and showed that climbers have less dense wood and a lower proportion of their cross-section devoted to fibers than subshrubs, that vessel size and frequencies are closer to the packing limit in climbers than in subshrubs, and that the ecological wood anatomy of climbers differs from that of subshrubs.

Biomechanically, we expected that climbers would have wood structure that was less specialized for self-support than the subshrubs (Hypothesis 1). This expectation was supported by the climbers having lower wood density and lower fiber area than subshrubs (Table 2), and by climber anatomy exhibiting greater diversity, suggesting it has been less constrained evolutionarily in the structures and their combinations that were able to evolve. For example, climbers showed no correlation between the vessel and fiber area in a stem, because a wide variety of combinations of cell types were exhibited (Fig. 2b). In contrast, subshrubs had a strong negative correlation between these variables. Another example is the degree to which fiber and vessel diameter were correlated (Fig. 2a). In climbers, the two variables were not correlated but in subshrubs there was a strong positive correlation.

The wide range of patterns in which climbers' anatomical characteristics were combined was consistent with our understanding of their growth form. We think of climbers as having more slender stems, and thus more flexibility than self-supporting plants of the same height. Flexibility in climbers is often interpreted as a mechanical advantage for a growth form that may hang, swing, or be coiled while slipping or falling from host vegetation (Haberlandt 1914, Isnard & Silk 1996, Putz & Holbrook 1991). The stem stiffness is given by the products of material stiffness and a geometric factor (second moment area). Because the geometric factor is proportional to the fourth power of stem radius, narrower stems are much more flexible than wider stems of the same material. Climbing plants commonly have a much smaller rate of radial growth than do self-supporting species (Ewers *et al*. 1991, Putz 1990), and they are quite small in stem diameter relative to the amount of foliage they supply (Putz 1983). Apparently climbers compensate for their narrow stem diameters by producing wider vessels, and a greater number of vessels per area than closely related self-supporting species (Ewers 1985). Both wider vessel lumens and greater vessel density increase the theoretical conductivity making climbers much more hydraulically efficient.

However, what is the adaptive significance of the observed anatomical constraints on the subshrubs? One possibility is related to the path-length for water transport in different growth forms, with the assumption that subshrubs may have had little selective pressure to have wood with wide diameter vessels. Many woody plants produce wood that is more conductive near the base than the top of the plant, presumably mitigating the increased resistance on the water column due to path-length and height (Ryan & Yoder 1997, Enquist *et al*. 2000, McDowell *et al*. 2002, Barnard & Ryan 2003, McCulloh *et al*. 2010, Savage *et al*. 2010, Meizner *et al*. 2011). This interpretation is consistent with Fig. 3c, showing that vessel lumen diameter was positively correlated with the distance from the apex of the plant: wood near the base of the taller plants had much wider vessels than did wood at the base of short plants. If there was little selective pressure in subshrubs for wood with wide vessels and high selective pressure for wood that could support self-weight, then one may expect that small-diameter vessels and large fiber areas may have evolved. An interesting observation is that in the subshrubs, with their apparent need for a large fiber area and their consequent constraint on vessel area, there could have been selective pressure to evolve larger-diameter vessels in to maintain high water flux: this pattern, however, was not observed.

Fiber diameter is related to distance from the apex in both climbers and subshrubs (Fig. 3d). This relationship may explain the higher wood density in subshrubs. In fact, previous findings show that wood density in shrubs can be driven by a reduction in fiber cell sizes (Jacobsen *et al*. 2005, 2007, Martínez-Cabrera *et al*. 2009).

Fiber diameters tended to be larger in ring-porous climbers than in the other types of climbers and all of the subshrubs types (Fig. 6). This unexpected result reflects the many roles that fibers can have. It is possible that the narrow diameter fibers, typically found in the subshrubs (Fig. 3b, 6) and diffuse-porous climbers (Fig. 6) function primarily in mechanical support but that the larger diameter fibers in the ring-porous climbers function in water storage and release (Carlquist 1958, 2001). This idea is supported by observed negative correlations between wood density and fiber diameter (Jacobsen *et al*. 2005, McCulloh *et al*. 2012), and the positive correlations found between wood density and water storage capacity and daily use of stored water (Meinzer *et al*. 2008, McCulloh *et al*. 2012).

As predicted by Hypothesis 2, climbers had vessel diameters and frequencies that were closer to the packing limit than did subshrubs. Climbers had a higher vessel frequency for a given vessel lumen diameter than did subshrubs (Fig. 4), reflected in climbers' higher vessel area and lower fiber area (Table 2). As discussed above, this functional allocation of stem area is consistent with our understanding that climber xylem has less of a role in self-support than subshrub xylem. The fact that climbers tended to be shifted to the right on the packing-limit graph (Fig. 4) is consistent with the water transport efficiency that climbers often exhibit by having fewer wide vessels compared to subshrubs.

As predicted by Hypothesis 3, there were differences between growth forms in the basic wood anatomy and in the distribution of anatomies with respect to climate and site factors. Regarding anatomy, only climbers had species that were ring-porous (Annex 4 and Fig. 5), and only subshrubs had species with successive cambia and/or that were rayless (Annex 4). One possible mechanism for the ring-porosity in climbers as well as the axial gradient in vessel diameter for all species pooled is the auxin hypothesis that predicts an increase in vessel diameter with distance from apical meristem (Aloni & Zimmermann 1983). The alteration of vascular increments with parenchyma provided by successive cambia may offer an ideal stem organization for storage and retrieval of photosynthate and water (Carlquist 2007). Raylessness may cause the loss of radial conduction of assimilates and possibly water and hormones, and occurs only in stems that have relatively small diameters. If rayless stems do experience the addition of secondary xylem to an appreciable extent, they tend to develop rays. Raylessness can also be regarded as a means of achieving a rapid substitution of mechanical tissue for ray tissue (Carlquist 2001). The rays may aid in giving climber stems flexibility, as was proposed for the role of axial parenchyma (summarized in Haberlandt 1914).

Regarding site factors, the climbing species showed differences in their mean vessel diameters and vessel frequencies by site water availability and site temperature. For the subshrubs species, in contrast, we detected no site-related variation in vessel anatomy (Fig. 5), and for fiber characteristics, neither growth form exhibited consistent site-related variation (Fig. 6). These results underscore the wider range of diversity of wood anatomies found within climbers than within subshrubs, and suggest that xylem adaptation options seem to be fewer in subshrubs. The lack of fiber diameter differences by site characteristic for either growth form may have resulted from ‘fiber’ actually representing more than one functional role, as discussed above.

Conclusions

This study showed that within the woody flora of the island of Cyprus, the structure of the secondary xylem of climbers appeared to be less specialized for mechanical support and more specialized for long-distance water transport than did the secondary xylem of subshrubs. The support for this statement included the greater vessel areas, vessel lumen diameters and higher incidence of ring-porosity in climbers than subshrubs, and the packing-limit functions that were closer to the maximum possible in climbers than subshrubs. Additionally, the anatomy of climbers varied systematically with site water availability and temperature, whereas the subshrub anatomy did not.

Our understanding of the plastic vs. genetic nature of these adaptations could be furthered by studies of the ecological wood anatomy of selected species over a range of environments. It would also be interesting to compare the habitats, ranges, plant architectures, and physiologies of ring-porous or diffuse-porous species of a variety of growth forms to learn if there are specific associations that would suggest constraints of the wood anatomy on the ecology of species.

5. Overall conclusions

In the past years, wood anatomy has gained new attention thanks to new studies showing the hidden ecological information richness in stems from trees, shrubs and herbs. These studies are a source for retrospective studies on many ecological and eco-physiological questions. In the era of global climate change such studies are of great relevance, especially in tropical and arid environments, where the knowledge in anatomical properties of plants is still largely unexplored, especially concerning shrubs and dwarf shrubs.

Although the total area of Mediterranean forests are significantly smaller than the timber productive forest types, they have specific features which make them a unique world natural heritage. Moreover, it is expected that predicted climate and socio-economic changes will increase the already existing threats on Mediterranean forests on one hand and contribute to the expansion of Mediterranean conditions to new areas on the other. The Mediterranean region also houses an extraordinary natural heritage, which has resulted in it being identified among the 200 most important ecoregions in the world (Olson & Dinnerstein 1998), as well as considered as one of the 34 global "hotspots" for conservation priority (Mittermeier *et al.* 2004).

Wood of shrubs and dwarf shrubs, as well as wood of not widely technologically used trees, has been not investigated thoroughly and in detail before. Pith and bark anatomy were rarely presented systematically for a great number of species, and no comprehensive studies on the relation between bark and pith anatomical features were published to my knowledge.

The present thesis investigated anatomically trees and shrubs species belonging to the flora of the island of Cyprus. More than 170 investigated species belonging to different woody plant life forms and many of them being endemic plants to the flora of Cyprus were described. These plants represent almost the entire woody flora of the island, excluding the exotics and introduced species. A great number of the presented plants have never been anatomically described before. Pith and juvenile bark anatomies were described by following new classification for anatomical features of those tissues specifically designed for this research.

Throughout examination of bark, wood and pith anatomy it will be much more easy to determine a plant fragment found of an archaeological site, or to pieces of wood that have been washed ashore. Identifying wood archeo-botanical findings (carbonized wood, glacial deposits, etc.), historical objects, and remains belonging to the human cultural heritage (prehistoric stuffs, structural beams, etc.) is often difficult because wood anatomical features are only partially present. Therefore, having bark and pith anatomical descriptions address new possibilities in plant identification for wood anatomists who are interested on the wood structure of single species or the range of anatomical patterns within the Eastern Mediterranean region.

The methodology used in the current work will help to improve the standards of description of plants.

A large dataset that covers almost the entire woody flora of a well defined geographical region represented a great opportunity to describe patterns in distribution of wood anatomical features in relation to ecological, biological, taxonomical attributes. The results of this approach were described for tree and shrub species, results reveal new insights on the functional ecology of wood anatomy of certain plant ecological groups. This was a new approach providing new insight into wood formation of individual systematic plant *taxa* and under specific ecological site characteristics. The same procedure was carried out for bark analyses and it is the first comprehensive study on this aspect carried out on a so greet number of species.

The specific anatomy of 10 woody climbers and 25 subshrubs with different survival strategies, has been related to mechanical and hydraulic needs of the plants. The analyses showed that climbers have less dense wood and a lower proportion of their cross-section devoted to fibers than the subshrubs, that the vessel sizes and frequencies were closer to the packing limit in climbers than in subshrubs, and that the ecological wood anatomy of climbers generally differed from that of subshrubs. These findings will help the scientists to understand better the adaptations of anatomy to main functions of the plant tissues. The analyses will also help to understand better the secondary growth in relation to taxonomy, life forms, and ecology in general.

This thesis relates the described wood anatomical features to biogeographic, taxonomic, and environmental parameters and offers an approach towards an ecological interpretation of anatomical architecture and plant functioning. In providing such a dataset for a geographically distinct region like an island, the present study offers baseline data for ongoing research like e.g. the potential threats and benefits that plant species might experience from ongoing environmental change based on the hydraulic properties of their wood anatomical characteristics. Such study would provide a systematic basis on issues of biodiversity change or species extinction threats in terms of functional limitations of a species in terms of hydraulic plasticity.

Literature cited

1. Abbate Edlmann M.L., De Luca L. & S. Lazzeri. 1994. Atlante anatomico degli alberi ed arbusti della macchia mediterranea. Firenze (IT) Istituto Agronomico per l'Oltremare.
2. Aloni R. & M.H. Zimmermann. 1983. The control of vessels size and density along the plant axis: a new hypothesis. Differentiation. 24: 203-208.
3. Alziar G. 1985. *Contribution a l'histoire naturelle de l'ile de Chypre. La flore*. Biocosme Mésogéen. 2: 1-20.
4. Alziar G. 1986. *Contribution a l'histoire naturelle de l'ile de Chypre. La flore. 2e partie*. Biocosme Mésogéen. 3: 49--57.
5. Alziar G. 1995. *Généralités sur la flore de l'île de Chypre. Quelques données quantitatives*. Ecol. Medit. 21: 47-52.
6. Alziar G. 1999. *Compte rendu du 4ème Iter Mediterraneum*. Bocconea 11: 5--83.
7. Arroyo M.T.K. & C. Von Bohlen. 1994. Distribution patterns of endemic species in the Mediterranean-type flora of Chile. Noticiero Biol. 2, 12.
8. Baas P. 1973. The wood anatomical range in *Ilex* (*Aquifoliaceae*) and its ecological and phylogenetic significance. Blumea 21: 193.
9. Baas P. 1976. Some functional ad adaptive aspects of vessel member morphology. In: Baas P., Bolton A.J. & D.M. Catling. (eds.), Wood structure in biological and technological research. Leiden Botanical Series 3: 157-181. Leiden University Press. Leiden.
10. Baas P. 1982. Systematic, phylogenetic and ecological wood anatomy - history and perspectives. - In: Baas P. (ed.), New perspectives in wood anatomy: 23-58. Nijhoff / Junk, The Hague.
11. Baas P. 1986. Ecological patterns in xylem anatomy. In: Givnish J. (ed.), On the economy of plant form and functions: 327-352. Cambridge University Press. Cambridge.
12. Baas P. 2001. Leeuwenhoek's observation on the anatomy of bark. Holzforschung. 55:123-127.
13. Baas P & S. Carlquist. 1985. A comparation of the ecological wood anatomy of the floras of southern California and Israel. IAWA Bulletin 6(4): 349-354.
14. Bass P. & R.B. Miller. 1985. Functional and ecological wood anatomy. Some introductory comments. IAWA Bulletin 6(4): 281-282.
15. Baas P. Werker E. & A. Fahn. 1983. Some ecological trends in vessel characters. IAWA Bull. 4(2-3): 141-159.
16. Bamber I.W. 1984. Wood anatomy of some Australian rainforest vines. In: Sudo S. (ed.), Proceeding of Pacific regional wood anatomy conference. Wood technology division of the forestry and forest products research institute. Ibaraki, Japan.

17. Barber I. & A. Valles. 1995. Contribution to the knowledge of the bioclimate and vegetation of the island of Cyprus. Post Diploma Course in Forestry. Nicosia: Cyprus Forestry College, 37 pp.
18. Barnard H.R. & M.G. Ryan. 2003. A test of the hydraulic limitation hypothesis in fast-growing *Eucalyptus saligna*. Plant Cell and Environment. 26(8): 1235-1246.
19. Blondel J. & J. Aronson. 1999. Biology and wildlife of the Mediterranean region. Oxford University Press
20. Brullo S. Pavone P. & C. Salmeri. 1993. Three new species of *Allium* (Alliaceae) from Cyprus. Condollea. 48: 279-290.
21. Carlquist S. 1958. Wood anatomy of *Heliantheae* (*Compositae*). Trop. Woods. 108: 1-30.
22. Carlquist S. 1966. Wood anatomy of *Compositae*: a summary, with comments on factors controlling wood evolution. Aliso. 6: 25-44.
23. Carlquist S. 1974. Island biology. Columbia University Press: New York and London. 660 pp.
24. Carlquist S. 1975. Ecological strategies in xylem evolution. University of California Press. Los Angeles, London. 259 pp.
25. Carlquist S. 1985. Observation on functional wood histology of vines and lianas: vessels dimorphism, tracheids, vasicentric tracheids, narrow vessels, and parenchyma. Aliso. 11(2): 139-157.
26. Carlquist S. 1991. Anatomy of vine and liana stems: a review and synthesis. In: Putz F.E. & H.A. Mooney (ed.), The biology of vines: 53-71. Cambridge University Press. Cambridge.
27. Carlquist S. 1992a. Wood anatomy of *Lamiaceae*. A survey: with comments on vascular and vasicentric tracheids. Aliso. 13: 309-338
28. Carlquist S 1992b. Wood, bark and pith anatomy of old world species of *Ephedra* and summary for the genus. Aliso. 13(2): 255-295
29. Carlquist S. 2001. Comparative wood anatomy. Systematic, ecological, and evolutionary aspects of dicotyledonous wood. Springer Verlag, Berlin.
30. Carlquist S. & D.A. Hoekman. 1985. Ecological wood anatomy of the woody southern California flora. IAWA Bulletin 6(4): 319-348
31. Chang Y. 1954. Bark structure of north American conifers. Forest Products Laboratory. Technical bulletin no. 1095.
32. Chapman E.F. 1949. Cyprus Trees and Shrubs. Nicosia.
33. Chiu S.T. & F.W. Ewers. 1992. Xylem structure and water transport in a twiner, a scrambler, and a shrub of *Lonicera* (*Caprifoliaceae*). Trees. 6: 216-224.
34. Chrtek J. & B. Slavík. 1981. Contribution to the flora of Cyprus. Preslia. 53: 45-65.
35. Chrtek J. & B. Slavík. 1993. Contribution to the flora of Cyprus. 2. Flora Medit. 3: 239-259.
36. Chrtek J. & B. Slavík. 1994. Contribution to the flora of Cyprus. 3. Flora Medit. 4: 9-20.

37. Chrtek J. & B. Slavík. 2000. Contribution to the flora of Cyprus. 4. Flora Medit. 10: 235-259.
38. Chrtek J. & B. Slavík. 2001. Contribution to the flora of Cyprus. 5. Acta Univ. Carol. Biol. 45: 267-293.
39. Chudnoff M. 1956. Minute anatomy and identification of the woods of Israel.
40. Cody M.L. 1986. Diversity, rarity and conservation in Mediterranean-climate regions. In: M.E. Soule (ed), Conservation Biology. The science of scarcity and diversity. Oxford University Press. pp. 122—152.
41. Cowling R.M., Holmes P.M. & A.M. Robelo. 1992. Plant diversity and endemism. In: Cowling R.M. (ed.). The ecology of finbos. nutrients, fire and diversity. Oxford University press. pp.62-112.
42. Cowling R.M., Rundel P.W. B.B. Lamont, M.K. Arroyo & M. Arianoutsou. 1996. Plant diversity in Mediterranean-climate regions. Tree. 11: 362-366.
43. Crivellaro A. 2012 (expected). Wood, bark and pith structure of trees and shrubs of Cyprus: anatomical descriptions and ecological interpretation. PhD thesis.
44. Darwin C. 1865. On the movements and habits of climbing plants. Botanical Journal of the Linnean Society. 9: 1-118.
45. Day M.E., Greenwood M.S. & C. Diaz-Sala. 2002. Age- and size-related trends in woody plant shoot development: regulatory pathways and evidence for genetic control. Tree Physiology. 22: 507-513.
46. Della A. & G. Iatrou. 1995. New plant records from Cyprus. Kew Bull. 50: 387-396.
47. di Martino A. & F.M. Raimondo. 1979. Biological and chorological survey of the Sicilian flora. Webbia. 34: 309-35.
48. Enquist, B.J., West G.B. & J.H. Brown. 2000. Quarter-power allometric scaling in vascular plants: functional basis and ecological consequences. In: Brown J.H. & G.B. West (eds.), Scaling in biology: 167-198. Oxford University Press. Oxford.
49. Evert R.F. 2006. Esau's plant anatomy. Meristems, cells, and tissues of the body: they structure, function, and development. John Wiley & Sons, Inc. New Jersey.
50. Ewers F.W. & J.B. Fisher. 1989. Variation in vessel length and diameter in stem of six tropical and subtropical lianas. American Journal of Botany. 76(10): 1452-1459.
51. Ewers F.W., Fisher J.B. & K. Fichtner. 1991. Water flux and xylem structures in wine. In: Putz F.E. & H.A. Mooney (eds.), The biology of vines. 127-160. Cambridge University Press. Cambridge.
52. Ewers F.W., Fisher J.B. & S.T. Chiu. 1990. A survey of vessel dimensions in stems of tropical lianas and other growth forms. Oecologia. 84(4): 544-552.
53. Fahn A. Werker E. & P. Baas. 1986. Wood anatomy and identification of trees and shrubs from Israel and adjacent regions. The Academy of Science and Humanities. Jerusalem.

54. Gallenmüllen F., Müller U., Rowe N. & T. Speck. 2001. The growth form of *Croton pullei* (*Euphorbiaceae*) – Functional morphology and biomechanics of a neotropical liana. Plant Biology. 3: 50-61.
55. Gallenmüllen F., Rowe N. & T. Speck. 2004. Development and growth form of the neotropical liana *Croton nuntians*: the effect of light and mode of attachement on the biomechanics of the stem. Journal of plant growth regulation. 23: 83-97.
56. Gartner B.L. 1991a. Stem hydraulic properties of vines vs. shrubs of western poison oak, *Toxicodendron diversilobum*. Oecologia. 87: 180-189.
57. Gartner B.L. 1991b. Structural stability and architecture of vines vs. shrubs of poison oak, *Toxicodendron diversilobum*. Ecology. 72: 2005—2015.
58. Gartner B.L., Bullock S.H., Mooney H.A., Brown V.B. & J.L. Whitbeck. 1990. Water transport properties of vine and tree stems in a tropical deciduous forest. American Journal of Botany. 77: 742-749.
59. Georgiadis T. & G. Hadjikyriakou. 1993. *Centaurea akamantis* (*Compositae*), a new species from Cyprus. Willdenowia. 23: 157-162.
60. Gómez-Campo C. (ed.). 1985. Plant Conservation in the Mediterranean area. Geobotany 7. Dordrecht, The Netherlands: Dr. W. Junk.
61. Guilaine J. & F. Briois. 2003. *Parekklisha Shillourokambos: periodization et aménagements domestique*. In J. Guilaine & A. Le Brun (eds). Le Néolithique de Cypre. BCH Supplement 43. Athens: Ècole Francaise d'Athènes, pp 3-14.
62. Haberlandt G. 1914. Physiological plant anatomy. Translated for the 4th German edition by M. Drummond. Macmillan & Co., Ltd. London.
63. Hadjikyriacou G. 2005. Cyprus. In: Merlo M. & Croitoru L. (eds.), Valuing Mediterranean forests: towards total economic value. Wallingford, United Kingdom: CABI Publishing.
64. Hadjikyriakou G. & G. Alziar. 1999. *Erysimum kykkoticum* (*Brassicaceae*), a new species from Cyprus. Biocosme Mésogéen 15: 243-251.
65. Hadjikyriakou G. & G. Alziar. 2006. *Peucedanum kyriakae* (*Apiaceae*), a new species from Cyprus. Biocosme Mésogéen 22: 177-183.
66. Hadjikyriakou G. & R. Hand. 2006. *Solenopsis antiphonitis* sp. *nova*. In: R. Hand (ed), Supplementary notes to the flora of Cyprus V. Willdenowia. 36 (2): 781-785.
67. Hadjikyriakou G., Makris C., Christofides Y. & G. Alziar. 2004. Additions to the flora of Cyprus. Journal de Botanique de la Société Botanique de France. 27: 31-46.
68. Hand R. (ed.). 2000. Contributions to the flora of Cyprus I. Willdenowia 30: 53-65.
69. Hand R. (ed.). 2001. Supplementary notes to the flora of Cyprus II. Willdenowia 31: 383-409.
70. Hand R. (ed.). 2003. Supplementary notes to the flora of Cyprus III. Willdenowia 33: 305-325.

71. Hand R. (ed.). 2004. Supplementary notes to the flora of Cyprus IV. Willdenowia 34: 427-456.
72. Hand R. (ed.). 2006. Supplementary notes to the flora of Cyprus V. Willdenowia 36: 761-809.
73. Holmboe J. 1914. Studies on the vegetation of Cyprus based upon researches during the spring and summer 1905. Bergens Museums Skrifter ny Raekke. 1(2): 1-344.
74. Howard E.T. 1977. Bark structure of the Southern Upland Oaks. Wood and Fiber. 9: 172-183.
75. Hubbard R.M., Bond B.J., Senock R.S. & M.G. Ryan. 2002. Effects of branch height on leaf gas exchange, branch hydraulic conductance and branch sap flux in open-grown ponderosa pine. Tree Physiology. 22(8): 575-582.
76. Huber B. & C. Rouschal. 1954. *Mikrophotographischer Atlas meriterraner Holzer*. Fritz Haller VErlag, Berlin
77. Isnard S. & W.K. Silk. 2009. Moving climbing plants from Charles Darwin's time into the 21st century. American Journal of Botany. 96(7): 1205-1221.
78. Ives E. 2001. A guide to wood microtomy. Making quality microslides of wood sections.
79. Jacobsen A.L., Pratt R.B., Ewers F.W. & S.D. Davis. 2007. Cavitation resistance among 26 chaparral species of southern California. Ecological Monographs. 77: 99-115.
80. Jacobsen A.L., Ewers F.W., Pratt R.B., Paddock III W.A. & S.D. Davis. 2005. Do fibers affect vessel cavitation resistance? Plant Physiology. 139: 546-556.
81. Junikka L. 1994. Survey of English macroscopic bark terminology. IAWA Journal 15: 3-45.
82. Kollmann F.F. & W.A. Côte. 1968. Principles of wood science and technology. Springler Verlag, Berlin.
83. Ley-Yadun S. 1991. Terminology used in bark anatomy: Additions and comments. IAWA Bulletin. 12: 207–209.
84. Machado R.S., Marcati C.R., Lange de Morretes B. & V. Angyalossy. 2005. Comparative bark anatomy of root and stem in *Styrax camporum* (*Styracaceae*). IAWA Journal. 26(4): 477-487.
85. Manwiller H.G. 1972. Wood and bark properties of Spruce Pine. USDA Forest Service. Research paper SO-78.
86. Martínez-Cabrera H.I., Cynthia S.J., Espino S. & H.J. Schenk. 2009. Wood anatomy and wood density in shrubs: responses to varying aridity along transcontinental transects. American Journal of Botany. 96(8): 1388-1398.
87. McCulloh K., Sperry J.S., Lachenbruch B., Meinzer F.C., Reich P.B. & S. Voelker. 2010. Moving water well: comparing hydraulic efficiency in twigs and trunks of coniferous, ring-porous, and diffuse-porous saplings from temperate and tropical forests. New Phytologist. 186: 439-450.
88. McCulloh K.A., Johnson D.M., Meinzer F.C., Voelker S.L., Lachenbruch B. & J.C. Domec. 2012. Hydraulic architecture of two species differing in

wood density: opposing strategies in co-occurring tropical pioneer species. Plant, Cell & Environment. 35(1): 116–125
89. McDowell N.G., Phillips N., Lunch C., Bond B.J. & M.G. Ryan. 2002. An investigation of hydraulic limitation and compensation in large, old Douglas-fir trees. Tree Physiology. 22(11): 763—774.
90. Médail F. & R. Verlaque. 1997. Ecological characteristics and rarity of endemic plants from southern France and Corsica: implication for biodiversity conservation. Biolobical conservation. 80: 269—281.
91. Meikle R.D. 1977 & 1985. Flora of Cyprus. 2 vols. Royal Botanic Gardens. London.
92. Meinzer F.C., Lachenbruch B. & T.E. Dawson (eds.). 2011. Size- and age-related changes in tree structure and function. Springer Verlag, Berlin.
93. Meinzer F.C., Campanello P.I., Domec J-C., Gatti M.G., Goldstein G., Villalobos-Vega R. & D.R. Woodruff. 2008. Constraints on physiological function associated with branch architecture and wood density in tropical forest trees. Tree Physiology. 28: 1609-1617.
94. Metcalfe C.R. & L. Chalk. 1950. Anatomy of the dicotyledons. London: Oxford University Press.
95. Meyer D., Zeileis A. & K. Hornik. 2003. Visualizing independence using extended association plots. Proceedings of the 3rd International Workshop on Distributed Statistical Computing (DSC 2003). March 20–22, Vienna, Austria.
96. Mencuccini M., T. Holtta & J. Martinez-Vilalta. 2011. Comparative criteria for Models of the vascular transport systems of tall trees. In: Meinzer F.C. Lachenbruch B. & T.E. Dawson (eds.), Size- and age-related changes in tree structure and function. Springer Verlag, Berlin.
97. Mittermeier R.A., Robles Gil P., Hoffman M., Pilgrim J., Brooks T., Goettsch Mittermeier C., Lamoreux J. & G.A.B. da Fonseca. 2004. Hotspots Revisited: Earth's Biologically Richest and Most Threatened Terrestrial Ecoregions. Conservation International, Washington, D.C., USA. 390 pp.
98. Miles P.D. & Smith W.B. 2009. Specific gravity and other properties of wood and bark for 156 tree species found in north America. US Dept. of Agriculture. Research note NRS-38.
99. Niklas K.J. 1992. Plant Biomechanics. An engineering approach to plant form functions. The University of Chicago Press.
100. Olson D. & E. Dinnerstein. 1998. The Global 200: A representative approach to conserving the Earth's most biologically valuable ecoregions. Conservation Biology 12:502-515.
101. Pantelas V., Papachristophorou T. & P. Christodoulou. 1993. Cyprus flora in colour. The endemics. Lefkosia (Nicosia).
102. Peltenburg E.J. 2003. Identifying settlement of the Xth-IXth millennium B.P. in Cyprus from the content of Kissonerga-Mylouthkia wells. In: Guilaine J. & A. Le Brun (eds), *Le Néolithique de Cypre*. BCH Supplement 43. Athens: Ècole Francaise d'Athènes, pp 3-14.

103. Peltenburg E.J., Colledge S., Croft P., Jackson A., McCartney C. & M.A. Murray. 2000. Agro-pastoralists colonization of Cyprus in the 10th millennium B.C.: initial assessments. Antiquity. 74: 844-853.
104. Piccioli L. 1919. Tecnologia del legno. Torino. UTET
105. Putz F.E. 1983. Liana biomass and leaf area of a "*tierra firme*" forest in the Rio Negro Basin, Venezuela. Biotropica. 15: 185-189.
106. Putz F.E. 1990. Liana stem diameter growth and mortality rates on Barro Colorado Island, Panama. Biotropica. 22: 103-105.
107. Putz F.E. & N.M. Holbrook. 1991. Biomechanical studies of vines. In: Putz F.E. & H.A. Mooney (eds), The biology of vines: 73—97. Cambridge University Press.
108. Quezel P. 1988. *Esquisse phytogéographique de la vegetation climacique potentielle des grandes iles Mèditerranèennes*. Bull. Ecol. 19(2-3): 121-127.
109. R Development Core Team. 2009. R: A language and environment for statistical computing. R Foundation for Statistical Computing. http://www.R-project.org.
110. Raus T. & H. Scholz. 2004: Contribution to the flora of Cyprus: a new species of *Crypsis* (*Poaceae*). Willdenowia. 34: 457-462.
111. Richter H.G., Grosser D., Heinz I. & P.E. Gasson. 2004. IAWA list of microscopic features for softwood identification. IAWA Journal (25)1: 1-70.
112. Rowe N. & T. Speck. 2005. Plant tree growth forms: an ecological and evolutionary perspective. New Phytologist. 166: 61—72.
113. Ryan M.G. & B.J. Yoder. 1997. Hydraulic limits to tree height and tree growth. Bioscience. 47: 235—242.
114. Savage V.M., Bentley L.P., Enquist B.J.,Sperry J.S., Smith D.D., Reich P.B. & E.I. von Allmen. 2010. Hydraulic trade-off and space filling enable better predictions of vascular structure and functions in plants. Proceeding of the National Academy of Science. 107(52): 22722—22727.
115. Schweingruber F.H. 1978. Microscopic wood anatomy: structural variability of stems and twigs in recent and subfossil woods from Central Europe. Birmensdorf: Eidgenossische Anstalt fur das forstliche Versuchswesen. 226p.
116. Schweingruber F.H. 1990. Anatomy of European woods. Verlag Paul Haupt: Bern & Stuttgart. 800 pp.
117. Schweingruber F.H. 2006. Anatomical characteristics and ecological trends in the xylem and phloem of *Brassicaceae* and *Resendaceae*. IAWA Journal. 27(4): 419-442.
118. Schweingruber F.H. 2007 Wood structure and environment. (Springer Series in Wood Science.). Berlin, Heidelberg: Springer-Verlag 279 pp.
119. Schweingruber F.H., Börner A. & E.D. Schulze. 2008. Atlas of woody plant stems. Evolution, structure and environmental modifications. Springer Verlag, Berlin.

120. Schweingruber F.H. & P. Poschlod. 2005. Growth rings in herbs and shrubs: life span, age determination and stem anatomy. Forest, Snow and Landscape Research. 79(3): 195—415.
121. Schweingruber F.H., Börner A. & E.D. Schulze. 2011. Atlas of stem anatomy in herbs, shrubs and trees. Springer Verlag, Berlin.
122. Thompson J.D., Lavergne S., Affre L., Gaudeul M. & M. Debussche. 2005. Ecological differentiation of Mediterranean endemic plants. Taxon. 54(4): 967–976
123. Tibbetts T.J. & F.W. Ewers. 2000. Root pressure and specific conductivity in temperate lianas: exotic *Celastrus orbiculatus* (*Celestracea*) vs. native *Vitis riparia* (*Vitaceae*). American Journal of Botany. 87: 1272—1278.
124. Tsintides T. 1998. The endemic plants of Cyprus. Nicosia.
125. Tsintides T., Christodoulou C.S., Delipetrou P. & K. Georghiou (eds.). 2007. The Red Data Book of the flora of Cyprus. Nicosia.
126. Tsintides T., Hadjikyriakou G. N. & C.S. Christodoulou. 2002. Trees and shrubs in Cyprus. Nicosia.
127. Trochenbrodt M. 1990. Survey on discussion of the terminology used in bark anatomy. IAWA Bull. 11:141-166
128. Vaucher H. 2003. Tree bark. Timber Press. Portland, Oregon, USA.
129. Warton D.I., Wright J.I., Falster D.S. & M. Westoby. 2006. Bivariate line-fitting methods for allometry. Biological Reviews. 81(2): 259—291.
130. Wheeler E.A., Baas P. & P.E. Gasson (eds.). 1989. IAWA List of microscopic features for hardwood identification. IAWA Bull. 10(3): 219—332.
131. Zahur M.S. 1959. Comparative study of secondary phloem of 423 species of woody dicotyledons belonging to 85 families. Mem. Cornell Univ. Agric. Exp. Sta. 358: 1–160.
132. Zanne A.E., Westoby M., Falster D.S., Ackerly D.D., Loarie S.R., Arnold S.E.J. & D.A. Coomes. 2010. Angiosperm wood structure: Global patterns in vessel anatomy and their relation to wood density and potential conductivity. American Journal of Botany. 97:207–215.

WEB sources

Nasa earth observatory. 2011. www.earthobservatory.nasa.gov. Accessed November 2011.

Cyprus Meteorological Service. 2011. Meteorological reports. http://www.moa.gov.cy. Accessed March 2011.

Flora of Cyprus. 2011. www.flora-of-cyprus.eu. Accessed November 2011.

Annexes

Annex 1

Photomicrographs for each one of the species described. Wood, pith and bark transverse sections are presented. Each picture enlargements is indicated in the caption under the picture.

Annex 2

Biological and wood anatomical descriptive information on endemic and indigenous species studied.

Annex 3

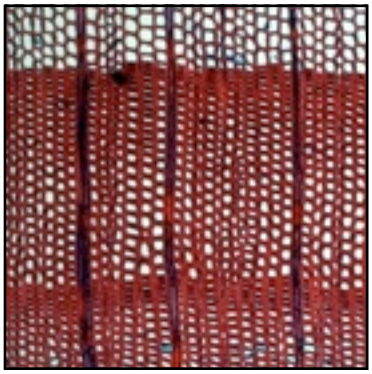
Biological and bark anatomical descriptive information on endemic and indigenous species studied.

Annex 4

Descriptive information on climbers and subshrubs studied in chapter 4.

Plate no. 1

Cupressus sempervirens L.



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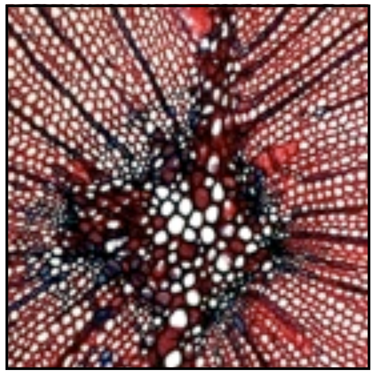

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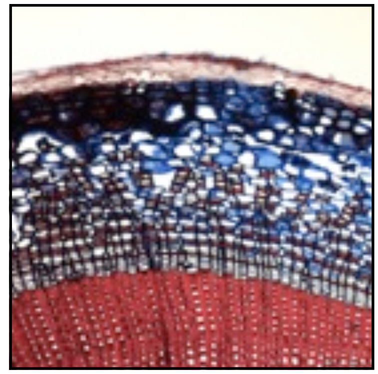

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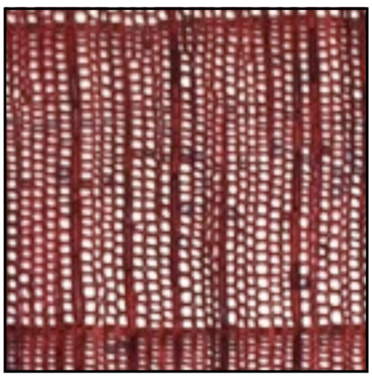
Juniperus excelsa M.Bieb.



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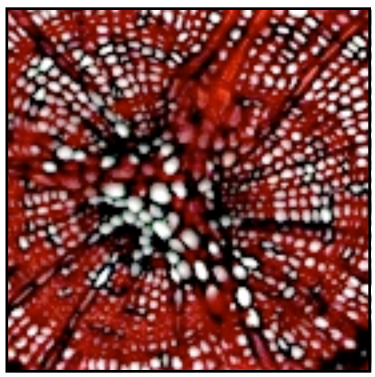

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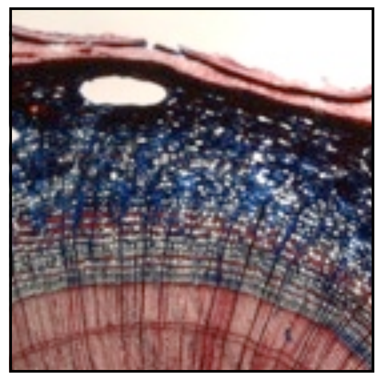

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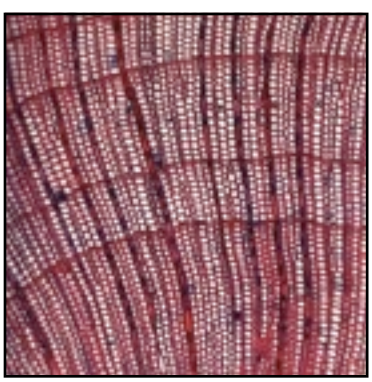
Juniperus foetidissima Willd.



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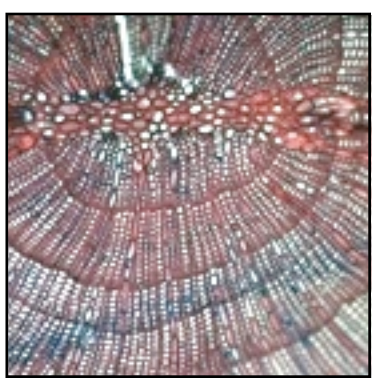

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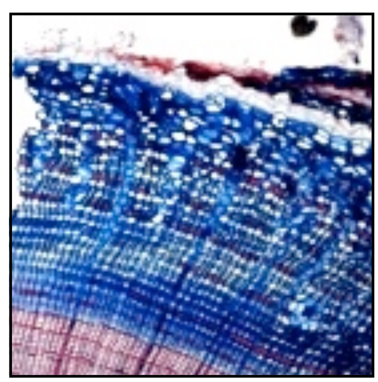

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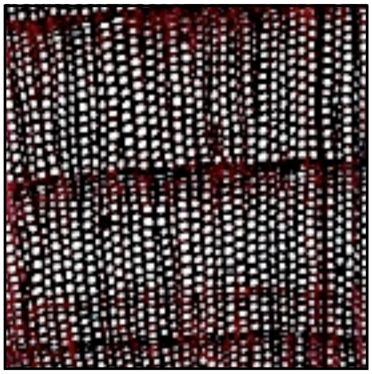
Juniperus phoenicea L.



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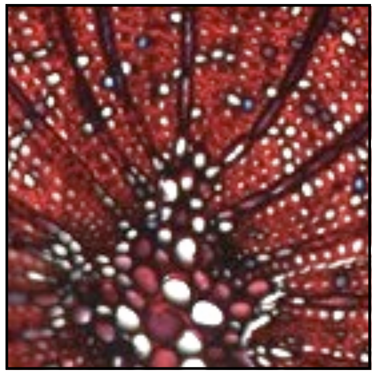

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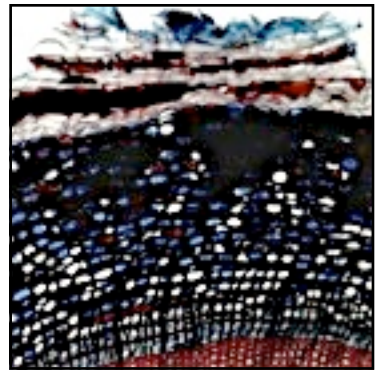

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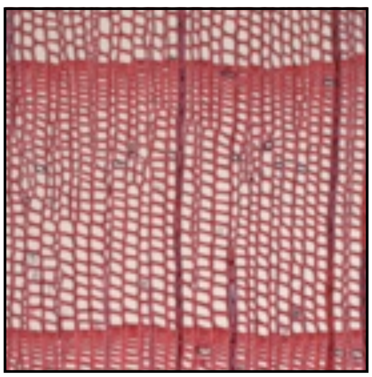
Juniperus oxycedrus L.



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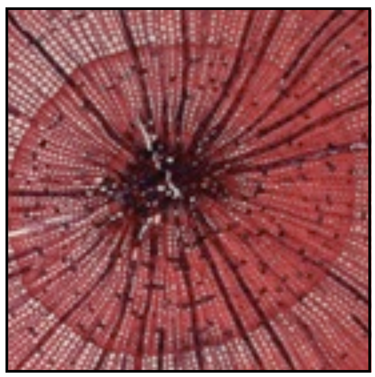

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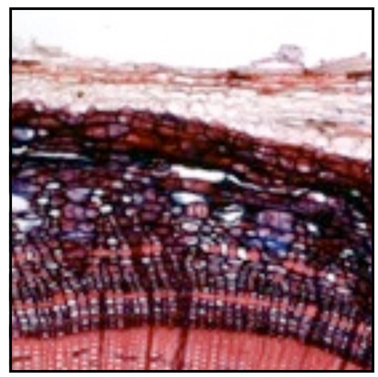

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Cedrus brevifolia (Hook. F.) Henry

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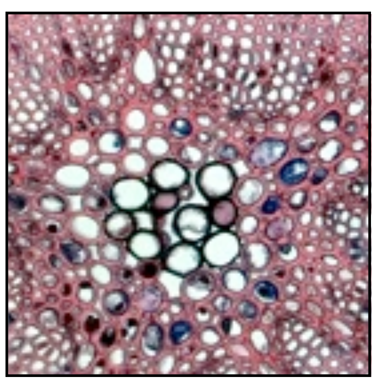

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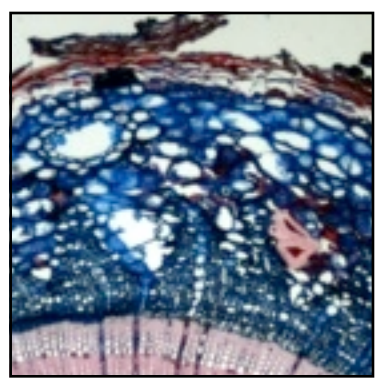

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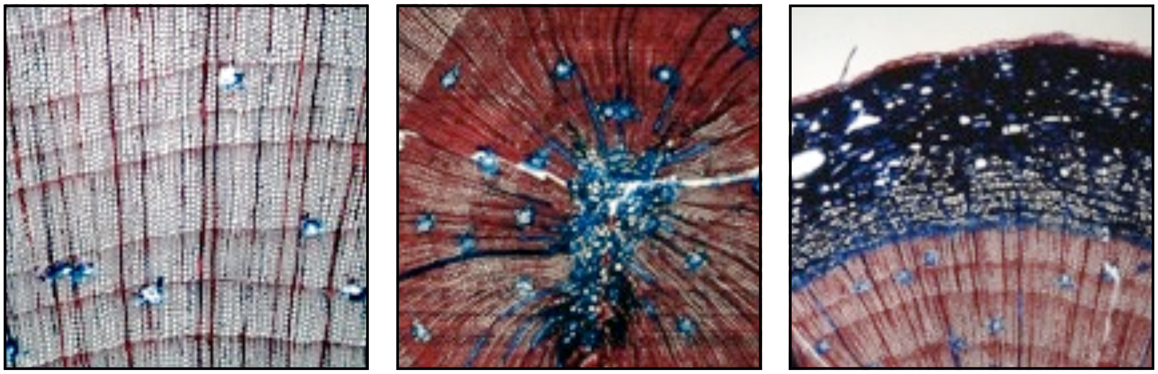
Pinus brutia Ten.



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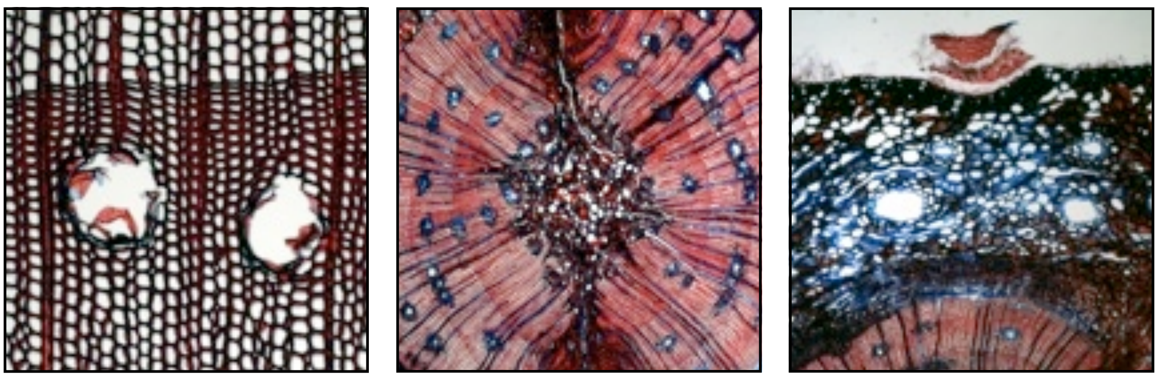
Pinus nigra J.F. Arnold subsp. *pallasiana* (Lamb.) Holmboe



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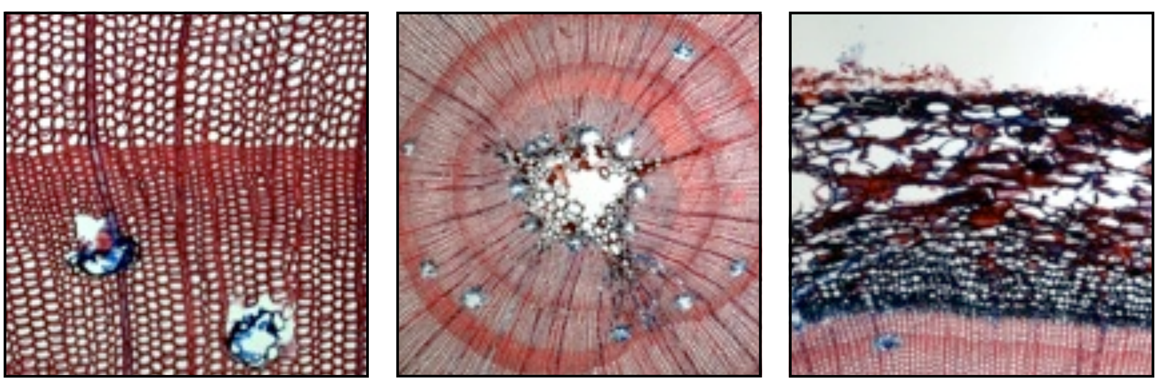
Pinus pinea L.



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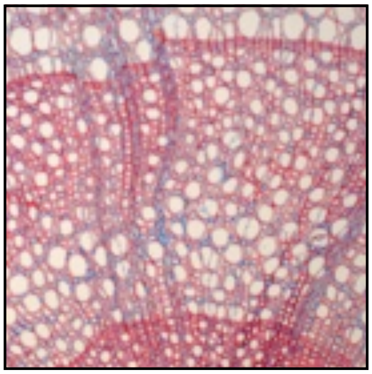
Ephedra fragilis (J.C. Mayer) Asch. et Graebn.



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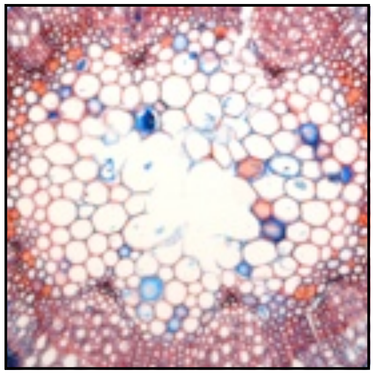

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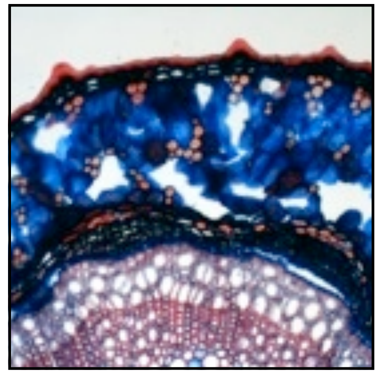

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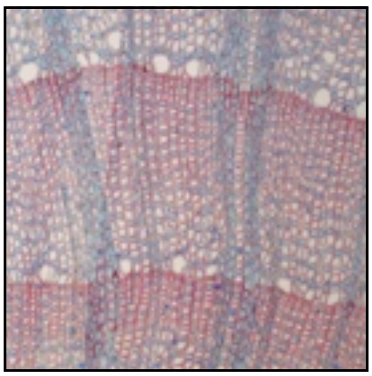
Ephedra nebrodensis Guss.



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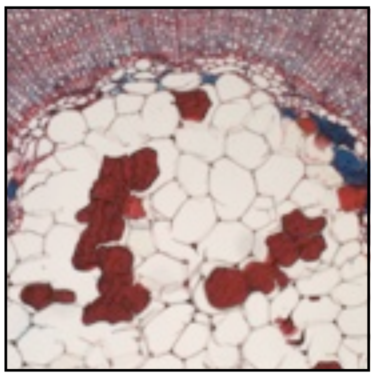

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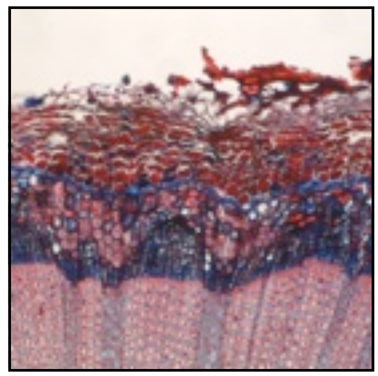

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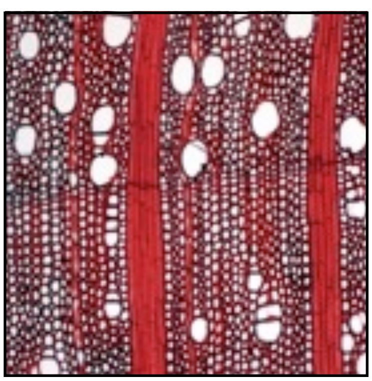
Acer obtusifolium Sibth. & Sm.



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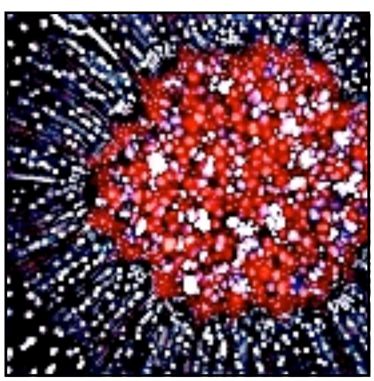

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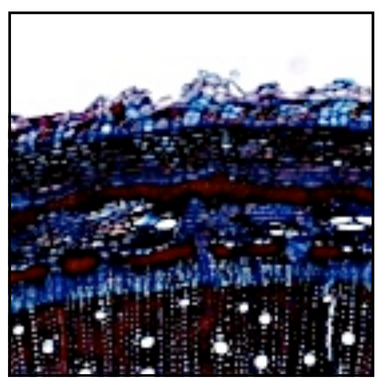

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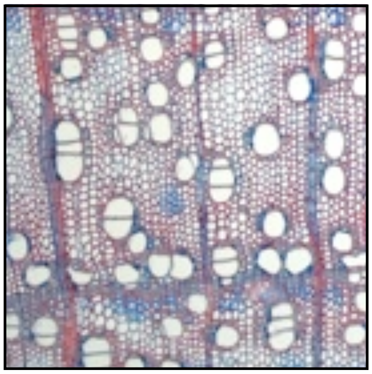
Plate no. 5

Acer pseudoplatanus L.



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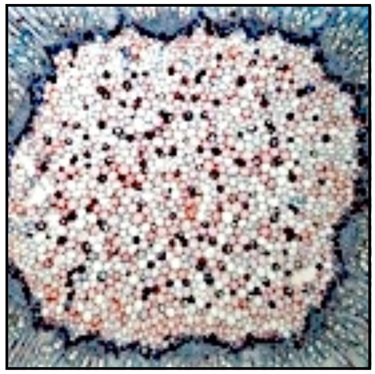

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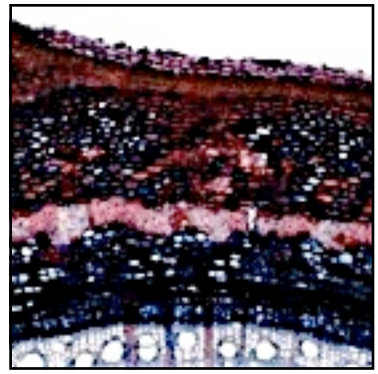

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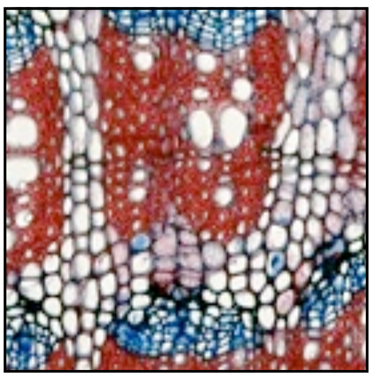
Bosea cypria Boiss.



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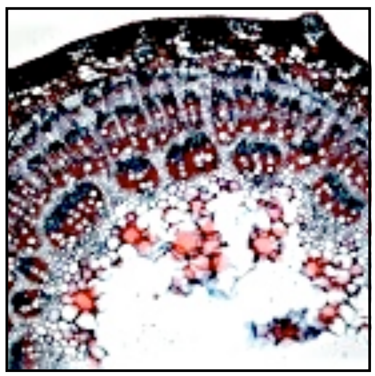

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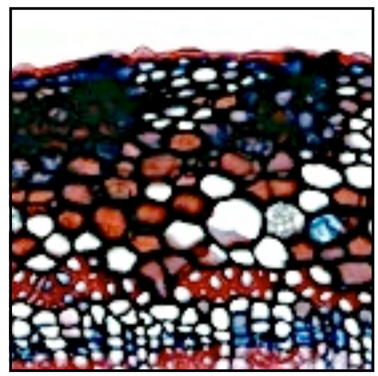

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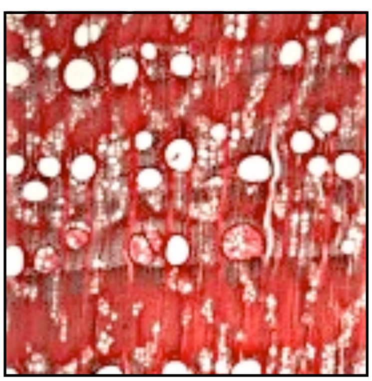
Pistacia atlantica Desf.



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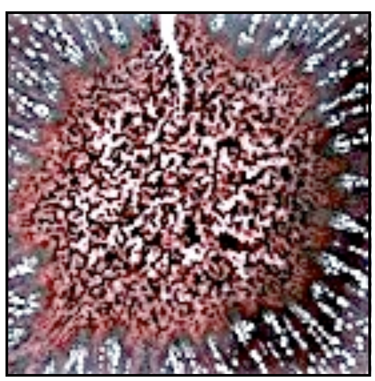

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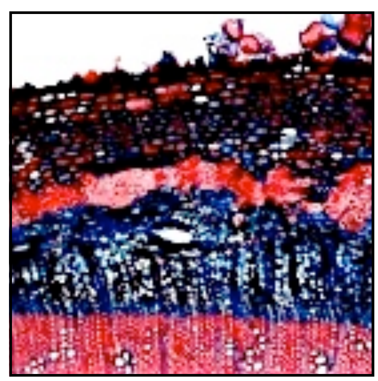

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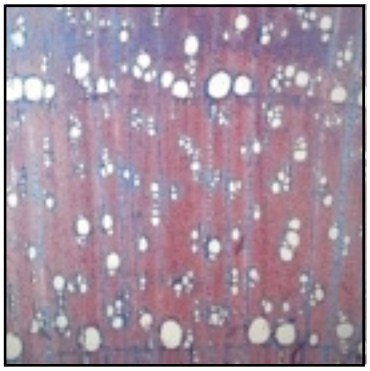
Plate no. 6

Pistacia lentiscus L.



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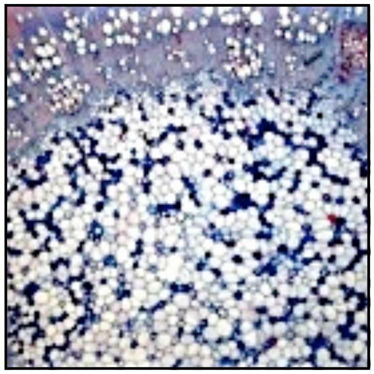

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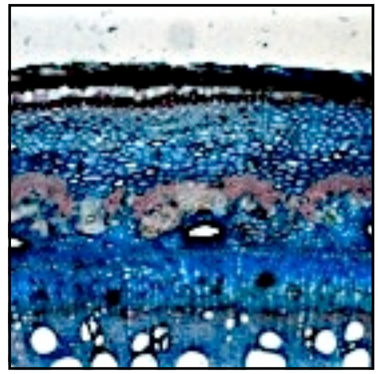

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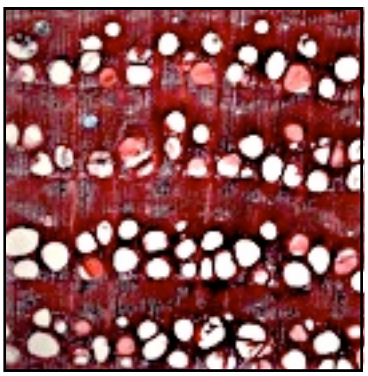
Rhus coriaria L.



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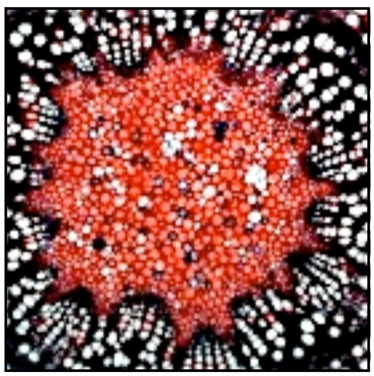

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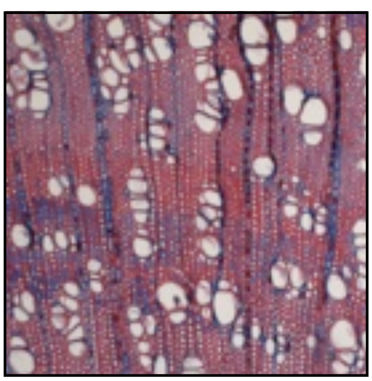
Schinus molle L.



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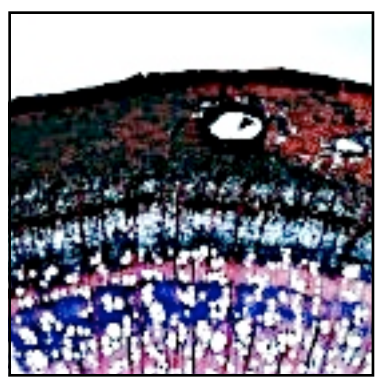

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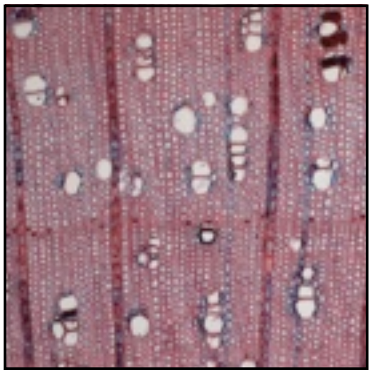
Schinus terebinthifolius Raddi



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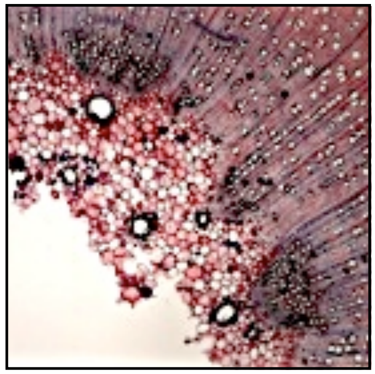

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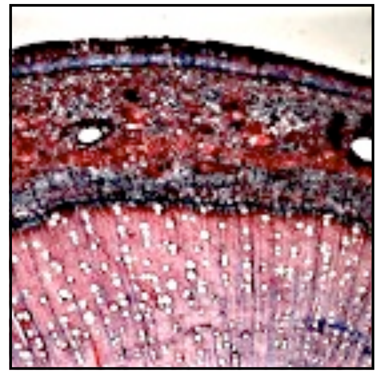

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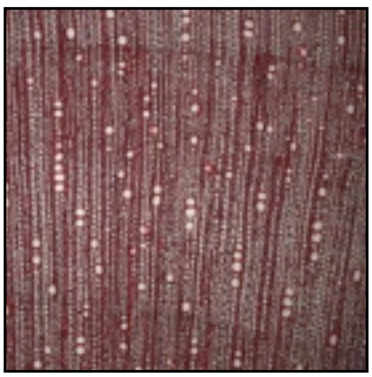
Nerium oleander L.



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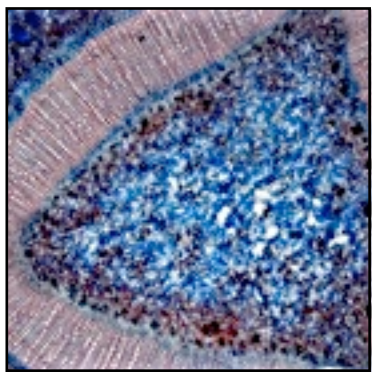

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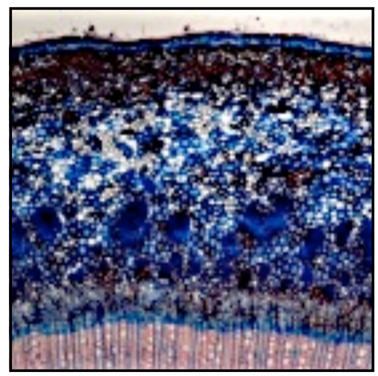

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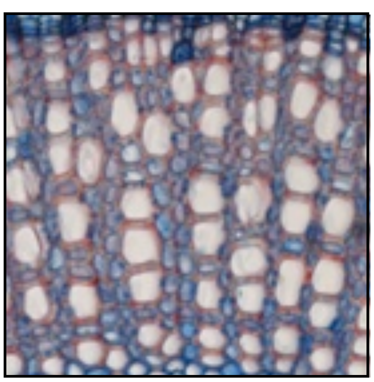
Vinca major L.



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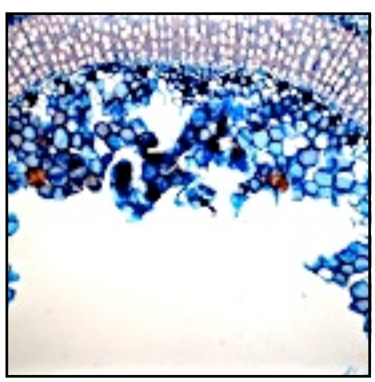

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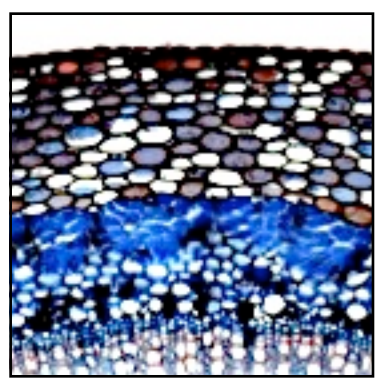

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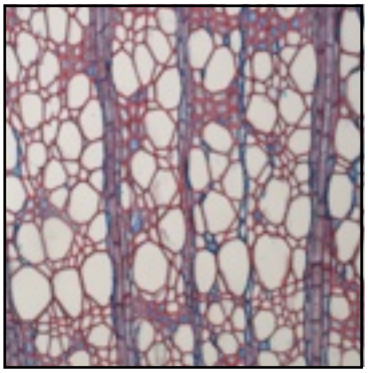
Plate no. 8

Hedera helix subsp. *poetarum* L.



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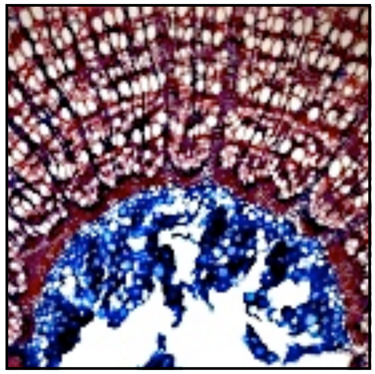

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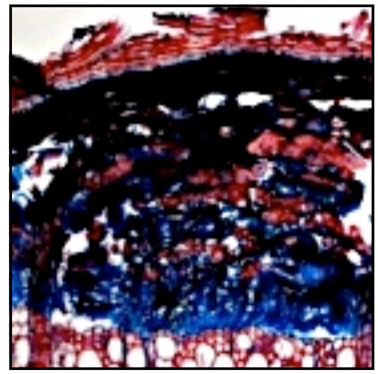

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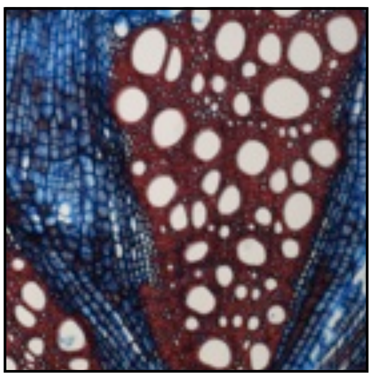
Aristolochia sempervirens L.



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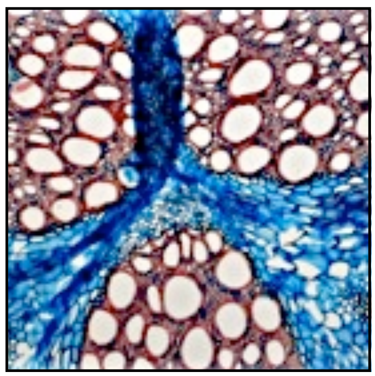

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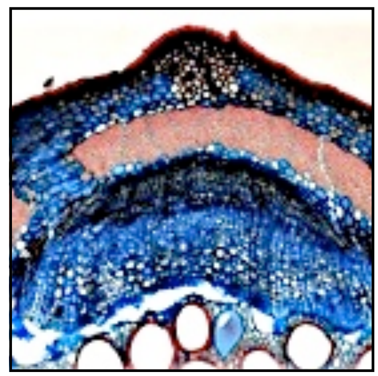

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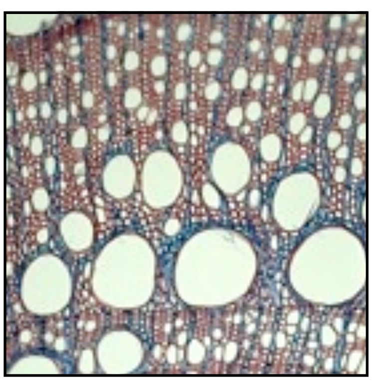
Cyprinia gracilis (Boiss.) Browicz



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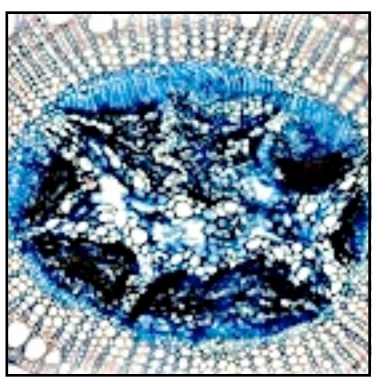

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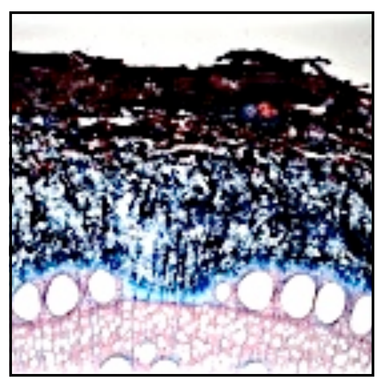

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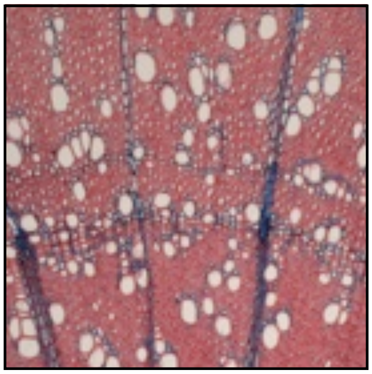
Plate no. 9

Achillea cretica L.



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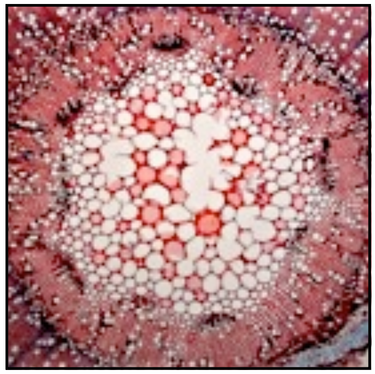

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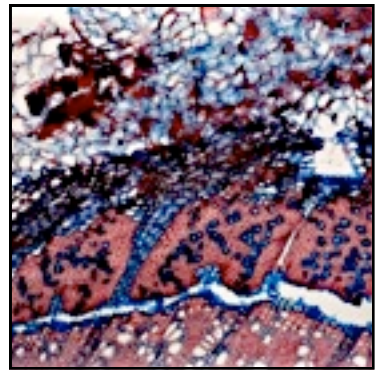

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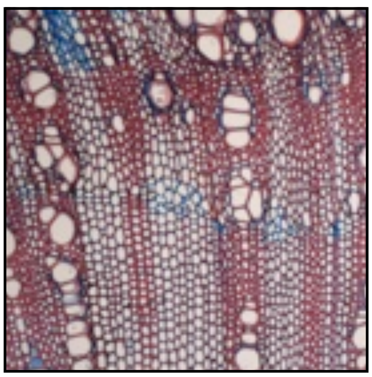
Ambrosia maritima L.



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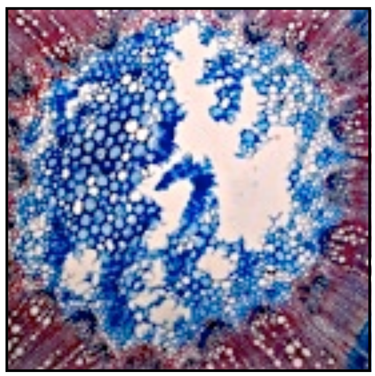

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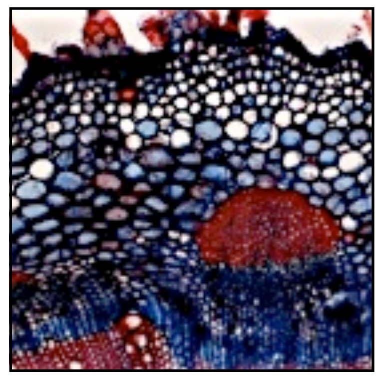

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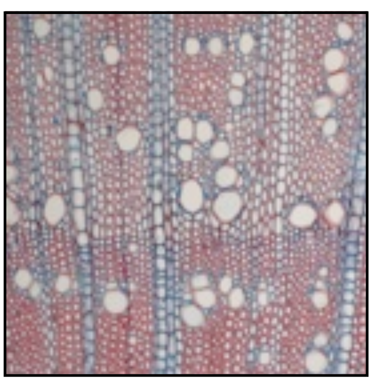
Artemisia arborescens L.



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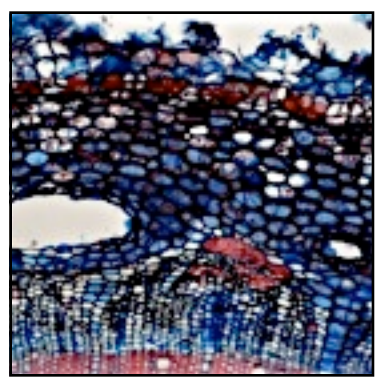

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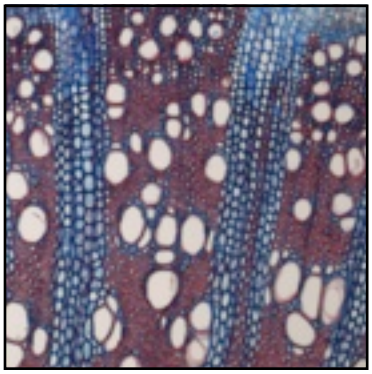
Plate no. 10

Centaurea akamantis T.Georgiades et Hadjikyriakou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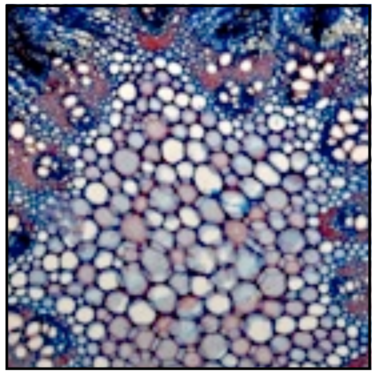
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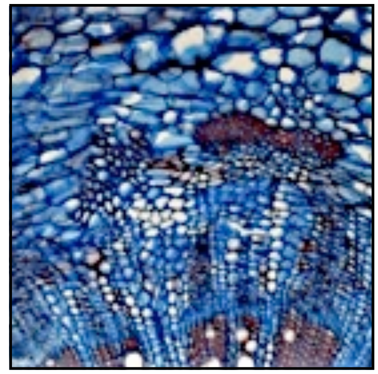
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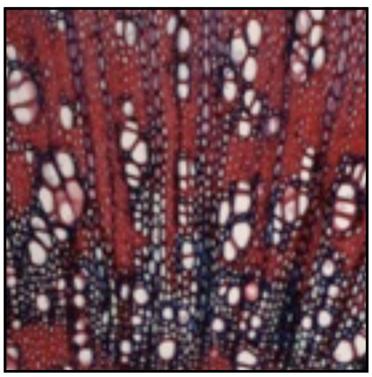
Cichorium spinosum L.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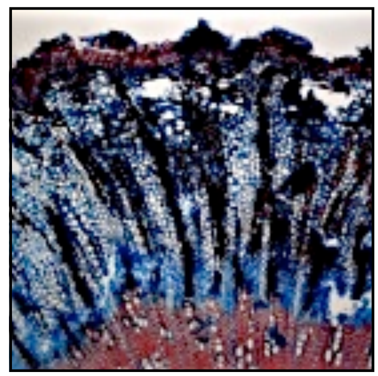
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Helichrysum italicum (Roth) G.Don


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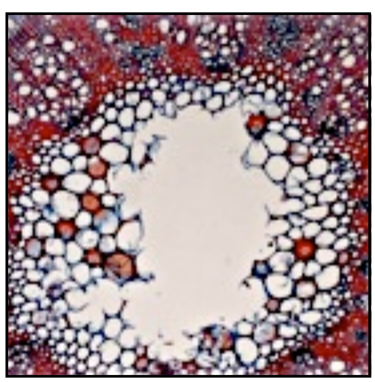
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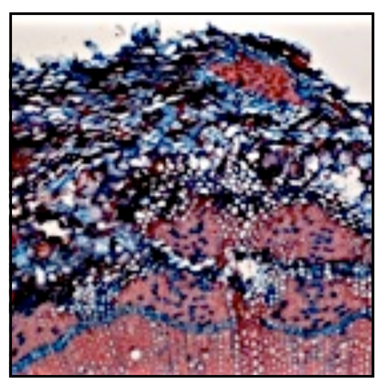
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Plate no. 11

Inula crithmoides L.

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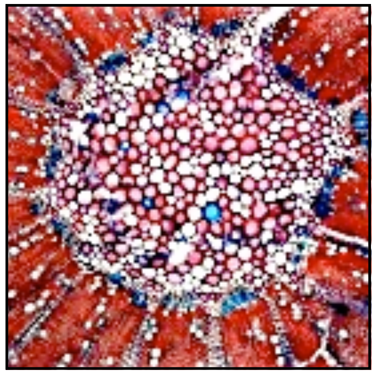

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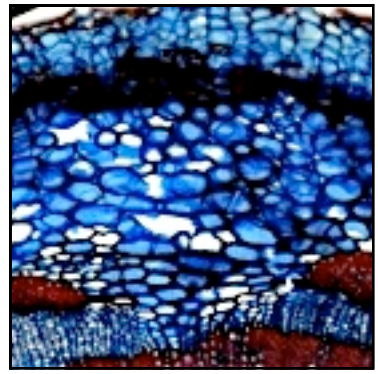

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Inula viscosa (L.) Aiton.

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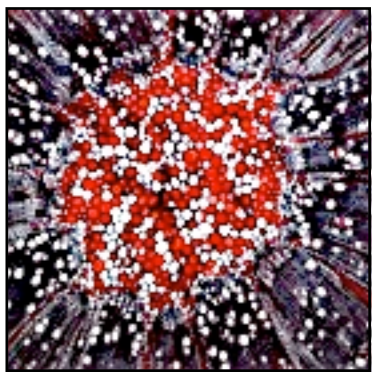

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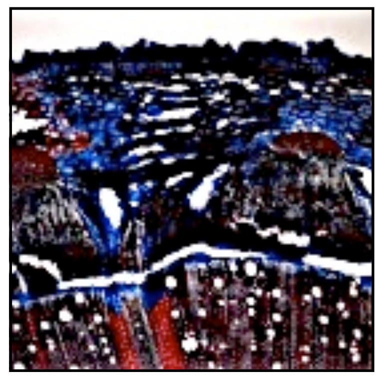

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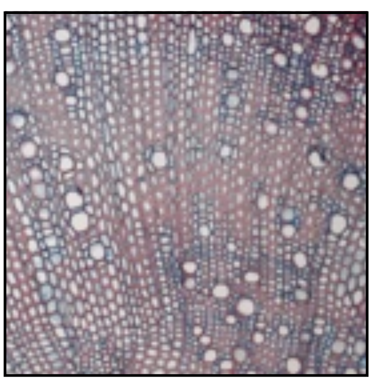
Otanthus maritimus (L.) Hoffmanns. et Link



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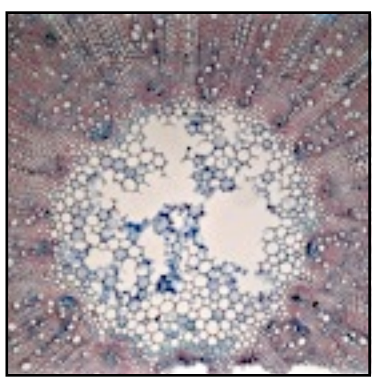

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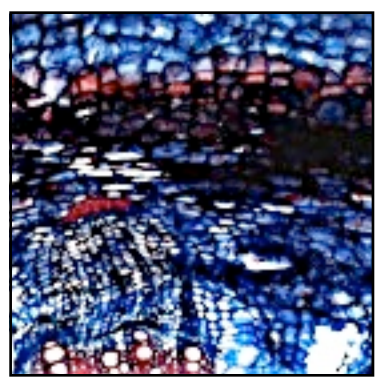

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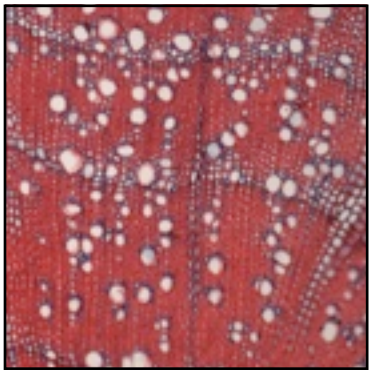
Plate no. 12

Phagnalon rupestre (L.) DC.



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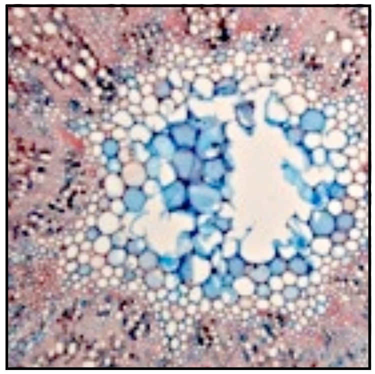

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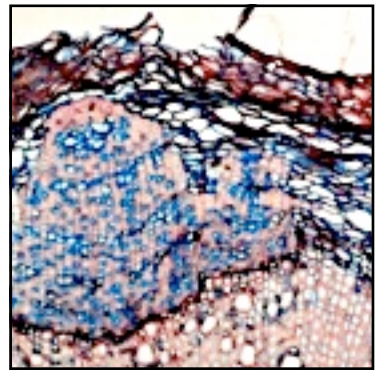

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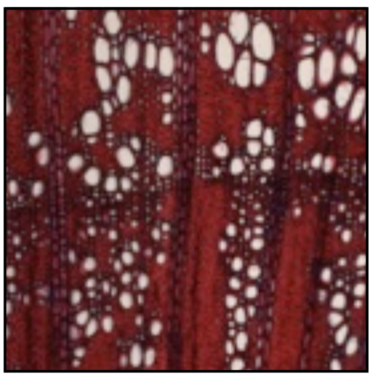
Ptilostemon chamaepeuce (L.) Less. var. *cyprius* Greuter



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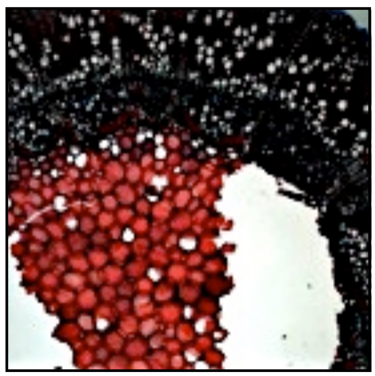

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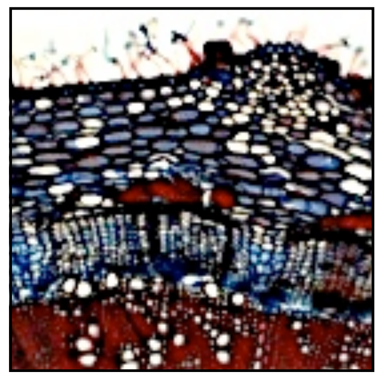

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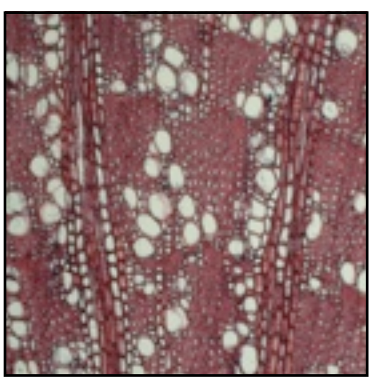
Staehelina lobelii DC.



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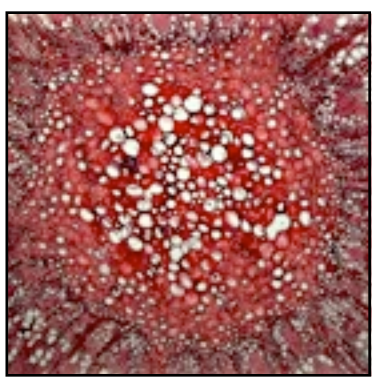

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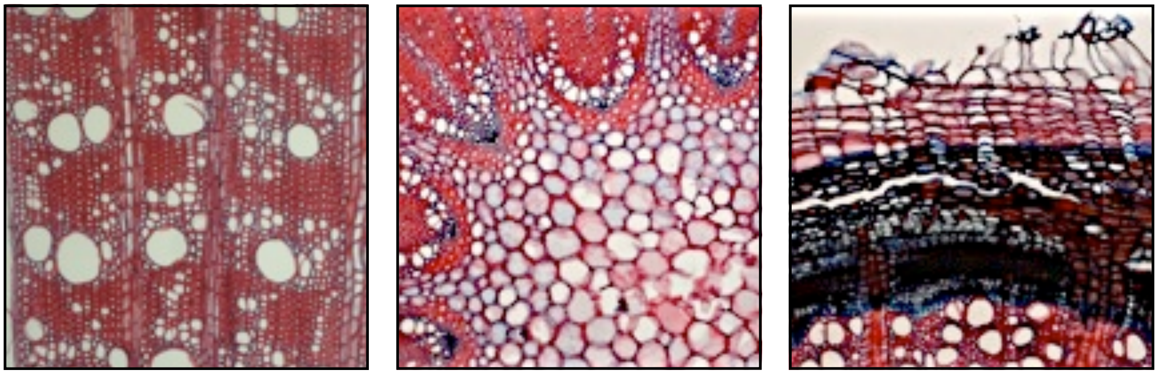
Plate no. 13

Berberis cretica L.



100x 100x 100x

Alnus orientalis Decne.

100x 100x 100x

Echium angustifolium Link ex Willk. & Lange

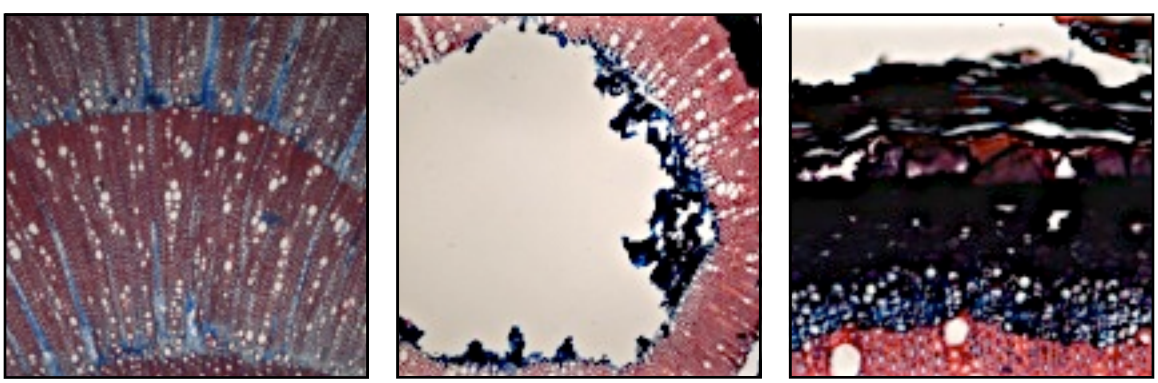


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Plate no. 14

Lithodora hispidula (Sm.) Griseb. subsp. *versicolor* Meikle

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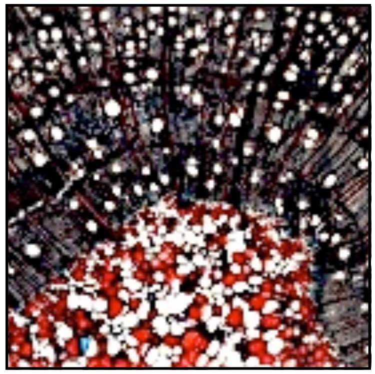

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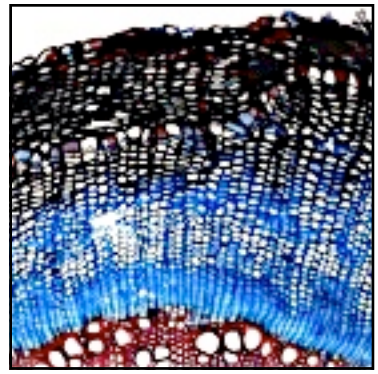

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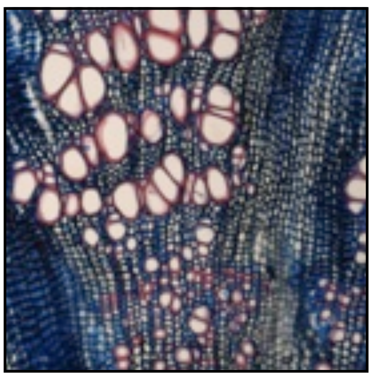
Onosma caespitosa Kotschy



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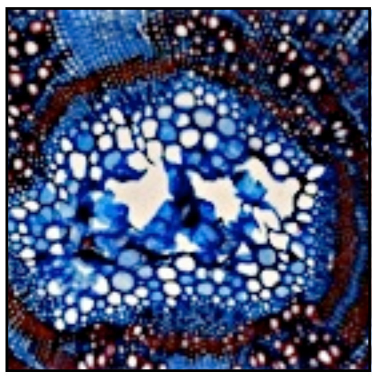

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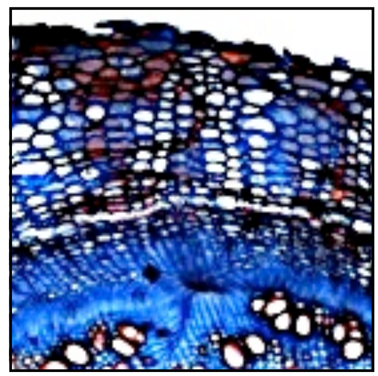

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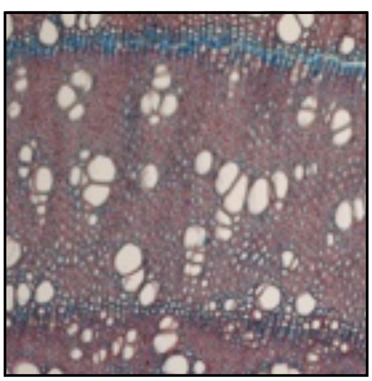
Onosma fruticosa Sm.



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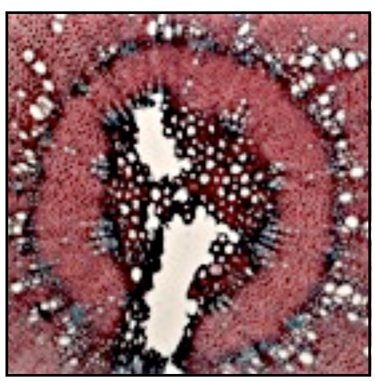

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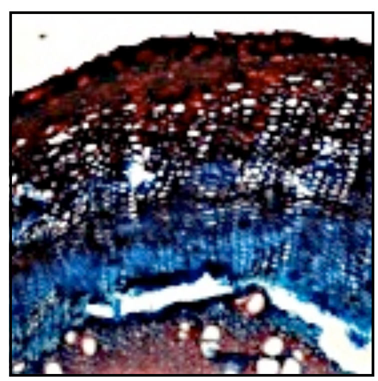

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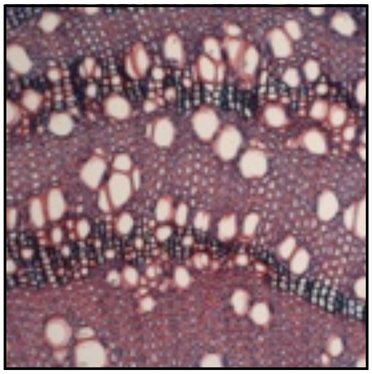
Plate no. 15

Onosma mitis Boiss. et Heldr.



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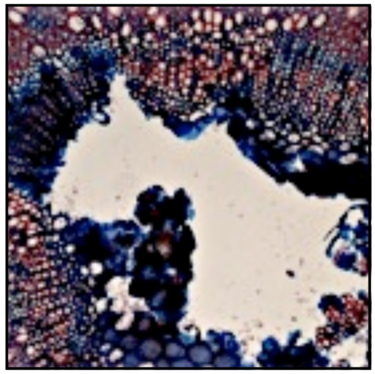

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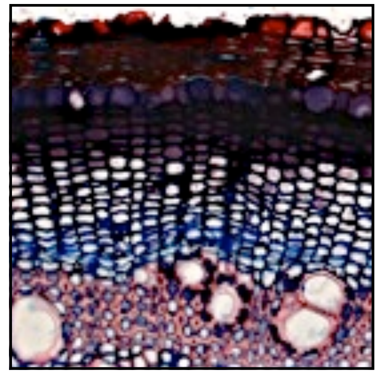

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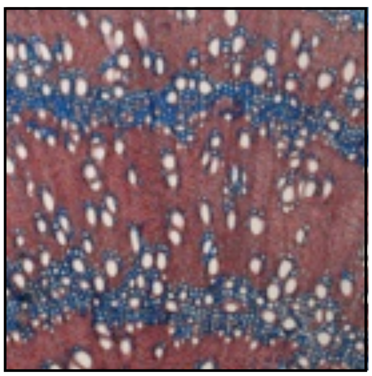
Alyssum akamasicum B.L.Burtt



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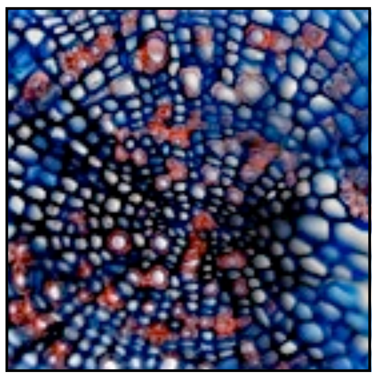

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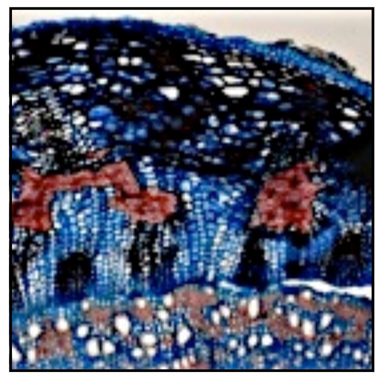

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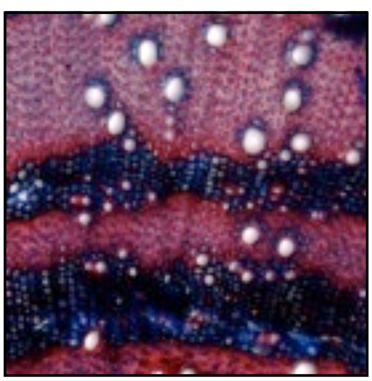
Alyssum troodi Boiss.



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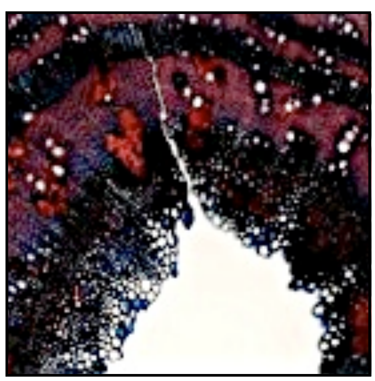

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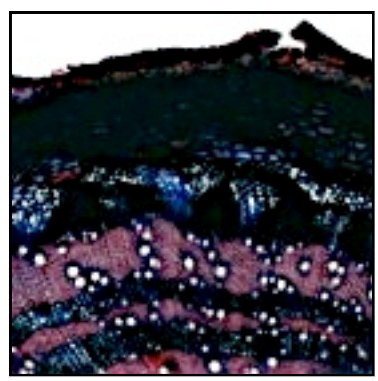

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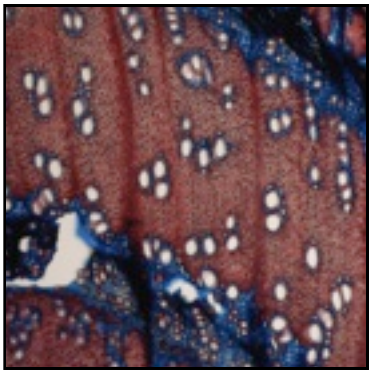
Plate no. 16

Alyssum cypricum Nyar.



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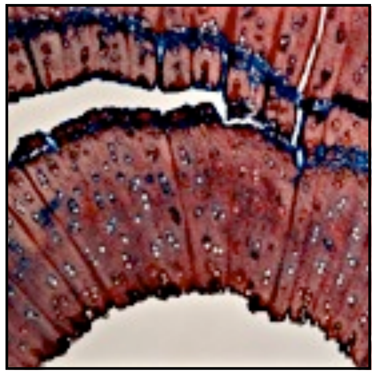

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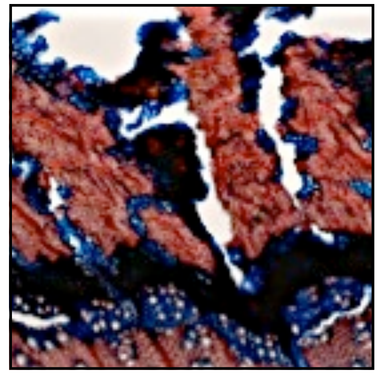

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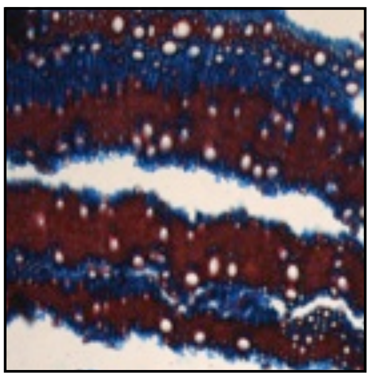
Arabis cypria Holmboe



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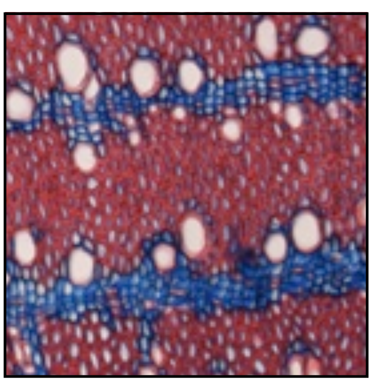
100x

Arabis purpurea Sibth. et Sm.



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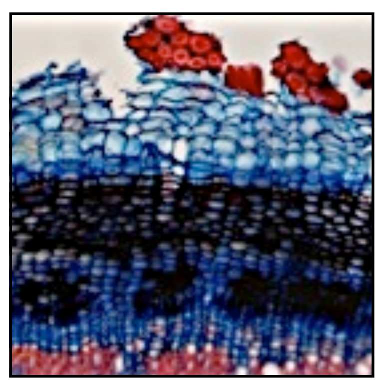

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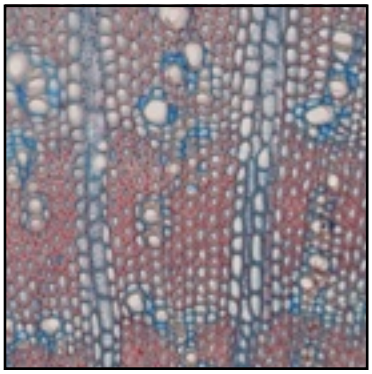
Plate no. 17

Brassica hilarionis Post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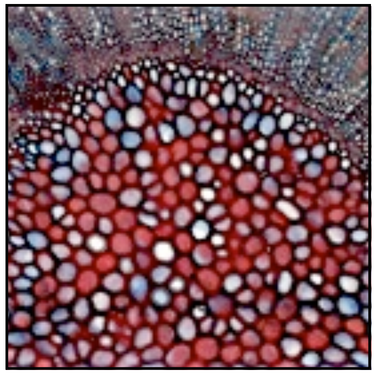
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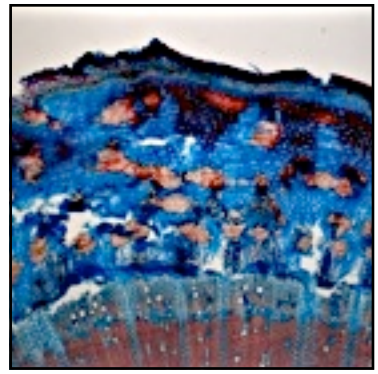
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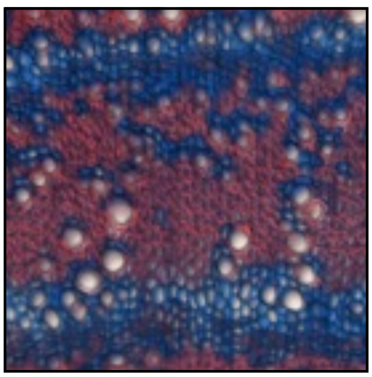
Erysimum kykkoticum Hadjikyriakou et Alziar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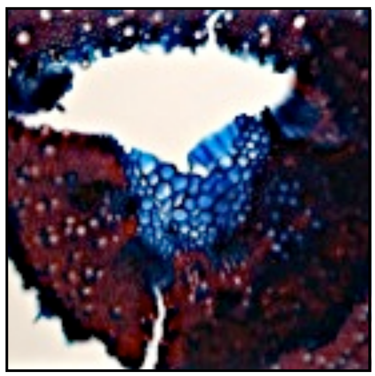
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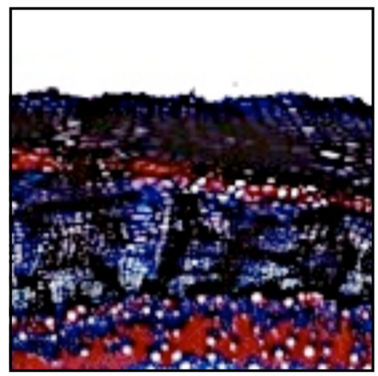
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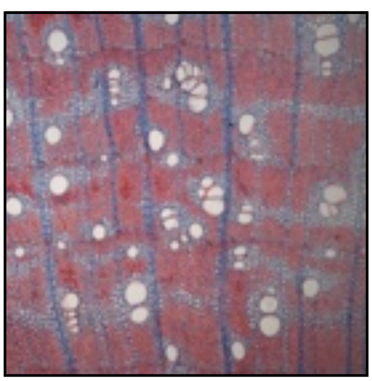
Ceratonia siliqua L.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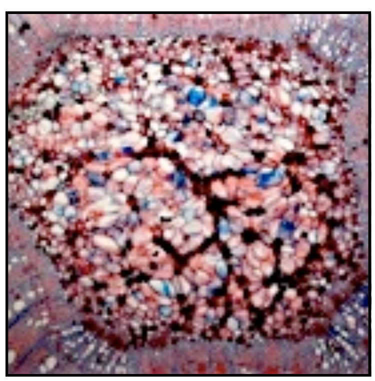
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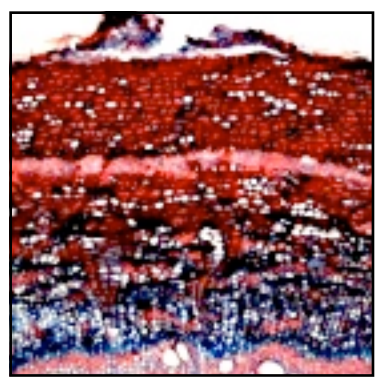
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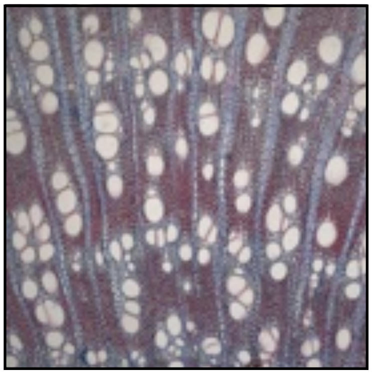
Plate no. 18

Capparis spinosa L.



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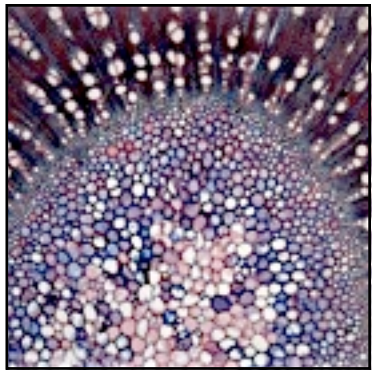

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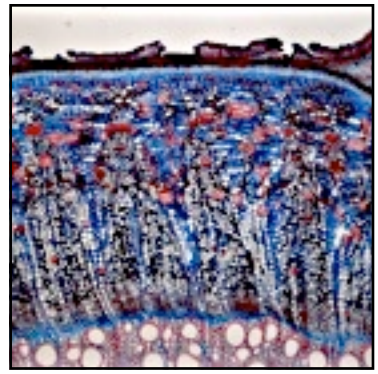

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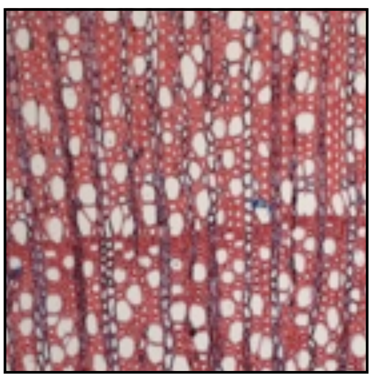
Lonicera etrusca Santi



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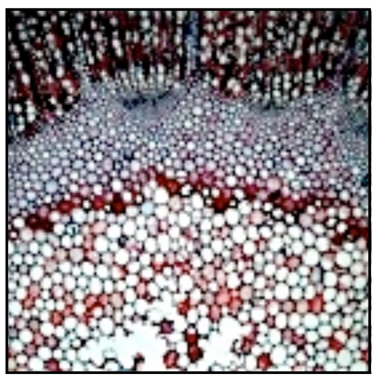

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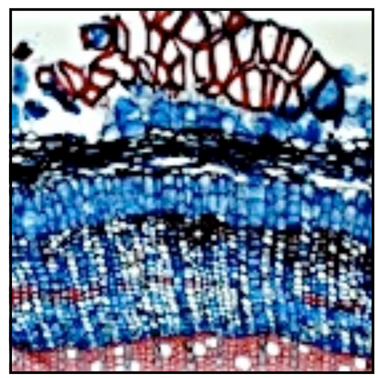

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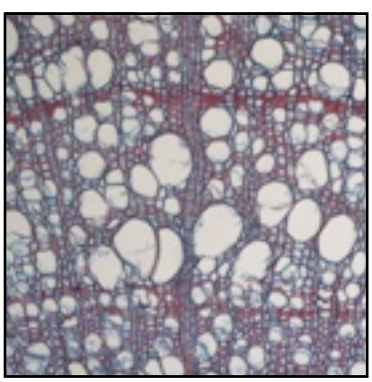
Lonicera japonica Thumb.



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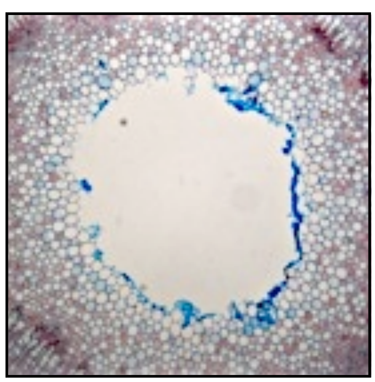

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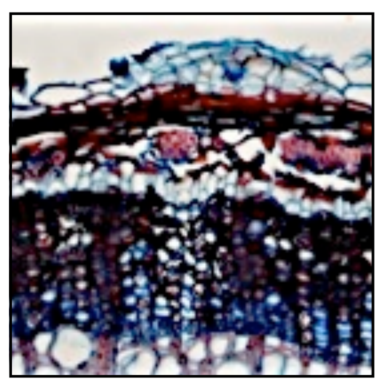

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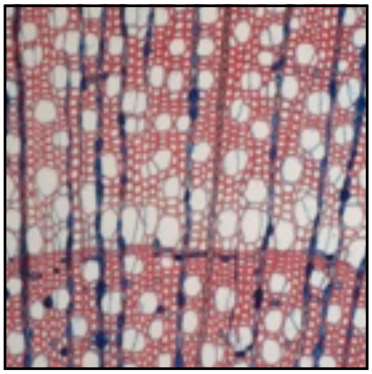
Plate no. 19

Viburnum opulus L.



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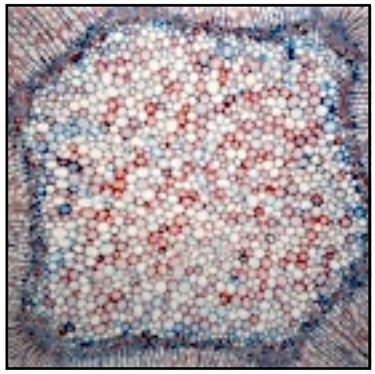

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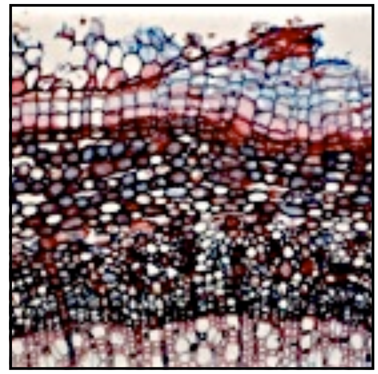

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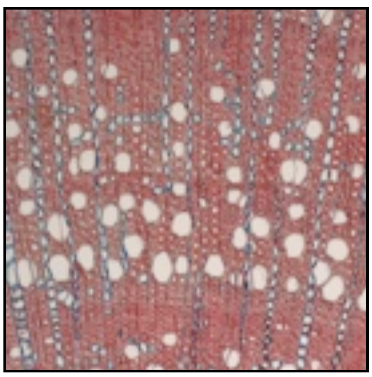
Viburnum tinus L.



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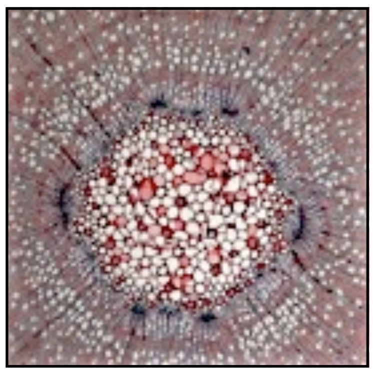

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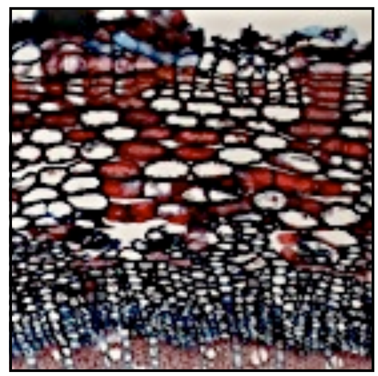

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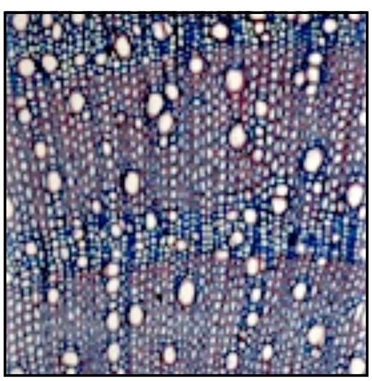
Silene fruticosa L.



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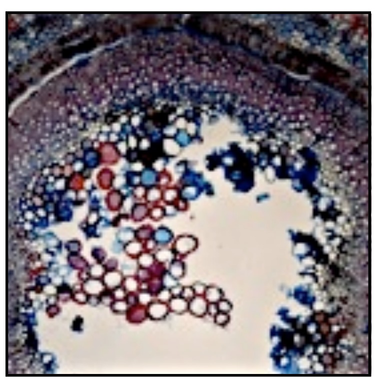

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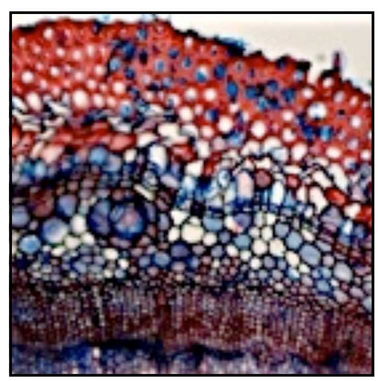

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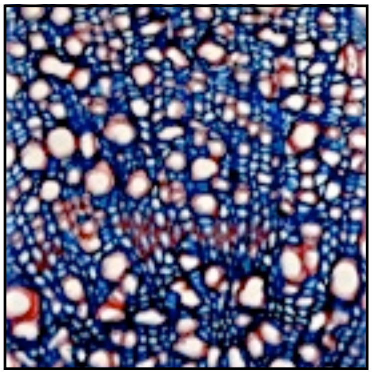
Plate no. 20

Silene galataea Boiss.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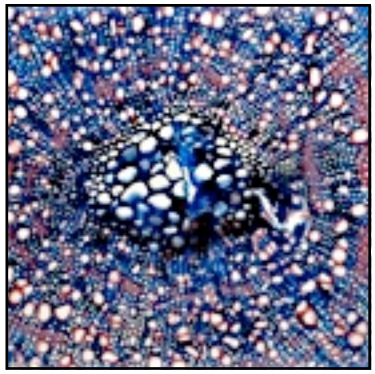
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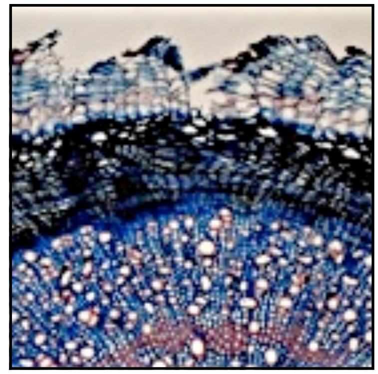
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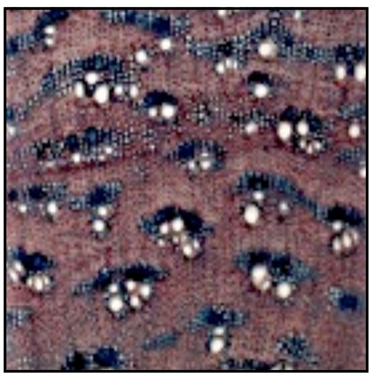
Arthrocnemum macrostachyum (Moric.) Mois et Delponte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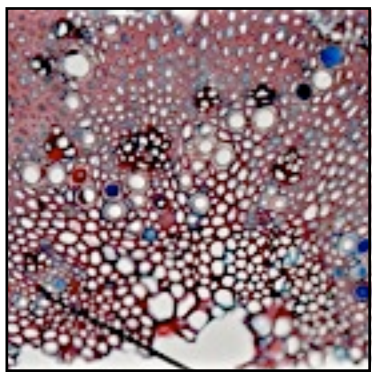
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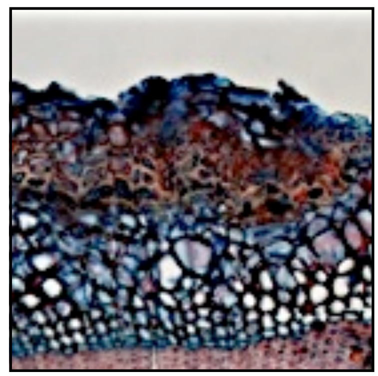
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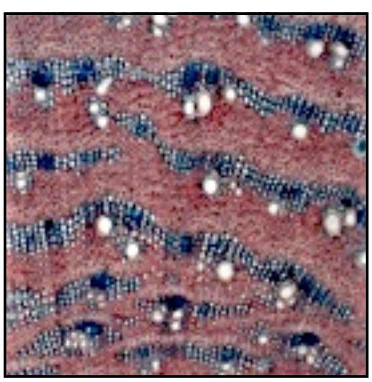
Arthrocnemum perenne (Mill.) Moss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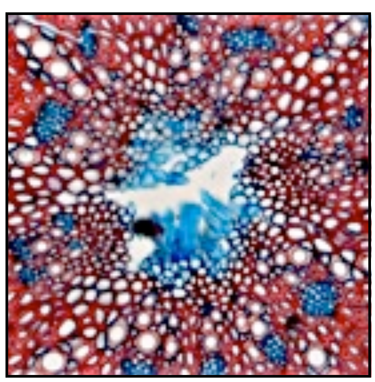
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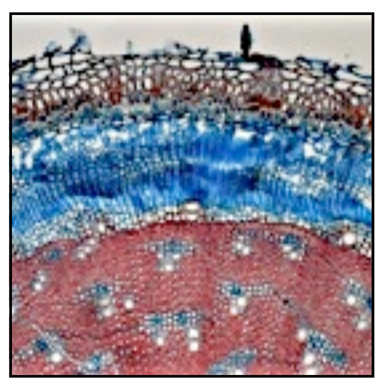
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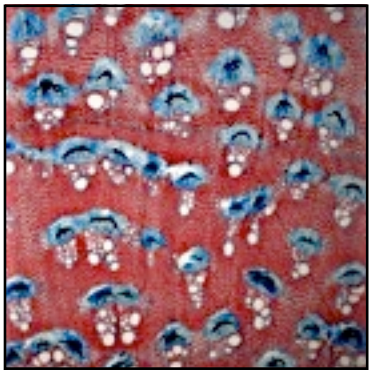
Plate no. 21

Atriplex halimus L.



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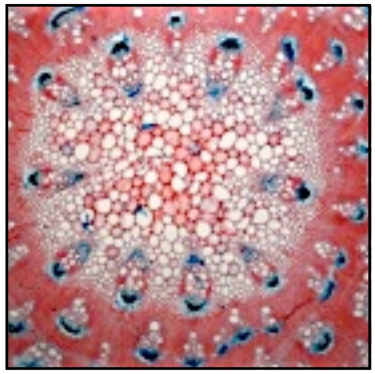

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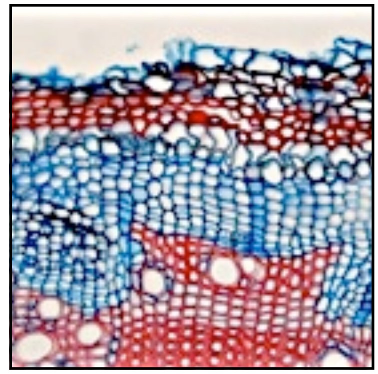

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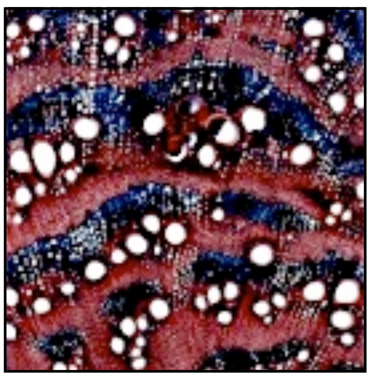
Atriplex semibaccata R.Br.



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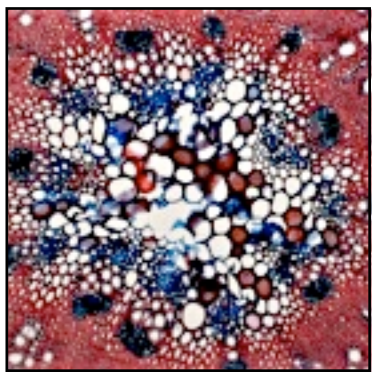

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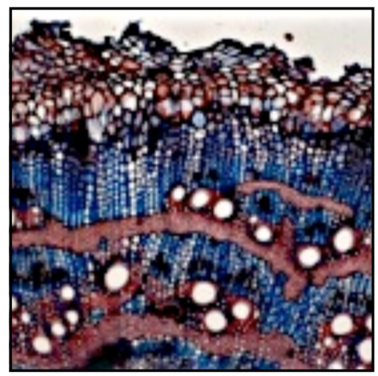

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Halimione portulacoides (L.) Aellen

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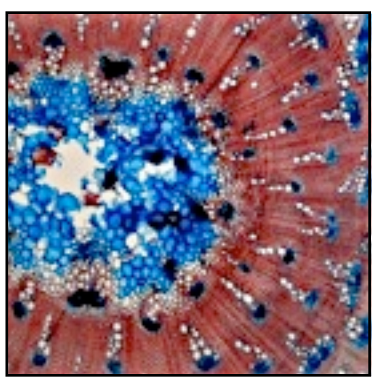

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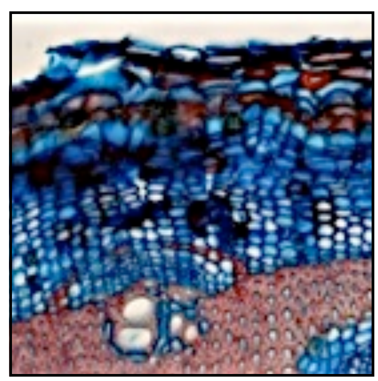

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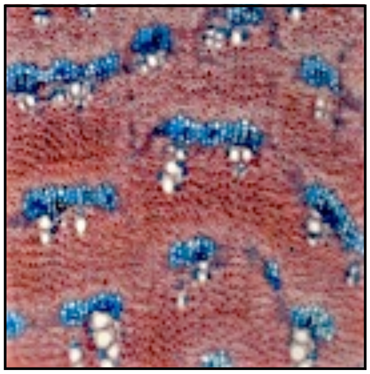
Plate no. 22

Halocnemum strobilaceum (Pall.) Bieb.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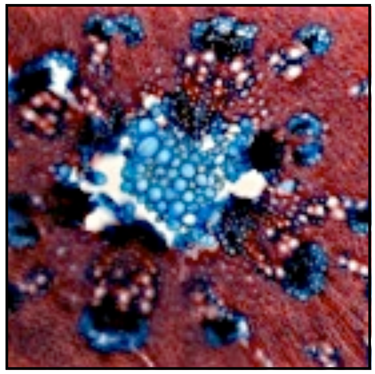
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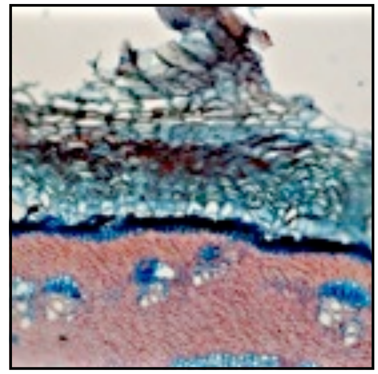
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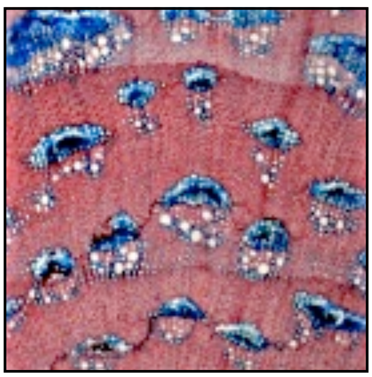
Noaea mucronata (Forssk.) Asch. et Schwinf.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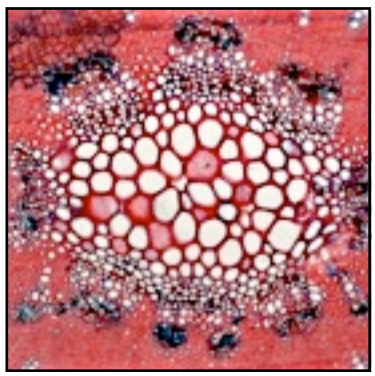
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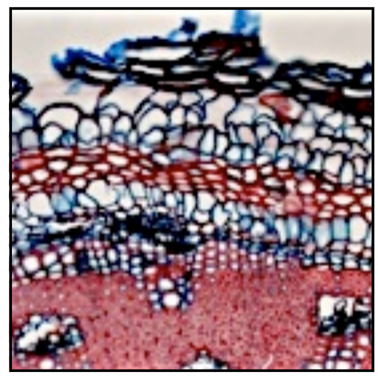
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Suaeda aegyptiaca (Hasselq.) Zohary


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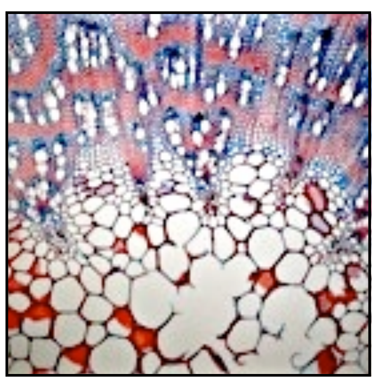
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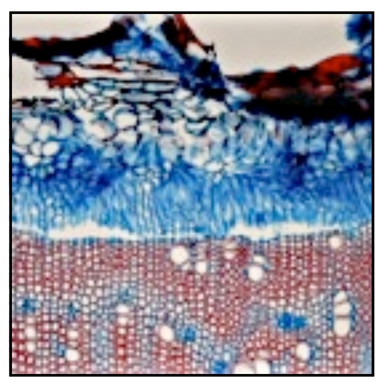
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Plate no. 23

Suaeda vera Forssk. ex J.F.Gmel

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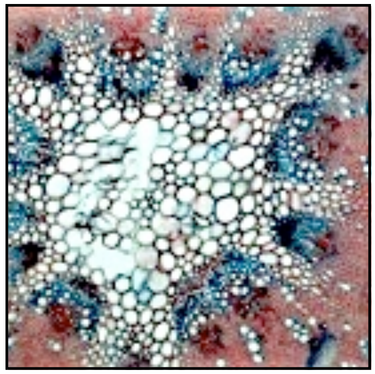

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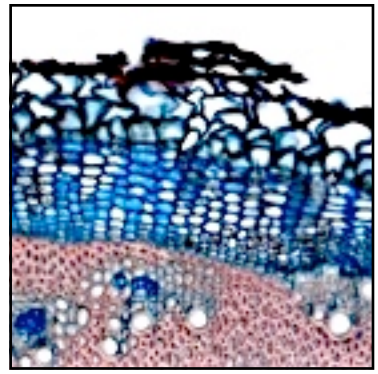

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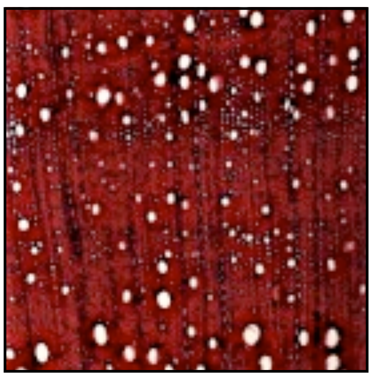
Cistus creticus L.



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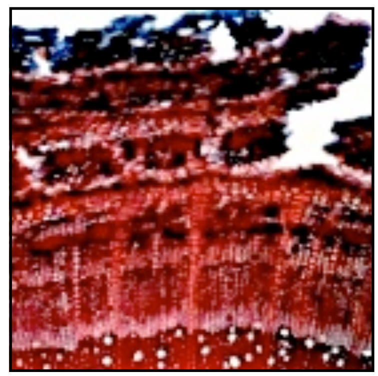

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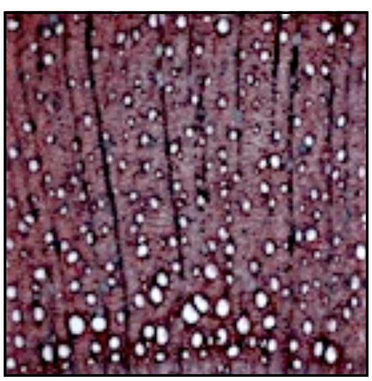
Cistus ladanifer L.



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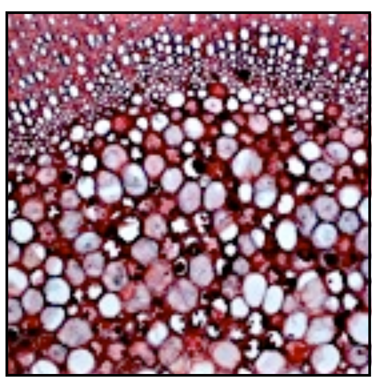

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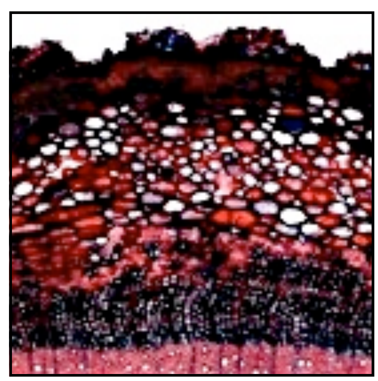

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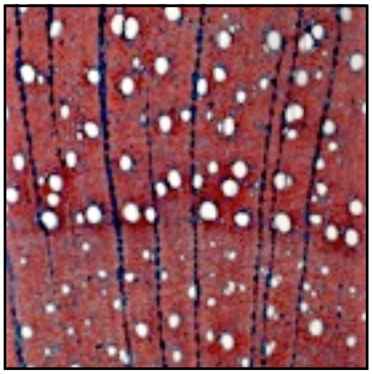
Plate no. 24

Cistus monspelliensis L.



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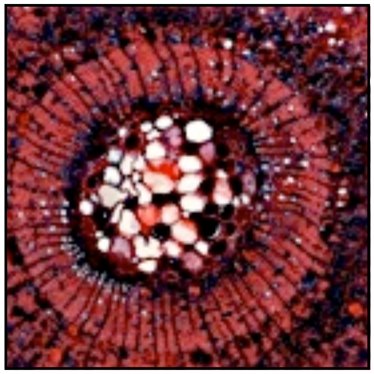

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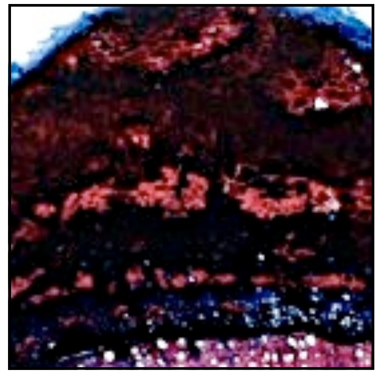

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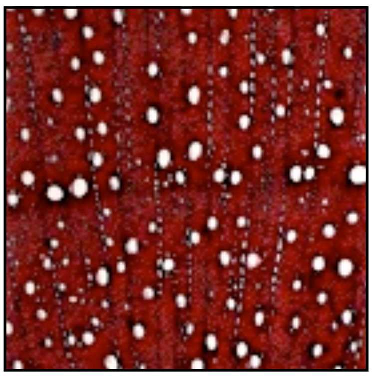
Cistus parvifolius Lam.



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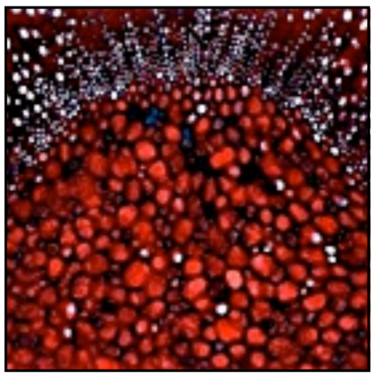

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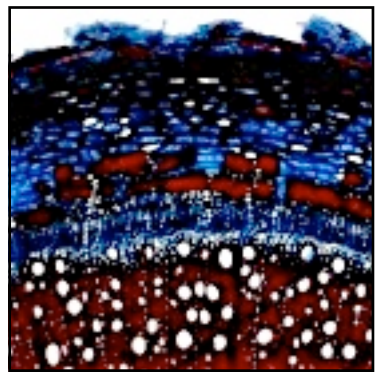

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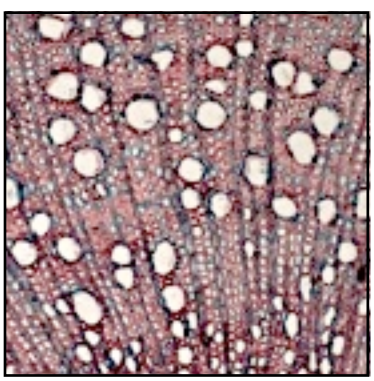
Fumana arabica (L.) Spach.



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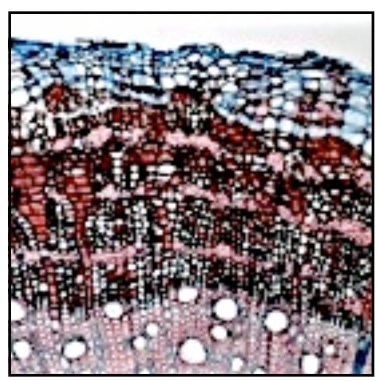

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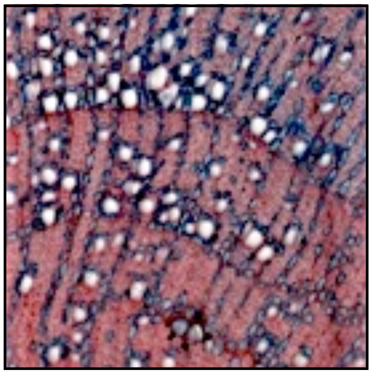
Plate no. 25

Fumana thymifolia (L.) Verlot



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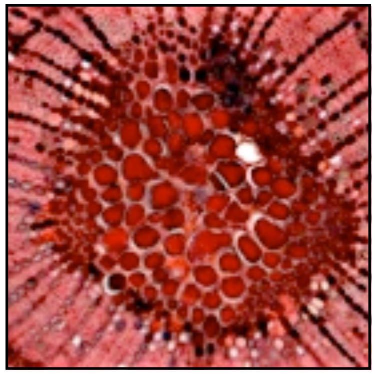

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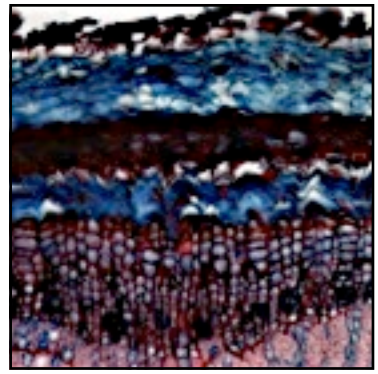

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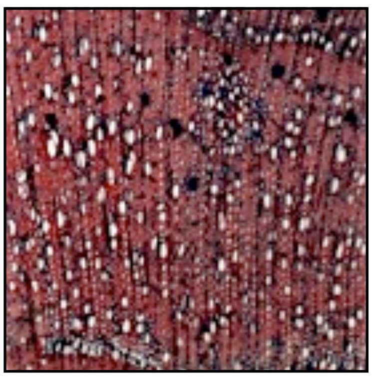
Helianthemum obtusifolium Dunal



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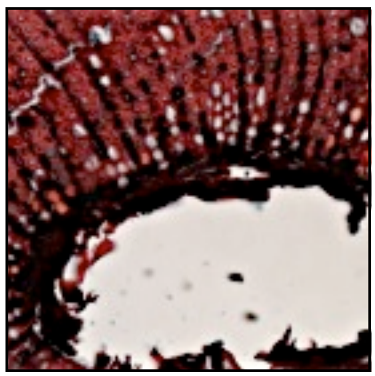

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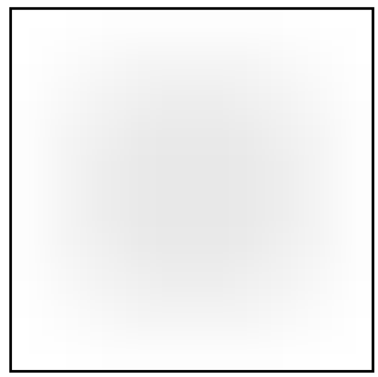
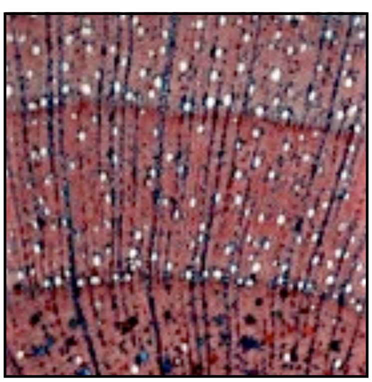


Helianthemum stipulatum (Forssk.) C.Christens.



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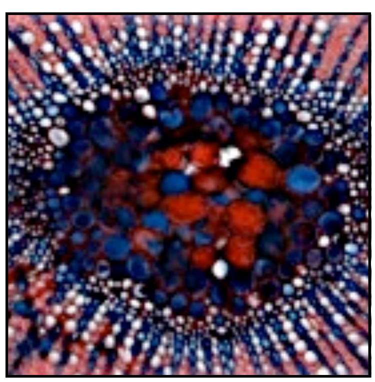

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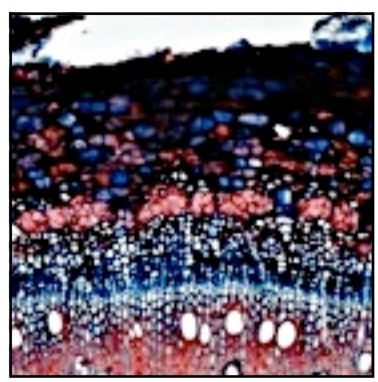

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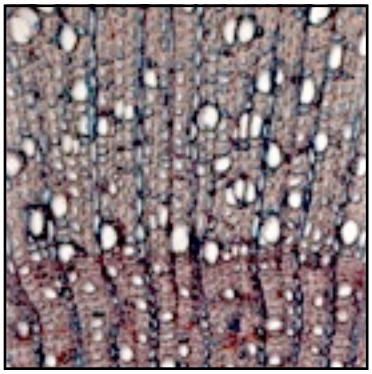
Plate no. 26

Helianthemum syriacum (Jacq.) Dum-Cours.



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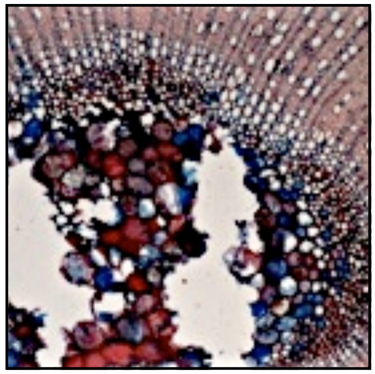

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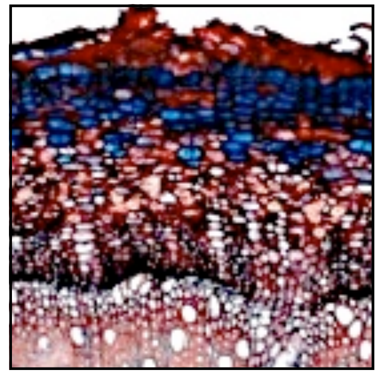

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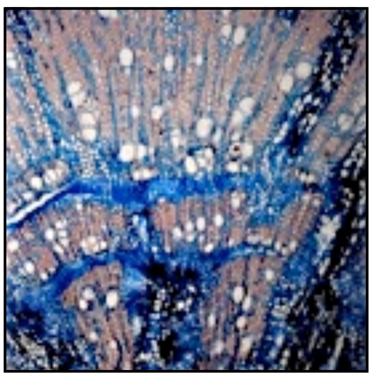
Convolvulus dorycnium L.



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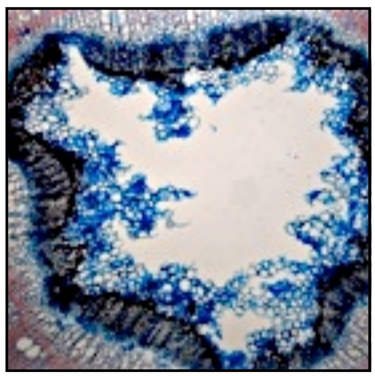

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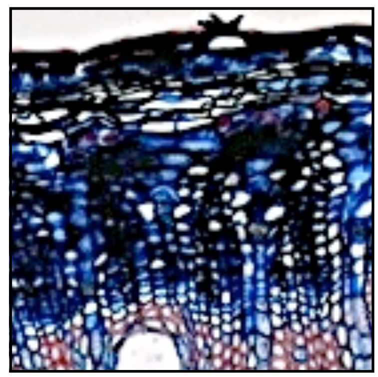

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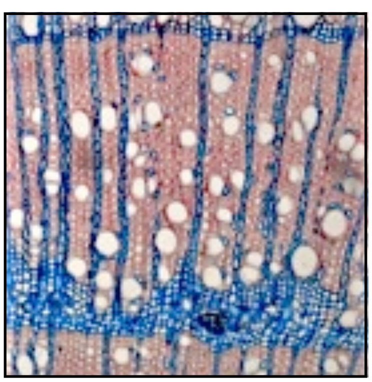
Convolvulus oleifolius var. *desertii* Desr. Pamp.



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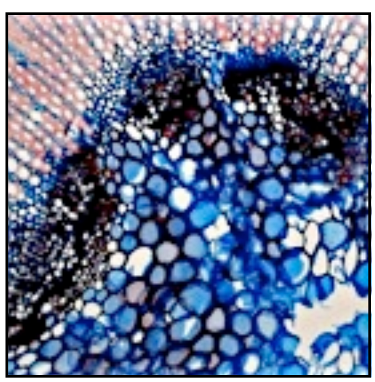

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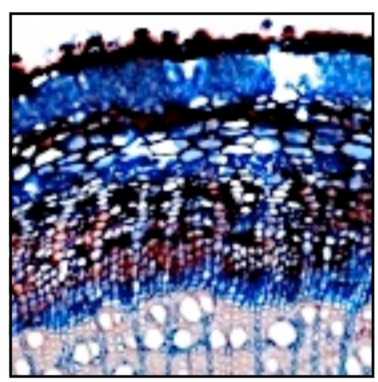

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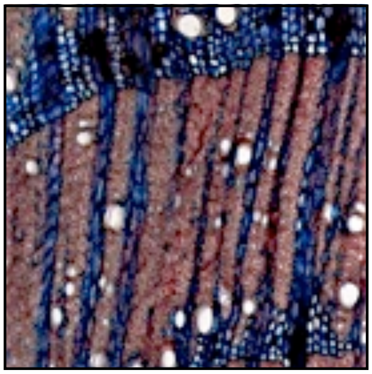
Plate no. 27

Convolvulus oleifolius var. *pumilus* Desr. Pamp.



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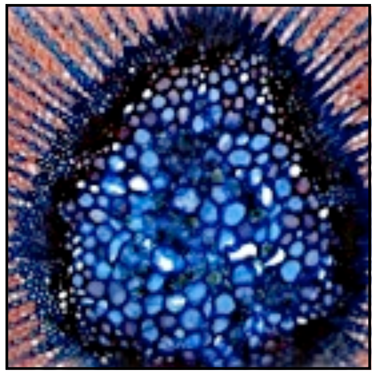

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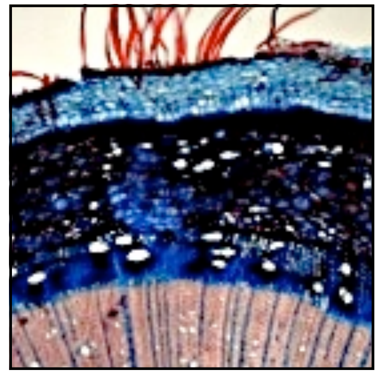

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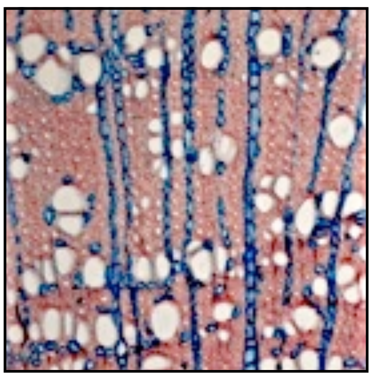
Convolvulus oleifolius var. *oleifolius* Desr.



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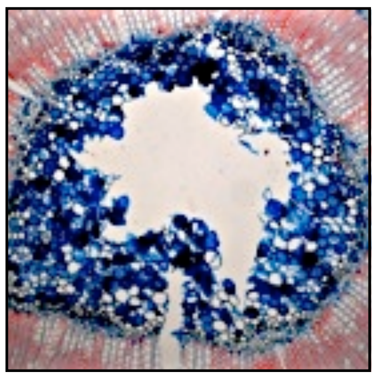

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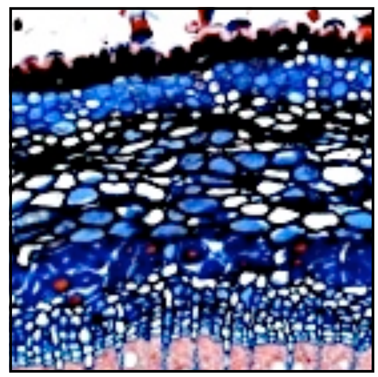

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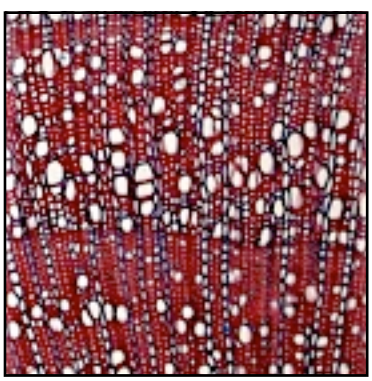
Pterocephalus multiflorus Poech subsp. *multiflorus*



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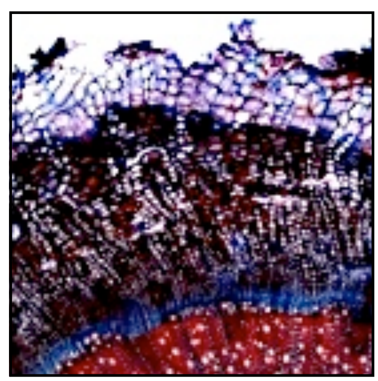

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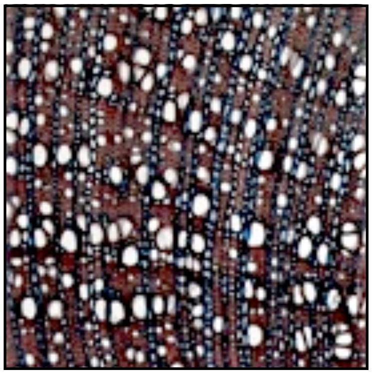
Plate no. 28

Pterocephalus multiflorus Poech. subsp. *obtusifolius* Holmboe



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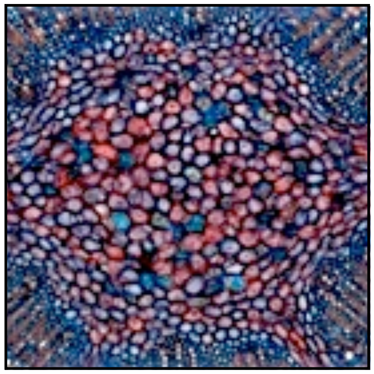

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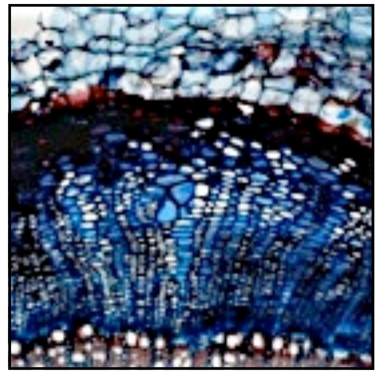

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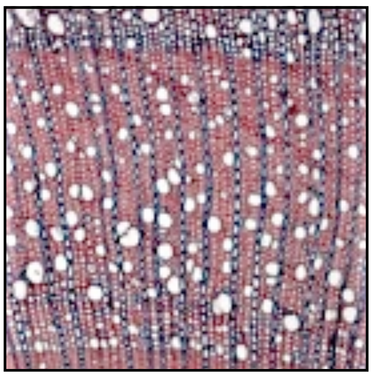
Scabiosa cyprica Post.



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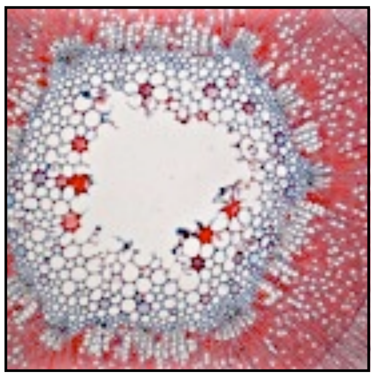

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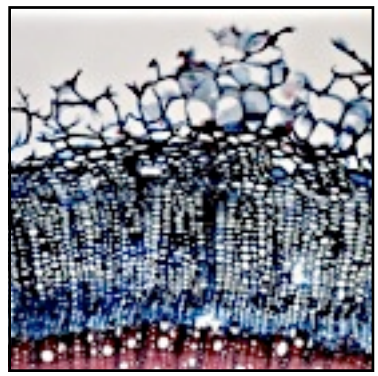

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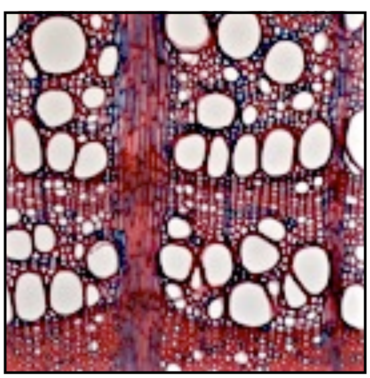
Elaeagnus angustifolia L.



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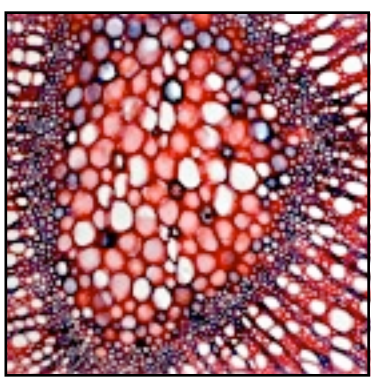

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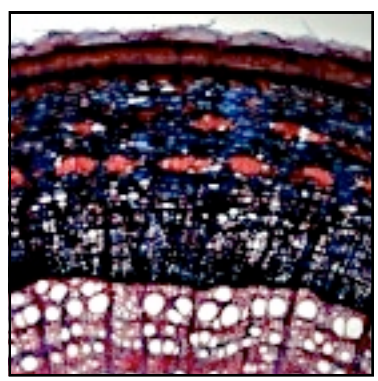

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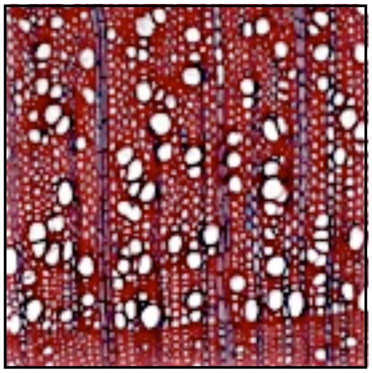
Plate no. 29

Arbutus andrachne L.



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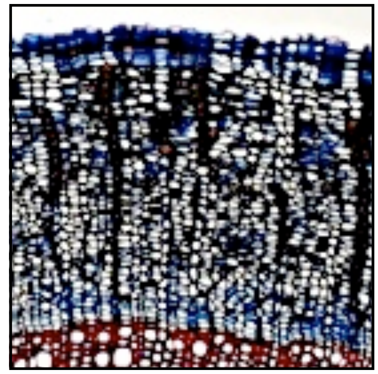

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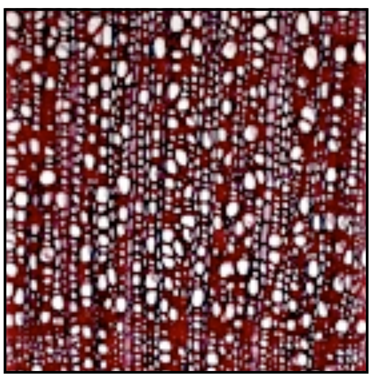
Arbutus unedo L.



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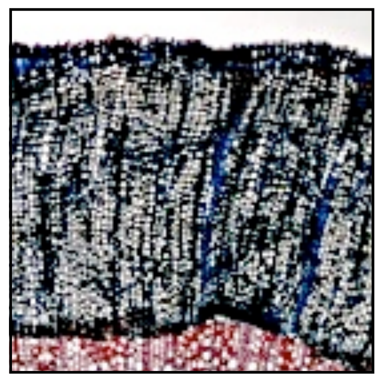

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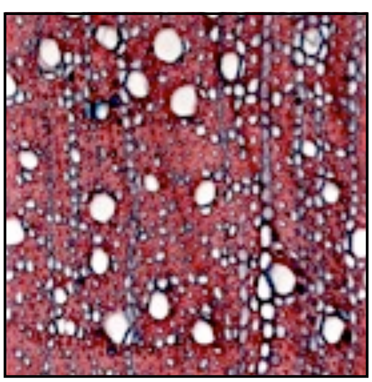
Erica sicula Guss.



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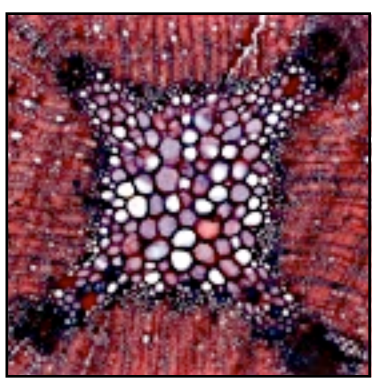

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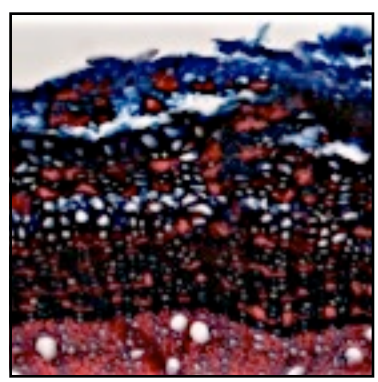

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Plate no. 30

Euphorbia hierosolymitana Boiss.

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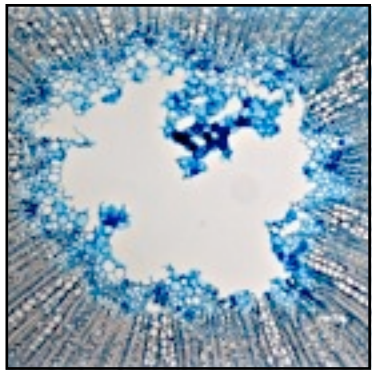

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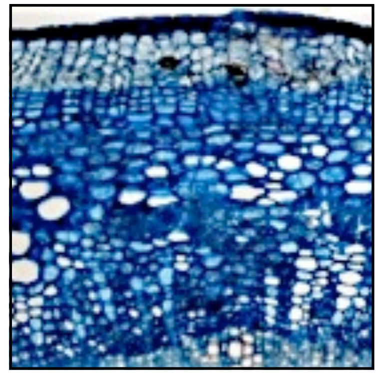

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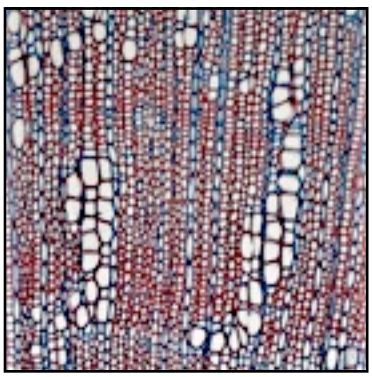
Euphorbia thompsonii Holmboe



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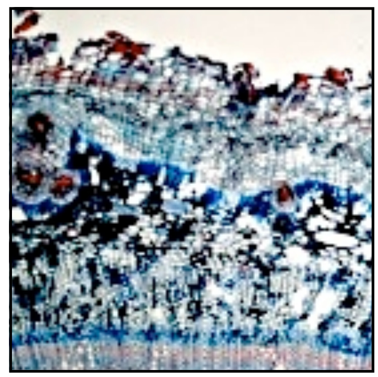

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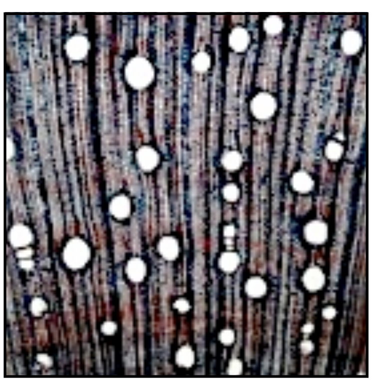
Ricinus communis L.



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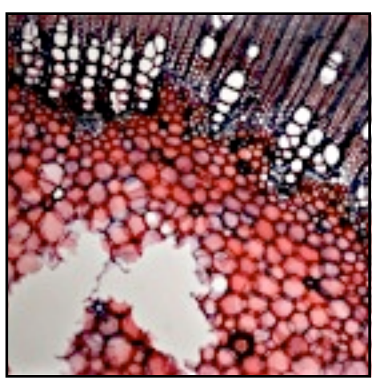

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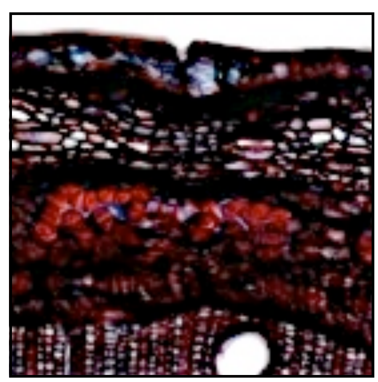

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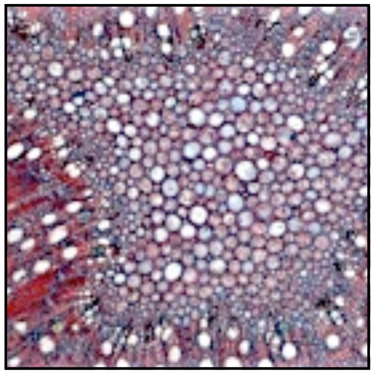
Plate no. 31

Quercus coccifera L. subsp. *calliprinos* (Webb) Holmboe


40x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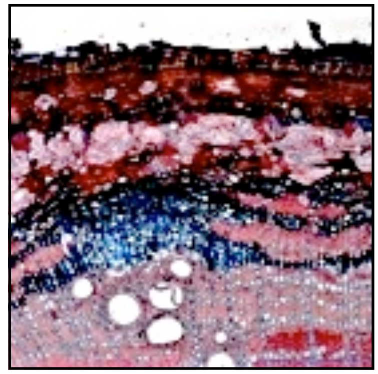
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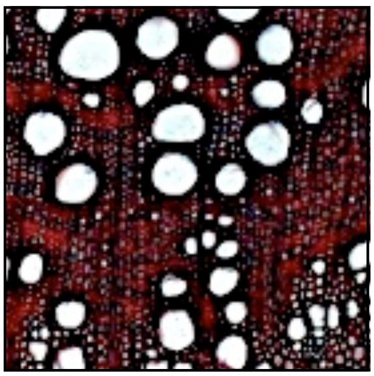
Quercus infectoria Oliv. subsp. *veneris* (A.Kern.) Holmboe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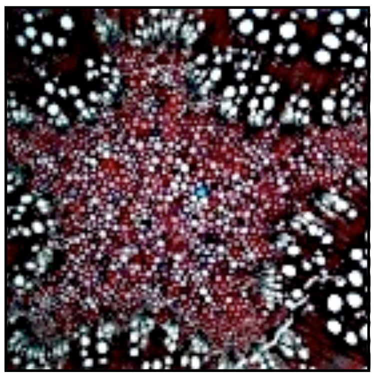
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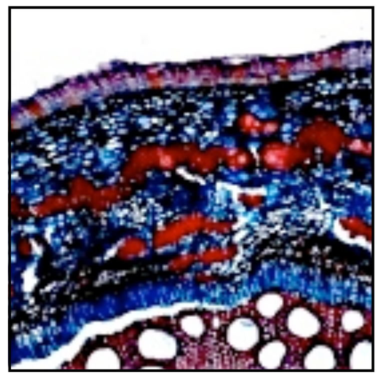
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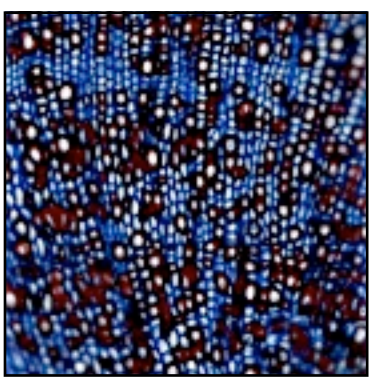
Frankenia hirsuta L.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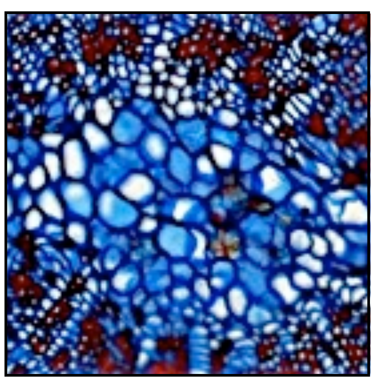
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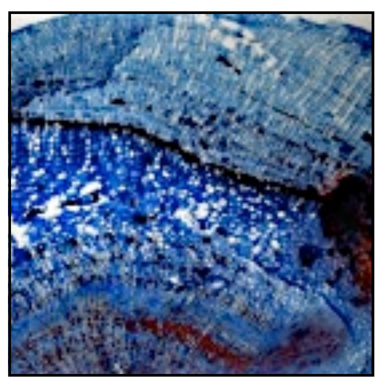
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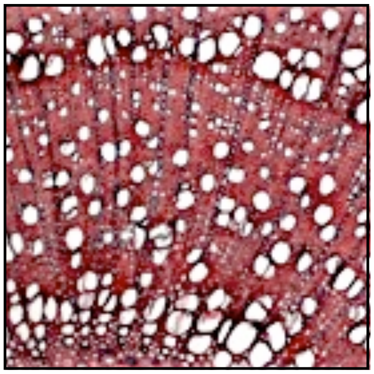
Plate no. 32

Hypericum hircinum L.



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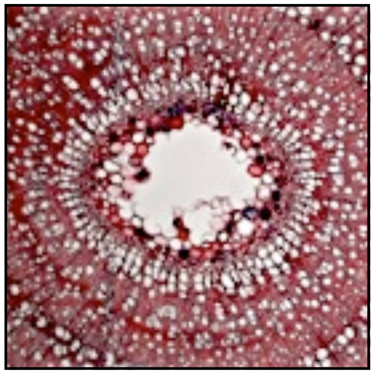

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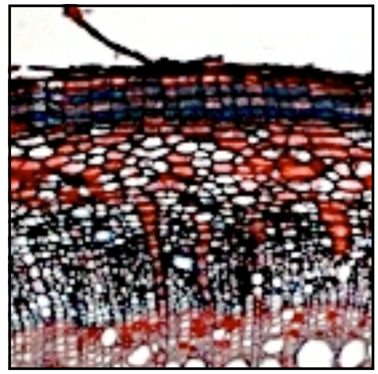

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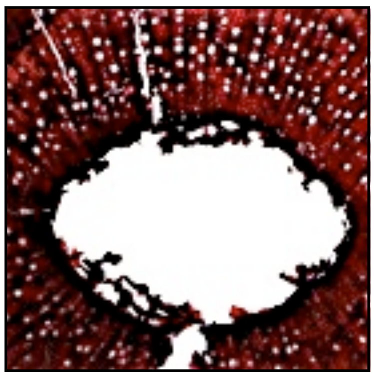
Hypericum confertum (Choisy) G.Don

100x



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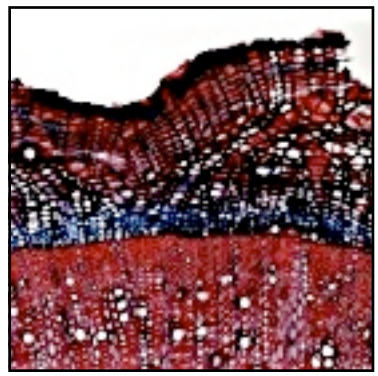

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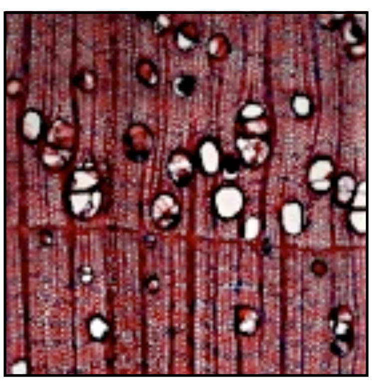
Juglans regia L.



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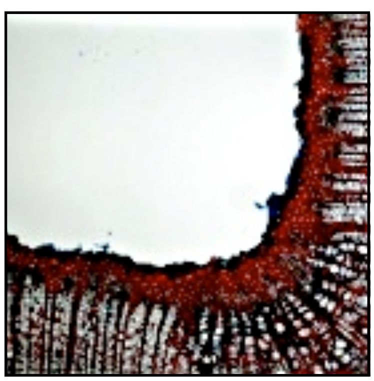

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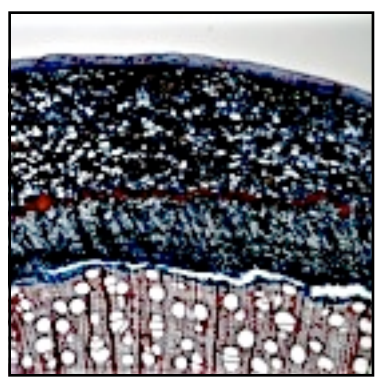

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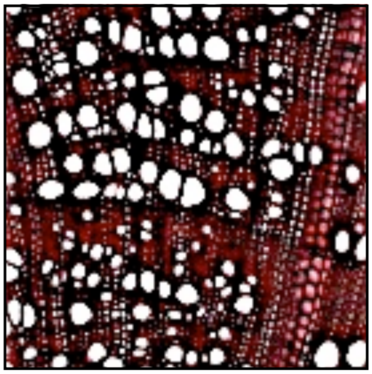
Plate no. 33

Ballota integrifolia Benth.



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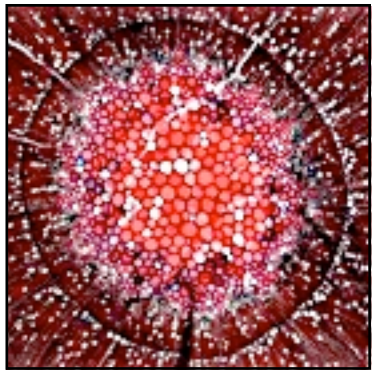

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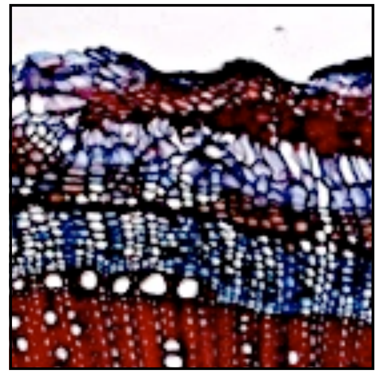

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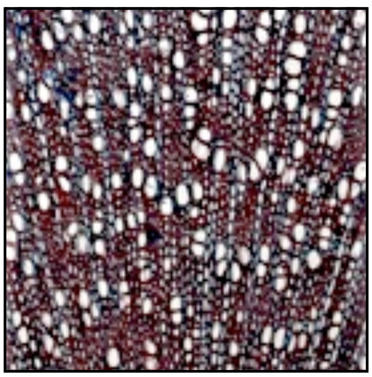
Calamintha incana (Sibth. & Sm.) Boiss.



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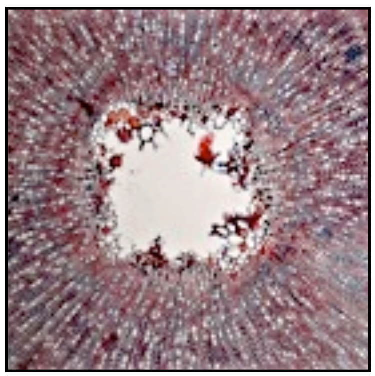

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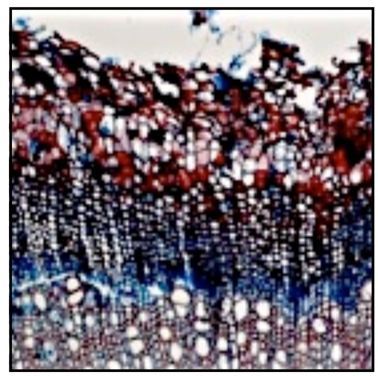

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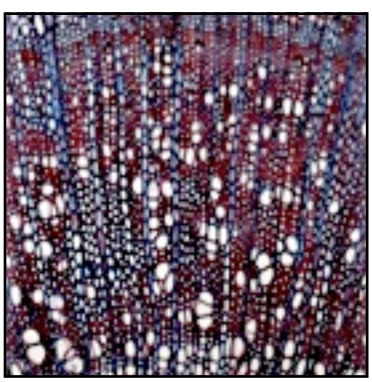
Lavandula angustifolia Mill.



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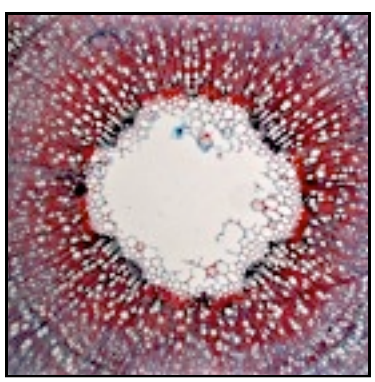

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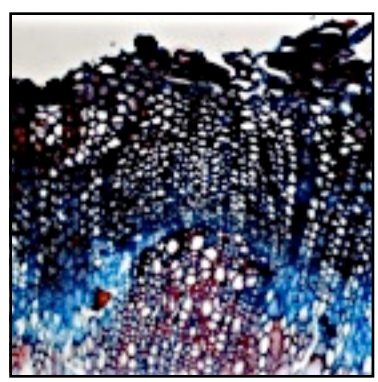

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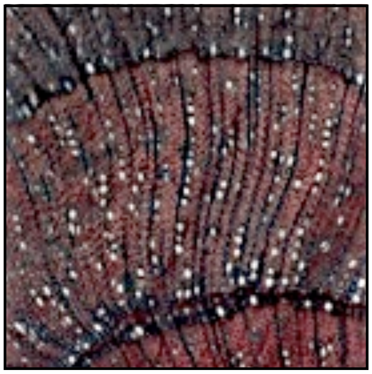
Plate no. 34

Micromeria nervosa (Desf.) Benth.



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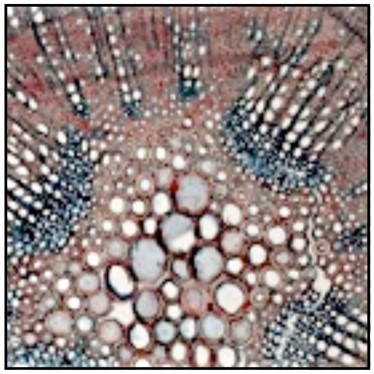

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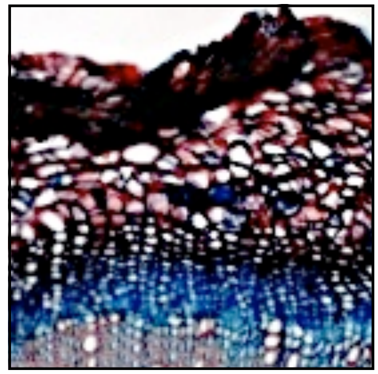

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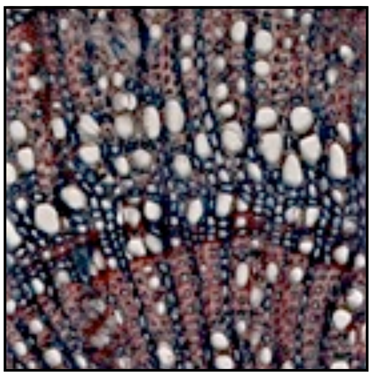
Micromeria cypria Kotschy



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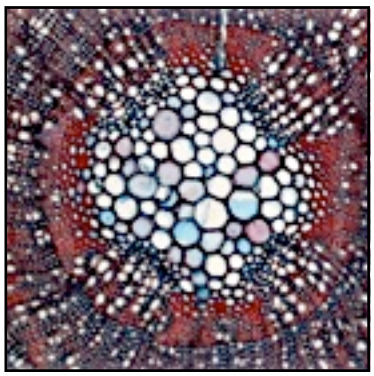

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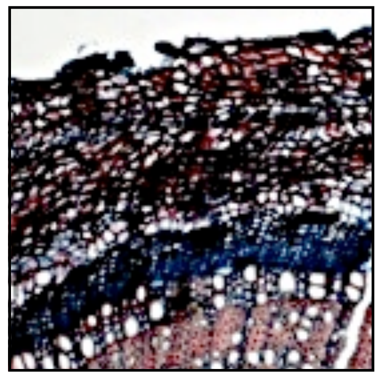

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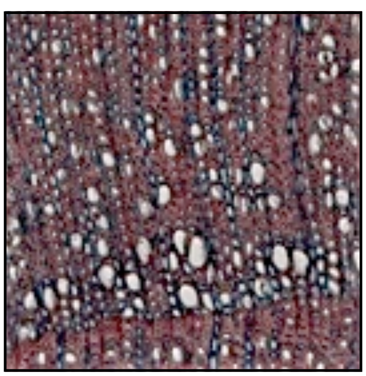
Micromeria chionistrae Meikle



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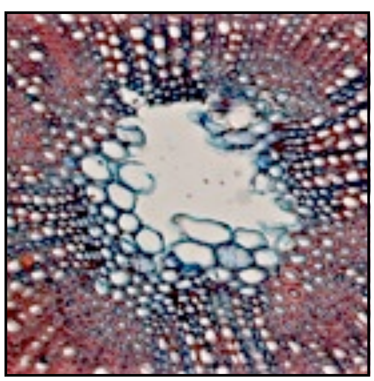

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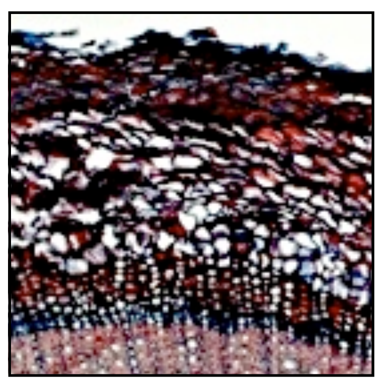

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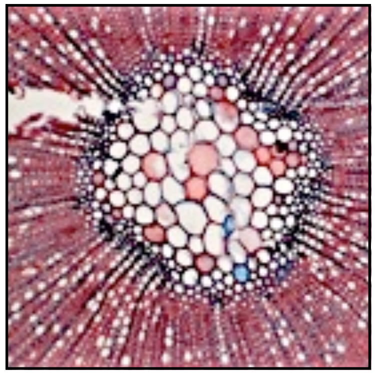
Plate no. 35

Micromeria myrtifolia Boiss. et Hohen


200x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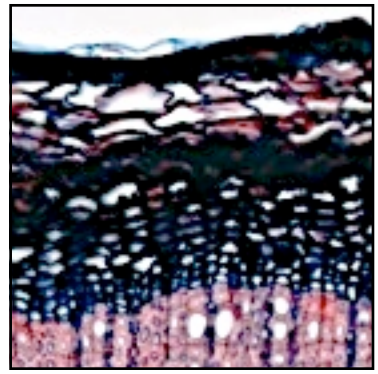
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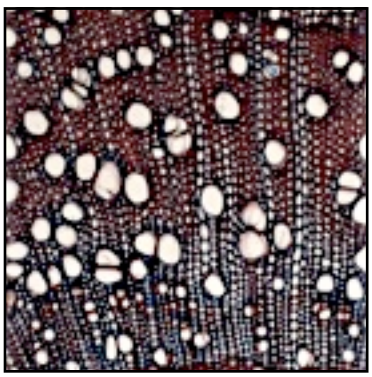
Nepeta troodi Holmboe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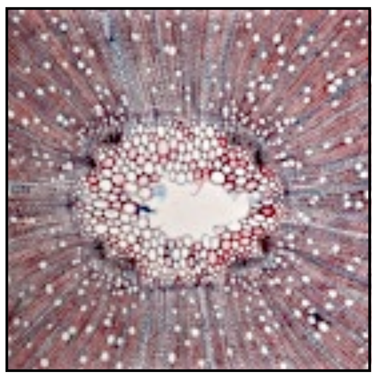
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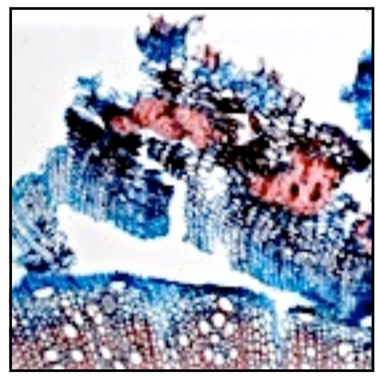
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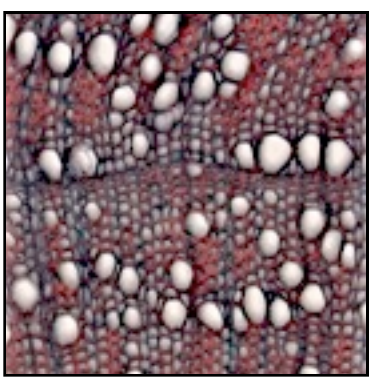
Origanum cordifolium (Aucher et Montbret ex Benth.) Vogel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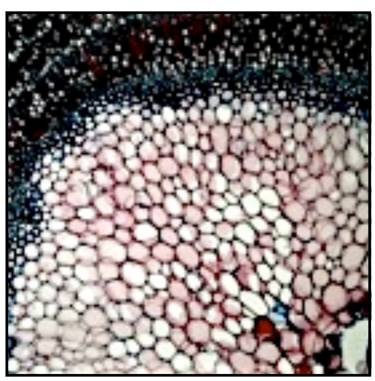
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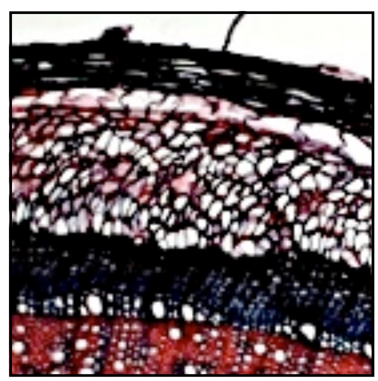
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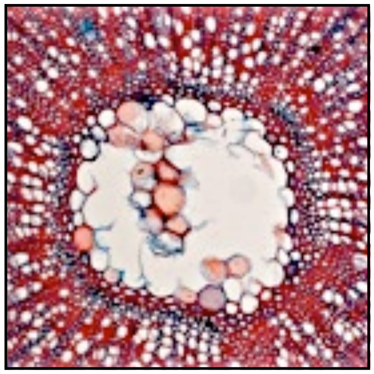
Plate no. 36

Origanum dubium Boiss.

100x



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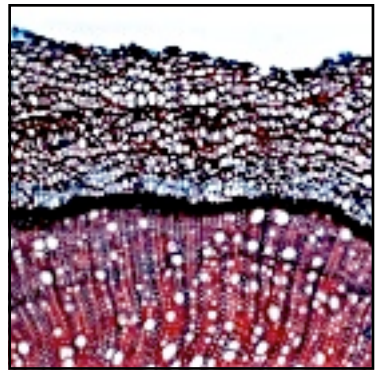

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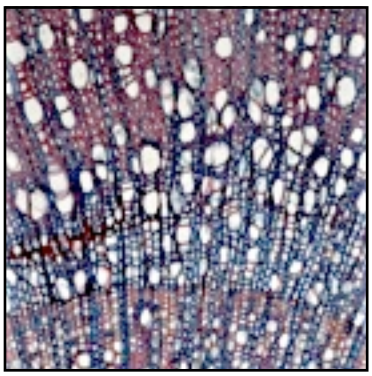
Origanum majorana L.



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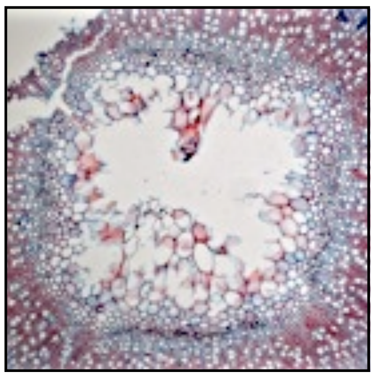

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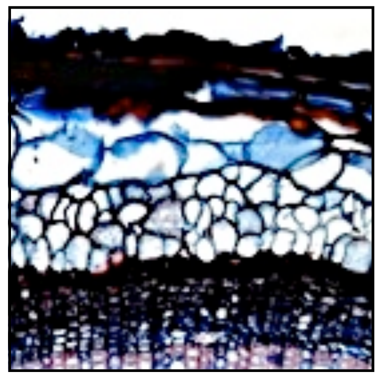

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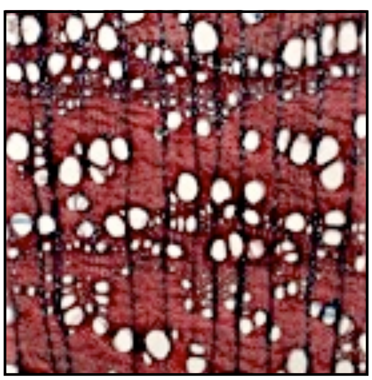
Phlomis brevibracteata Turril



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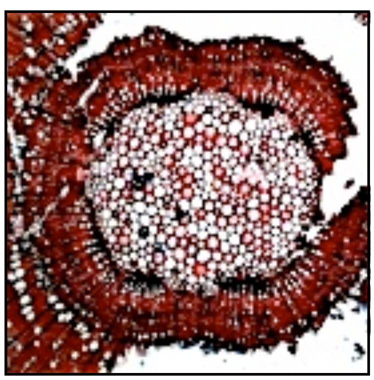

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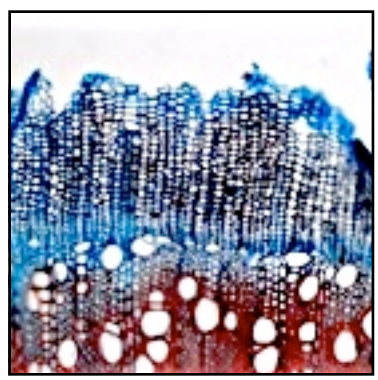

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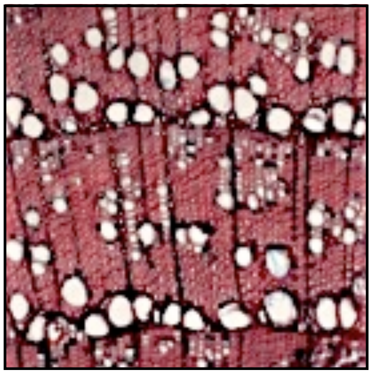
Plate no. 37

Phlomis cypria Post. var. *cypria* Meikle



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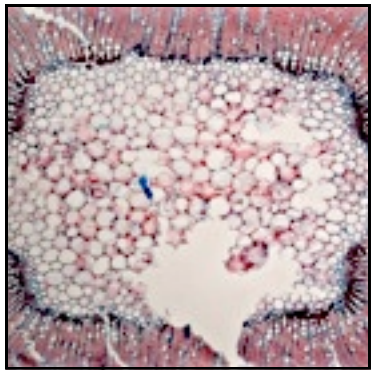

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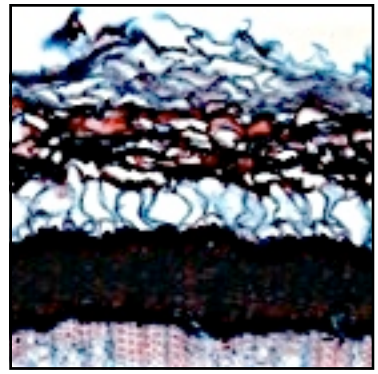
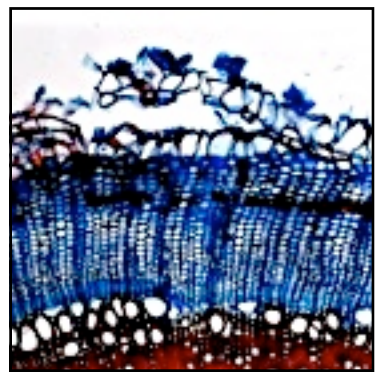


200x

Phlomis cypria Post. var. *occidentalis* Meikle

100x

40x



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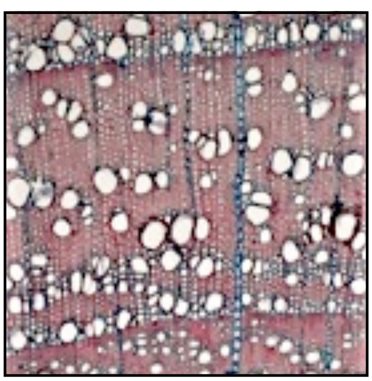
Phlomis lunariifolia Sm.



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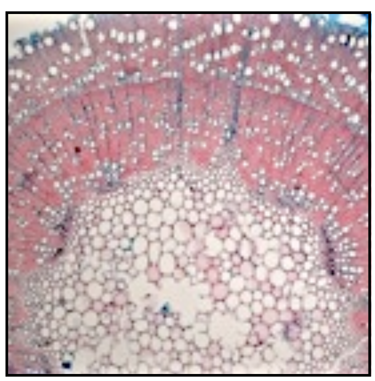

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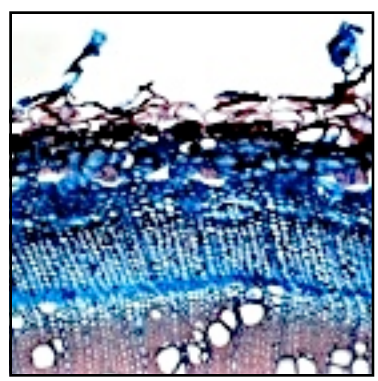

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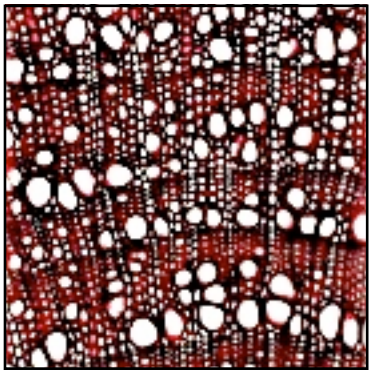
Plate no. 38

Prasium majus L.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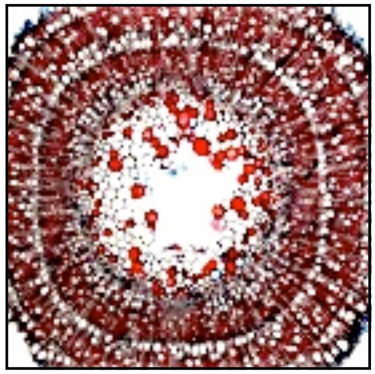
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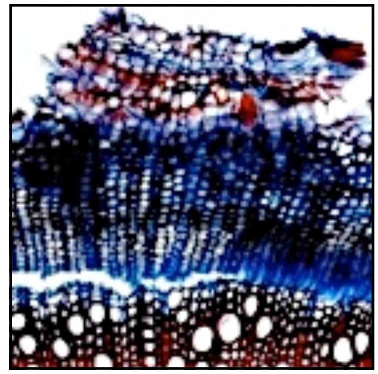
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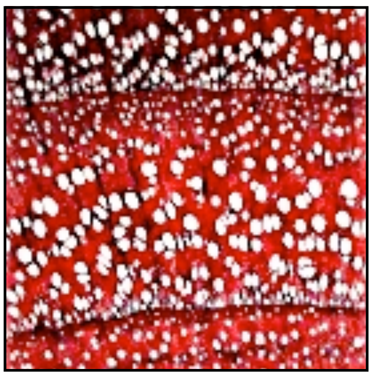
Salvia fruticosa Mill.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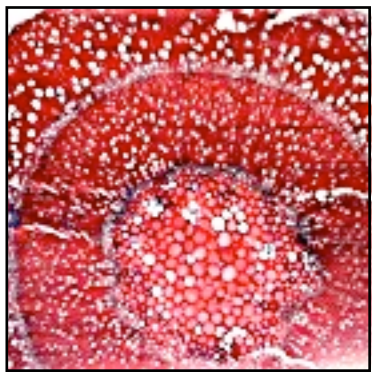
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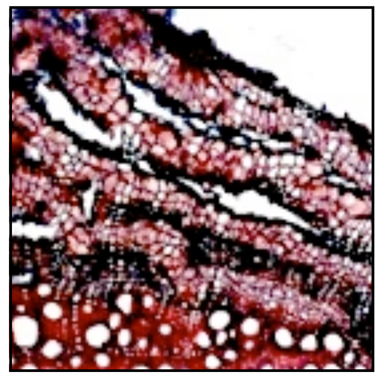
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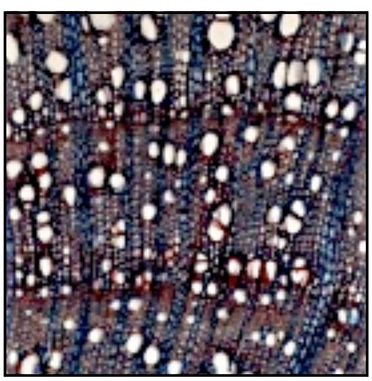
Salvia willeana (Holmboe) Hedge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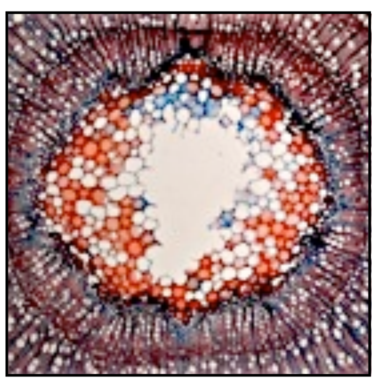
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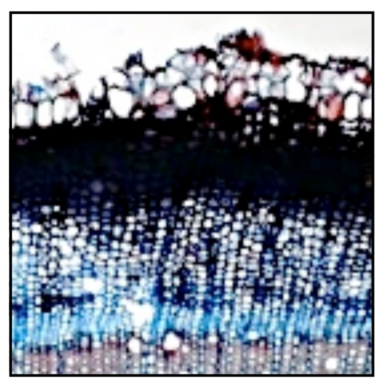
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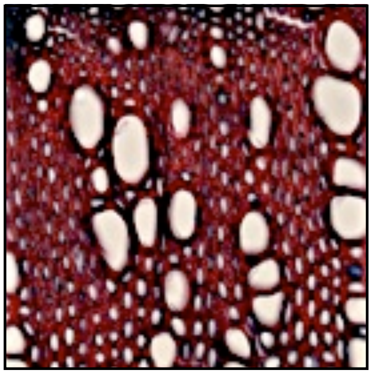
Plate no. 39

Salvia lanigera Poir.



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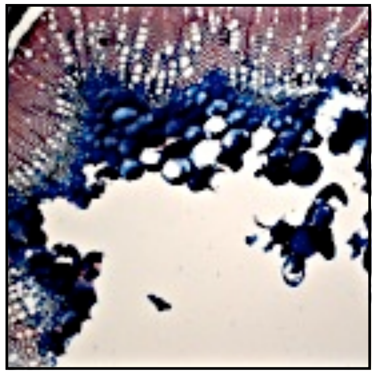

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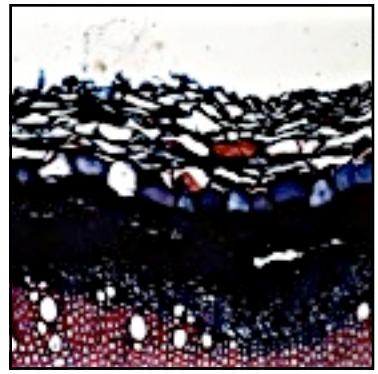

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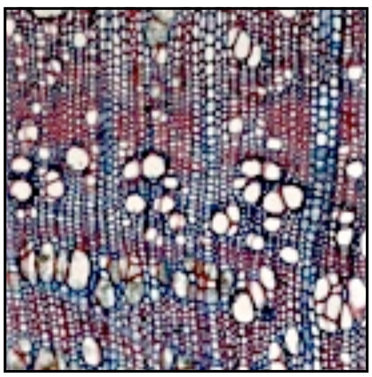
Salvia dominica L.



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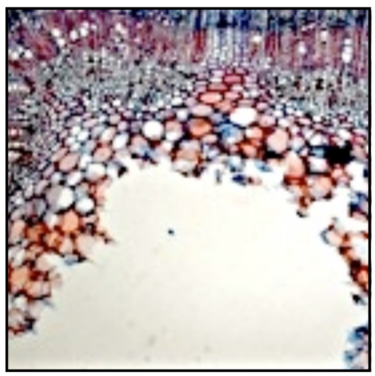

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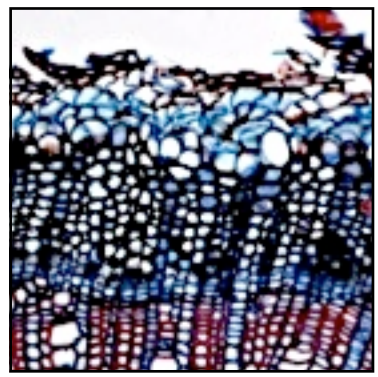

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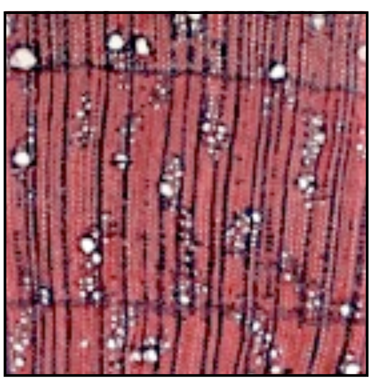
Satureja thymbra L.



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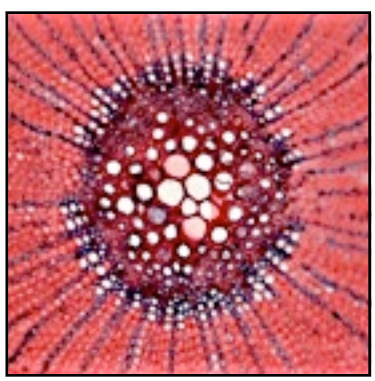

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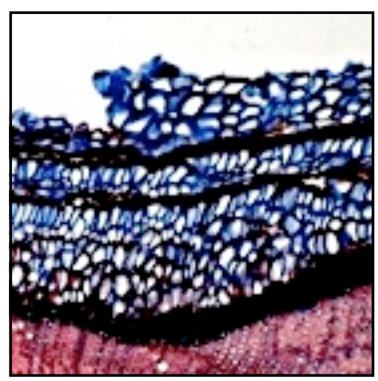

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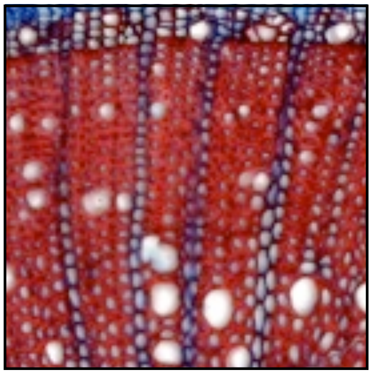
Plate no. 40

Scutellaria sibthorpii Boiss. et Reut. ex Boiss.



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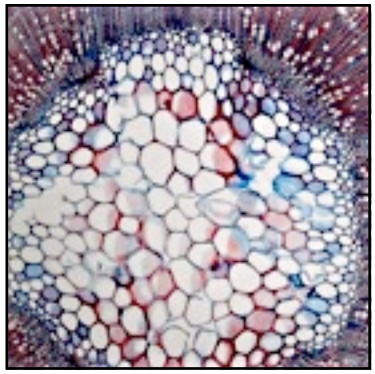

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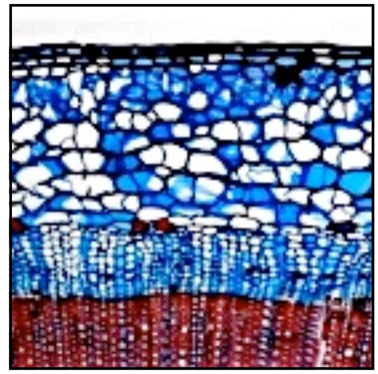
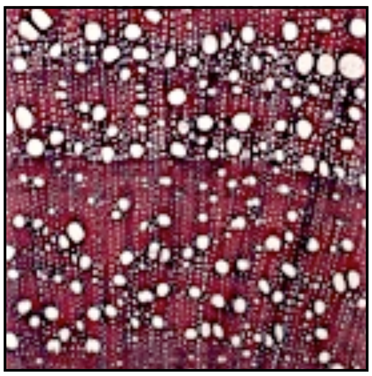


100x

Sideritis cypria Post



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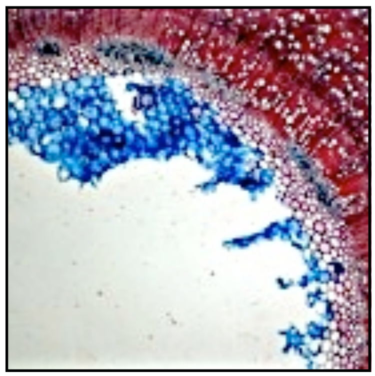

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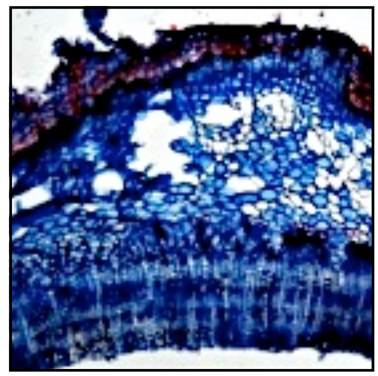

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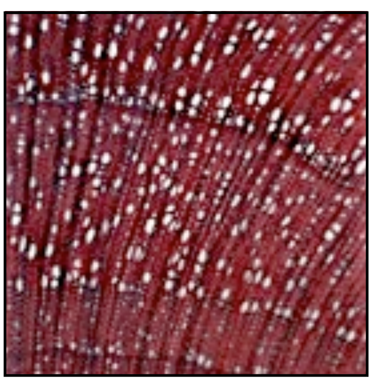
Teucrium micropodioides Rouy



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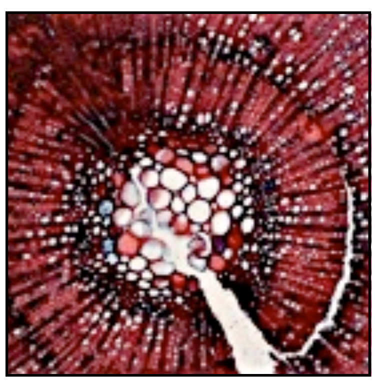

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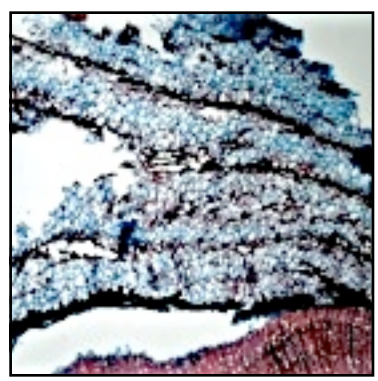
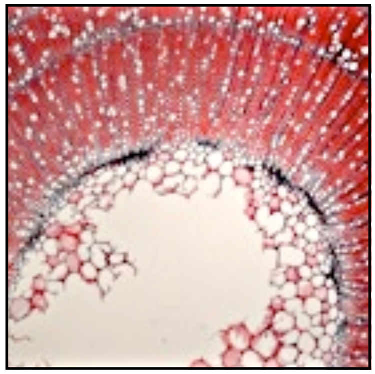


40x

Plate no. 41

Teucrium creticun L.

100x



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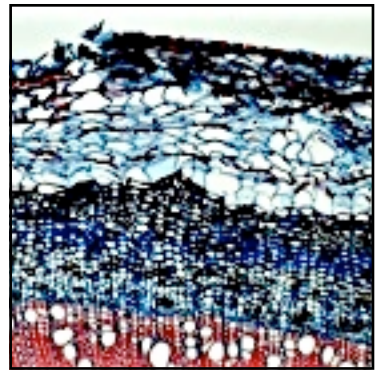

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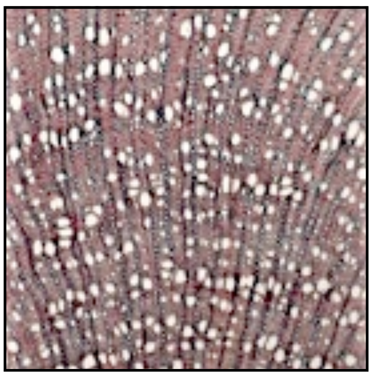
Teucrium cyprium Boiss. *cyprium*



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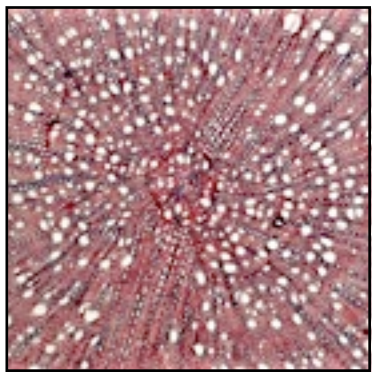

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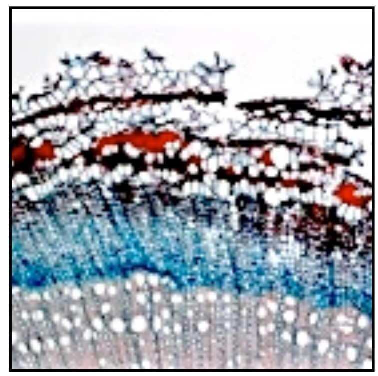

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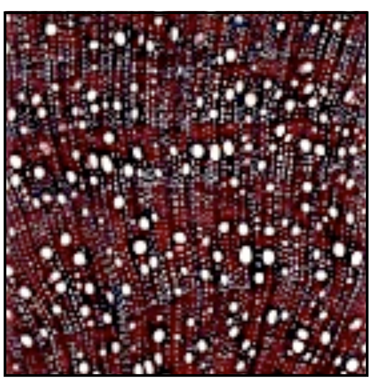
Teucrium cyprium Boiss. subsp. *kyreniae* Boiss. P.H. Davis



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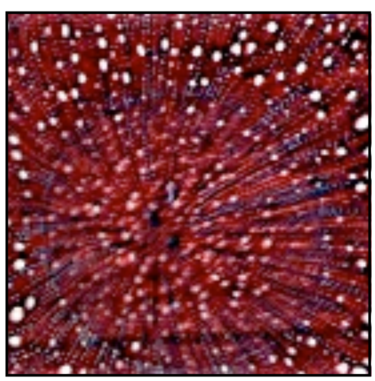

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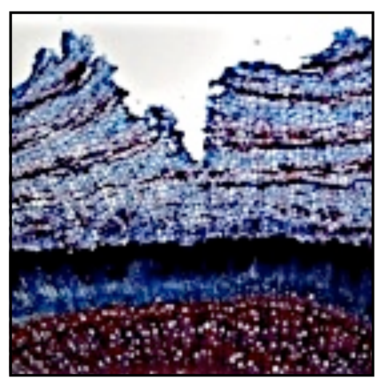

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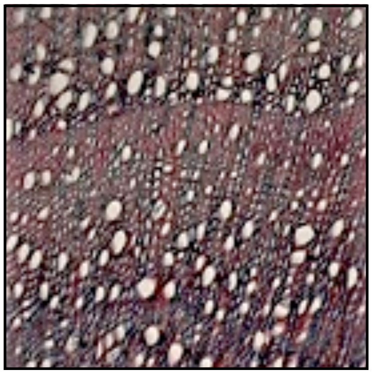
Plate no. 42

Teucrium divaricatum subsp. *canescens* Heldr. (Celak.) Holmboe



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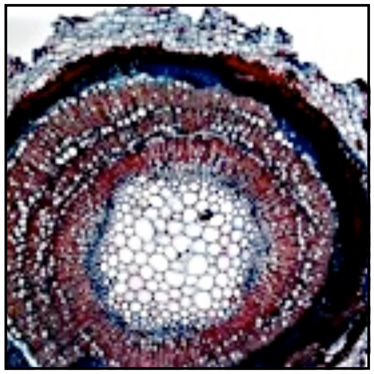

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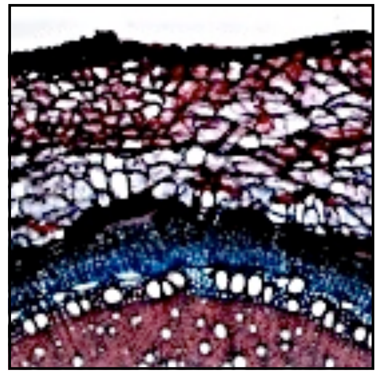

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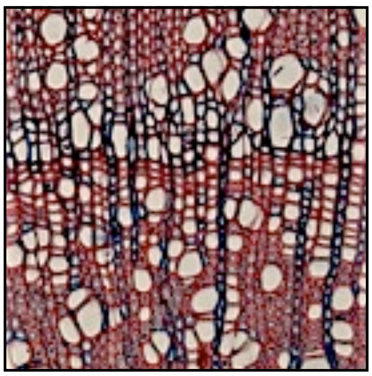
Teucrium kotschyanum Poech.



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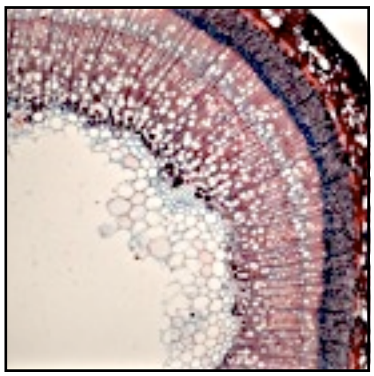

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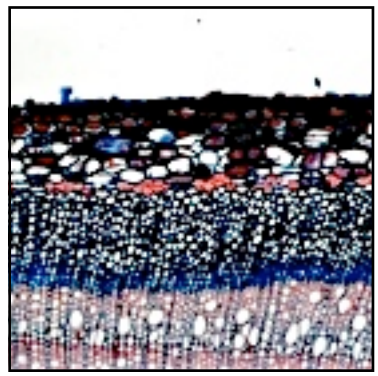
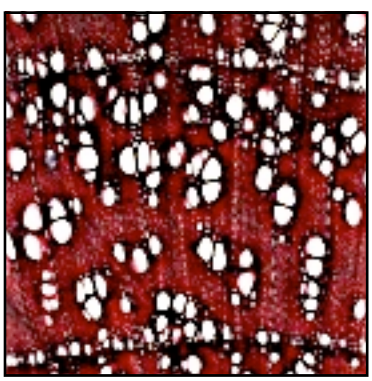


100x

Thymus capitatus (L.) Hoffmanns



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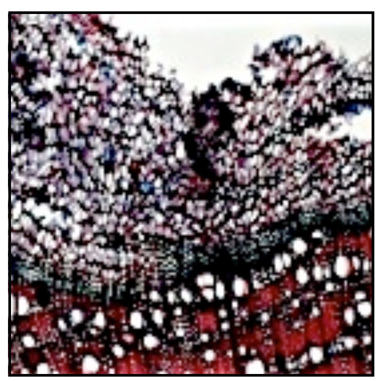

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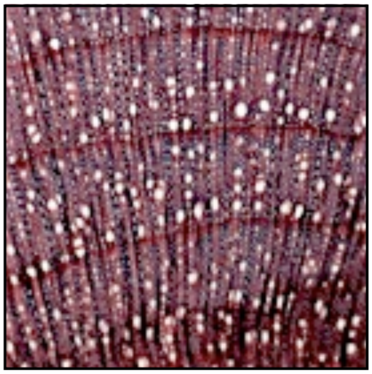
Plate no. 43

Thymus intiger Griseb.



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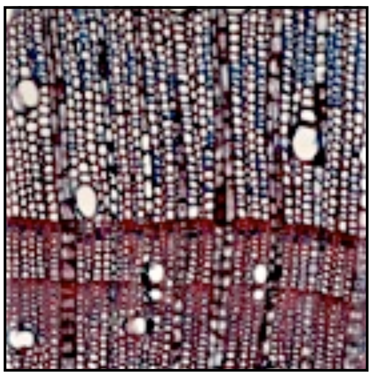
100x

Laurus nobilis L.



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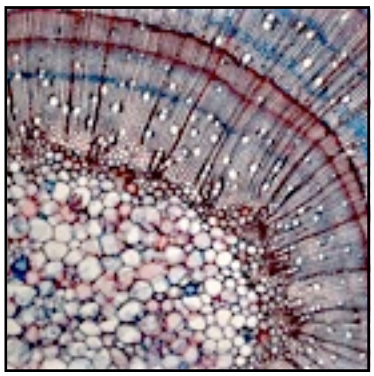

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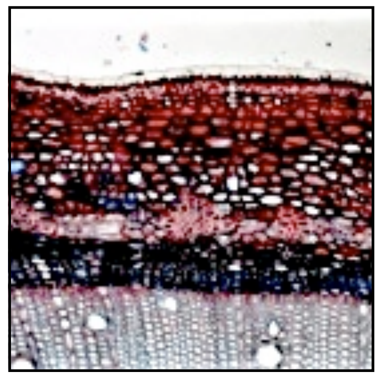

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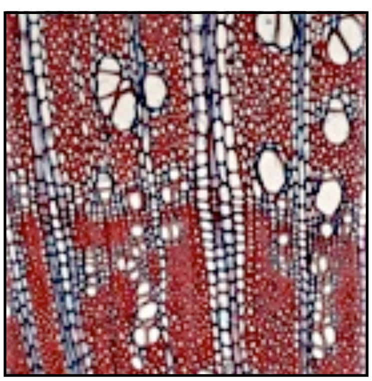
Lavatera bryoniifolia Mill.



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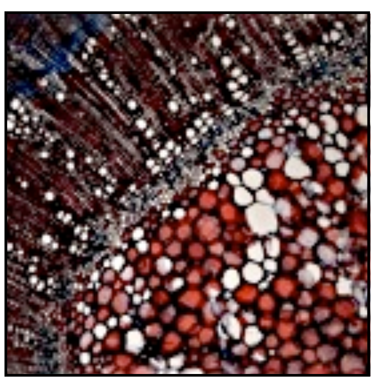

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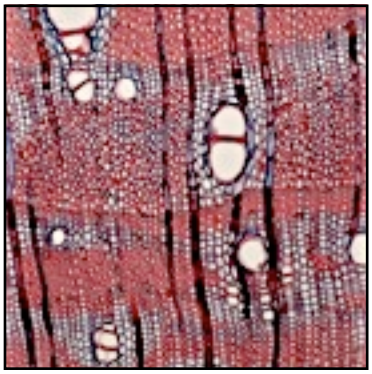
100x

Plate no. 44

Acacia saligna (Labill.) H.L.Wendl.



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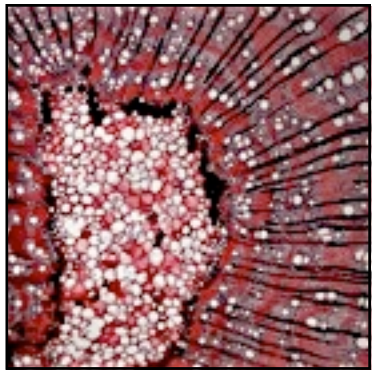

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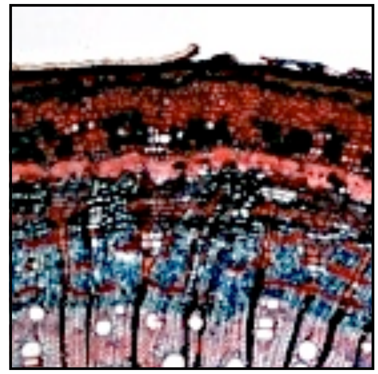

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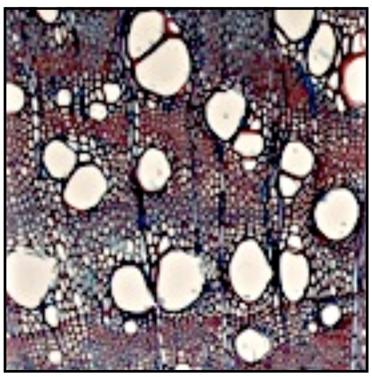
Prosopis fracta (Banks & Sol.) J.F.Macbr.



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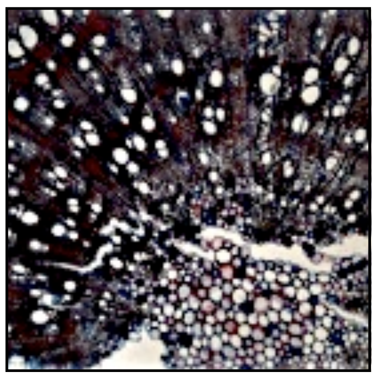

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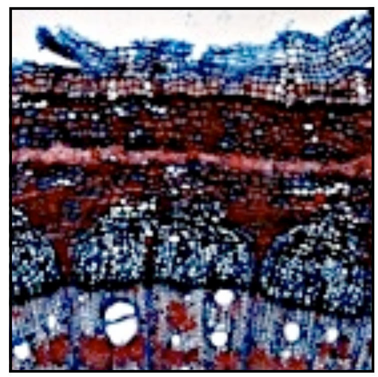

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Ficus carica L.

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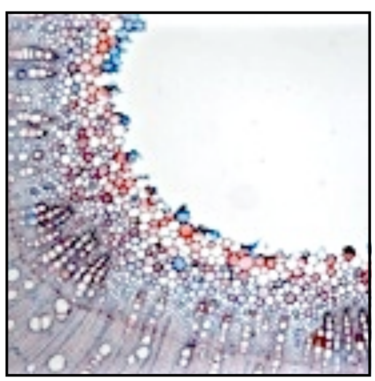

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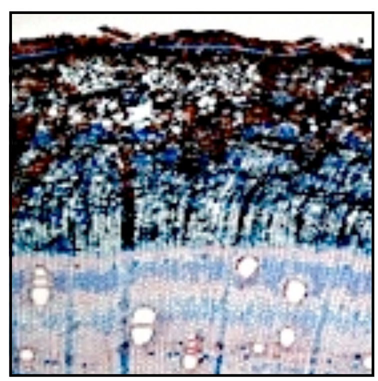

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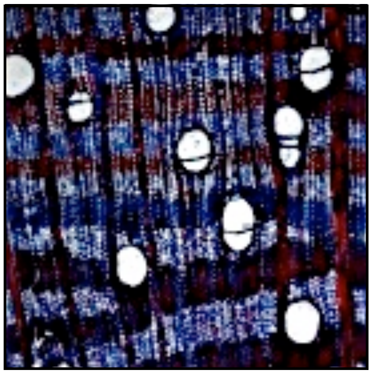
Plate no. 45

Ficus sycomorus L.



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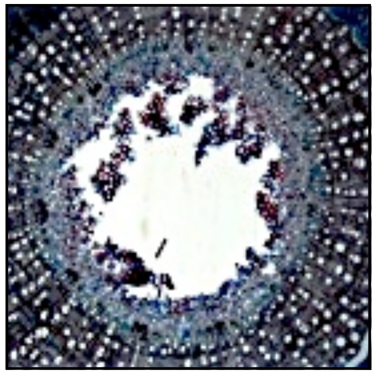

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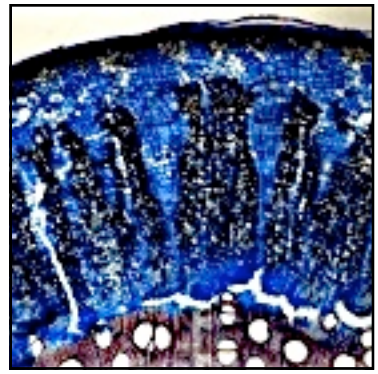

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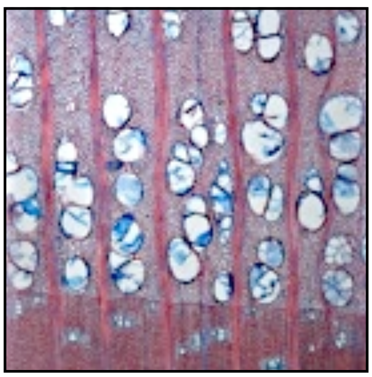
Morus alba L.



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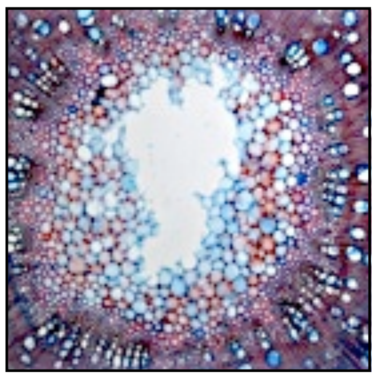

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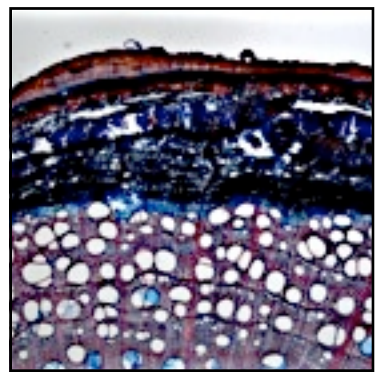

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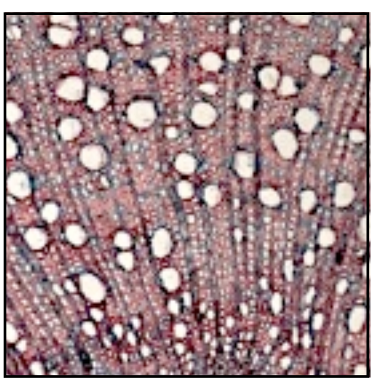
Callistemon lanceolatus DC.



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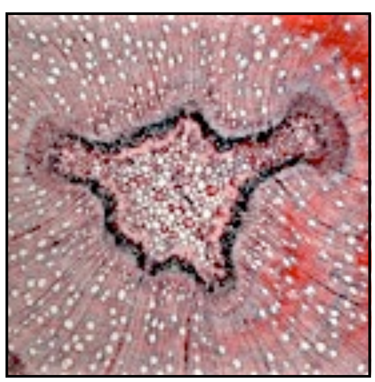

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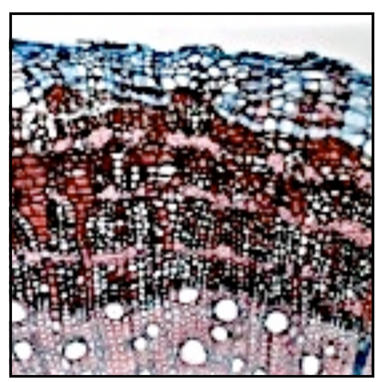

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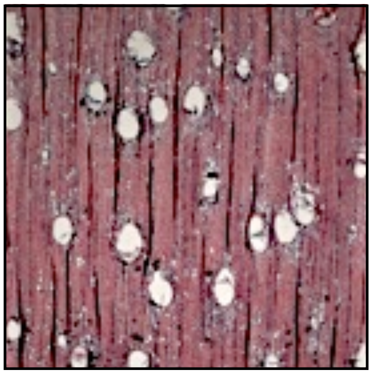
Plate no. 46

Eucalyptus camaldulensis Dehnh.



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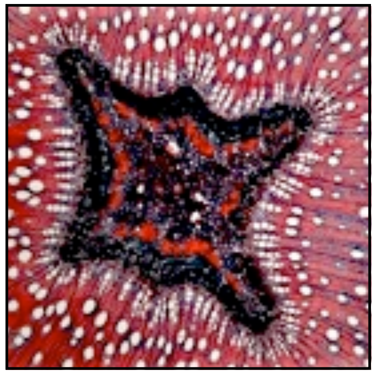

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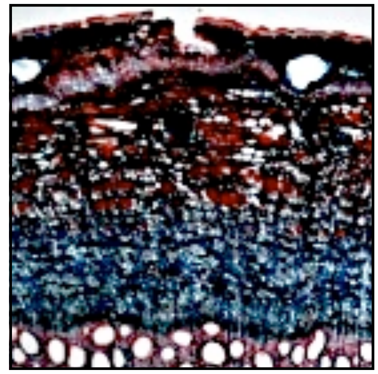

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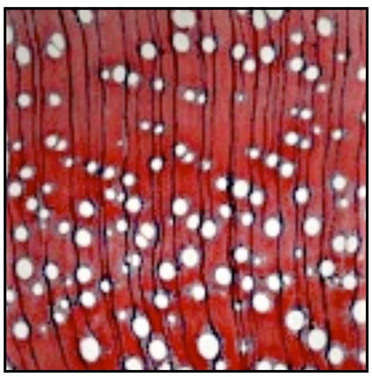
Eucalyptus gomphocephala DC.



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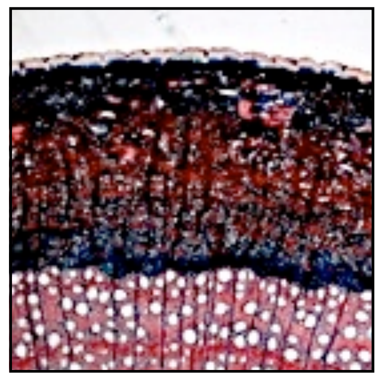

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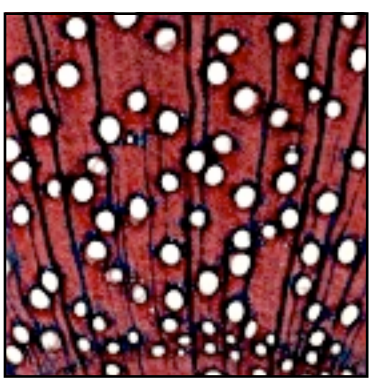
Eucalyptus salubris F.Muell.



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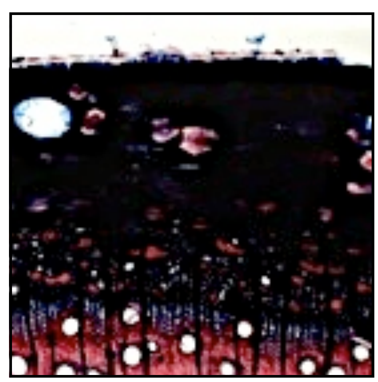

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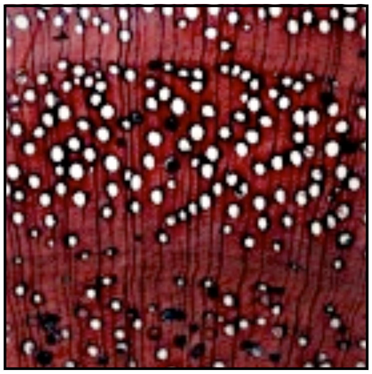
Plate no. 47

Eucalyptus torquata Luehm.



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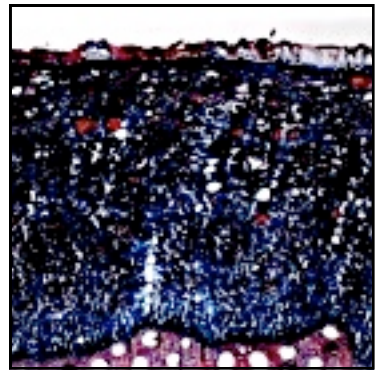

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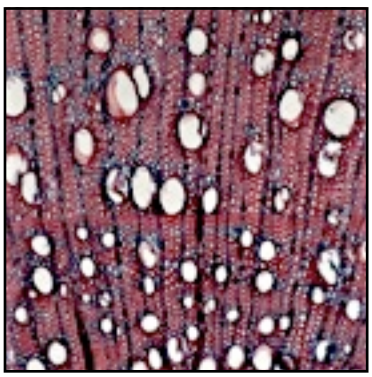
Melaleuca almillaris (Sol. ex Gartn.) Sm.



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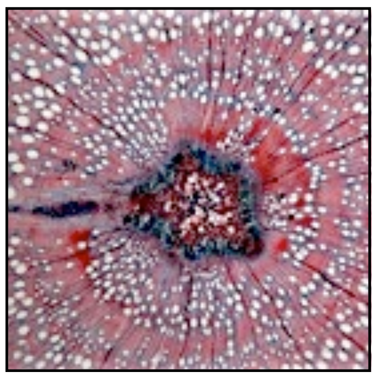

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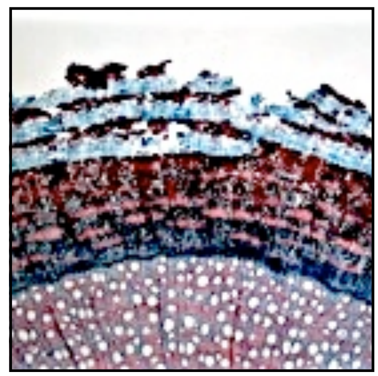

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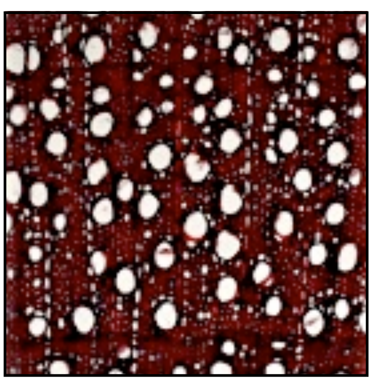
Myrtus communis L.



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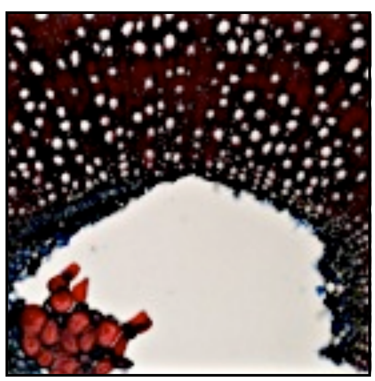

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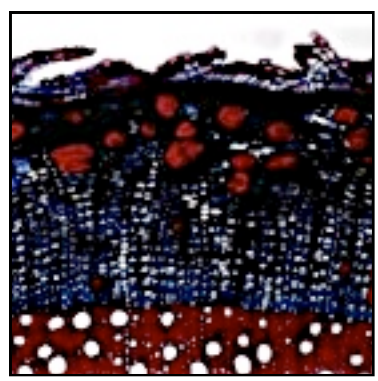

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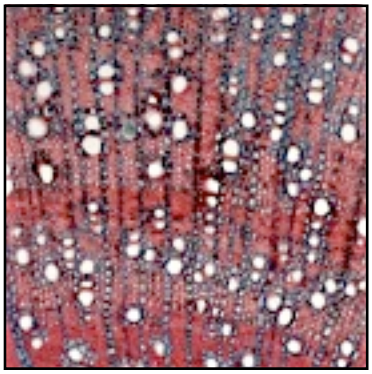
Plate no. 48

Olea europaea L.



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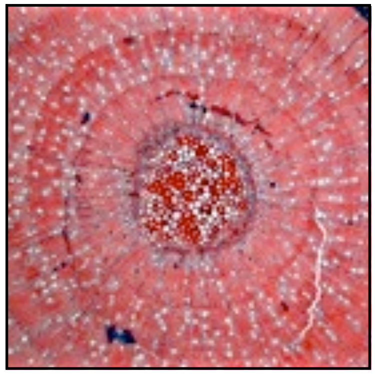

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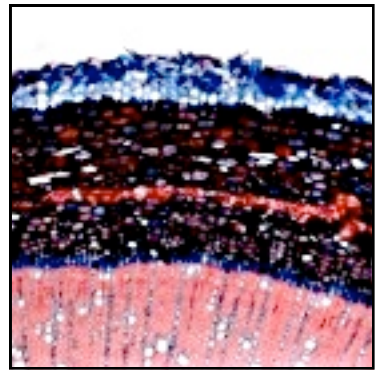

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Phillyrea latifolia L.

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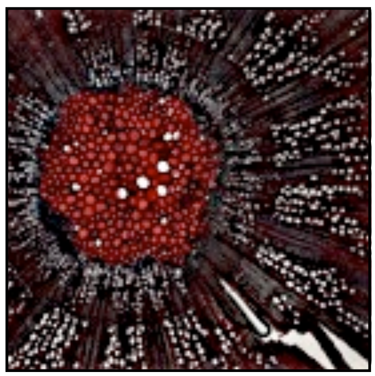

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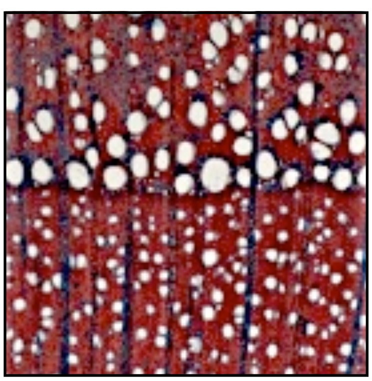
Syringa vulgaris L.



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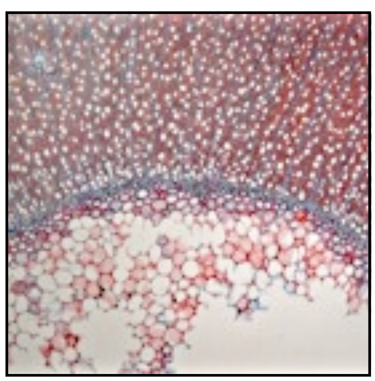

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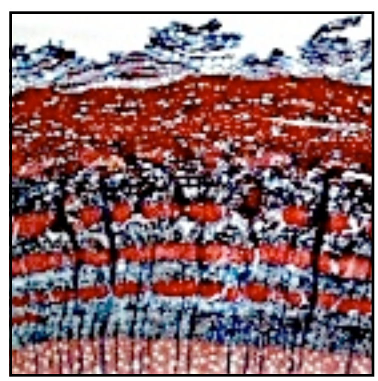

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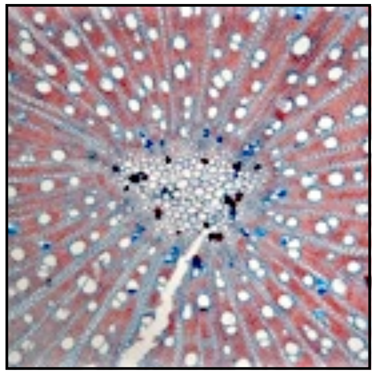
Plate no. 49

Alhagi graegorum Boiss.

100x



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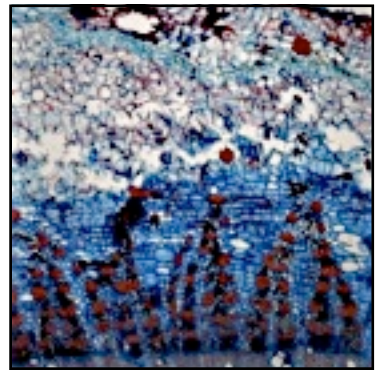

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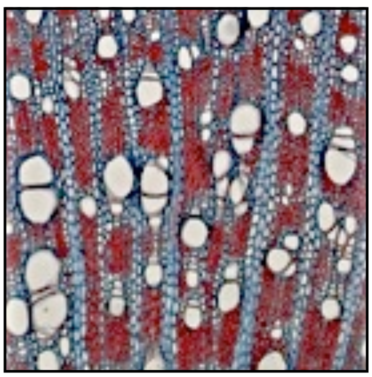
Alhagi maurorum Medik.



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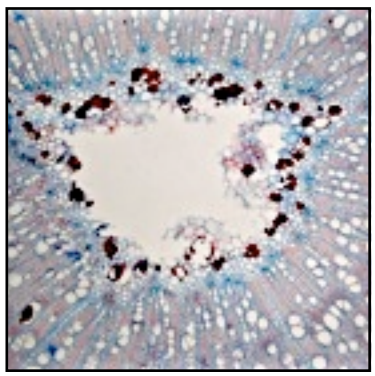

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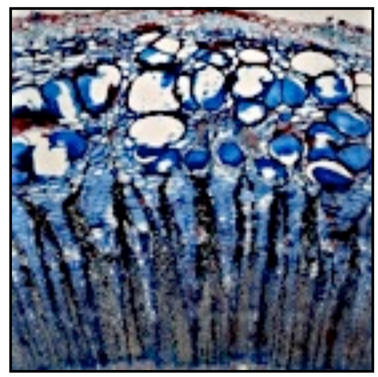

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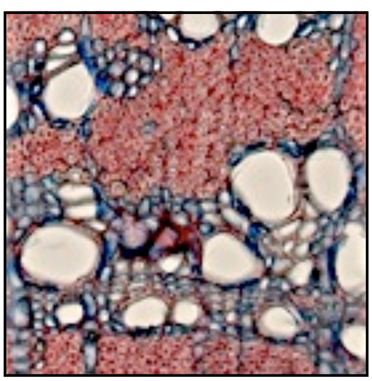
Anagyris foetida L.



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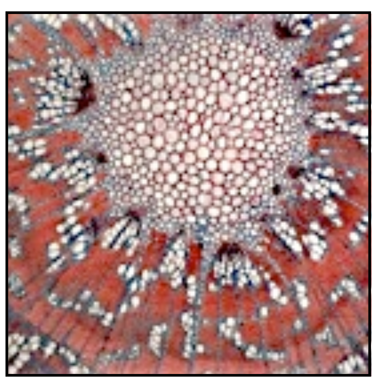

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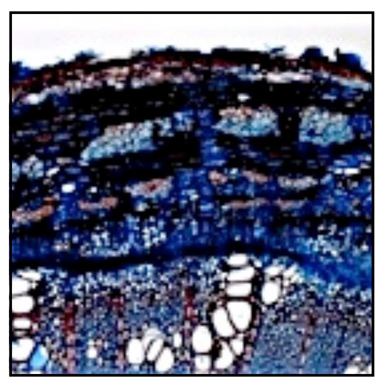

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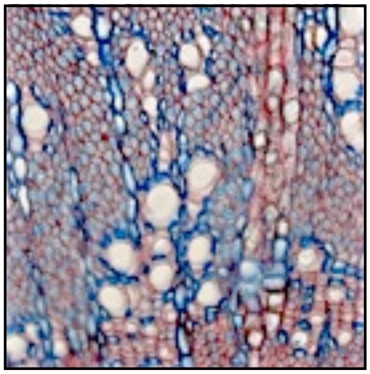
Plate no. 50

Argyrolobium uniflorum (Dec.) Jaub. & Spach



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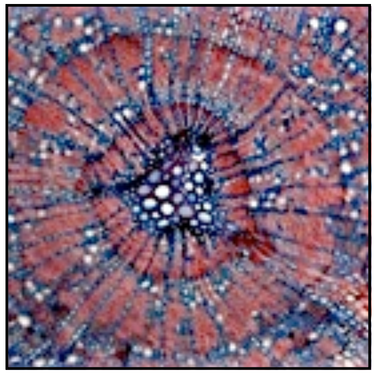

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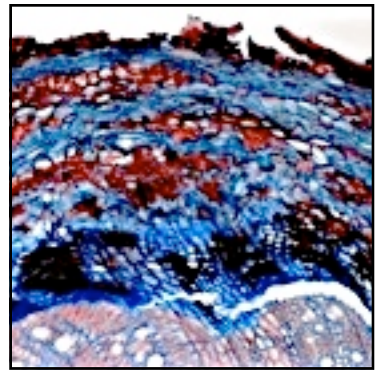

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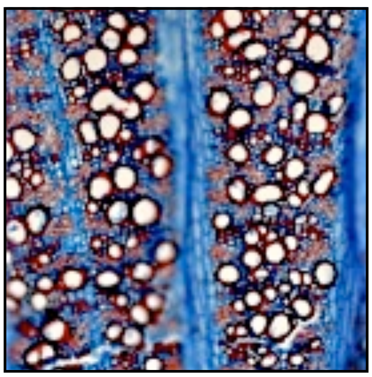
Astragalus echinus subsp. *echinus* DC.



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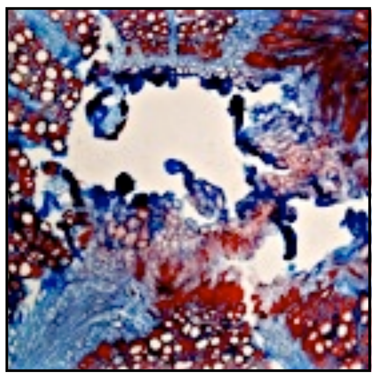

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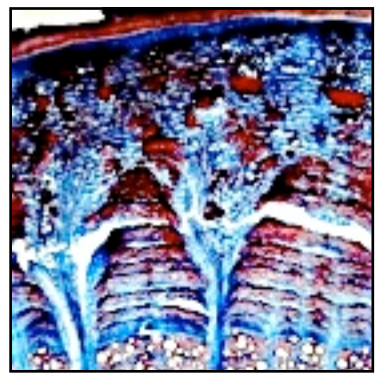

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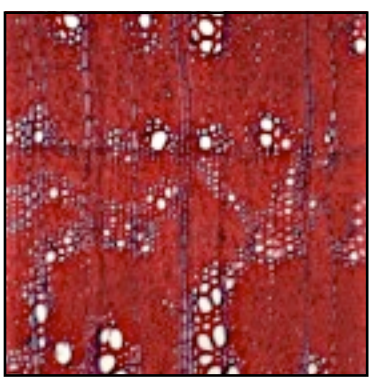
Calycotome villosa (Poir.) Link



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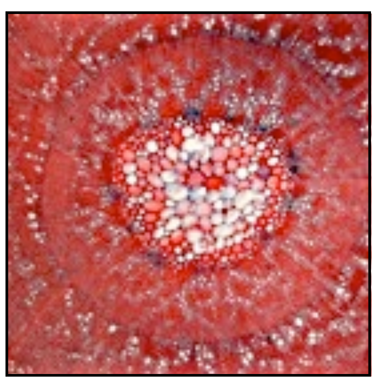

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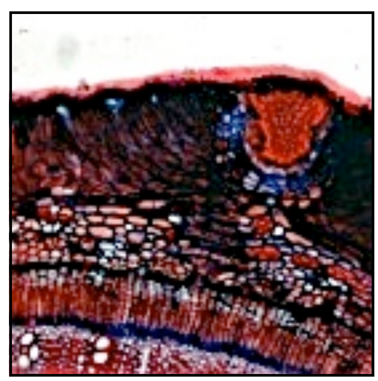

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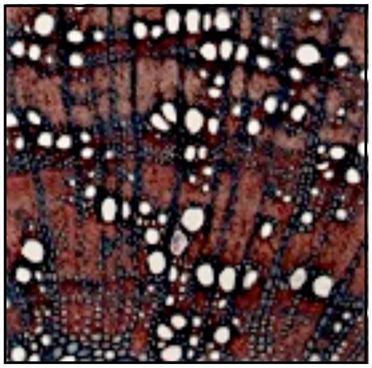
Plate no. 51

Coronilla emerus L. subsp. *emeroides* (Boiss. et Spruner.) Holmboe



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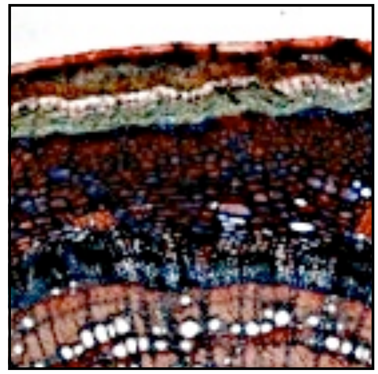

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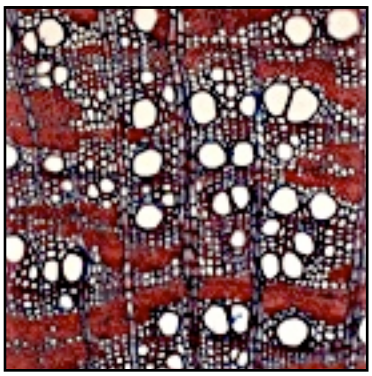
Genista sphacelata Decne



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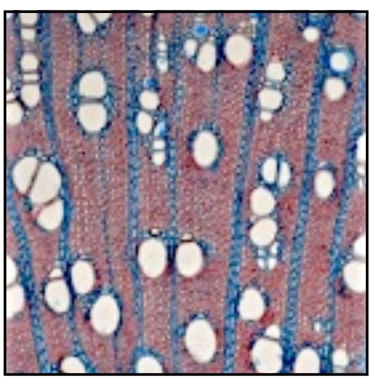
40x

40x

Glycyrrhiza glabra L.



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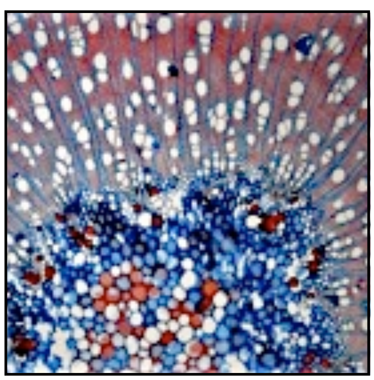

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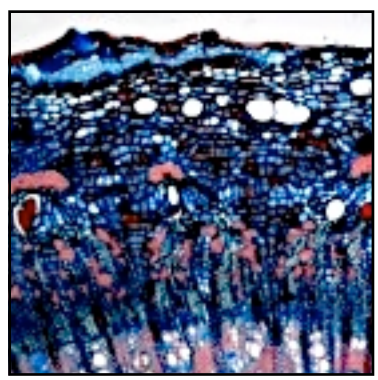

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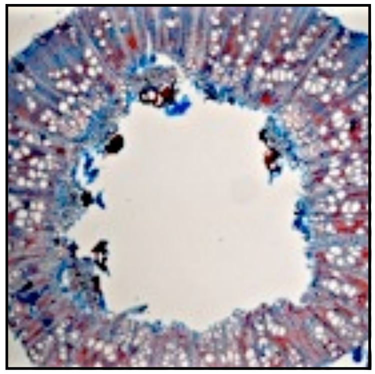
Plate no. 52

Hedysarum cyprium Boiss.

100x



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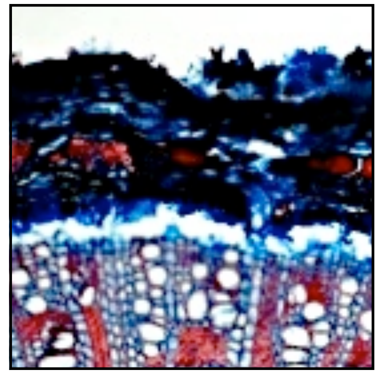

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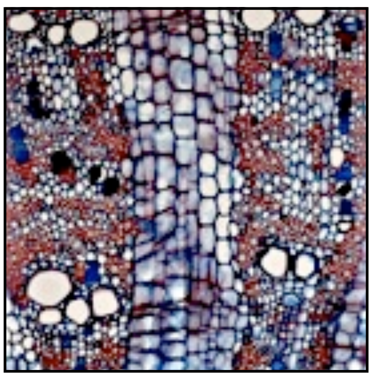
Ononis spinosa L. (Boiss.) subsp. *leiosperma* Sirjaev



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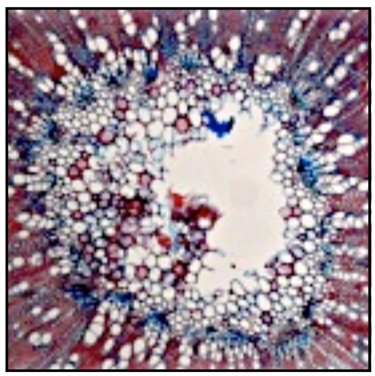

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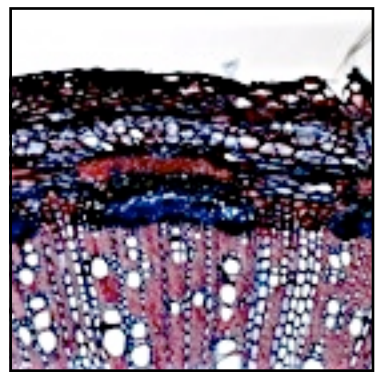

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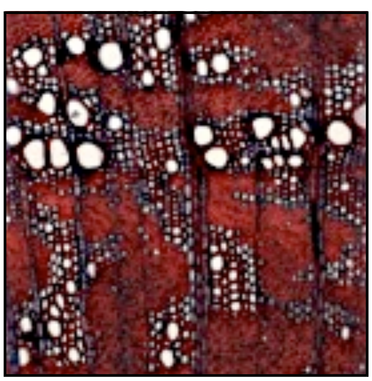
Spartium junceum L.



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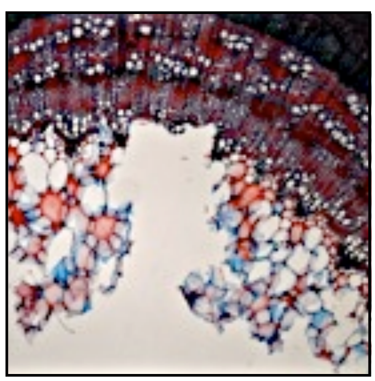

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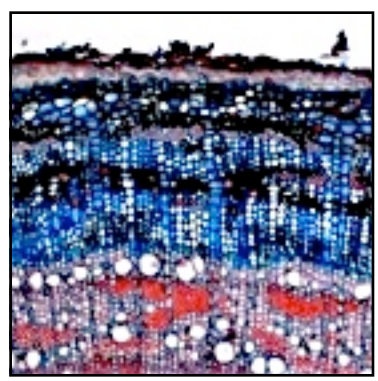

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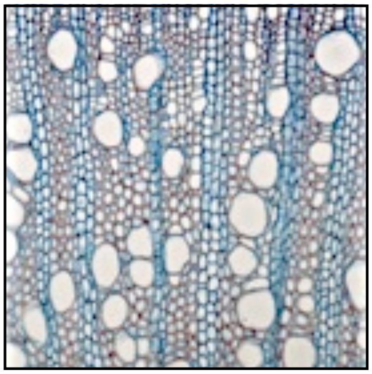
Plate no. 53

Phytolacca pruinosa Fenzi



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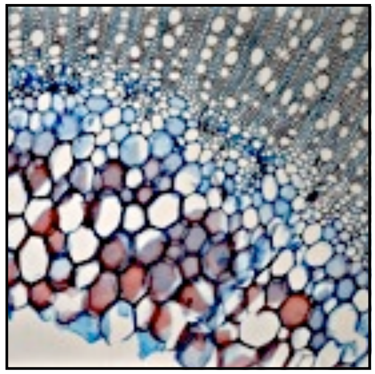

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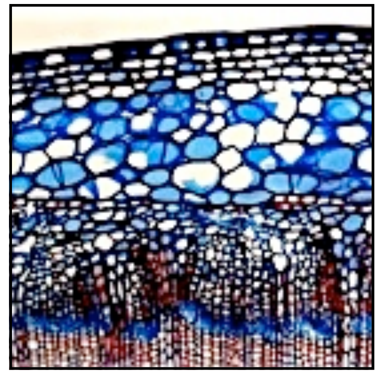

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Platanus orientalis L.

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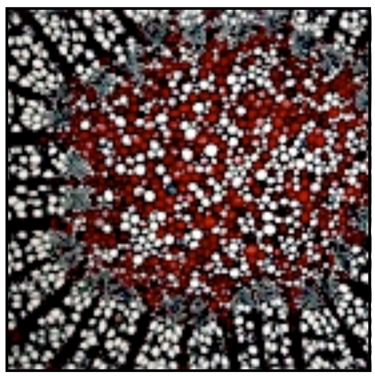

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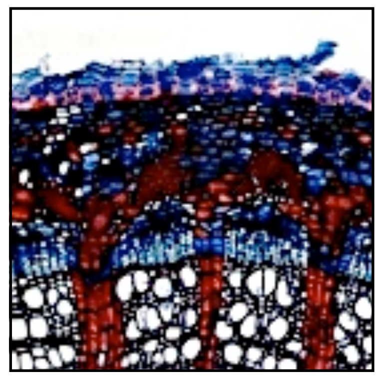

100x

Plumbago auriculata Lam.

100x

40x

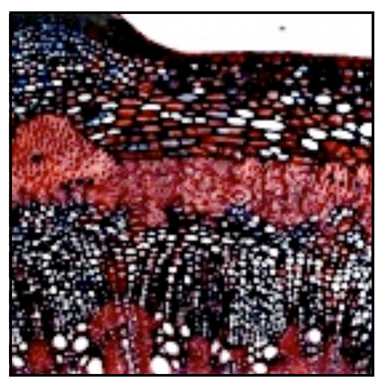

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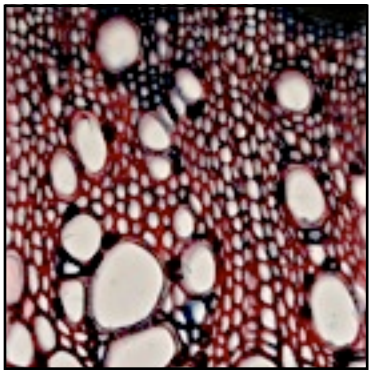
Plate no. 54

Plumbago europaea L.



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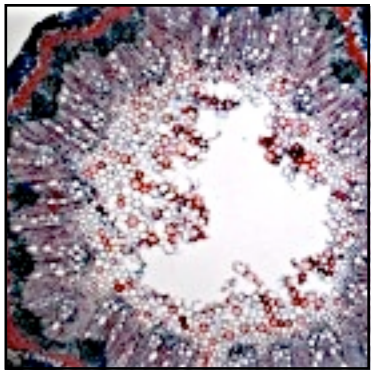

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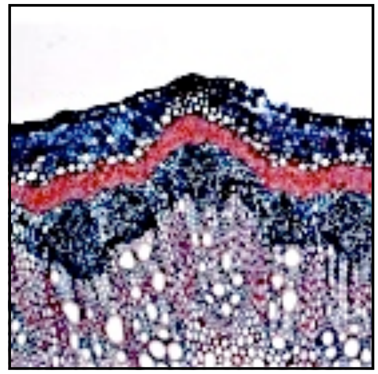

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Punica granatum L.

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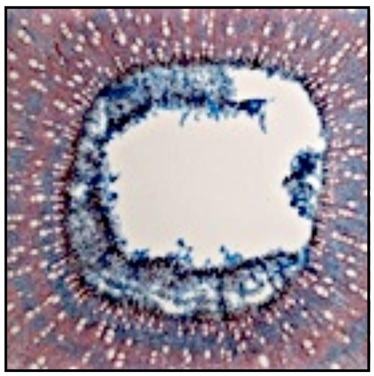

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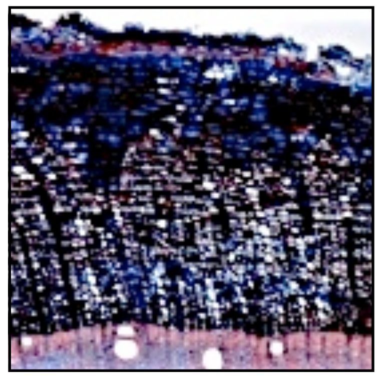

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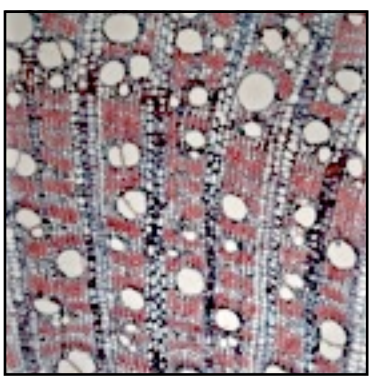
Clematis cirrhosa L.



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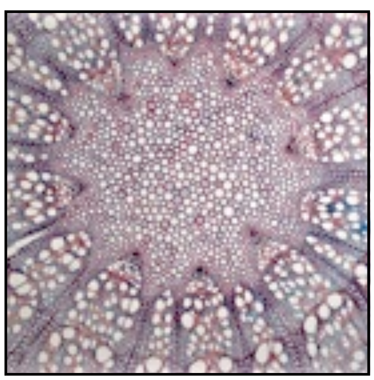

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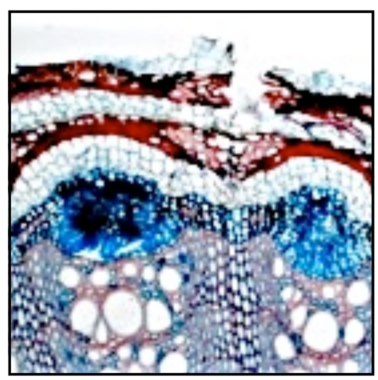

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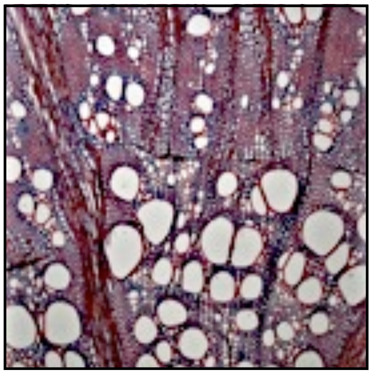
Plate no. 55

Clematis vitalba L.



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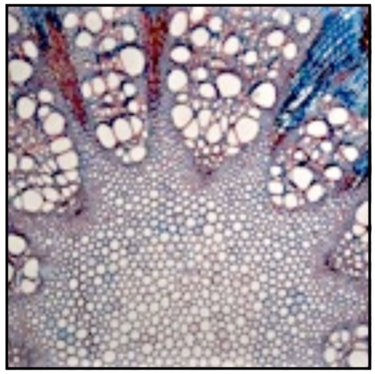

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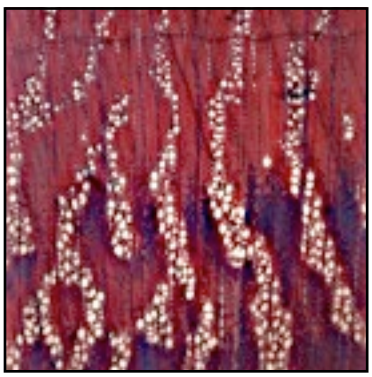
Rhamnus alaternus L.



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Rhamnus oleoides L.

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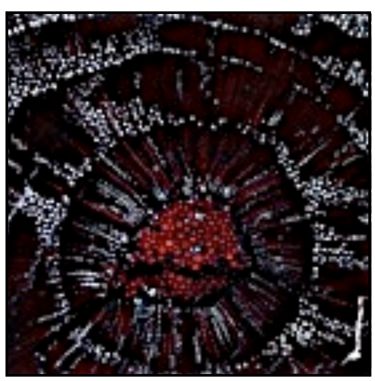

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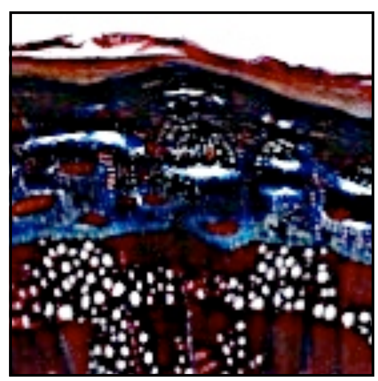

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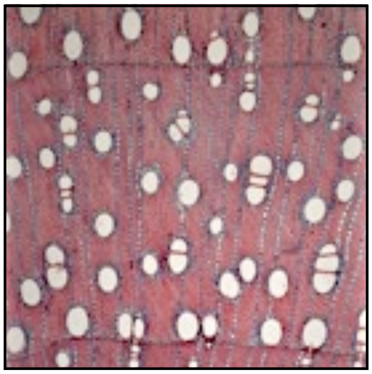
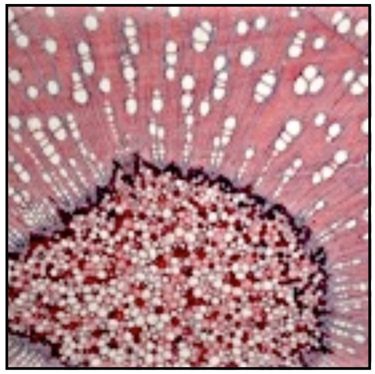
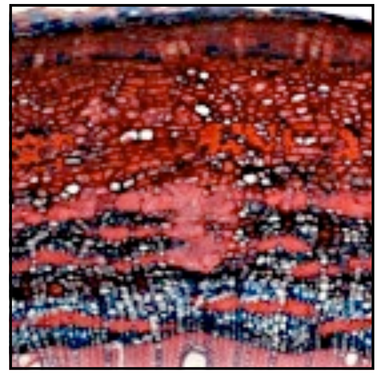
Plate no. 56

Zizyphus lotus (L.) Lam.

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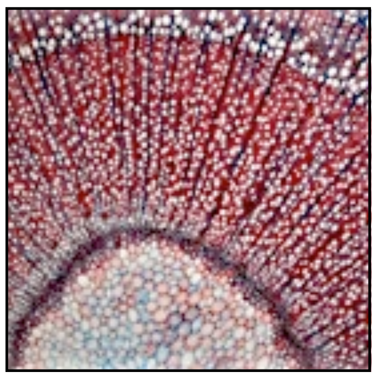
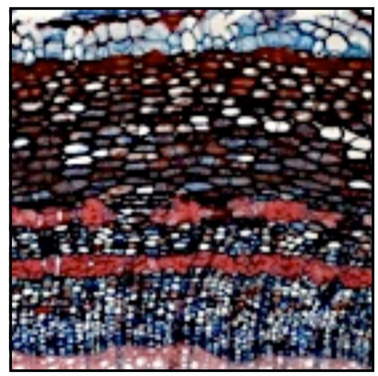
Zizyphus spina-christi (L.) Willd.

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Zizyphus zizyphus (L.) Meikle

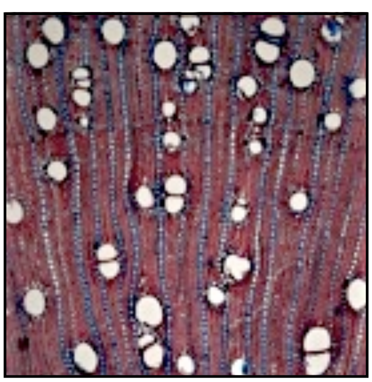
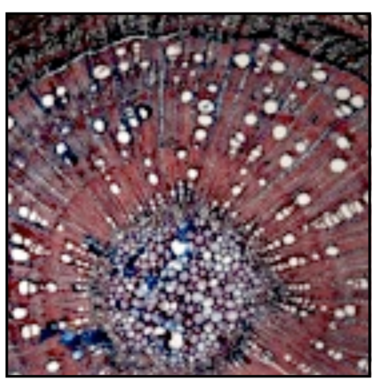

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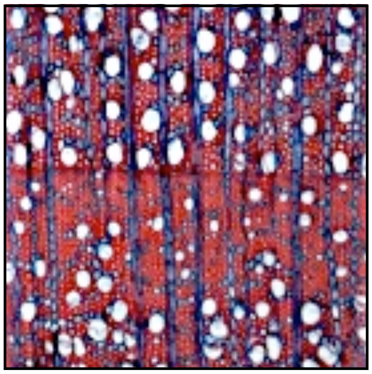
Plate no. 57

Cotoneaster racemiflorus (Desf.) C.Koch var. *nummularius* (Fisch. et Meyer) Dippel



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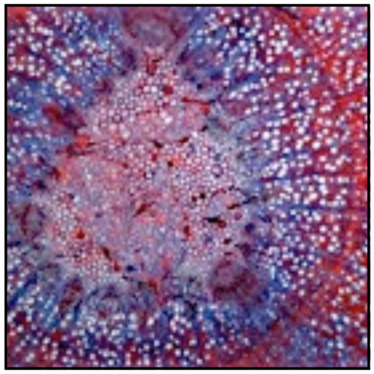

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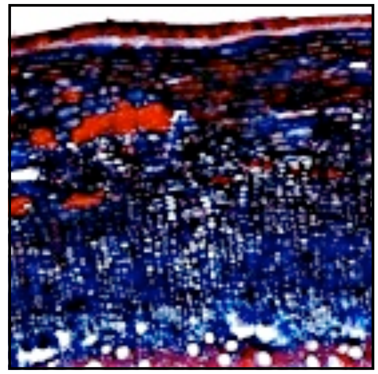

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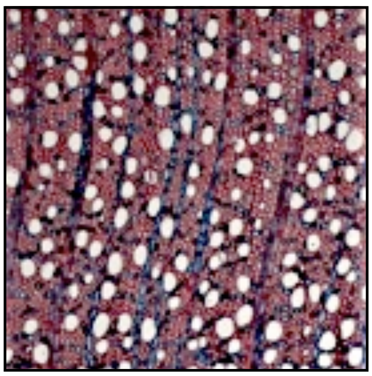
Crataegus azarolus L.



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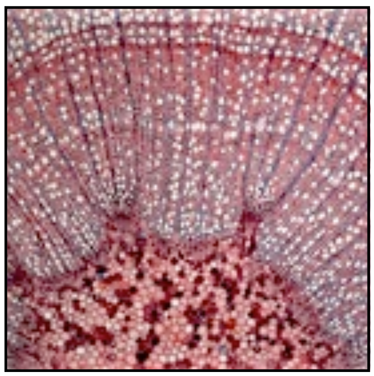

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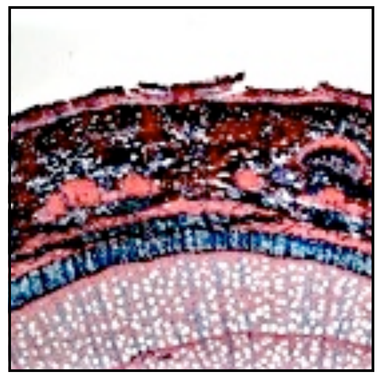

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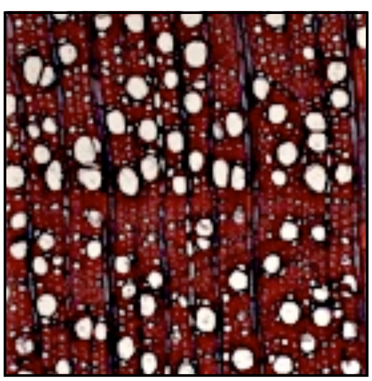
Crataegus monogina Jacq.



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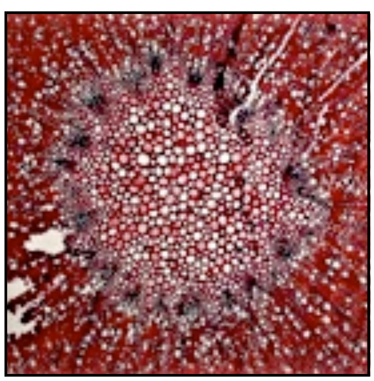

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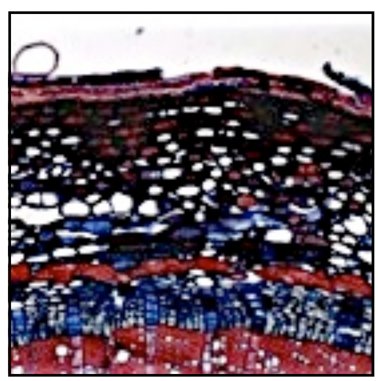

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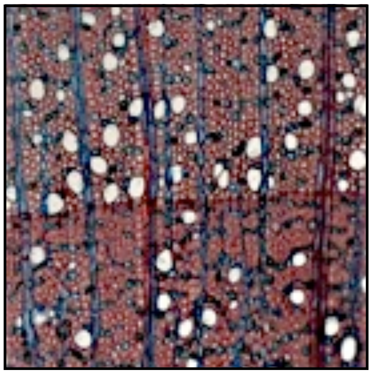
Plate no. 58

Crataegus sinaica Boiss.



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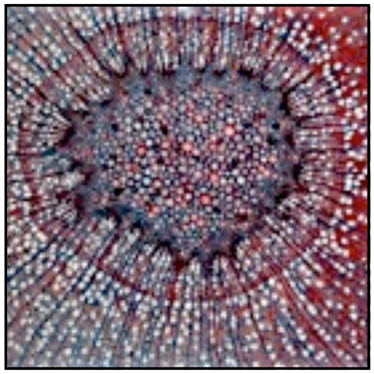

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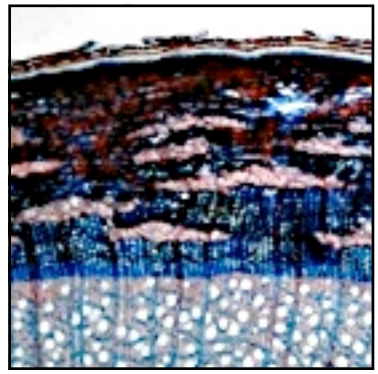

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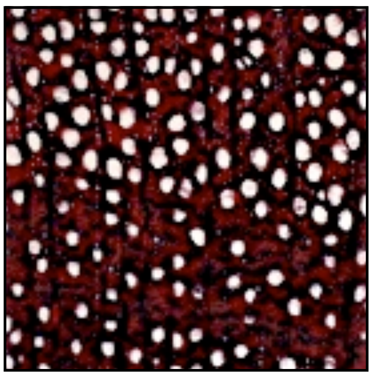
Cydonia oblonga Mill.



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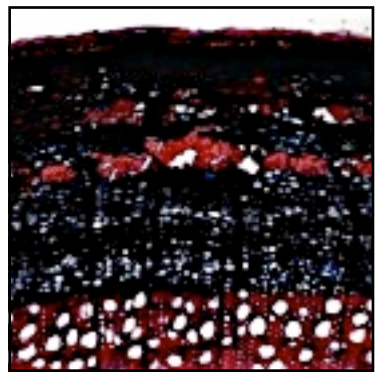

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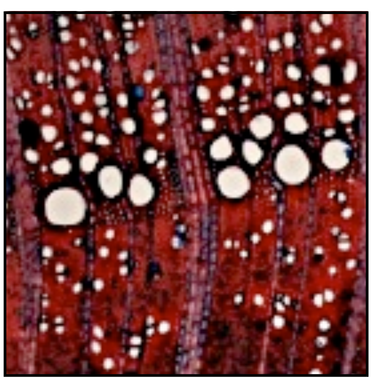
Prunus armeniaca L.



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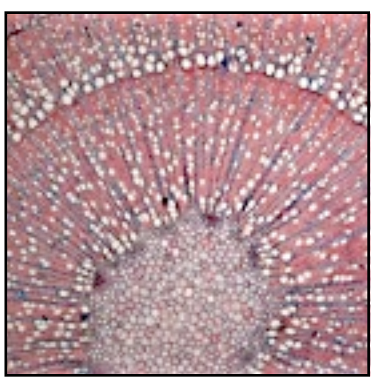

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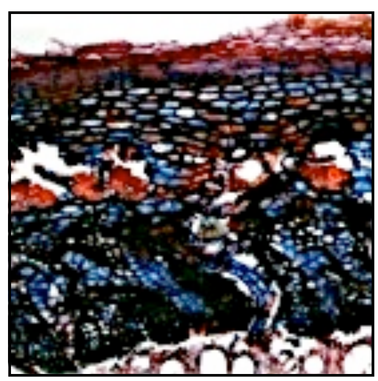

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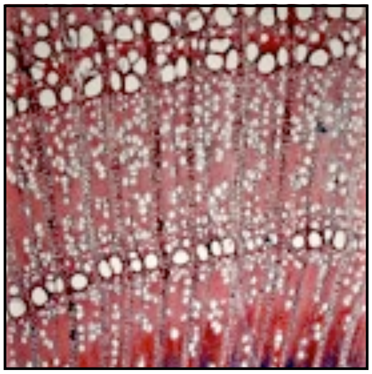
Plate no. 59

Prunus dulcis (Mill.) D.A.Webb



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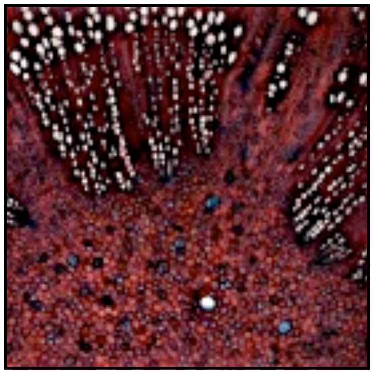

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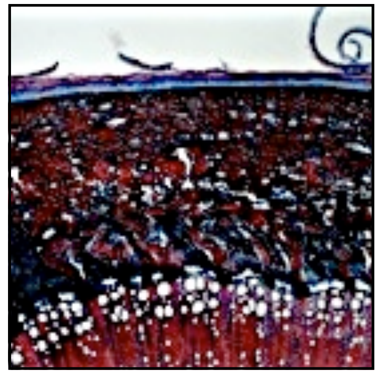

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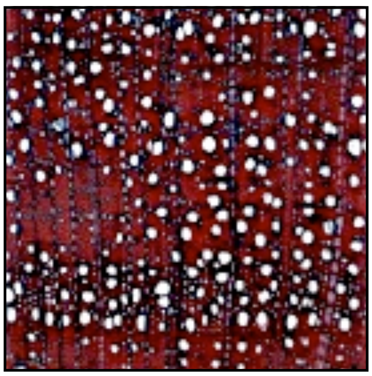
Pyracantha coccinea M.Roem.



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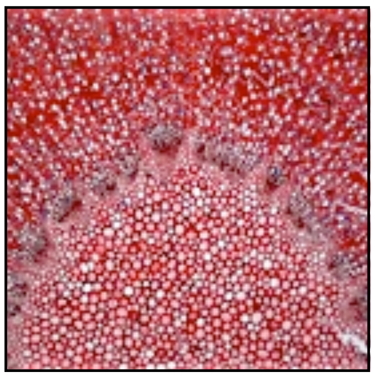

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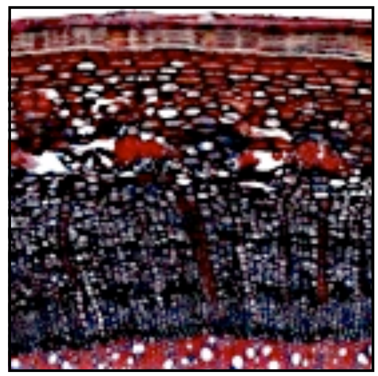

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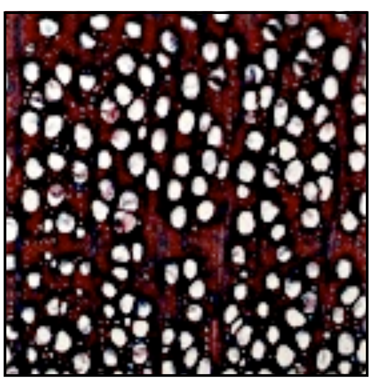
Pyrus malus L.



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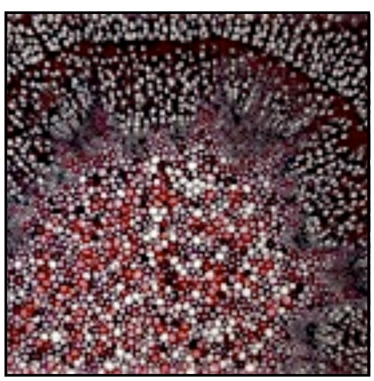

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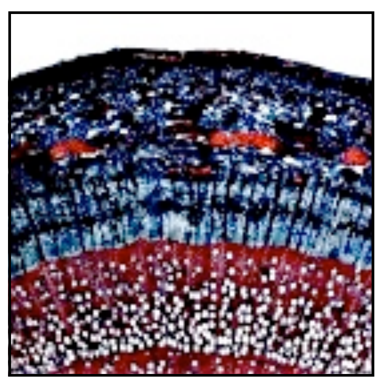
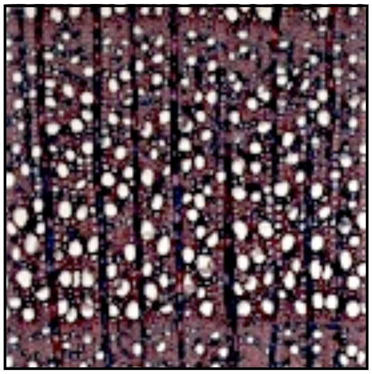


100x

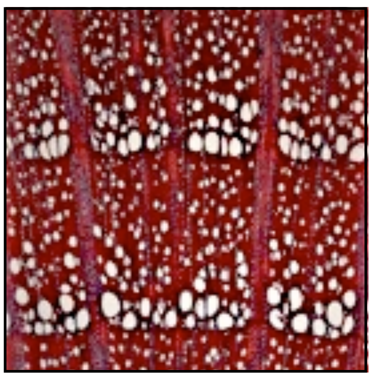
Plate no. 60

Pyrus syriaca Boiss.



100x | 40x | 100x

Rosa canina L.



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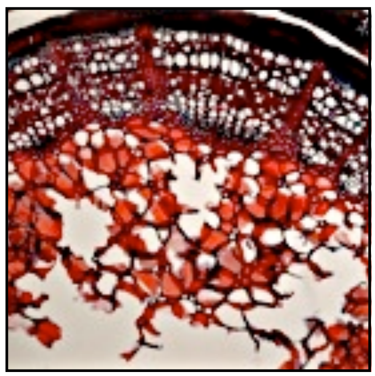

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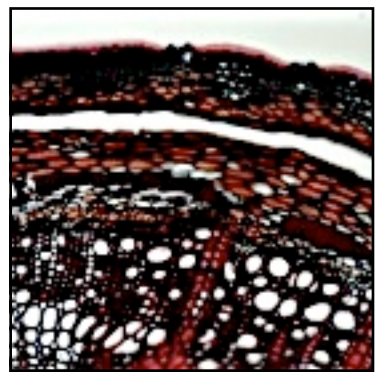
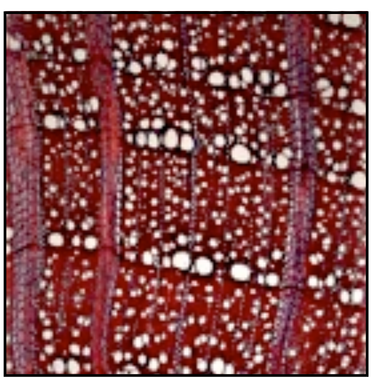


100x

Rosa chionistrae H. Lindb.



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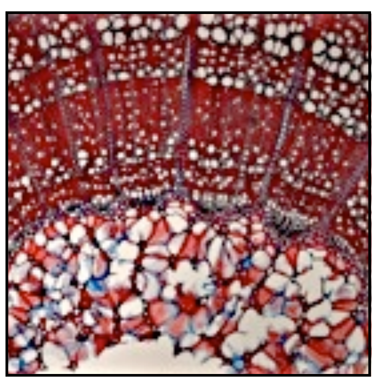

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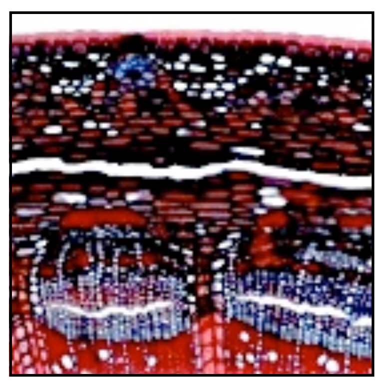
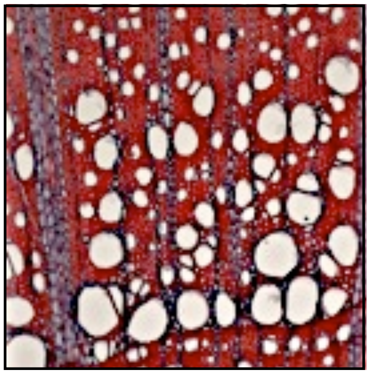


100x

Plate no. 61

Rosa damascena Mill.



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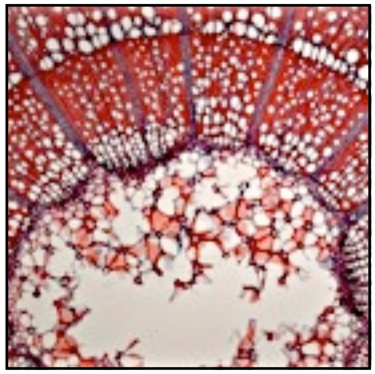

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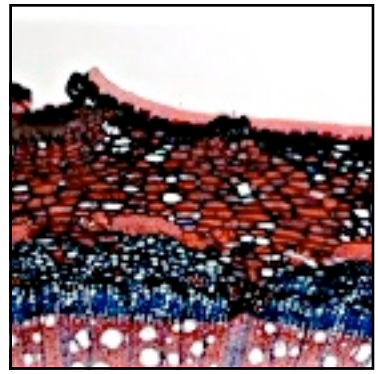
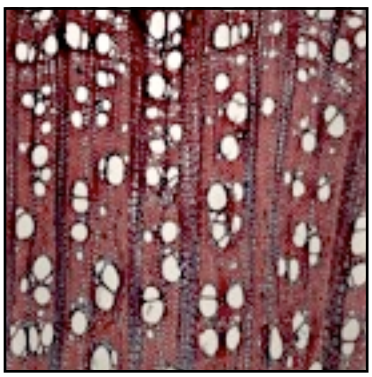


100x

Rubus discolor Weihe et Nees



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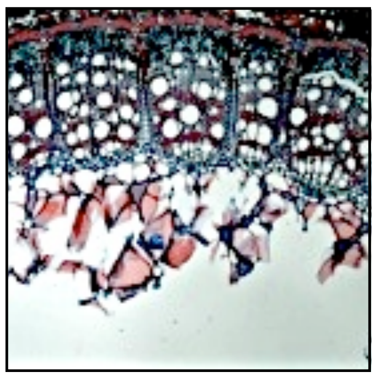

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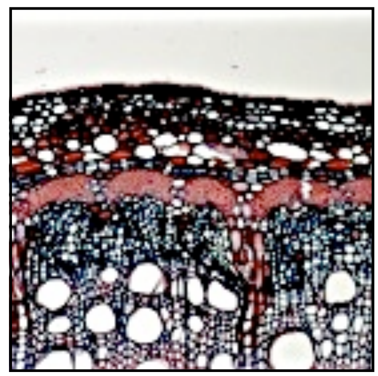

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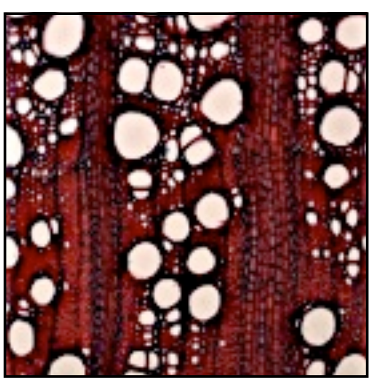
Rubus sanctus Schreb



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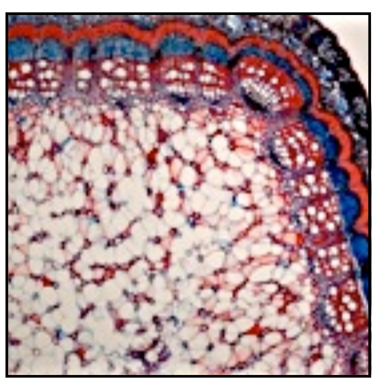

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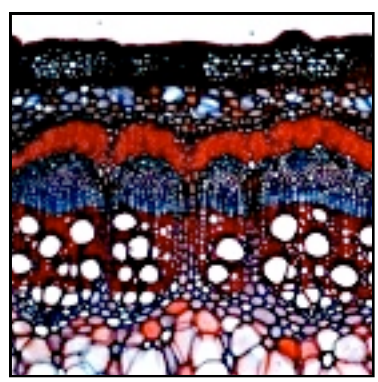
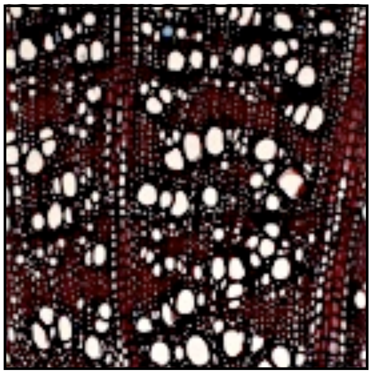


100x

Plate no. 62

Sarcopoterium spinosum (L.) Spach



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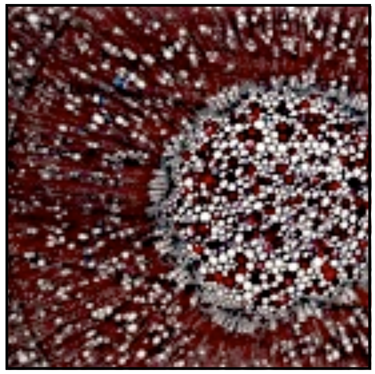

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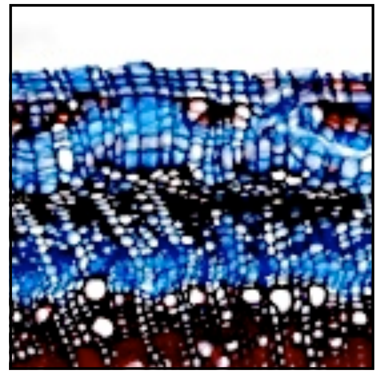
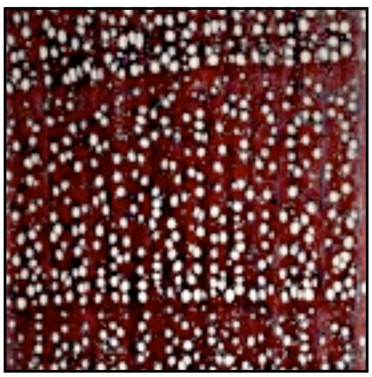


200x

Sorbus aria (L.) Crantz subsp. *cretica* (Lindl.) Holmboe



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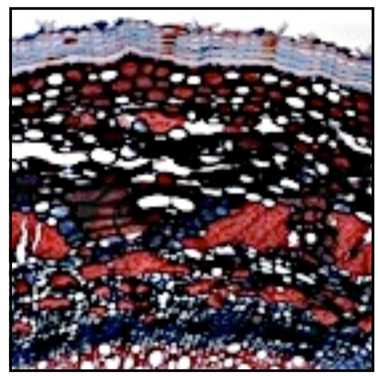

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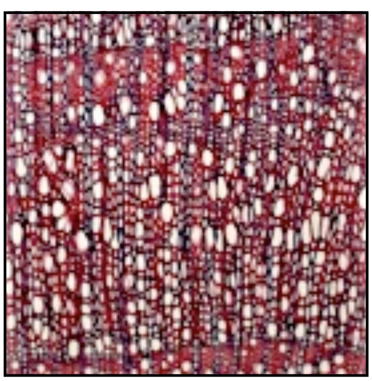
Asperula cypria Ehrend.



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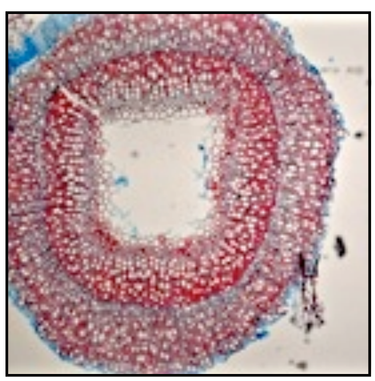

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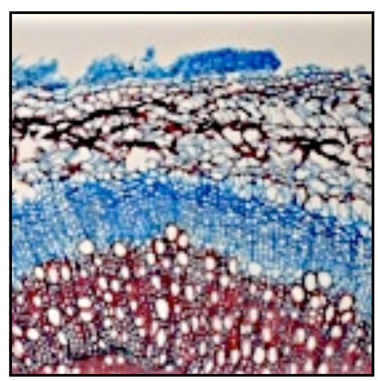
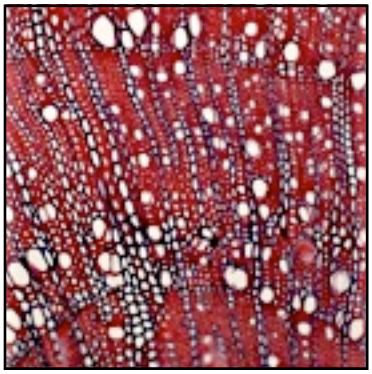


100x

Plate no. 63

Putoria calabrica (L.f.) DC.



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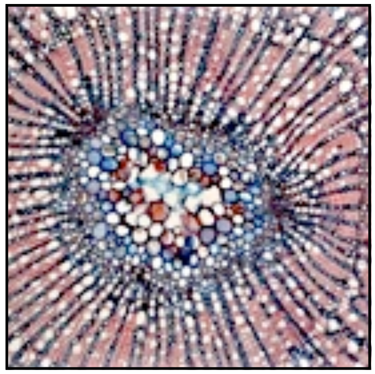

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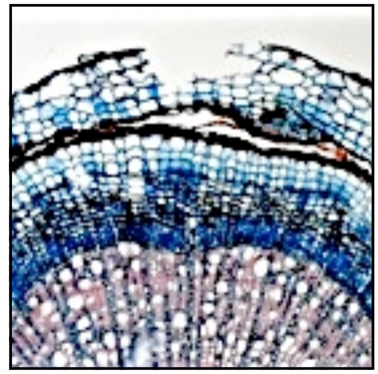

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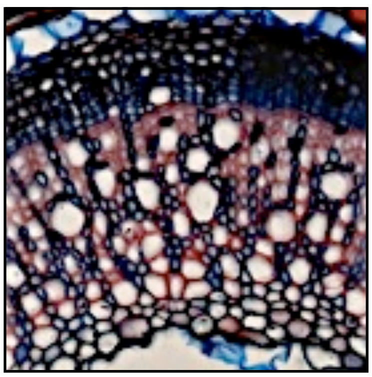
Rubia laurae (Holmboe) Airy Shaw



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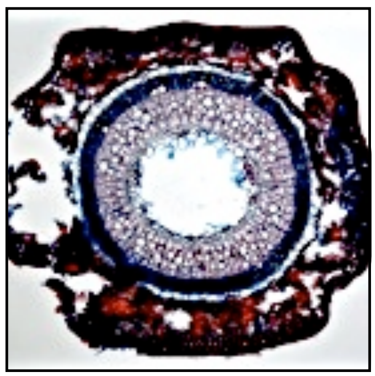

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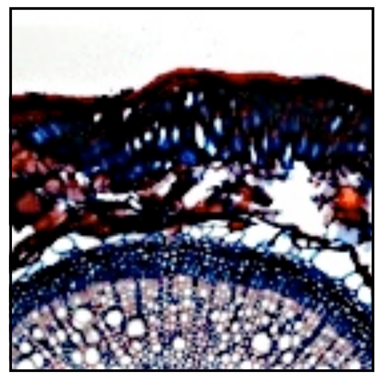

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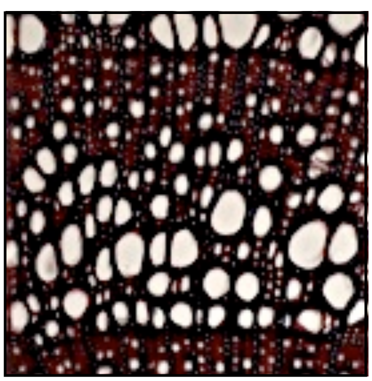
Rubia tenuifolia d'Urv.



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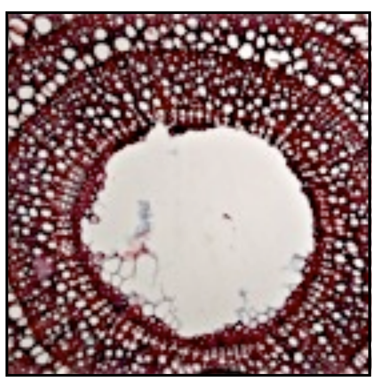

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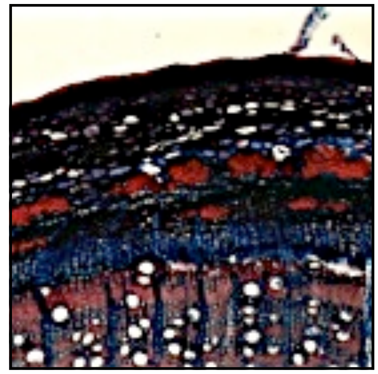
Plate no. 64

Citrus aurantium L.

40x



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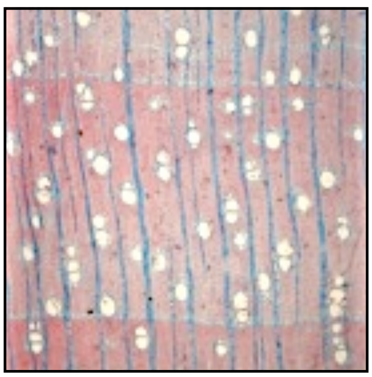
Citrus limon (L.) Burm.f.



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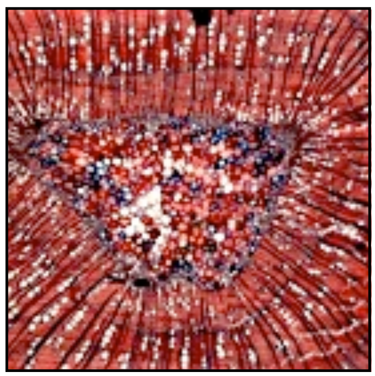

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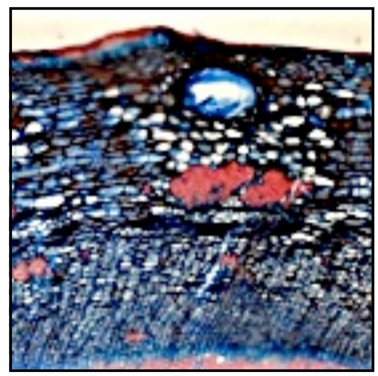

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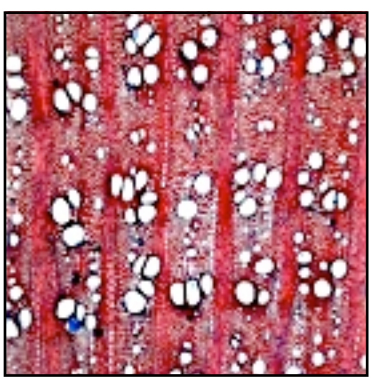
Citrus sinensis (L.) Osbeck



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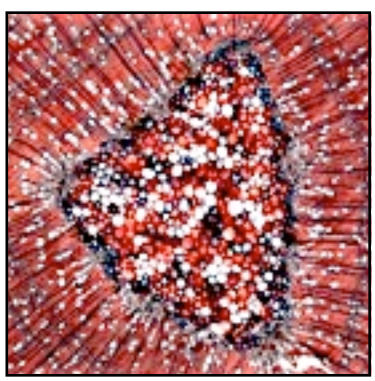

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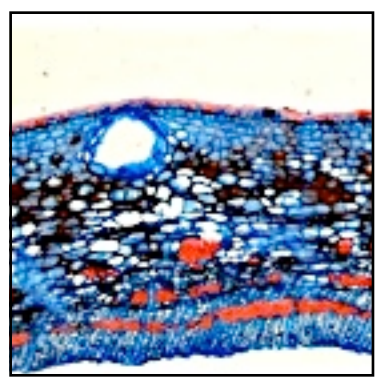

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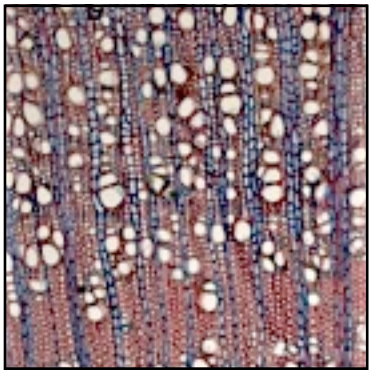
Plate no. 65

Ruta chalepensis L.



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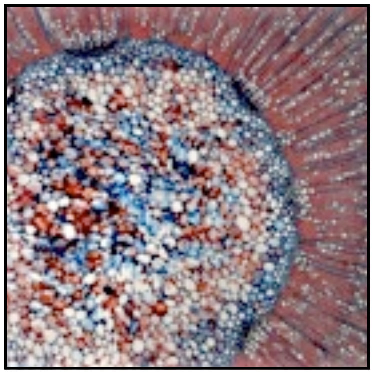

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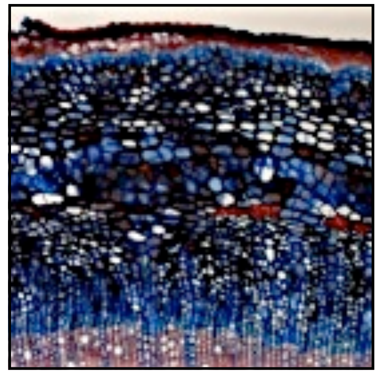

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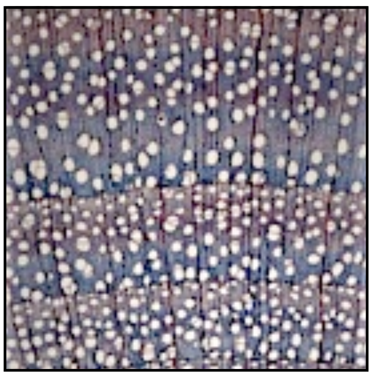
Salix alba L.



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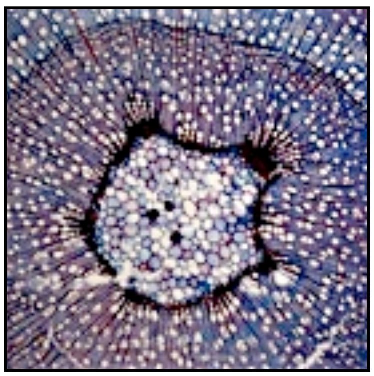

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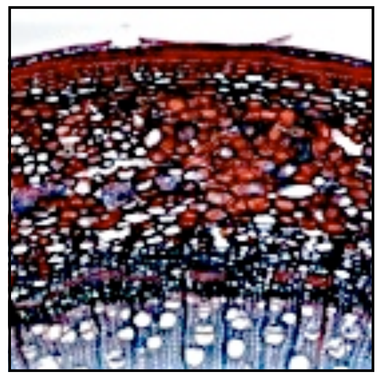

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Dodonaea viscosa (L.) Jacq.

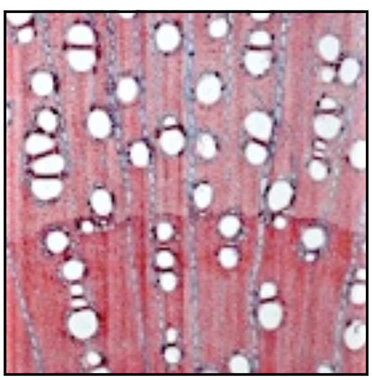

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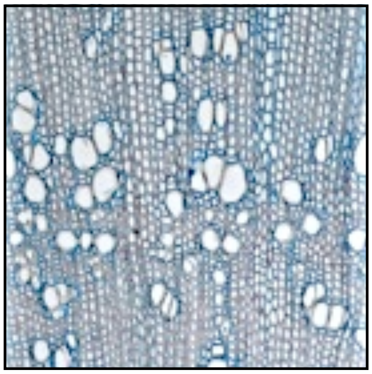
Plate no. 66

Antirrhinum majus L.



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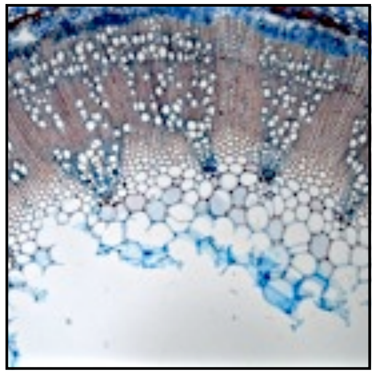

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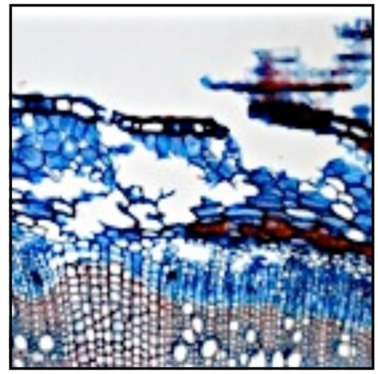

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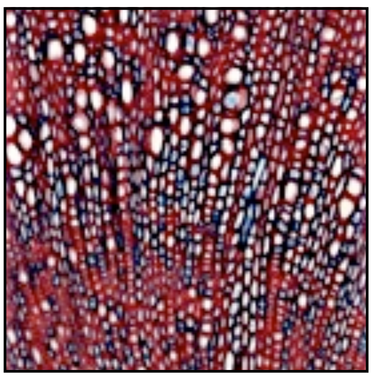
Odontites cypria Boiss.



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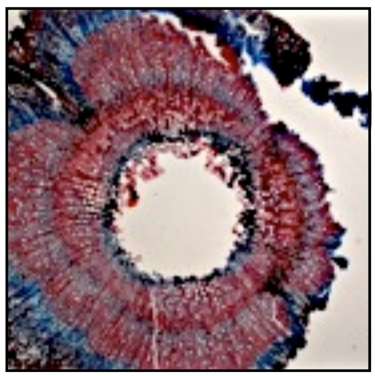

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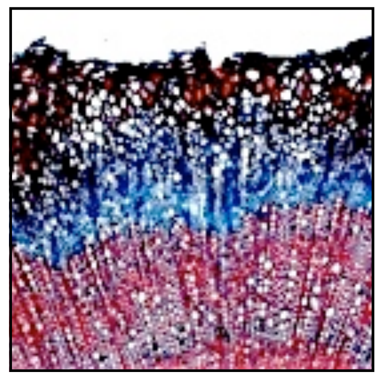

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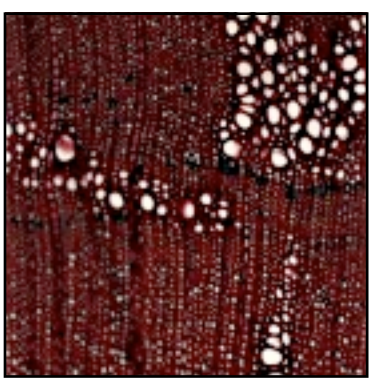
Lycium ferocissimum Miers



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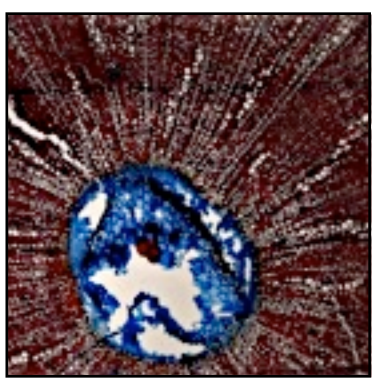

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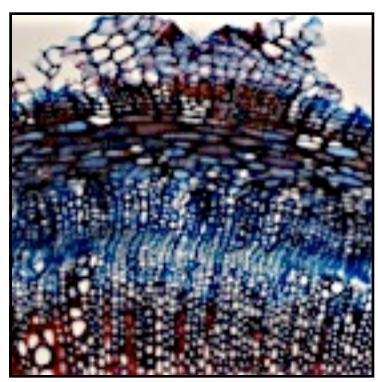

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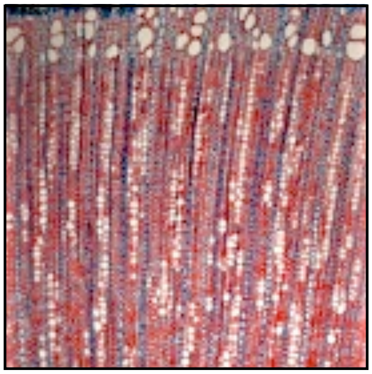
Plate no. 67

Nicotiana glauca Graham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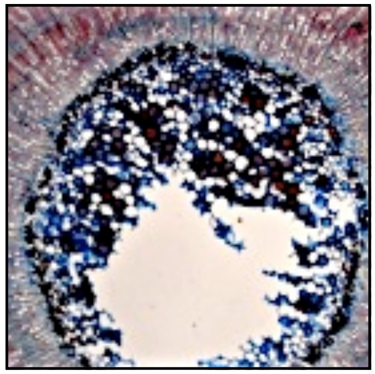
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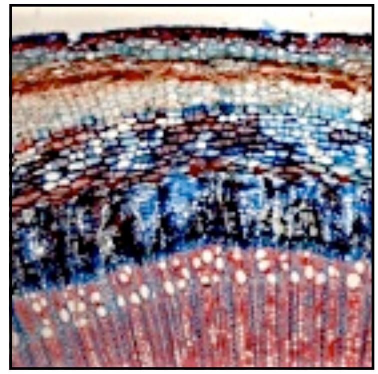
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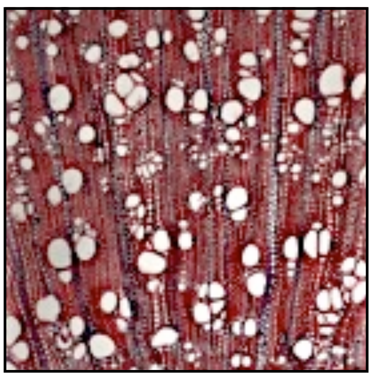
Withania somnifera (L.) Dunal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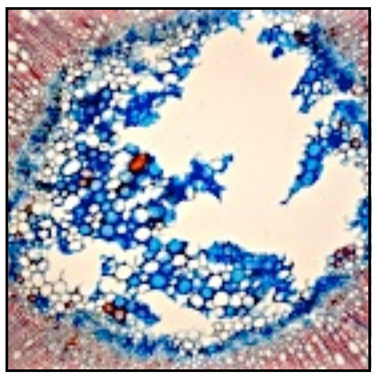
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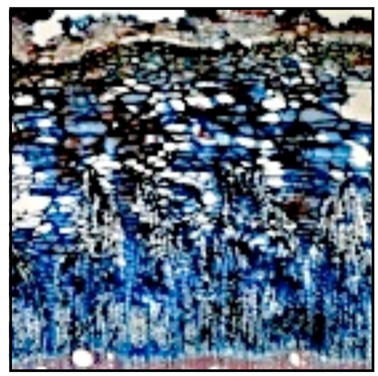
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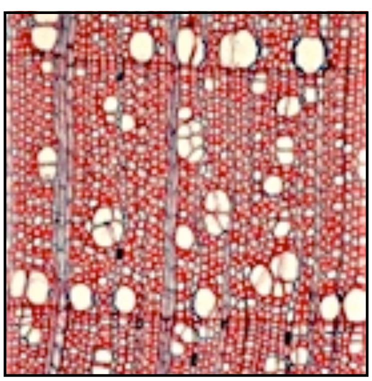
Styrax officinalis L.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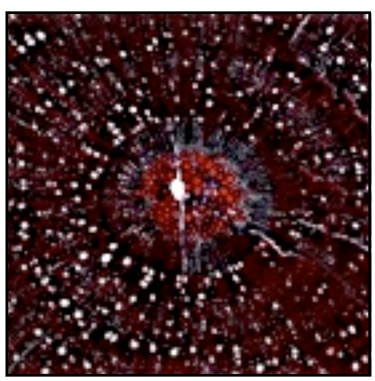
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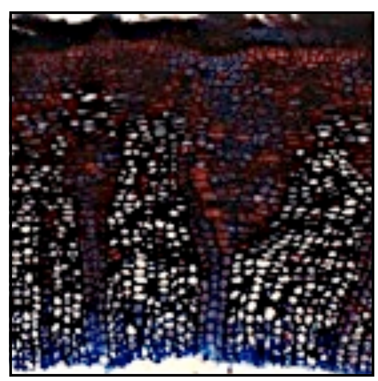
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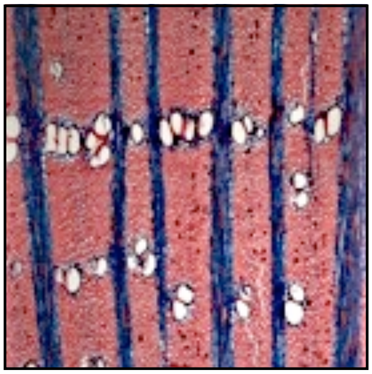
Plate no. 68

Tamarix ahpylla (L.) H.Karst



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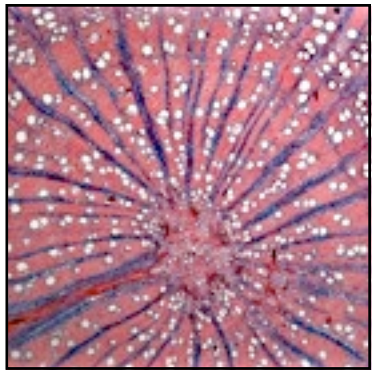

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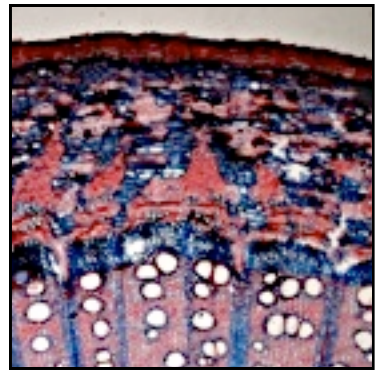

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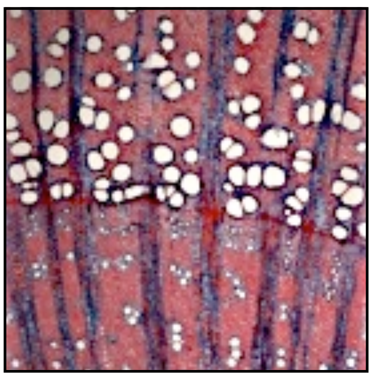
Tamarix dalmatica Baum



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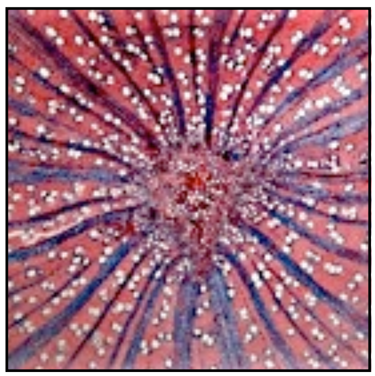

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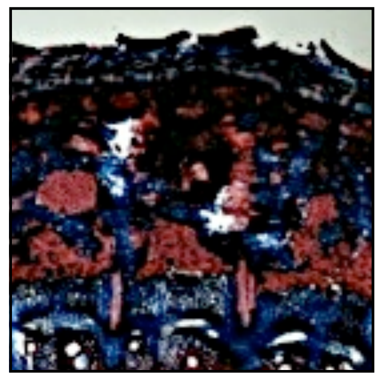

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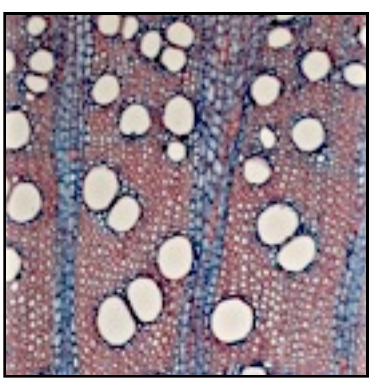
Tamarix smyrnensis Bunge



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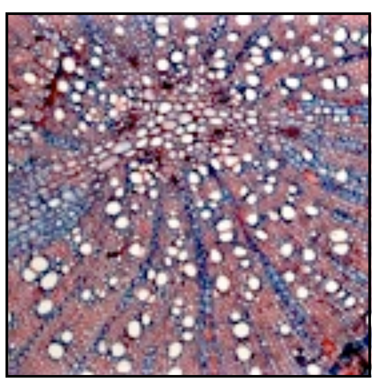

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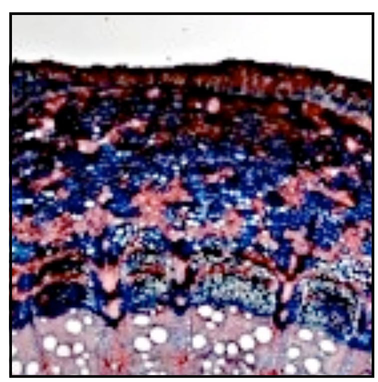

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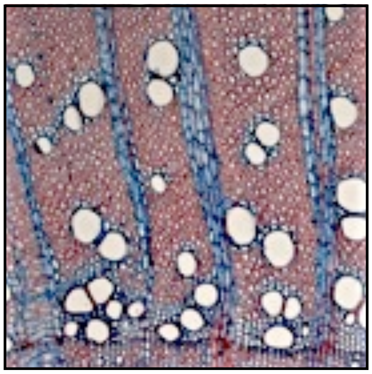
Plate no. 69

Tamarix tetragyna Ehrenb.



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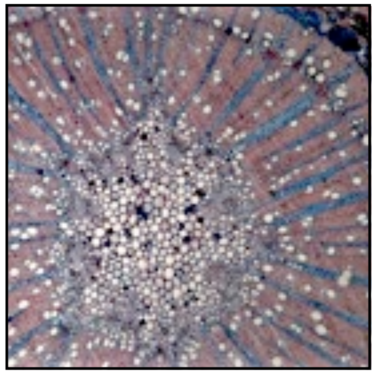

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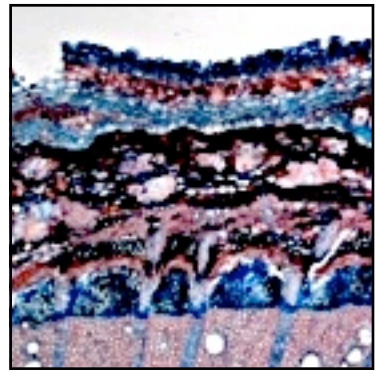

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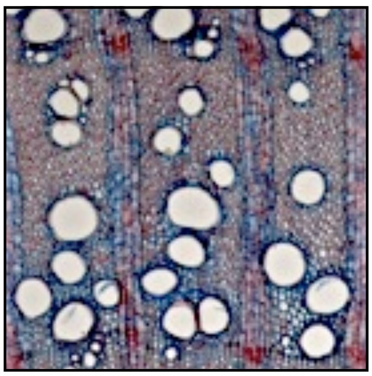
Tamarix tetrandra Pall. ex Bieb.



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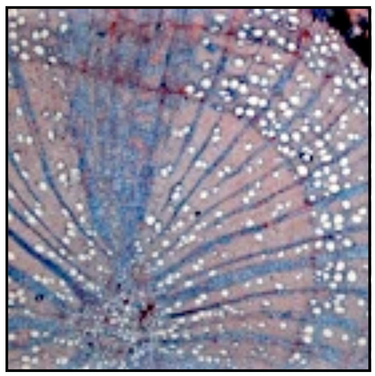

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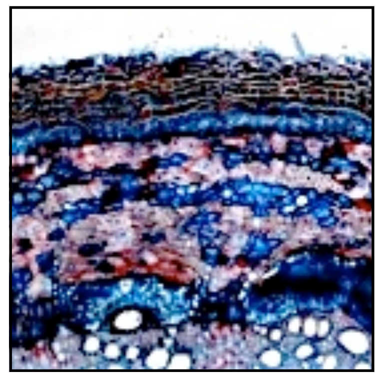

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Thymelaea hirsuta (L.) Endl.

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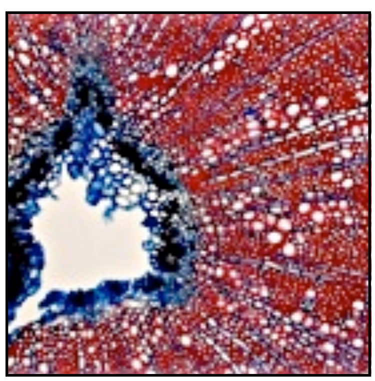

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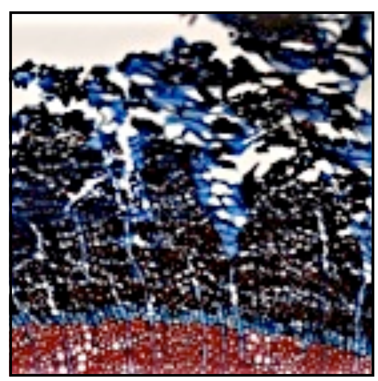

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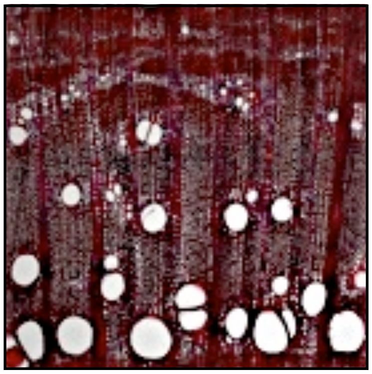
Plate no. 70

Celtis australis L.



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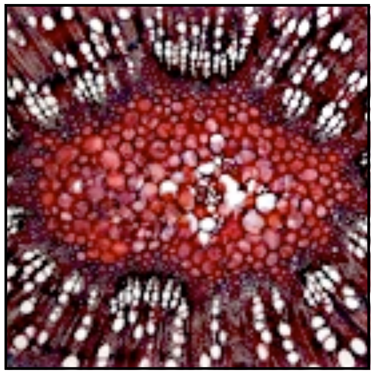

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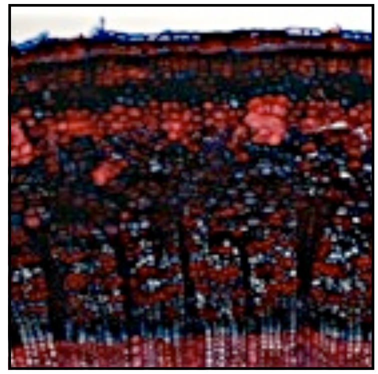

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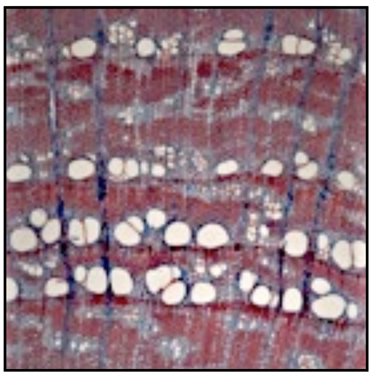
Celtis tournefortii Lam.



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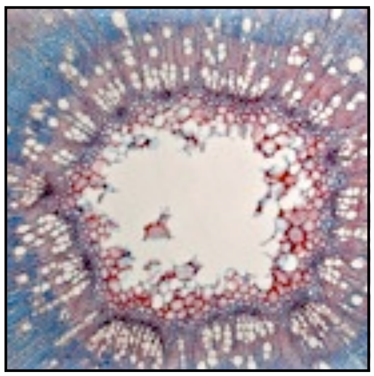

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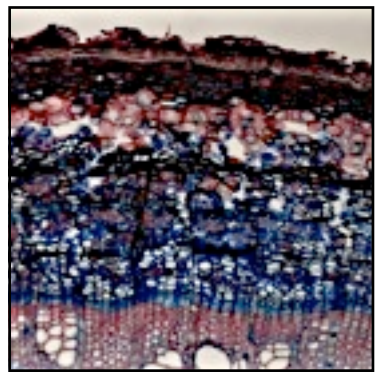

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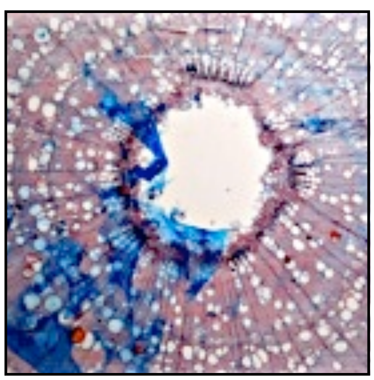
Ulmus canescens Melville



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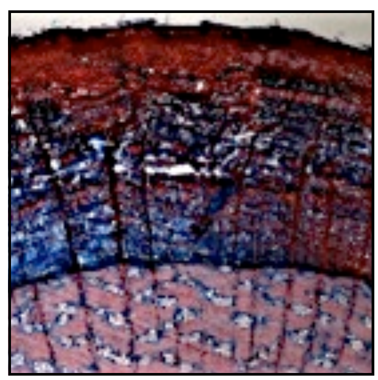

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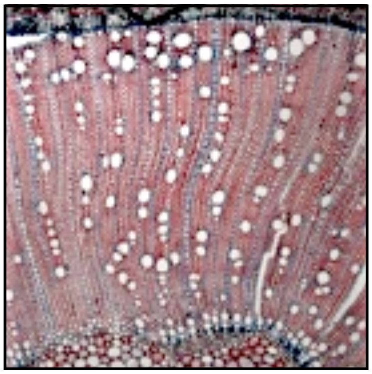
Plate no. 71

Lantana camara L.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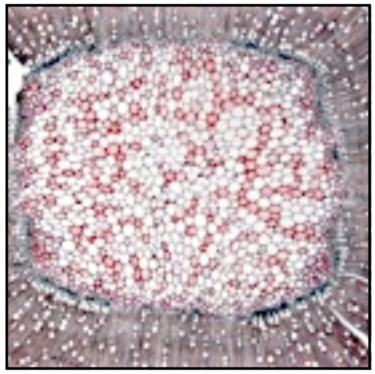
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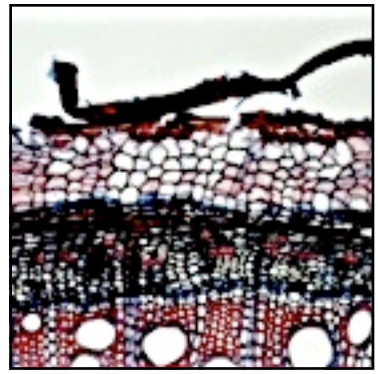
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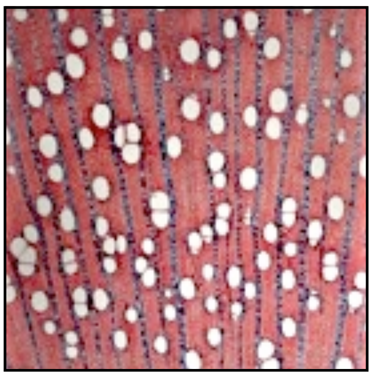
Vitex agnus-castus L.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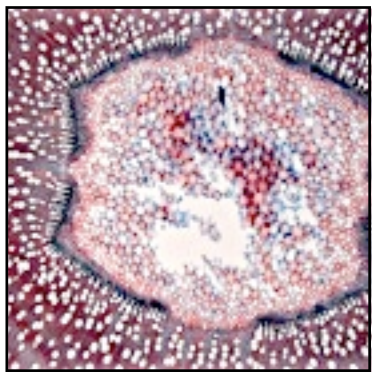
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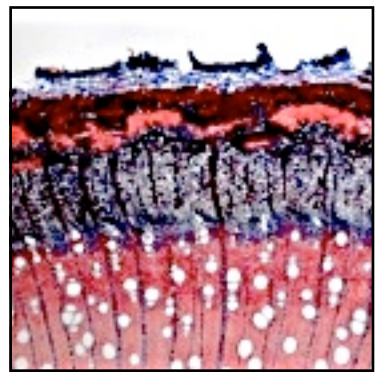
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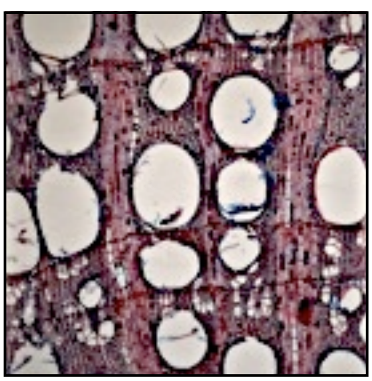
Vitis vinifera L.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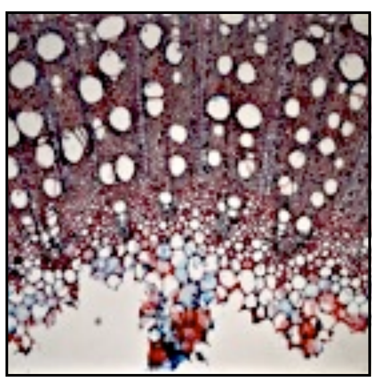
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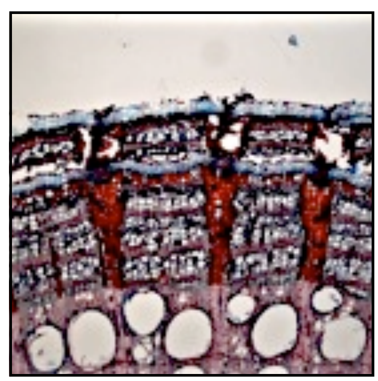
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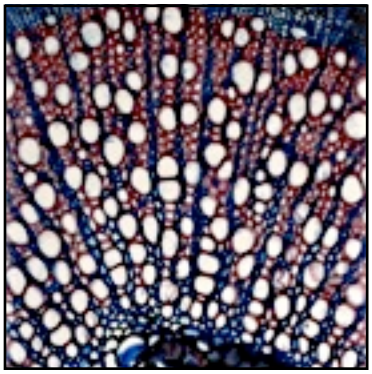
Plate no. 72

Fagonia cretica L.



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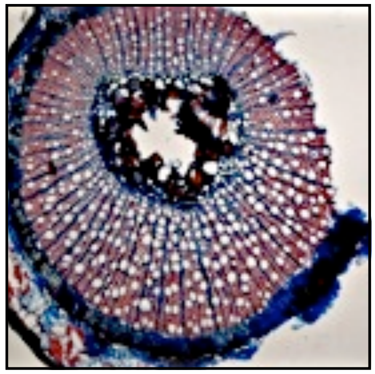

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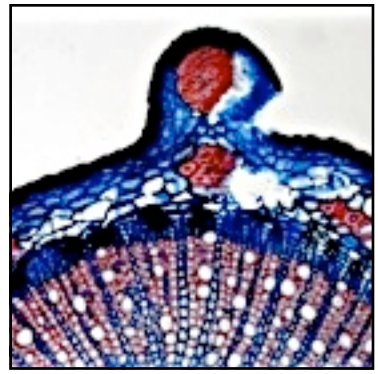

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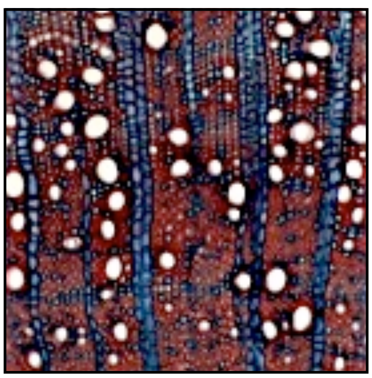
Zygophyllum album L.



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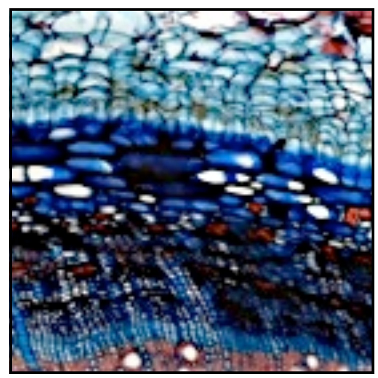

100x

Annex 2. Wood anatomical descriptive information on endemic and indigenous species studied: family and scientific name, lifeform (W, woody chamaephyte; N, nanophanerophyte; P, phanerophyte; Cl, climbers), plant height (Short, species with plant height less than or equal to the median plant height; Tall, species with plant height greater than the median plant height), level of endemism (A, species strictly endemic to Cyprus; B, species close to endemic; C, eastern Mediterranean species; D, Mediterranean species), MAP (Mean Annual Precipitation) (Dry, if the species came from a site with MAP less than or equal to the median MAP; Wet, if the species came from a site with MAP greater than the median MAP), MAT (Mean annual temperature) (Cold, if the species came from a site with MAT less than or equal to the median MAT; Hot, if the species came from a site with MAP greater than the median MAP), elevation (Low, if the species came from a site with elevation less than or equal to the median elevation; High, if the species came from a site with MAP greater than the median elevation), Habitat (A, shaded and moist sites, stream and river banks, salt lakes and wet seashores; B, fields, cultivations, ruderal and semi-ruderal places; C, rocks, rock faces, cliffs, rocky and sandy dry seashores; D, shrub-lands, garrigues and maquis, and forests.), wood density (Low, less than 0.40 g/cm^3; Med, 0.40-0.75 g/cm^3; High, greater than 0.75 g/cm^3), wood porosity (R, ring-porous; S, semi ring-porous; D, diffuse porous), vessel diameter (40.1, less than 20 µm; 40.2, 20-50 µm; 41, 50-100 µm; 42, 100-200 µm; 43, greater than 200 µm), vessel grouping (S, solitary; C, clusters; R, radial), helical thickenings (A, absent; P, present), fiber wall thickness (Thin; Med, medium; Thick), tension wood (A, absent; P, present), rays per millimeter (number of rays classes) bark sclerenchyma (A, absent; F, fibers; S, sclereids; F, S, fibers and sclereids), axial parenchyma (Apo, apotracheal; Para, paratracheal; Rare), ray width (A, raylessness; 96, uniseriate; 97, 1-3 cells wide; 98, 4-10 cells wide; 99, greater than 10 cells; 103, rays of two distinct size), raylessness (A, absent; P, present), rays composition (He, heterocellular rays; Ho, homocellular rays; He, Ho, both heterocelluar and homocellular rays present), crystals in wood (A, absent; P, present), crystals in bark (A, absent; P, present), tyloses and deposits (T, tyloses; D, deposits; T, D, tyloses and deposits. Species are ordered alphabetically by family name and than by scientific name within each family.

#	Family	Scientitific name	Lifeform	Plant height	Endemism	MAP	MAT	Elevation	Habitat	Wood density	Ring porosity	Vessel diameter	Vessel grouping	Helical thickenings	Fiber wall thickness	Tension wood	Rays per millimeter	Bark sclerenchyma	Axial parenchyma	Ray width	Raylessness	Ray composition	Crystals in wood	Crystals in bark	Tyloses and deposits
1	Aceraceae	Acer obtusifolium Sibth. et Sm.	N	Tall	C	Wet	Cold	High	C		D	40.2	R	P	Thin	P	12-20	F, S	Para	97	A	He	P	P	A
2	Amaranthaceae	Bosea cypria Boiss.	N	Tall	A	Dry	Hot	Low	C	Med	D	40.2	S	A	Thin	A	12-20	F	Para	103	A	Ho	P	P	T, D
3	Anacardiaceae	Pistacia atlantica Desf.	P	Tall	E	Dry	Hot	Low	B	Med	R	41	R	P	Thin	P	4-12	S	Para	97	A	He, Ho	P	P	A
4	Anacardiaceae	Pistacia lentiscus L.	N	Tall	D	Wet	Cold	High	C		R	41	R	P	Thin	P	4-12	S	Para	97	A	He	P	P	A
5	Anacardiaceae	Pistacia terebinthus L.	N	Tall	C	Wet	Cold	High	D		D	40.2	S	A	Thick	P	> 20	F, S	Apo	96	A	He	P	P	A
6	Anacardiaceae	Pistacia terebinthus x lentiscus	N	Tall	C	Dry	Hot	Low	D	High	S	41	C	P	Med	P	12-20	S	Para	97	A	He	A	P	A
7	Anacardiaceae	Rhus coriaria L.	N	Tall	C	Wet	Cold	High	D	Med	R	41	S	P	Med	A	4-12	F, S	Para	97	A	He	P	P	T
8	Apocynaceae	Nerium oleander L.	N	Tall	D	Wet	Cold	High	A	Med	D	40.2	R	A	Thin	A	12-20	S	Apo	97	A	He	P	P	A
9	Araliaceae	Hedera helix poetarum L.	Cl	Tall	B	Wet	Cold	High	A	Low	R	41	C	A	Thin	A	4-12	S	Apo	103	A	Ho	A	P	A
10	Aristolochiaceae	Aristolochia sempervirens L.	Cl	Tall	D	Dry	Hot	Low	D	Low	D	40.2	S	A	Thin	A	< 4	F, S	Para	99	A	He	A	A	A

#	Family	Scientitific name	Lifeform	Plant height	Endemism	MAP	MAT	Elevation	Habitat	Wood density	Ring porosity	Vessel diameter	Vessel grouping	Helical thickenings	Fiber wall thickness	Tension wood	Rays per millimeter	Bark sclerenchyma	Axial parenchyma	Ray width	Raylessness	Ray composition	Crystals in wood	Crystals in bark	Tyloses and deposits
11	Asclepiadaceae	Cyprinia gracilis (Boiss.) Browicz	Cl	Tall	B	Wet	Cold	High	D	Low	R	42	S	A	Thin	A	> 20	S	Para	96	A	Ho	A	P	A
12	Asteraceae	Achillea cretica L.	N	Short	C	Dry	Hot	Low	C	Med	D	40.2	C	A	Thin	A	< 4	F	Para	103	A	Ho	A	P	D
13	Asteraceae	Ambrosia maritima L.	N	Short	D	Dry	Hot	Low	C	Low	D	40.2	R	A	Thin	A	< 4	S	Para	103	A	Ho	A	P	T
14	Asteraceae	Centaurea akamantis T.Georgiades et Hadjikyriakou	W	Short	A	Dry	Hot	Low	C	Low	D	40.2	C	A	Med	A	< 4	F	Para	103	A	Ho	A	P	A
15	Asteraceae	Cichorium spinosum L.	W	Short	C	Dry	Hot	Low	C	Low	D	40.2	C	A	Thick	A	> 20	F	Para	97	A	Ho	A	P	A
16	Asteraceae	Helichrysum conglobatum (Viv.) Steud.	W	Short	D	Dry	Hot	Low	B	Med	D	40.2	R	A	Thin	A	< 4	F	Para	99	A	Ho	A	A	A
17	Asteraceae	Helichrysum italicum (Roth) G.Don	N	Short	C	Dry	Hot	Low	C	Med	D	40.2	C	P	Thin	A	4-12	F	Para	103	A	Ho	A	A	T
18	Asteraceae	Inula crithmoides L.	W	Short	D	Dry	Hot	Low	A	Med	D	40.2	S	A	Thin	A	4-12	F, S	Para	103	A	Ho	A	P	A
19	Asteraceae	Inula fruticosa Sch.Bip. ex Delile	N	Short	D	Dry	Hot	Low	B	High	D	40.2	C	A	Med	A	< 4	F	Para	103	A	Ho	A	A	A
20	Asteraceae	Inula viscosa (L.) Aiton	W	Tall	D	Wet	Cold	High	B	Med	D	40.2	S	A	Thin	A	< 4	F	Para	103	A	Ho	A	P	A
21	Asteraceae	Otanthus maritimus (L.) Hoffmanns. et Link	W	Short	D	Dry	Hot	Low	C	Low	D	40.1	R	A	Thin	A	4-12	F	Para	103	A	Ho	A	P	A
22	Asteraceae	Phagnalon rupestre DC.	N	Short	C	Dry	Hot	Low	C	High	D	40.2	R	P	Med	A	< 4	F	Para	103	A	Ho	A	A	A
23	Asteraceae	Ptilostemon chamaepeuce cyprius (L.) Less. Greuter	N	Tall	A	Dry	Hot	Low	C	Med	D	40.2	C	A	Thick	A	4-12	F	Para	97	A	He	A	P	T, D
24	Asteraceae	Staehelina lobelii DC.	W	Short	B	Wet	Cold	High	C		D	40.2	C	A	Thin	A	< 4	F	Para	98	A	He	P	A	A
25	Berberidaceae	Berberis cretica L.	N	Tall	C	Wet	Cold	High	C	Med	R	41	C	P	Thin	A	< 4	A	Para	99	A	He	A	P	A
26	Betulaceae	Alnus orientalis Decne.	P	Tall	C	Wet	Cold	High	A		D	41	C	A	Thick	A	> 20	A	Apo	96	A	Ho	A	A	A
27	Boraginaceae	Echium angustifolium Link ex Willk. & Lange	W	Short	C	Dry	Hot	Low	B	Med	D	40.2	S	A	Thin	A	4-12	A	Rare	98	A	He	A	P	D
28	Boraginaceae	Lithodora hispidula (Sibth. et Sm.) Griseb.	N	Short	C	Dry	Hot	Low	D	Med	D	40.1	C	P	Thin	A	< 4	A	Apo	98	A	He	A	A	A
29	Boraginaceae	Lithodora hispidula versicolor (Sm.) Griseb. Meikle	N	Tall	C	Wet	Cold	High	D	Med	D	40.2	R	A	Thin	P	4-12	F, S	Para	97	A	He	P	P	T
30	Boraginaceae	Onosma caepistosa Kotschy	W	Short	A	Wet	Cold	High	C	Med	D	40.1	C	P	Thin	A	A	S	Para	117	P	A	A	P	A
31	Boraginaceae	Onosma fruticosa Sm.	N	Short	A	Dry	Hot	High	D	Med	S	40.2	C	A	Thin	A	A	A	Para	117	P	A	A	A	D

#	Family	Scientitific name	Lifeform	Plant height	Endemism	MAP	MAT	Elevation	Habitat	Wood density	Ring porosity	Vessel diameter	Vessel grouping	Helical thickenings	Fiber wall thickness	Tension wood	Rays per millimeter	Bark sclerenchyma	Axial parenchyma	Ray width	Raylessness	Ray composition	Crystals in wood	Crystals in bark	Tyloses and deposits
32	Boraginaceae	Onosma mitis Boiss. et Heldr.	W	Short	B	Wet	Cold	High	C	Med	D	40.2	S	A	Thin	A	A	A	Para	117	P	A	A	A	D
33	Brassicaceae	Alyssum akamasicum B.L.Burtt	W	Short	A	Dry	Hot	Low	C	Med	D	40.1	R	A	Med	A	A	S	Para	117	P	A	A	A	A
34	Brassicaceae	Alyssum chondrogynum B.L. Burtt	W	Short	A	Dry	Hot	Low	C	Med	D	40.1	S	A	Thick	A	4-12	F	Para	98	A	Ho	A	A	A
35	Brassicaceae	Alyssum cypricum Nyar.	W	Short	B	Wet	Cold	High	C	Med	D	40.1	C	A	Thick	A	< 4	F	Para	97	A	Ho	A	A	D
36	Brassicaceae	Alyssum troodi Boiss.	W	Short	A	Wet	Cold	High	C	Med	D	40.1	S	A	Thin	A	A	S	Para	117	P	A	A	A	A
37	Brassicaceae	Arabis cypria Holmboe	W	Short	A	Wet	Cold	High	C	Low	D	40.1	C	A	Med	A	A	A	Para	117	P	A	A	A	A
38	Brassicaceae	Arabis purpurea Sibth. Et Sm.	W	Short	A	Dry	Hot	Low	C	Low	D	40.1	C	A	Thin	A	A	S	Para	117	P	A	A	A	A
39	Brassicaceae	Brassica hilarionis Post	W	Short	A	Wet	Cold	High	C	Med	D	40.1	S	A	Thick	A	4-12	S	Para	98	A	Ho	A	A	A
40	Brassicaceae	Erysimum kykkoticum Hadjikyriakou et Alziar	W	Short	A	Wet	Cold	High	C	Med	D	40.1	S	A	Thin	A	A	A	Para	117	P	A	A	A	D
41	Caesalpiniaceae	Ceratonia siliqua L.	P	Tall	C	Wet	Cold	High	D	Med	D	41	S	A	Med	P	4-12	F, S	Para	97	A	He	P	P	T, D
42	Capparaceae	Capparis spinosa canescens L.	N	Tall	D	Dry	Hot	Low	B	Med	D	40.2	R	A	Thin	A	> 20	F, S	Para	97	A	He	A	P	A
43	Caprifoliaceae	Lonicera etrusca Santi	Cl	Tall	D	Wet	Cold	High	C	Med	D	40.2	S	P	Thin	A	12-20	A	Rare	97	A	He, Ho	A	P	D
44	Caprifoliaceae	Sambucus nigra L.	N	Tall	D	Wet	Cold	High	B	Med	D	41	C	A	Thin	P	4-12	A	Rare	97	A	He	A	A	T
45	Caryophyllaceae	Dianthus cyprius A.K. Jacks. et Turrill	W	Short	A	Wet	Cold	High	C	Med	D	40.1	R	A	Thin	A	A	F	Para	117	P	A	A	P	A
46	Caryophyllaceae	Silene fruticosa L.	W	Short	D	Dry	Hot	Low	C	Low	D	40.2	S	P	Thin	A	A	S	Para	117	P	A	A	A	A
47	Caryophyllaceae	Silene galataea Boiss.	N	Short	A	Wet	Cold	Low	C	Low	D	40.1	S	A	Thin	A	A	A	Para	117	P	A	A	P	A
48	Chenopodiaceae	Arthrocnemum macrostachyum (Moric.) Mois et Delponte	W	Short	D	Dry	Hot	Low	A	Med	D	40.1	C	A	Med	A	A	A	Para	117	P	A	A	P	A
49	Chenopodiaceae	Arthrocnemum perenne (Mill.) Moss	W	Short	D	Dry	Hot	Low	A	High	D	40.1	C	A	Med	A	A	A	Para	117	P	A	A	P	A
50	Chenopodiaceae	Atriplex halimus L.	N	Tall	D	Dry	Hot	Low	C	Med	D	40.2	S	A	Med	A	A	F	Para	117	P	A	P	P	A
51	Chenopodiaceae	Halimione portulacoides (L.) Aellen	W	Tall	D	Dry	Hot	Low	A	Med	D	40.1	S	A	Med	A	A	F	Para	117	P	A	A	P	A

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52	Chenopodiaceae	Halocnemum strobilaceum (Pall.) Bieb.	W	Short	D	Dry	Hot	Low	A	High	D	40.1	C	P	Thick	A	A	A	Para	117	P	A	A	A	A
53	Chenopodiaceae	Noaea mucronata (Forssk.) Asch. et Schwinf.	N	Short	C	Dry	Hot	Low	C	High	D	40.2	C	A	Med	A	A	A	Para	117	P	A	A	P	A
54	Chenopodiaceae	Salicornia friticosa (L.) L.	W	Tall	D	Dry	Hot	Low	A	High	D	40.1	C	A	Thick	A	A	A	Para	117	P	A	A	A	A
55	Chenopodiaceae	Suaeda aegyptiaca (Hasselq.) Zohary	W	Tall	C	Dry	Hot	Low	A	Med	D	40.2	R	A	Thin	A	4-12	A	Para	97	A	He	A	P	A
56	Chenopodiaceae	Suaeda vera Forssk. ex J.F.Gmel	N	Short	D	Dry	Hot	Low	C	Med	D	40.1	S	P	Thin	A	A	A	Para	117	P	A	A	A	D
57	Cistaceae	Cistus creticus creticus L.	N	Tall	D	Wet	Cold	High	D	Med	S	40.2	S	A	Thick	A	> 20	S	Apo	97	A	He	A	P	D
58	Cistaceae	Cistus monspeliensis L.	N	Tall	D	Dry	Hot	Low	D	High	D	40.1	C	P	Thick	A	12-20	F	Para	97	A	Ho	A	A	T, D
59	Cistaceae	Cistus parviflorus Lam.	N	Tall	D	Dry	Hot	Low	D	High	D	40.1	S	A	Thick	A	> 20	F	Apo	97	A	Ho	A	P	T, D
60	Cistaceae	Cistus parviflorus x monspeliensis	N	Short	D	Dry	Hot	Low	D	High	D	40.2	S	P	Thick	A	> 20	F	Apo	97	A	He	A	P	A
61	Cistaceae	Cistus salviifolius L.	N	Short	D	Dry	Hot	Low	D	High	S	40.2	S	A	Thin	A	> 20	F	Rare	96	A	He	P	P	D
62	Cistaceae	Fumana arabica (L.) Spach.	W	Short	D	Wet	Cold	High	D	High	D	40.1	S	A	Thick	A	> 20	F	Para	96	A	Ho	A	A	A
63	Cistaceae	Fumana thymifolia (L.) Verlot	W	Short	D	Dry	Hot	Low	D	High	S	40.1	C	A	Thick	A	> 20	S	Apo	96	A	Ho	A	P	D
64	Cistaceae	Helianthemum obtusifolium Dunal	W	Short	A	Dry	Hot	Low	D	Med	D	40.1	S	A	Med	A	> 20	F	Apo	96	A	Ho	A	P	D
65	Cistaceae	Helianthemum stipulatum (Forssk.) C.Christens.	W	Short	B	Dry	Hot	Low	C	Med	D	40.1	S	A	Med	A	> 20	S	Apo	97	A	Ho	P	P	T, D
66	Cistaceae	Helianthemum syriacum (Jacq.) Dum-Cours.	W	Short	D	Dry	Hot	High	C	Med	D	40.1	C	A	Med	A	> 20	F	Para	97	A	Ho	A	P	A
67	Convolvulaceae	Convolvulus dorycnium L.	W	Short	C	Dry	Hot	Low	C	Low	S	41	C	A	Thick	A	12-20	A	Para	97	A	He	P	P	A
68	Convolvulaceae	Convolvulus oleifolius deserti Desr. Pamp.	N	Tall	B	Dry	Hot	Low	C	Med	D	40.2	C	A	Thin	A	> 20	F	Apo	97	A	Ho	P	P	A
69	Convolvulaceae	Convolvulus oleifolius oleifolius Desr.	W	Short	D	Dry	Hot	Low	C	Med	D	40.2	C	A	Thin	A	> 20	A	Para	96	A	Ho	P	P	A
70	Convolvulaceae	Convolvulus oleifolius pumilus Desr. Pamp.	N	Short	B	Dry	Hot	Low	C	High	R	40.2	S	A	Med	A	> 20	F	Para	97	A	Ho	P	P	A
71	Dipsacaceae	Pterocephalus multiflorus multiflorus Poech	N	Tall	A	Wet	Cold	High	C	Med	S	40.2	C	P	Thin	A	> 20	A	Apo	96	A	Ho	A	P	A
72	Dipsacaceae	Pterocephalus multiflorus obtusifolius Poech. Holmboe	N	Short	A	Wet	Cold	High	C		R	40.1	C	P	Thin	A	> 20	A	Para	103	A	Ho	A	P	D

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73	Dipsacaceae	Scabiosa cyprica Post	N	Short	A	Dry	Hot	Low	C	Med	S	40.2	S	A	Thin	A	> 20	A	Rare	96	A	Ho	A	P	A
74	Ephedraceae	Ephedra fragilis campylopoda (J.C. Mayer) Asch. et Graebn.	Cl	Tall	C	Dry	Hot	Low	D	High	S	40.2	S	A	Thin	A	4-12	F, S	Rare	97	A	Ho	A	P	A
75	Ephedraceae	Ephedra nebrodensis Guss.	N	Short	E	Dry	Hot	Low	D	Med	R	40.1	S	A	Thin	A	4-12	S	Apo	97	A	Ho	P	P	A
76	Ericaceae	Arbutus andrachne L.	N	Tall	C	Wet	Cold	High	D	Med	S	40.2	S	P	Thin	A	4-12	S	Para	97	A	He, Ho	A	P	A
77	Ericaceae	Arbutus unedo L.	N	Tall	E	Dry	Hot	Low	D	Med	S	40.2	C	P	Med	A	> 20	A	Para	97	A	He, Ho	A	P	T, D
78	Ericaceae	Arbutus unedo x andrachnoides Link	N	Tall	D	Wet	Cold	High	D	Med	D	40.2	C	P	Thin	A	4-12	A	Rare	97	A	He	P	P	A
79	Ericaceae	Erica sicula Guss.	N	Short	C	Wet	Cold	High	C	High	D	40.1	S	A	Med	A	> 20	F	Apo	97	A	He, Ho	A	A	T, D
80	Euphorbiaceae	Euphorbia hierosolymitana Boiss.	N	Short	C	Wet	Cold	High	C	Low	D	40.1	R	A	Thin	A	> 20	S	Rare	96	A	Ho	A	P	A
81	Euphorbiaceae	Euphorbia thompsonii Holmboe	W	Tall	B	Dry	Hot	Low	D	Low	D	40.1	R	A	Thin	A	12-20	S	Apo	96	A	Ho	A	P	A
82	Fagaceae	Quercus coccifera calliprinos (Webb) Holmboe	P	Tall	C	Wet	Cold	High	D	Med	D	41	S	A	Thick	P	> 20	S	Para	103	A	He, Ho	P	P	T
83	Fagaceae	Quercus infectoria veneris Oliv. (A.Kern.) Holmboe	P	Tall	C	Wet	Cold	High	D		R	42	S	A	Thin	P	4-12	A	Para	103	A	Ho	P	A	T
84	Frankeniaceae	Frankenia hirsuta L.	W	Short	B	Dry	Hot	Low	A	Med	D	40.1	S	A	Thin	A	A	S	Para	117	P	A	A	P	A
85	Guttiferae	Hypericum confertum stenobotrys (Choisy) G.Don	W	Short	C	Wet	Cold	High	D	Med	R	40.1	C	P	Med	A	> 20	A	Apo	97	A	Ho	A	A	D
86	Guttiferae	Hypericum hircinum albimontanum L.	N	Tall	D	Wet	Cold	High	A		R	40.2	R	A	Thin	A	12-20	A	Apo	96	A	He, Ho	A	A	D
87	Labiateae	Ballota integrifolia Benth.	N	Tall	A	Dry	Hot	Low	C	Med	R	40.2	C	P	Thin	A	12-20	S	Rare	97	A	Ho	P	P	A
88	Labiateae	Calamintha incana (Sibth. & Sm.) Boiss.	W	Short	C	Dry	Hot	Low	B	Low	D	40.2	R	A	Thin	A	> 20	A	Rare	96	A	Ho	A	P	A
89	Labiateae	Lavandula stoechas L.	N	Short	C	Wet	Cold	High	C	Med	S	40.1	C	A	Thick	A	> 20	A	Para	103	A	Ho	A	A	A
90	Labiateae	Micromeria chionistrae Meikle	W	Short	A	Wet	Cold	High	C	Med	S	40.1	S	A	Thin	A	> 20	A	Rare	96	A	Ho	A	A	A
91	Labiateae	Micromeria cypria Kotschy	W	Short	A	Wet	Cold	High	C		D	40.2	R	A	Thin	A	> 20	A	Rare	96	A	Ho	A	A	A
92	Labiateae	Micromeria myrtifolia Boiss. et Hohen	W	Short	C	Dry	Hot	Low	D	High	S	40.1	R	A	Thin	A	> 20	A	Rare	96	A	Ho	A	A	D
93	Labiateae	Micromeria nervosa (Desf.) Benth.	W	Short	D	Dry	Hot	High	D	High	D	40.2	R	A	Thin	A	> 20	A	Rare	96	A	Ho	A	A	A

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94	Labiateae	Nepeta troodi Holmboe	W	Short	A	Wet	Cold	High	C	Low	D	40.2	C	P	Thin	A	> 20	S	Rare	96	A	Ho	A	P	A
95	Labiateae	Origanum cordifolium (Aucher et Montbret ex Benth.) Vogel	W	Short	A	Wet	Cold	High	A	Med	D	40.2	R	A	Thin	A	> 20	A	Para	96	A	Ho	A	P	A
96	Labiateae	Origanum dubium Boiss.	N	Short	B	Wet	Cold	Low	D	Med	S	40.2	S	A	Thin	A	> 20	A	Rare	96	A	Ho	A	P	A
97	Labiateae	Origanum majorana tenuifolium L. Weston	N	Short	A	Dry	Hot	Low	D	Low	S	40.2	S	A	Thin	A	12-20	A	Para	96	A	Ho	A	P	D
98	Labiateae	Phlomis brevibracteata Turril	N	Short	A	Dry	Hot	Low	D	Med	S	40.2	R	P	Med	A	12-20	S	Para	97	A	Ho	A	P	A
99	Labiateae	Phlomis cypria cypria Post	N	Tall	A	Dry	Hot	Low	D	Med	R	40.2	C	P	Thin	A	12-20	F	Para	97	A	Ho	A	P	A
100	Labiateae	Phlomis cypria occidentalis Post Meikle	N	Tall	A	Wet	Cold	High	D	Med	R	40.2	C	P	Thin	A	12-20	A	Para	97	A	He, Ho	A	A	A
101	Labiateae	Phlomis lunariifolia Sm.	N	Tall	B	Wet	Cold	High	D	Med	S	40.2	C	P	Med	A	> 20	S	Para	97	A	Ho	A	P	A
102	Labiateae	Prasium majus L.	N	Tall	D	Dry	Hot	Low	D	Med	S	40.2	S	A	Thin	A	12-20	F	Rare	97	A	Ho	A	P	A
103	Labiateae	Rosmarinus officinalis L.	N	Tall	D	Wet	Cold	High	B		D	40.1	C	A	Thin	A	> 20	F	Apo	97	A	Ho	A	A	A
104	Labiateae	Salvia dominica L.	N	Tall	C	Dry	Hot	Low	C	Low	D	40.2	C	P	Thin	A	4-12	S	Para	97	A	Ho	P	P	A
105	Labiateae	Salvia fruticosa Mill.	N	Tall	C	Wet	Cold	High	C	Med	S	40.2	S	A	Thin	A	12-20	S	Para	97	A	Ho	A	P	T
106	Labiateae	Salvia lanigera Poir.	W	Short	C	Dry	Hot	Low	C	Low	D	40.2	R	A	Thin	A	> 20	A	Rare	96	A	Ho	A	P	A
107	Labiateae	Salvia willeana (Holmboe) Hedge	W	Short	A	Wet	Cold	High	C	Med	R	40.2	S	A	Thin	A	> 20	A	Rare	97	A	Ho	A	P	T, D
108	Labiateae	Satureja thymbra L.	N	Short	C	Dry	Hot	Low	C	Med	R	40.2	C	A	Thin	A	> 20	A	Para	96	A	Ho	A	P	A
109	Labiateae	Scutellaria sibthorpii Boiss. et Reut. ex Boiss.	W	Short	A	Wet	Cold	High	C	Med	D	40.1	S	A	Thin	A	> 20	F	Rare	97	A	Ho	A	P	A
110	Labiateae	Sideritis cypria Post	W	Short	A	Wet	Cold	High	C	Low	S	40.2	S	A	Thin	A	> 20	A	Rare	97	A	Ho	A	P	A
111	Labiateae	Teucrium creticum L.	N	Tall	B	Dry	Hot	Low	C	Med	R	40.2	R	P	Med	A	4-12	A	Rare	97	A	Ho	A	P	A
112	Labiateae	Teucrium cyprium cyprium Boiss.	W	Short	A	Wet	Cold	High	C	Med	D	40.1	S	P	Thin	A	> 20	A	Rare	96	A	Ho	A	P	A
113	Labiateae	Teucrium cyprium kyreniae Boiss. P.H. Davis	W	Short	A	Wet	Cold	High	C	Med	S	40.2	C	P	Med	A	> 20	A	Rare	96	A	Ho	A	P	D

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114	Labiateae	Teucrium divaricatum canescens Heldr. (Celak.) Holmboe	W	Short	A	Wet	Cold	High	C	Med	R	40.2	S	A	Thin	A	12-20	A	Rare	97	A	Ho	A	P	A
115	Labiateae	Teucrium kotschyanum Poech.	N	Short	C	Wet	Cold	Low	C		S	40.2	C	P	Med	A	> 20	F	Rare	96	A	Ho	A	A	T, D
116	Labiateae	Teucrium micropodioides Rouy	W	Short	A	Dry	Hot	Low	C		D	40.1	C	A	Med	A	> 20	A	Apo	96	A	Ho	A	P	D
117	Labiateae	Thymus capitatus (L.) Hoffmanns	N	Tall	D	Dry	Hot	Low	C	Med	D	40.2	C	A	Med	A	12-20	A	Para	96	A	Ho	A	P	T, D
118	Labiateae	Thymus integer Griseb.	W	Short	A	Dry	Hot	Low	C	Med	D	40.1	S	A	Thin	A	> 20	A	Rare	96	A	Ho	A	P	T, D
119	Lauraceae	Laurus nobilis L.	N	Tall	D	Wet	Cold	High	A	Low	D	41	S	A	Thin	P	4-12	A	Para	97	A	He	P	A	A
120	Malvaceae	Lavatera bryoniifolia Mill.	W	Short	C	Dry	Hot	Low	A	Med	D	40.1	C	A	Thin	A	4-12	F	Para	103	A	Ho	A	P	A
121	Mimosaceae	Prosopis farcta (Banks et Sol.) J.F.Macbr.	N	Short	C	Dry	Hot	Low	B		S	41	S	A	Thin	P	12-20	F, S	Para	97	A	Ho	A	P	A
122	Moraceae	Ficus carica L.	P	Tall	C	Wet	Cold	High	B	Med	D	41	S	A	Thin	A	4-12	S	Para	97	A	He	P	P	T, D
123	Moraceae	Morus nigra L.	P	Tall	D	Wet	Cold	High	B		R	41	C	A	Thin	P	4-12	F, S	Para	98	A	He	P	P	T
124	Myrtaceae	Myrtus communis L.	N	Tall	E	Wet	Cold	High	A	Med	D	40.2	S	P	Med	A	> 20	S	Apo	97	A	He, Ho	A	P	A
125	Oleaceae	Olea europaea L.	N	Tall	D	Wet	Cold	High	B	High	D	40.2	R	A	Med	A	4-12	F, S	Para	97	A	He	A	P	T, D
126	Oleaceae	Phillyrea latifolia L.	N	Tall	D	Wet	Cold	High	D		D	40.2	S	A	Thin	A	4-12	S	Para	97	A	He	A	P	A
127	Papilionaceae	Alhagi graegorum Boiss.	W	Short	C	Dry	Hot	Low	C	Med	D	41	S	A	Thin	A	> 20	A	Para	97	A	Ho	P	A	T, D
128	Papilionaceae	Alhagi maurorum Medik.	W	Short	C	Dry	Hot	Low	C	Low	D	41	S	A	Thin	A	12-20	F	Para	103	A	Ho	A	P	A
129	Papilionaceae	Anagyris foetida L.	N	Short	D	Wet	Cold	High	D	Med	S	41	C	A	Thick	A	4-12	F, S	Para	98	A	He	P	A	D
130	Papilionaceae	Argyrolobium uniflorum (Dec.) Jaub. & Spach	W	Short	D	Dry	Hot	Low	D	Med	D	40.1	R	A	Thick	A	> 20	F	Para	103	A	Ho	P	P	A
131	Papilionaceae	Astragalus echinus echinus DC.	W	Short	C	Wet	Cold	High	C	Low	R	40.2	C	A	Med	A	< 4	S	Apo	99	A	He	P	P	A
132	Papilionaceae	Calycotome villosa (Poir.) Link	N	Tall	D	Wet	Cold	High	B	Med	S	40.2	C	P	Thick	A	4-12	S	Para	97	A	He	A	P	T, D
133	Papilionaceae	Coronilla emerus emeroides L. (Boiss. et Spruner.) Holmboe	N	Short	C	Wet	Cold	High	D	Med	D	40.2	S	P	Thick	A	12-20	A	Para	97	A	He	A	A	D

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134	Papilionaceae	Genista sphacelata crudelis Decne (Meikle) Chrtek & B.Slav k	N	Short	A	Wet	Cold	High	D	Med	S	40.2	C	P	Thick	A	4-12	F, S	Para	97	A	He	A	A	D
135	Papilionaceae	Genista sphacelata sphacelata Decne	N	Tall	C	Wet	Cold	High	D	Med	S	40.2	C	P	Med	A	4-12	F, S	Para	97	A	He	A	P	D
136	Papilionaceae	Hedysarum cyprium Boiss.	W	Short	A	Dry	Hot	Low	D	Low	D	40.1	S	A	Thick	A	4-12	F	Para	98	A	He	P	A	A
137	Papilionaceae	Ononis spinosa leiosperma L. (Boiss.) Sirjaev	W	Tall	C	Wet	Cold	High	A	Med	R	40.2	S	A	Thick	A	4-12	F	Para	103	A	He	P	P	A
138	Phytolaccaceae	Phytolacca pruinosa Fenzi	W	Tall	C	Wet	Cold	High	C	Low	D	40.2	S	A	Thin	A	12-20	F	Para	97	A	Ho	P	P	A
139	Platanaceae	Platanus orientalis L.	P	Tall	E	Wet	Cold	High	A	Med	D	41	C	A	Med	A	< 4	S	Apo	99	A	He	P	P	A
140	Plumbaginaceae	Plumbago europaea L.	N	Tall	E	Dry	Hot	Low	B		D	40.1	S	P	Thin	A	A	F	Para	117	P	A	A	A	D
141	Polygonaceae	Polygonum equisetiforme Sm.	W	Tall	D	Dry	Hot	Low	B	Med	D	40.2	S	A	Thin	A	4-12	F	Para	97	A	He	A	P	A
142	Ranunculaceae	Clematis cirrhosa L.	Cl	Tall	C	Wet	Cold	High	D	Low	D	41	C	A	Thin	A	< 4	F	Para	98	A	Ho	A	P	A
143	Rhamnaceae	Rhamnus alaternus L.	N	Tall	C	Wet	Cold	High	D	Med	D	40.1	S	A	Med	A	12-20	S	Para	97	A	He	P	P	A
144	Rhamnaceae	Rhamnus oleoides graecus (Boiss. et Reut.) Holmboe	N	Tall	C	Wet	Cold	High	C	Med	D	40.2	C	P	Med	P	> 20	S	Para	97	A	He	P	P	T
145	Rhamnaceae	Zizyphus lotus (L.) Lam.	N	Tall	D	Dry	Hot	Low	B	Med	D	41	S	A	Med	A	12-20	F, S	Para	96	A	He	P	P	A
146	Rosaceae	Cotoneaster racemiflorus nummularius (Desf.) C.Koch (Fisch. et Meyer) Dippel	N	Short	D	Wet	Cold	High	B	Med	S	40.2	S	P	Med	A	12-20	S	Apo	97	A	He, Ho	A	P	A
147	Rosaceae	Crataegus azarolus L.	N	Tall	D	Wet	Cold	High	B	Med	D	40.2	S	P	Thin	A	> 20	S	Apo	97	A	He	P	P	A
148	Rosaceae	Crataegus monogyna Jacq.	N	Tall	D	Wet	Cold	High	B	Med	D	40.2	C	A	Med	A	12-20	F, S	Apo	97	A	He	P	P	A
149	Rosaceae	Crataegus sinaica Boiss.	N	Tall	C	Wet	Cold	High	B	Med	D	40.2	S	A	Med	A	> 20	F	Apo	97	A	He	P	P	A
150	Rosaceae	Prunus dulcis (Mill.) D.A.Webb	N	Tall	E	Dry	Hot	Low	B	Med	R	41	R	P	Med	P	12-20	S	Para	103	A	He, Ho	P	P	A
151	Rosaceae	Pyrus syriaca Boiss.	P	Tall	C	Wet	Cold	High	B	Med	D	40.2	C	A	Med	A	> 20	A	Apo	97	A	Ho	P	A	A
152	Rosaceae	Rosa canina L.	N	Tall	E	Wet	Cold	High	A	Med	R	41	C	P	Med	A	> 20	F	Apo	103	A	He	P	P	T
153	Rosaceae	Rosa chionistrae H.Lindb.	N	Tall	A	Wet	Cold	High	A	Med	R	41	S	P	Med	A	4-12	F	Apo	98	A	He	P	P	T

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154	Rosaceae	Rubus sanctus Schreb	N	Tall	C	Wet	Cold	High	A		R	41	S	A	Med	A	4-12	F	Apo	103	A	He	P	P	A
155	Rosaceae	Sarcopoterium spinosum (L.) Spach	N	Short	D	Dry	Hot	Low	B	Med	D	40.2	C	A	Med	A	> 20	F	Rare	103	A	Ho	P	P	T
156	Rosaceae	Sorbus aria cretica (L.) Crantz (Lindl.) Holmboe	N	Tall	D	Wet	Cold	High	D	Med	D	40.2	C	P	Med	A	4-12	F, S	Apo	97	A	He	A	P	A
157	Rubiaceae	Asperula cypria Ehrend.	W	Short	A	Wet	Cold	High	C		D	40.2	C	A	Thin	A	> 20	A	Rare	96	A	Ho	A	A	A
158	Rubiaceae	Putoria calabrica (L.f.) DC.	N	Short	D	Wet	Cold	High	C	Low	S	40.2	C	A	Thin	A	> 20	A	Para	97	A	Ho	A	P	D
159	Rubiaceae	Rubia laurae (Holmboe) Airy Shaw	Cl	Short	A	Wet	Cold	High	D		D	40.1	S	P	Thin	A	> 20	A	Para	96	A	Ho	A	P	A
160	Rubiaceae	Rubia tenuifolia d'Urv.	Cl	Tall	C	Wet	Cold	Low	D	Low	R	40.2	C	P	Thin	A	> 20	A	Apo	96	A	Ho	A	P	A
161	Rutaceae	Ruta chalepensis L.	W	Short	D	Dry	Hot	Low	C	Med	D	40.1	C	P	Thin	A	12-20	F	Para	97	A	Ho	P	P	D
162	Salicaceae	Salix alba L.	P	Tall	E	Wet	Cold	High	A	Low	S	40.2	S	A	Thin	P	12-20	F	Para	96	A	He	A	P	D
163	Scrophulariaceae	Antirrhinum majus L.	N	Short	D	Wet	Cold	High	C	Med	D	40.2	C	A	Thin	A	< 4	S	Para	103	A	Ho	P	P	A
164	Scrophulariaceae	Odontites cypria Boiss.	W	Short	A	Wet	Cold	High	D	Med	S	40.1	R	A	Thin	A	> 20	A	Rare	97	A	Ho	A	A	D
165	Solanaceae	Lycium schweinfurthii Dammer	N	Short	D	Dry	Hot	Low	C	Low	D	40.1	S	A	Thin	A	> 20	A	Rare	96	A	Ho	A	A	A
166	Styracaceae	Styrax officinalis L.	N	Tall	C	Wet	Cold	High	D	Med	D	41	C	A	Thin	A	4-12	A	Apo	97	A	He	P	P	T
167	Tamaricaceae	Tamarix dalmatica Baum	P	Tall	C	Dry	Hot	Low	A	Med	S	41	R	P	Thin	A	4-12	F, S	Para	99	A	Ho	A	A	A
168	Tamaricaceae	Tamarix smyrnensis Bunge	N	Tall	C	Dry	Hot	Low	A	Med	D	40.2	S	A	Thin	A	4-12	F, S	Para	98	A	He	A	A	A
169	Tamaricaceae	Tamarix tetragyna Ehrenb.	N	Tall	C	Dry	Hot	Low	A	Med	S	40.2	C	A	Thin	A	4-12	F	Para	98	A	Ho	P	A	D
170	Tamaricaceae	Tamarix tetrandra Pall. Ex Bieb.	N	Tall	E	Dry	Hot	Low	A	Med	S	41	C	A	Thin	A	< 4	F, S	Para	99	A	He	A	P	A
171	Thymelaeaceae	Thymelaea hirsuta (L.) Endl.	N	Tall	D	Dry	Hot	Low	C	Med	S	40.1	R	A	Med	A	> 20	A	Apo	96	A	Ho	A	P	D
172	Thymelaeaceae	Thymelaea tartonraira argentea L.	N	Tall	B	Wet	Cold	Low	D	Med	S	40.1	C	P	Thick	A	12-20	S	Apo	96	A	He	A	P	A
173	Ulmaceae	Celtis australis L.	P	Tall	E	Wet	Cold	High	B		R	42	C	P	Thin	P	< 4	F, S	Para	103	A	He	P	P	T
174	Ulmaceae	Celtis tournefortii Lam.	P	Tall	C	Dry	Hot	Low	B	Med	R	41	C	P	Thin	P	4-12	S	Para	103	A	He	P	P	A

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175	Ulmaceae	Ulmus canescens Melville	P	Tall	D	Dry	Hot	Low	B	Med	D	42	C	P	Med	A	< 4	A	Para	98	A	Ho	P	A	A
176	Verbenaceae	Vitex agnus-castus L.	N	Tall	D	Dry	Hot	Low	A	Med	S	42	C	P	Med	A	4-12	S	Para	97	A	He	P	P	A
177	Vitaceae	Vitis vinifera L.	Cl	Tall	D	Wet	Cold	High	B	Low	R	43	S	A	Thin	A	< 4	F	Para	103	A	Ho	A	P	A
178	Zygophyllaceae	Fagonia cretica L.	W	Short	D	Dry	Hot	Low	C		D	40.2	S	A	Thin	A	> 20	F	Para	96	A	Ho	A	P	A
179	Zygophyllaceae	Zygophyllum album L.	N	Short	D	Dry	Hot	Low	C	Med	D	40.1	S	P	Thin	A	12-20	F	Apo	97	A	He, Ho	A	P	A

Annex 3. Bark anatomical descriptive information on endemic and indigenous species studied (A, anatomical feature absent; P, anatomical feature present).

#	Family	Scientific name	Lifeform	Endemism	Habitat	Sieve tube in clusters	Sieve tube in tang. rows	Sieve tube in rad. rows	Sieve tube collapsed	Some ray dilated	Sclerenchyma cells	Fibers	Fiber in rad. rows	Fiber in tang. rows	Fiber scattered	Fiber grouped	Sclereids	Sclereids in rad. rows	Sclereids in tang. rows	Sclereids scattered	Sclereids grouped	Prismatic crystals	Acicular crystals	Druses crystals	Crystal sand	Phloem uniform	Laticifers structure	Laticifers in ducts	Cell content	Phellem not distinct	Phellem homogeneous	Phellem heterogeneous	Phellem distinct pol. light	Lignified cells in phellem	Phellem layered	Phelloderm layered
1	Aceraceae	Acer obtusifolium Sibth. et Sm.	N	C	C	P	A	A	P	P	A	P	A	P	A	A	A	A	A	A	A	P	A	A	A	A	A	A	A	A	P	A	P	A	A	A
2	Amaranthaceae	Bosea cypria Boiss.	N	A	C	P	A	A	A	A	A	P	A	A	P	P	A	A	A	A	A	P	A	A	P	A	A	A	A	A	A	A	P	A	A	A
3	Anacardiaceae	Pistacia atlantica Desf.	P	E	B	P	A	A	P	P	P	A	A	A	A	A	P	A	P	A	P	P	A	A	A	A	P	P	A	A	P	A	P	A	A	A
4	Anacardiaceae	Pistacia lentiscus L.	N	D	C	P	P	A	P	A	A	P	A	P	A	A	P	A	P	A	A	P	A	A	A	A	P	P	A	A	P	A	P	A	A	A
5	Anacardiaceae	Pistacia terebinthus L.	N	C	D	P	A	A	A	A	A	P	A	A	A	P	P	A	P	A	A	P	A	P	A	A	A	A	A	A	P	A	P	A	A	A
6	Anacardiaceae	Pistacia terebinthus x lentiscus	N	C	D	P	A	A	P	P	A	P	A	P	A	A	P	A	P	A	A	P	A	A	A	A	P	P	A	A	P	A	P	A	A	A
7	Anacardiaceae	Rhus coriaria L.	N	C	D	P	A	A	P	P	A	A	A	A	A	A	P	A	A	P	A	A	A	P	A	A	P	P	A	A	P	A	A	A	A	A
8	Apocynaceae	Nerium oleander L.	N	D	A	P	A	A	A	P	A	A	A	A	A	A	P	A	A	P	A	P	A	A	A	A	P	A	A	A	P	A	A	A	A	A
9	Araliaceae	Hedera helix poetarum L.	L	B	A	P	A	A	P	A	A	A	A	A	A	A	P	A	P	P	A	A	A	A	A	A	A	A	A	A	P	A	P	A	A	A
10	Aristolochiaceae	Aristolochia sempervirens L.	L	D	D	P	A	A	P	A	A	P	A	P	A	A	P	A	A	P	A	A	A	A	A	A	A	A	A	A	P	A	P	A	A	A
11	Asteraceae	Achillea cretica L.	N	C	C	P	A	A	A	P	A	P	A	P	A	P	A	A	A	A	A	A	A	A	P	A	A	A	A	A	A	A	A	A	A	A
12	Asteraceae	Ambrosia maritima L.	N	D	C	P	A	A	A	P	A	P	A	A	P	P	A	A	A	A	A	P	A	A	P	A	A	A	A	A	P	A	P	A	A	A
13	Asteraceae	Centaurea akamantis T.Georgiades et Hadjikyriakou	Z	A	C	P	A	A	P	P	A	P	A	A	A	P	A	A	A	A	A	A	A	A	P	A	A	A	A	A	P	A	A	A	A	A
14	Asteraceae	Cichorium spinosum L.	Z	C	C	P	A	A	P	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	A	A	A	A	P	A	A	A	A	A
15	Asteraceae	Helichrysum conglobatum (Viv.) Steud.	Z	D	B	A	A	A	P	P	A	P	A	A	A	P	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
16	Asteraceae	Helichrysum italicum (Roth) G.Don	N	C	C	P	A	A	P	P	P	P	A	P	A	P	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
17	Asteraceae	Inula crithmoides L.	Z	D	A	P	A	A	A	P	A	P	A	A	A	P	P	A	A	P	A	A	P	A	A	A	A	A	A	A	P	A	P	A	A	A
18	Asteraceae	Inula viscosa (L.) Aiton	Z	D	B	P	A	A	A	P	A	P	A	P	P	P	A	A	A	A	A	A	P	A	P	A	A	A	A	A	P	A	A	A	A	A

#	Family	Scientific name	Lifeform	Endemism	Habitat	Sieve tube in clusters	Sieve tube in tang. rows	Sieve tube in rad. rows	Sieve tube collapsed	Some ray dilated	Sclerenchyma cells	Fibers	Fiber in rad. rows	Fiber in tang. rows	Fiber scattered	Fiber grouped	Sclereids	Sclereids in rad. rows	Sclereids in tang. rows	Sclereids scattered	Sclereids grouped	Prismatic crystals	Acicular crystals	Druses crystals	Crystal sand	Phloem uniform	Laticifers structure	Laticifers in ducts	Cell content	Phellem not distinct	Phellem homogeneous	Phellem heterogeneous	Phellem distinct pol. light	Lignified cells in phellem	Phellem layered	Phelloderm layered
19	Asteraceae	Otanthus maritimus (L.) Hoffmanns. et Link	Z	D	C	P	A	P	A	A	A	P	A	P	A	A	A	A	A	A	A	A	A	A	P	A	A	A	A	A	A	A	A	A	A	A
20	Asteraceae	Phagnalon rupestre DC.	N	C	C	P	A	A	A	P	P	P	A	A	A	P	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
21	Asteraceae	Ptilostemon chamaepeuce cyprius (L.) Less. Greuter	N	A	C	A	A	P	P	A	A	P	A	P	P	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	A	A	A	A
22	Berberidaceae	Berberis cretica L.	N	C	C	P	P	A	A	P	A	A	A	A	A	A	P	A	P	P	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
23	Betulaceae	Alnus orientalis Decne.	P	C	A	P	A	A	P	A	A	P	A	P	A	A	P	A	A	P	A	P	A	P	A	A	A	A	A	A	P	A	P	A	A	A
24	Boraginaceae	Echium angustifolium Link ex Willk. & Lange	Z	C	B	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	A	P	A	A	A	A	A	A	A
25	Boraginaceae	Lithodora hispidula (Sibth. et Sm.) Griseb.	N	C	D	P	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	A	A	A	A	A	A	A	A	A
26	Boraginaceae	Lithodora hispidula versicolor (Sm.) Griseb. Meikle	N	C	D	P	A	A	A	P	P	P	A	A	A	P	P	A	P	A	A	P	A	P	A	A	A	A	A	A	P	A	P	A	A	A
27	Boraginaceae	Onosma fruticosa Sm.	N	A	D	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	A	A	A	A	A	A	A	A	A
28	Boraginaceae	Onosma mitis Boiss. et Heldr.	Z	B	C	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	A	A	A	P	A	A	A	A	A
29	Brassicaceae	Alyssum akamasicum B.L.Burtt	Z	A	C	P	A	A	P	A	A	A	A	A	A	A	P	P	A	P	P	A	A	A	A	A	A	A	A	A	P	A	P	A	A	A
30	Brassicaceae	Alyssum chondrogynum B.L. Burtt	Z	A	C	P	A	A	P	P	P	P	P	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	P	A	A	A
31	Brassicaceae	Alyssum cypricum Nyar.	Z	B	C	A	A	A	P	A	A	P	P	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
32	Brassicaceae	Alyssum troodi Boiss.	Z	A	C	P	A	A	P	A	A	A	A	A	A	A	P	P	A	P	P	A	A	A	A	A	A	A	A	A	P	A	P	A	A	A
33	Brassicaceae	Arabis cypria Holmboe	Z	A	C	P	A	A	P	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	P	A	A	A
34	Brassicaceae	Arabis purpurea Sibth. Et Sm.	Z	A	C	P	A	A	P	A	A	A	A	A	A	A	P	A	A	A	P	A	A	A	A	A	A	A	A	A	P	A	P	A	A	A
35	Brassicaceae	Brassica hilarionis Post	Z	A	C	P	A	A	P	P	P	A	A	A	A	A	P	A	A	A	P	A	A	A	A	A	A	A	A	A	P	A	P	A	A	A
36	Brassicaceae	Erysimum kykkoticum Hadjikyriakou et Alziar	Z	A	C	P	A	A	P	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	P	A	A	A
37	Caesalpiniacea	Ceratonia siliqua L.	P	C	D	P	A	A	A	P	P	P	A	A	A	P	P	A	P	A	A	P	A	P	A	A	A	A	A	A	P	A	P	A	A	A

#	Family	Scientific name	Lifeform	Endemism	Habitat	Sieve tube in clusters	Sieve tube in tang. rows	Sieve tube in rad. rows	Sieve tube collapsed	Some ray dilated	Sclerenchyma cells	Fibers	Fiber in rad. rows	Fiber in tang. rows	Fiber scattered	Fiber grouped	Sclereids	Sclereids in rad. rows	Sclereids in tang. rows	Sclereids scattered	Sclereids grouped	Prismatic crystals	Acicular crystals	Druses crystals	Crystal sand	Phloem uniform	Laticifers structure	Laticifers in ducts	Cell content	Phellem not distinct	Phellem homogeneous	Phellem heterogeneous	Phellem distinct pol. light	Lignified cells in phellem	Phellem layered	Phelloderm layered
	e																																			
38	Capparaceae	Capparis spinosa canescens L.	N	D	B	P	A	A	P	P	A	P	A	A	P	A	P	A	A	P	A	P	A	A	A	A	A	A	A	A	A	A	P	A	A	A
39	Caprifoliaceae	Lonicera etrusca Santi	L	D	C	A	A	A	A	A	P	P	A	P	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	P	A	A	A
40	Caprifoliaceae	Sambucus nigra L.	P	D	D	P	A	A	P	A	P	P	A	A	P	A	A	A	A	A	A	A	A	A	P	A	A	A	A	A	P	A	P	A	A	A
41	Caryophyllaceae	Dianthus cyprius A.K. Jacks. et Turrill	Z	A	C	P	A	A	A	A	A	P	A	P	A	A	A	A	A	A	A	A	A	A	P	A	A	A	A	A	A	A	A	A	A	A
42	Caryophyllaceae	Silene fruticosa L.	Z	D	C	P	A	A	P	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	P	P	A	A
43	Caryophyllaceae	Silene galataea Boiss.	N	A	C	P	P	A	P	A	A	A	A	A	A	A	A	A	A	A	A	P	A	A	A	A	A	A	A	A	A	A	A	A	A	A
44	Chenopodiaceae	Arthrocnemum macrostachyum (Moric.) Mois et Delponte	Z	D	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	P	A	A	A	A	P	A	P	A	A	A
45	Chenopodiaceae	Arthrocnemum perenne (Mill.) Moss	Z	D	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	A	A	P	A	A	A	A	P	A	P	A	A	A
46	Chenopodiaceae	Atriplex halimus L.	N	D	C	P	A	A	A	A	A	P	A	P	A	A	A	A	A	A	A	P	A	A	A	A	A	A	A	A	A	A	A	A	A	A
47	Chenopodiaceae	Noaea mucronata (Forssk.) Asch. et Schwinf.	N	C	C	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	A	A	A	A	A	A	A	A	P
48	Chenopodiaceae	Salicornia friticosa (L.) L.	Z	D	A	P	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	A	A	A	P	A	P	A	A	A
49	Chenopodiaceae	Suaeda aegyptiaca (Hasselq.) Zohary	Z	C	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	P	P	A	A	A	A	A	A	A	A	A	A
50	Chenopodiaceae	Suaeda vera Forssk. ex J.F.Gmel	N	D	C	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	A	A	A	A	A	A	A	A	A
51	Cistaceae	Cistus creticus creticus L.	N	D	D	P	A	A	A	A	P	P	A	P	A	A	A	A	A	A	A	A	A	P	A	A	A	A	A	A	A	A	A	A	A	A
52	Cistaceae	Cistus monspeliensis L.	N	D	D	A	A	A	A	A	P	P	A	A	A	P	P	A	A	A	P	P	A	A	A	A	A	A	P	A	P	A	P	A	A	A
53	Cistaceae	Cistus parviflorus Lam.	N	D	D	A	P	A	A	A	A	P	A	P	A	P	A	A	A	A	A	P	A	A	A	A	A	A	A	A	P	A	P	A	A	A
54	Cistaceae	Cistus parviflorus x monspeliensis	N	D	D	P	A	A	P	A	A	P	A	P	A	P	A	A	A	A	A	P	A	A	A	A	A	A	A	A	P	A	P	A	A	A

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55	Cistaceae	Cistus salviifolius L.	N	D	D	A	A	A	A	A	P	P	A	P	A	P	P	A	A	A	P	P	A	P	A	A	A	A	A	A	P	A	P	A	A	A
56	Cistaceae	Fumana arabica (L.) Spach.	Z	D	D	P	A	A	P	A	A	P	A	P	P	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	P	A	A	A
57	Cistaceae	Fumana thymifolia (L.) Verlot	Z	D	D	P	A	A	A	A	A	A	A	A	A	A	P	A	P	P	A	P	A	A	A	A	A	A	P	A	A	A	A	A	A	P
58	Cistaceae	Helianthemum obtusifolium Dunal	Z	A	D	A	A	A	A	A	A	P	A	A	P	A	A	A	A	A	A	P	A	P	A	A	A	A	P	A	A	A	A	A	A	A
59	Cistaceae	Helianthemum stipulatum (Forssk.) C.Christens.	Z	B	C	A	A	A	P	A	A	A	A	A	A	A	P	A	P	P	A	P	A	A	A	A	A	A	P	A	P	A	P	A	A	A
60	Cistaceae	Helianthemum syriacum (Jacq.) Dum-Cours.	Z	D	C	P	A	A	A	P	A	P	A	A	P	A	A	A	A	A	A	P	A	P	A	A	A	A	P	A	A	A	P	A	A	A
61	Convolvulaceae	Convolvulus dorycnium L.	Z	C	C	P	A	A	P	P	A	A	A	A	A	A	P	A	A	P	A	A	A	P	A	A	A	A	A	A	P	A	A	A	A	A
62	Convolvulaceae	Convolvulus oleifolius deserti Desr. Pamp.	N	B	C	P	A	A	P	A	A	P	A	A	P	P	A	A	A	A	A	A	A	P	A	A	A	A	A	A	P	A	A	A	A	A
63	Convolvulaceae	Convolvulus oleifolius oleifolius Desr.	Z	D	C	P	A	A	P	A	A	A	A	A	A	A	P	A	A	P	A	A	A	P	A	A	A	A	A	A	P	A	P	A	A	A
64	Convolvulaceae	Convolvulus oleifolius pumilus Desr. Pamp.	Z	B	C	P	A	A	P	P	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	A	P	P	A	A	P	A	A	A	A	A
65	Dipsacaceae	Pterocephalus multiflorus obtusifolius Poech. Holmboe	N	A	C	P	A	P	P	A	A	A	A	A	A	A	A	A	A	A	A	P	A	A	A	A	A	A	A	P	A	A	A	A	A	A
66	Dipsacaceae	Scabiosa cyprica Post	N	A	C	P	A	A	P	P	A	A	A	A	A	A	A	A	A	A	A	P	A	A	A	A	A	A	A	A	A	A	A	A	A	P
67	Ephedraceae	Ephedra nebrodensis Guss.	N	E	D	P	A	A	P	A	P	A	A	A	A	A	P	A	A	P	A	A	A	A	P	A	A	A	P	A	A	A	A	A	A	P
68	Ericaceae	Arbutus andrachne L.	N	C	D	P	P	A	P	P	A	A	A	A	A	A	P	A	A	P	A	P	A	A	A	A	A	A	A	A	P	A	P	A	A	A
69	Ericaceae	Arbutus unedo L.	N	E	D	P	A	P	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	A	A	A	A	A	A	A	P	A	P	A	A	A
70	Ericaceae	Arbutus unedo x andrachnoides Link	N	D	D	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	A	A	P	A	A	A	A	P	A	A	A	A	A
71	Ericaceae	Erica sicula Guss.	N	C	C	A	A	A	A	P	P	P	A	P	P	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	P	A	P	A	A	A
72	Euphorbiaceae	Euphorbia hierosolymitana Boiss.	N	C	C	P	A	A	A	A	A	A	A	A	A	A	P	A	P	A	A	A	A	A	P	A	A	A	A	A	P	A	P	A	A	A

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73	Euphorbiaceae	Euphorbia thompsonii Holmboe	Z	B	D	P	A	A	A	A	A	A	A	A	A	A	P	A	A	P	A	A	A	A	P	A	P	P	A	A	P	A	P	A	A	A
74	Fagaceae	Quercus coccifera calliprinos (Webb) Holmboe	P	C	D	P	A	A	P	A	P	P	A	A	A	P	P	A	A	A	P	A	A	P	A	A	A	A	A	A	P	A	P	A	A	A
75	Fagaceae	Quercus infectoria veneris Oliv. (A.Kern.) Holmboe	P	C	D	P	A	P	P	A	P	P	A	P	A	A	P	A	A	P	A	P	A	P	A	A	A	A	A	A	P	A	P	A	A	A
76	Frankeniaceae	Frankenia hirsuta L.	Z	B	A	P	A	A	P	A	A	A	A	A	A	A	P	A	A	P	A	P	A	P	A	A	A	A	A	A	P	A	P	A	A	P
77	Guttiferae	Hypericum confertum stenobotrys (Choisy) G.Don	Z	C	D	P	A	A	P	P	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	P	A	A	P	A	A	A	A	A
78	Guttiferae	Hypericum hircinum albimontanum L.	N	D	A	P	A	A	P	P	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	P	A	A	P	A	A	A	A	A
79	Labiateae	Ballota integrifolia Benth.	N	A	C	P	A	A	A	A	P	P	A	A	A	P	P	A	P	A	A	P	A	A	A	A	A	A	A	A	P	A	A	A	A	A
80	Labiateae	Lavandula stoechas L.	N	C	C	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	A	A	A	A	A	P	P	A	A
81	Labiateae	Micromeria chionistrae Meikle	Z	A	C	P	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	A	A	A	A	A	P	A	A	A
82	Labiateae	Micromeria cypria Kotschy	Z	A	C	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	A	A	A	A	A	A	A	A	A
83	Labiateae	Micromeria myrtifolia Boiss. et Hohen	Z	C	D	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	A	P	A	A	A	A	A	A	A
84	Labiateae	Micromeria nervosa (Desf.) Benth.	Z	D	D	P	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	A	P	A	A	A	P	A	A	A
85	Labiateae	Nepeta troodi Holmboe	Z	A	C	P	A	A	P	A	A	A	A	A	A	A	P	A	P	P	A	P	A	A	A	A	A	A	A	A	A	A	A	A	A	A
86	Labiateae	Origanum cordifolium (Aucher et Montbret ex Benth.) Vogel	Z	A	A	P	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	P	A	A	A	A	A	A	A	A	A	A
87	Labiateae	Origanum dubium Boiss.	N	B	D	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	A	P	A	A	P	A	A	A	A	A	A	A
88	Labiateae	Origanum majorana tenuifolium L. Weston	N	A	D	P	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	A	P	A	A	A	P	A	A	A
89	Labiateae	Phlomis brevibracteata Turril	N	A	D	P	A	A	A	A	A	A	A	A	A	A	P	A	P	P	A	A	A	A	P	A	A	A	A	A	A	A	A	A	A	P
90	Labiateae	Phlomis cypria cypria Post	N	A	D	A	A	A	A	A	A	P	A	A	P	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	A	A

#	Family	Scientific name	Lifeform	Endemism	Habitat	Sieve tube in clusters	Sieve tube in tang. rows	Sieve tube in rad. rows	Sieve tube collapsed	Some ray dilated	Sclerenchyma cells	Fibers	Fiber in rad. rows	Fiber in tang. rows	Fiber scattered	Fiber grouped	Sclereids	Sclereids in rad. rows	Sclereids in tang. rows	Sclereids scattered	Sclereids grouped	Prismatic crystals	Acicular crystals	Druses crystals	Crystal sand	Phloem uniform	Laticifers structure	Laticifers in ducts	Cell content	Phellem not distinct	Phellem homogeneous	Phellem heterogeneous	Phellem distinct pol. light	Lignified cells in phellem	Phellem layered	Phelloderm layered
91	Labiateae	Phlomis cypria occidentalis Post Meikle	N	A	D	A	A	A	A	A	A	A	A	A	A	A	P	A	A	P	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
92	Labiateae	Phlomis lunariifolia Sm.	N	B	D	P	A	A	A	A	A	A	A	A	A	A	P	A	P	A	A	A	A	A	P	A	A	A	P	A	A	A	A	A	A	P
93	Labiateae	Prasium majus L.	N	D	D	P	P	A	P	A	A	P	A	P	P	A	A	A	A	A	A	P	A	P	P	A	A	A	A	A	A	A	A	A	A	A
94	Labiateae	Rosmarinus officinalis L.	P	D	D	P	A	A	A	A	P	P	A	A	P	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	A	A	A	A	P
95	Labiateae	Salvia dominica L.	N	C	C	P	A	A	P	A	A	A	A	A	A	A	P	A	P	P	A	A	P	A	A	A	A	A	A	A	A	A	A	A	A	A
96	Labiateae	Salvia lanigera Poir.	Z	C	C	P	A	A	P	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	A	A	A	A	P	A	A	A	A	A	A	A
97	Labiateae	Salvia willeana (Holmboe) Hedge	Z	A	C	P	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	A	A	P	A	A	A	A	A	A	P
98	Labiateae	Satureja thymbra L.	N	C	C	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	A	P	A	A	A	A	A	A	A	A	A	P
99	Labiateae	Scutellaria sibthorpii Boiss. et Reut. ex Boiss.	Z	A	C	P	A	A	A	A	A	P	A	A	P	A	A	A	A	A	A	A	A	A	P	A	A	A	A	A	P	A	A	A	A	A
100	Labiateae	Sideritis cypria Post	Z	A	C	P	A	A	P	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	A	A	A	A	P	A	A	A	A	A
101	Labiateae	Teucrium creticum L.	N	B	C	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	P	A	A	P	A	A	A	A	A	A	A
102	Labiateae	Teucrium divaricatum canescens Heldr. (Celak.) Holmboe	Z	A	C	A	A	A	A	A	A	A	A	A	A	A	P	A	A	P	A	A	A	A	P	A	A	A	P	A	A	A	A	A	A	P
103	Labiateae	Teucrium micropodioides Rouy	Z	A	C	A	A	A	P	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	P	A	A	A	P	A	A	A	A	A	A	A
104	Labiateae	Thymus capitatus (L.) Hoffmanns	N	D	C	P	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	P	A	A	A	A	A	A	A	A	A	A	A	A	A
105	Malvaceae	Lavatera bryoniifolia Mill.	Z	C	A	P	A	P	A	P	A	P	A	A	A	P	A	A	A	A	A	A	A	P	A	A	A	A	A	A	P	A	P	A	A	A
106	Mimosaceae	Prosopis farcta (Banks et Sol.) J.F.Macbr.	N	C	B	P	A	A	A	P	A	P	A	A	A	P	P	A	P	P	A	P	A	A	A	A	A	A	A	A	P	A	P	A	A	A
107	Moraceae	Ficus carica L.	P	C	B	P	P	A	A	P	A	A	A	A	A	A	A	A	A	A	A	P	A	A	A	A	P	A	P	A	P	A	P	A	A	A
108	Moraceae	Morus nigra L.	P	D	C	P	A	A	P	A	A	P	A	P	A	P	P	A	P	A	P	P	A	A	A	A	P	P	A	A	A	P	P	A	P	A

#	Family	Scientific name	Lifeform	Endemism	Habitat	Sieve tube in clusters	Sieve tube in tang. rows	Sieve tube in rad. rows	Sieve tube collapsed	Some ray dilated	Sclerenchyma cells	Fibers	Fiber in rad. rows	Fiber in tang. rows	Fiber scattered	Fiber grouped	Sclereids	Sclereids in rad. rows	Sclereids in tang. rows	Sclereids scattered	Sclereids grouped	Prismatic crystals	Acicular crystals	Druses crystals	Crystal sand	Phloem uniform	Laticifers structure	Laticifers in ducts	Cell content	Phellem not distinct	Phellem homogeneous	Phellem heterogeneous	Phellem distinct pol. light	Lignified cells in phellem	Phellem layered	Phelloderm layered
109	Myrtaceae	Myrtus communis L.	N	E	A	P	P	A	A	A	P	A	A	A	A	A	P	A	A	P	A	A	A	P	A	A	A	A	A	A	P	A	P	A	A	A
110	Oleaceae	Olea europaea L.	N	D	B	P	A	A	A	P	A	P	A	P	A	A	A	A	A	A	A	A	A	A	P	A	A	A	A	A	P	A	P	A	A	A
111	Oleaceae	Phillyrea latifolia L.	N	D	D	P	A	A	P	A	P	P	A	A	A	P	P	A	P	A	A	A	A	A	A	A	A	A	A	A	P	A	P	A	A	A
112	Papilionaceae	Alhagi maurorum Medik.	Z	C	C	P	A	A	A	P	P	P	A	A	A	P	A	A	A	A	A	P	A	A	A	A	P	A	P	A	P	A	P	A	A	A
113	Papilionaceae	Anagyris foetida L.	N	D	D	P	A	A	P	A	P	P	A	A	A	P	P	A	A	A	P	A	A	A	A	A	A	A	A	A	P	A	P	A	A	A
114	Papilionaceae	Calycotome villosa (Poir.) Link	N	D	B	P	P	A	P	A	A	A	A	A	A	A	P	A	P	A	P	P	A	A	A	A	A	A	A	A	P	A	P	A	A	A
115	Papilionaceae	Coronilla emerus emeroides L. (Boiss. et Spruner.) Holmboe	N	C	D	P	A	A	P	A	A	A	A	A	A	A	P	A	A	P	P	P	A	A	A	A	A	A	A	A	P	A	P	A	A	A
116	Papilionaceae	Genista sphacelata sphacelata Decne	N	C	D	P	A	A	A	P	P	P	A	P	A	A	P	A	P	A	A	A	P	A	A	A	P	P	A	A	P	A	P	A	A	P
117	Papilionaceae	Hedysarum cyprium Boiss.	Z	A	D	P	A	A	P	A	P	P	A	P	A	A	P	A	A	P	A	P	A	A	A	A	A	A	A	A	A	A	A	P	A	A
118	Papilionaceae	Ononis spinosa leiosperma L. (Boiss.) Sirjaev	Z	C	A	P	A	A	P	P	A	P	A	P	A	A	A	A	A	A	A	P	A	A	A	A	A	A	A	A	A	A	P	A	A	A
119	Phytolaccaceae	Phytolacca pruinosa Fenzi	Z	C	C	P	A	A	A	P	A	P	A	P	A	A	A	A	A	A	A	A	P	A	P	A	A	A	A	A	P	A	P	A	A	A
120	Platanaceae	Platanus orientalis L.	P	E	A	P	A	A	P	A	A	P	A	P	A	A	A	A	A	A	A	P	A	A	A	A	A	A	A	A	P	A	P	A	A	A
121	Plumbaginaceae	Plumbago europaea L.	N	E	B	P	A	A	P	A	A	P	A	P	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
122	Polygonaceae	Polygonum equisetiforme Sm.	Z	D	B	P	A	A	P	A	P	P	P	A	A	A	A	A	A	A	A	A	A	P	A	A	P	A	A	A	A	A	A	A	A	A
123	Ranunculaceae	Clematis cirrhosa L.	L	C	D	P	A	A	P	A	A	P	A	A	A	P	P	A	P	P	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A
124	Rhamnaceae	Rhamnus alaternus L.	N	C	D	P	A	A	P	A	A	A	A	A	A	A	P	A	A	A	P	A	P	A	A	A	A	A	A	A	P	A	P	A	A	A

#	Family	Scientific name	Lifeform	Endemism	Habitat	Sieve tube in clusters	Sieve tube in tang. rows	Sieve tube in rad. rows	Sieve tube collapsed	Some ray dilated	Sclerenchyma cells	Fibers	Fiber in rad. rows	Fiber in tang. rows	Fiber scattered	Fiber grouped	Sclereids	Sclereids in rad. rows	Sclereids in tang. rows	Sclereids scattered	Sclereids grouped	Prismatic crystals	Acicular crystals	Druses crystals	Crystal sand	Phloem uniform	Laticifers structure	Laticifers in ducts	Cell content	Phellem not distinct	Phellem homogeneous	Phellem heterogeneous	Phellem distinct pol. light	Lignified cells in phellem	Phellem layered	Phelloderm layered
125	Rhamnaceae	Rhamnus oleoides graecus (Boiss. et Reut.) Holmboe	N	C	C	P	A	A	P	P	A	A	A	A	A	A	P	A	A	A	P	P	A	A	A	A	A	A	A	A	P	A	P	A	A	A
126	Rhamnaceae	Zizyphus lotus (L.) Lam.	N	D	B	P	A	A	P	P	P	P	A	P	A	P	P	A	A	P	P	P	A	A	A	A	A	A	P	A	P	A	P	A	A	A
127	Rosaceae	Cotoneaster racemiflorus (Desf.) C.Koch	P	D	C	P	A	A	P	P	A	P	A	A	P	P	A	A	A	A	A	P	A	A	A	A	A	A	A	A	P	A	P	A	P	A
128	Rosaceae	Cotoneaster racemiflorus nummularius (Desf.) C.Koch (Fisch. et Meyer) Dippel	N	D	B	A	A	A	P	P	P	A	A	A	A	A	P	A	P	P	A	P	A	A	A	A	A	A	A	A	P	A	P	A	A	A
129	Rosaceae	Crataegus azarolus L.	N	D	B	A	A	A	P	A	P	A	A	A	A	A	P	A	P	A	A	P	A	A	A	A	A	A	A	A	P	A	P	A	A	A
130	Rosaceae	Crataegus monogyna Jacq.	N	D	B	P	A	A	P	A	A	P	A	A	A	P	P	A	P	A	A	P	A	A	A	A	A	A	A	A	P	A	A	A	A	A
131	Rosaceae	Crataegus sinaica Boiss.	N	C	B	P	A	A	P	A	P	P	A	P	A	A	A	A	A	A	A	P	A	A	A	A	A	A	A	A	P	A	P	A	A	A
132	Rosaceae	Prunus dulcis (Mill.) D.A.Webb	N	E	B	A	A	A	A	P	A	A	A	A	A	A	P	A	P	P	A	P	A	P	A	A	A	A	P	A	P	A	P	A	A	A
133	Rosaceae	Pyrus syriaca Boiss.	P	C	B	P	A	A	P	A	P	P	A	P	A	P	A	A	A	A	A	P	A	A	A	A	A	A	A	A	P	A	P	A	A	A
134	Rosaceae	Rosa canina L.	N	E	A	A	A	A	P	P	A	P	A	P	A	P	A	A	A	A	A	A	A	P	A	A	A	A	A	A	P	A	P	A	A	A
135	Rosaceae	Rosa chionistrae H.Lindb.	N	A	A	P	A	A	A	P	A	P	A	P	A	A	A	A	A	A	A	A	A	P	A	A	A	A	A	A	P	A	P	A	A	A
136	Rosaceae	Rubus sanctus Schreb	N	C	A	P	A	A	A	A	A	P	A	P	A	A	A	A	A	A	A	P	A	P	A	A	A	A	A	A	P	A	P	A	A	A
137	Rosaceae	Sarcopoterium spinosum (L.) Spach	N	D	B	P	A	A	P	A	A	A	A	A	A	A	A	A	A	A	A	P	A	A	A	A	A	A	A	A	A	A	P	A	A	A
138	Rosaceae	Sorbus aria cretica (L.) Crantz (Lindl.) Holmboe	N	D	D	P	A	A	P	A	A	P	A	A	P	A	P	A	P	A	A	P	A	A	A	A	A	A	P	A	P	A	A	A	A	A
139	Rubiaceae	Asperula cypria Ehrend.	Z	A	C	P	A	A	P	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
14	Rubiaceae	Putoria calabrica (L.f.) DC.	N	D	C	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	P	A	A	P	A	A	P	A	A	A	A	A	A	P

#	Family	Scientific name	Lifeform	Endemism	Habitat	Sieve tube in clusters	Sieve tube in tang. rows	Sieve tube in rad. rows	Sieve tube collapsed	Some ray dilated	Sclerenchyma cells	Fibers	Fiber in rad. rows	Fiber in tang. rows	Fiber scattered	Fiber grouped	Sclereids	Sclereids in rad. rows	Sclereids in tang. rows	Sclereids scattered	Sclereids grouped	Prismatic crystals	Acicular crystals	Druses crystals	Crystal sand	Phloem uniform	Laticifers structure	Laticifers in ducts	Cell content	Phellem not distinct	Phellem homogeneous	Phellem heterogeneous	Phellem distinct pol. light	Lignified cells in phellem	Phellem layered	Phelloderm layered
0																																				
141	Rutaceae	Ruta chalepensis L.	Z	D	C	P	A	A	P	P	A	P	A	A	P	A	A	A	A	A	A	A	A	P	A	A	A	A	A	A	P	A	P	A	A	A
142	Salicaceae	Salix alba L.	P	E	A	P	A	A	P	A	P	P	A	P	A	A	P	A	A	P	A	P	A	P	A	A	A	A	P	A	P	A	P	A	A	A
143	Scrophulariaceae	Antirrhinum majus L.	N	D	C	P	A	A	P	A	A	P	A	P	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	A	A	A	A
144	Scrophulariaceae	Odontites cypria Boiss.	Z	A	D	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	A	A	A	A	A	A	A	A	A
145	Solanaceae	Lycium schweinfurthii Dammer	N	D	C	P	A	A	P	P	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	A	A	A	A
146	Styracaceae	Styrax officinalis L.	N	C	D	A	A	A	A	P	A	A	A	A	A	A	A	A	A	A	A	P	A	A	A	P	A	A	A	A	P	A	P	A	A	A
147	Tamaricaceae	Tamarix dalmatica Baum	P	C	A	P	A	A	A	P	P	P	A	P	A	P	P	P	A	P	A	A	A	A	A	A	A	A	P	A	P	A	P	A	A	A
148	Tamaricaceae	Tamarix smyrnensis Bunge	N	C	A	P	A	A	P	A	P	P	A	P	P	A	P	A	A	P	A	A	A	A	A	A	A	A	A	A	P	A	P	A	A	A
149	Tamaricaceae	Tamarix tetragyna Ehrenb.	N	C	A	P	A	A	P	A	P	P	A	P	P	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	P	A	A	A
150	Tamaricaceae	Tamarix tetrandra Pall. Ex Bieb.	N	E	A	P	A	P	A	A	P	P	A	P	A	A	P	P	A	P	A	A	A	A	P	A	A	A	A	A	P	A	P	A	A	A
151	Thymelaeaceae	Thymelaea hirsuta (L.) Endl.	N	D	C	P	A	A	P	P	A	A	A	A	A	A	A	A	A	A	A	P	A	A	A	A	A	A	A	A	A	A	A	A	A	A
152	Thymelaeaceae	Thymelaea tartonraira argentea L.	N	B	D	P	A	A	P	A	P	P	A	A	P	A	P	A	A	P	A	P	A	A	A	A	A	A	A	A	A	A	P	A	A	A
153	Ulmaceae	Celtis australis L.	P	E	B	A	A	A	P	P	P	P	A	P	A	A	P	A	A	A	P	P	A	A	A	A	A	A	A	A	P	A	P	A	A	A
154	Ulmaceae	Celtis tournefortii Lam.	P	C	B	P	A	A	P	A	P	A	A	A	A	A	P	A	P	A	P	P	A	A	A	A	A	A	A	A	P	A	P	A	A	A
155	Ulmaceae	Ulmus canescens Melville	P	D	B	A	A	A	A	A	A	P	A	P	P	A	A	A	A	A	A	P	A	A	A	A	A	A	P	A	P	A	P	A	A	A

#	Family	Scientific name	Lifeform	Endemism	Habitat	Sieve tube in clusters	Sieve tube in tang. rows	Sieve tube in rad. rows	Sieve tube collapsed	Some ray dilated	Sclerenchyma cells	Fibers	Fiber in rad. rows	Fiber in tang. rows	Fiber scattered	Fiber grouped	Sclereids	Sclereids in rad. rows	Sclereids in tang. rows	Sclereids scattered	Sclereids grouped	Prismatic crystals	Acicular crystals	Druses crystals	Crystal sand	Phloem uniform	Laticifers structure	Laticifers in ducts	Cell content	Phellem not distinct	Phellem homogeneous	Phellem heterogeneous	Phellem distinct pol. light	Lignified cells in phellem	Phellem layered	Phelloderm layered
156	Verbenaceae	Vitex agnus-castus L.	N	D	A	P	A	A	P	P	P	P	A	A	A	P	P	A	A	A	P	P	A	A	A	A	A	A	P	A	P	A	P	A	A	A
157	Vitaceae	Vitis vinifera L.	L	D	B	A	A	A	A	A	P	P	A	P	A	A	A	A	A	A	A	P	A	A	A	A	A	A	A	A	P	A	P	A	A	A

	Sieve tube in clusters	Sieve tube in tang. rows	Sieve tube in rad. rows	Sieve tube collapsed	Some ray dilated	Sclerenchyma cells	Fibers	Fiber in rad. rows	Fiber in tang. rows	Fiber scattered	Fiber grouped	Sclereids	Sclereids in rad. rows	Sclereids in tang. rows	Sclereids scattered	Sclereids grouped	Prismatic crystals	Acicular crystals	Druses crystals	Crystal sand	Phloem uniform	Laticifers structure	Laticifers in ducts	Cell content	Phellem not distinct	Phellem homogeneous	Phellem heterogeneous	Phellem distinct pol. light	Lignified cells in phellem	Phellem layered	Phelloderm layered
Lifeform		X				X	X		X			X					X				X							X		X	X
Endemism					X	X	X		X								X									X		X			X
Habitat					X	X						X		X	X		X		X							X		X			X

Annex 4. Descriptive information on climbers and subshrubs studied: scientific name and family, total plant height (cm), sampling height from soil level (cm), wood diameter where sampled (mm), presence of successive cambia (N, not present; Y, present), presence of rays (N, not present; Y, present), wood porosity (3, ring-porous; 4, semi ring-porous; 5, diffuse porous), mean annual temperature (°C), mean annual precipitation (mm), water equability, water availability, elevation of sampling (m), leaf persistence during the adverse season (E, evergreen; D Deciduous, ?, unknown but presumed to be evergreen), and habitat from which plant was sampled. Species are ordered by vessel diameter within each growth form.

Species — Family	Plant height	Sampling height	Stem diameter	Successive cambia	Rays	Wood porosity	Mean annual temperature	Mean annual precipitation	Site temperature	Water equability	Water availability	Elevation	Leaf persistence	Habitat
Vitis vinifera L. — Vitaceae	1200	100	16.0	N	Y	3	17.2	714	C	L	W	650	D	Wasteland
Clematis cirrhosa L. — Ranunculaceae	650	550	12.5	N	Y	3	13.0	919	C	H	W	1200	E	Maquis and garigue
Clematis vitalba L. — Ranunculaceae	500	100	8.2	N	Y	3	13.0	919	C	H	W	1200	E	Maquis and garigue
Hedera helix L. subsp. *Poetarum* (Bertol) Nyman — Araliaceae	1200	100	13.0	N	Y	3	13.0	919	C	L	W	1271	E	Moist place in pine forest
Cyprinia gracilis (Boiss.) Browicz — Asclepiadaceae	400	4	7.7	N	Y	3	13.0	919	C	L	W	920	D	Pine forest
Rubia tenuifolia d'Urv. — Rubiaceae	300	30	5.2	N	Y	3	17.2	714	C	H	D	61	E	Rocky slopes in maquis
Lonicera etrusca Santi — Caprifoliaceae	400	300	8.2	N	Y	5	13.0	919	C	H	W	924	D	Rocky place in pine forest
Lonicera japonica Thumb. — Caprifoliaceae	450	150	5.1	N	Y	3	19.7	308	H	L	D	170	E	Escaped from cultivation in hedges
Aristolochia 1irsute1rens L. — Aristolochiaceae	150	15	3.0	N	Y	5	19.2	474	H	H	D	358	E	Maquis and garigue
Ephedra fragilis Desf. Subsp. *Campylopoda* (J.C. Mayer) Asch. Et Graebn. — Ephedraceae	100	20	2.5	N	Y	4	18.7	430	H	H	D	54	E	Rocky slope in maquis
Nepeta troodi Holmboe — Labiateae	20	2	4.4	N	Y	5	10.8	1109	C	St	W	1800	?	Rocky place

Onosma fruticosa Sm. — Boraginaceae	40	2	8.6	N	N	4	19.7	308	H	St	D	338	E	Garigue
Cichorium spinosum L. — Asteraceae	30	2	3.4	N	Y	5	18.7	430	H	St	D	0	E	Rock crevices on sea side
Salvia willeana (Holmboe) Hedge — Labiateae	20	10	8.0	N	Y	4	10.8	1109	C	St	W	1830	?	Rocky place in pine forest
Onosma mitis Boiss. Et Heldr. — Boraginaceae	30	0	2.9	N	N	5	17.2	714	C	St	D	650	E	Pine forest
Sideritis cypria Post — Labiateae	25	8	5.0	N	Y	4	17.2	714	C	St	D	715	?	South facing cliffs
Phagnalon rupestre DC. — Asteraceae	30	3	3.2	N	Y	5	19.7	308	H	St	D	344	?	Rocky ground
Arthrocnemum macrostachyum (Moric.) Mois et Delponte — Chenopodiaceae	20	2	4.0	Y	Y	5	19.6	334	H	L	D	0	E	Edge of salt lake
Teucrium divaricatum Heldr. Subsp. *Canescens* (Celak.) Holmboe — Labiateae	38	12	11.7	N	Y	4	17.2	714	C	St	D	654	?	Rocky place in maquis and garigue
Origanum cordifolium (Aucher et Montbret ex Benth.) Vogel — Labiateae	30	2	3.6	N	Y	5	17.2	714	C	L	D	540	E	Moist places along stream
Arabis purpurea Sibth. Et Sm. - Brassicaceae	10	0	3.2	Y	Y	5	19.7	308	H	St	D	175	E	Fissures in rocks
Halocnemum strobilaceum (Pall.) Bieb. — Chenopodiaceae	40	2	5.0	Y	N	5	19.6	344	H	L	D	0	E	Edge of salt lake
Fumana arabica (L.) Spach. — Cistaceae	35	10	2.1	N	Y	5	17.2	714	C	St	D	465	?	Rocky slope in maquis and garigue
Teucrium cyprium subsp. *Cyprium* Boiss. — Labiateae	20	10	2.8	N	Y	5	17.2	714	C	St	D	721	?	Rocky place
Micromeria nervosa (Desf.) Benth. — Labiateae	20	10	3.7	N	Y	5	19.7	308	H	St	D	377	?	Garigue
Alyssum akamasicum B.L.Burtt — Brassicaceae	12	2	3.4	Y	Y	5	19.2	374	H	St	D	358	E	Rocky site
Thymus integer Griseb. — Labiateae	15	8	1.2	N	Y	5	19.7	308	H	St	D	277	?	Ophiolite formation in mountain range

Teucrium cyprium Boiss. Subsp. *Kyreniae* Boiss. P.H. Davis — Labiateae	10	2	3.0	N	Y	4	17.2	714	C	St	D	600	?	Rocky places in pine forest
Micromeria myrtifolia Boiss. Et Hohen — Labiateae	20	2	2.4	N	Y	4	17.2	714	C	St	D	585	?	Forests and phrygana
Brassica hilarionis Post — Brassicaceae	15	2	4.3	N	Y	5	17.2	714	C	St	D	620	E	Rocky site
Erysimum kykkoticum Hadjikyriakou et Alziar — Brassicaceae	15	5	3.7	Y	N	5	17.2	714	C	St	D	534	E	Rocky site
Helianthemum obtusifolium Dunal — Cistaceae	20	8	3.7	N	Y	5	19.6	344	H	St	D	2	E	Rocky slope in maquis and garigue
Odontites cypria Boiss. — Scrophulariaceae	15	0	3.1	N	Y	4	13.0	919	C	St	W	1360	?	Garigue and maquis forests
Alyssum troodi Boiss. — Brassicaceae	12	2	4.5	Y	N	5	10.8	1109	C	St	W	1825	?	Rocky place
Frankenia 3irsute L. — Frankeniaceae	4	2	1.4	N	Y	5	19.6	344	H	L	D	2	E	Sandy shore