
THE OAKS OF TURKEY

by Aytekin Ertas

Geography of Turkey

Turkey covers about 78,000,000 hectares in total area. Most of Anatolia consists of a plateau, rising steadily towards the east and bounded on the north and south by steep mountain ranges, part of the Alpine-Himalayan system. Turkey can be divided into seven geographic regions:

North Anatolia

Throughout most of this area, the coast plunges steeply into the Black Sea. In the north-east, the range is high, continuous and close to the sea rising at many points to over 3,000 meters(9840 ft.). Most of this area consists of basic igneous rocks and flysch, many of the highest peaks are of crystalline limestone. In contrast to the rest of Turkey, the most striking climatic feature of this part is the heavy rainfall, which particularly in the east, continues all year round; when it is not raining, the hills are frequently swathed in mist.

West Anatolia

Many of the mountain ranges run east to west, and are divided by broad meandering river valleys. The geology is quite varied, with chalk at lower altitudes, basic igneous rocks, limestone, mica schists and granite making up various parts of the country. The coastline is greatly indented by gulfs and promontories.

South Anatolia

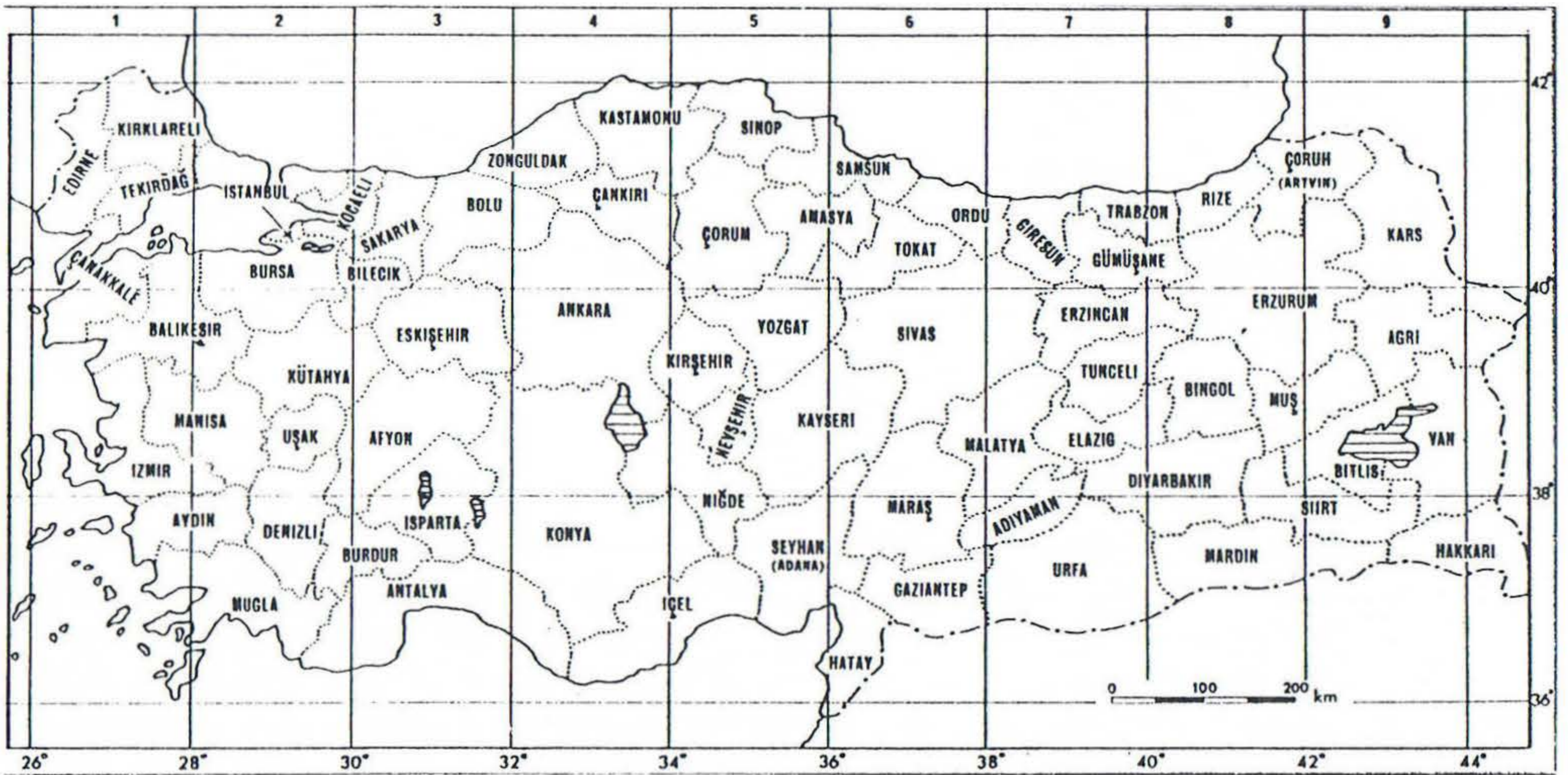
The coastline is very steep, with coastal plains of any size being confined to the neighborhood of Antalya and Adana. The dominant rock of South Anatolia is hard limestone. There are extensive areas of soft chalky rocks near Göksu valley of Adana. Limestone is scarce in the Amanos mountains where igneous rocks predominate. West and South Anatolia have a typical Mediterranean climate near the coast -- mild, wet winters and long, hot arid summers, with almost constant drought from May to September. In unfavorable years one can see even evergreen macchie shrubs with leaves withering in mid-summer.

Inner (Central) Anatolia

Much of the plateau of Central Anatolia lies between 800m(2624 ft.) and 1000m(3280 ft.), although various mountains rise much higher. Much of this central plateau is covered by very soft rocks of chalk, clay and marl.

East Anatolia

Apart from Mesopotamia, East Anatolia is higher and much more mountainous than Central Anatolia, the level of the plateau itself reaching over 1700m(5576 ft.). Much of East Anatolia is covered with basic igneous rocks, with limestone being largely dolomitic.



Map of Turkey with Turkish Vilayets and Grid System. From the *Flora of Turkey*, volume 1, Edinburgh University Press.

In Central and East Anatolia, precipitation is less and much of it falls as snow. Winter temperatures are much lower, particularly on the mountains where nearly the whole area is under snow from November to March or April. In general, the vegetation is desiccated by midsummer; the leaves of most herbaceous species wither after flowering.

South East Anatolia (Mesopotamia)

This plateau is considerably lower and flatter than the inner plateau of East Anatolia, falling gently from 800m in the north to about 400m near the Syrian frontier. It consists of rolling hills and vast plains, with the basaltic hump of Karacadag (1919meters/6294 ft.) providing the main relief. Temperatures are higher than in East Anatolia, thus accounting for Mesopotamia's floristic affinities with the Syrian Desert, of which it is but the northern extension.

Trace (Turkey in Europe)

This region is topographically, climatically and biologically heterogeneous. The Istranca Daglari that borders the Black Sea is (as far as the flora is concerned) a low continuation of the northern range of Anatolia and is composed largely of schists. On the northwestern side of the Sea of Marmara, the low sandstone range of Tekir Daglari continues southward into the Gelibolu peninsula. The climate is very close to Mediterranean conditions (Davis, 1965).

Information on the Individual Oaks

Eighteen oak species are known to be native to Turkey and they occupy 25 percent of the forest area of Turkey (5 million hectares). Oak forests are either high forest and productive coppices or degraded high forests and coppices. Turkey has to be considered rich in oaks. Ten of these species are white oak (section *Quercus*, formerly subgenus *Leucobalanus*), deciduous or semi-evergreen, lobed, dentate or pinnatifid, lobes obtuse or acuminate, fruit maturing in one year (Section I). Five are deciduous, with leaves lobed, dentate or pinnatifid, lobes acuminate, fruit maturing in two years (Section II). The remainders are components of macchie flora, with leaves evergreen, rigidly coriaceous, tomentose or glabrous beneath, entire or serrate, fruit maturing in one or two years (Section III) (Yaltirik, 1973).

Section I

Quercus pontica C. Koch: Deciduous tall shrub, 3-5m with lax habit. Leaves mostly at ends of branches, elliptic to broadly elliptic, 10-26cm x 5-13cm, regularly serrate with 20-30 acute teeth, primary veins to 30, parallel, prominent; intercalary veins absent; upper surface glabrous, dark-green, lower surface paler with scattered hairs on veins; petiole 1-2cm. Fruits clustered on short stout peduncles at ends of branches. Cupule hemispherical, 15-20mm diameter. A relict species, varying little in its characteristics and quite distinct among all of the other Turkish oaks on account of the very large, regularly serrate leaves with numerous prominent parallel veins. It grows in *Fagus orientalis*, *Picea orientalis*, *Rhododendron* forest, 800-1200m. A8 Trabzon, Rize, Hopa to Borcka.

Quercus robur L.: Deciduous tree to 25m(82ft.), wide-spreading at top. Leaves usually crowded at apex of shoots, obovate to 20 x 9cm, auriculate, sessile or stalked, with 5-8 entire, irregularly rounded, deep lobes, occasionally with secondary lobes; primary veins 5-9, intercalary veins also present, peduncle (2.) 4-12cm. Cupule hemispherical, 15-20mm diameter, greyish-brown, scales concentric, flat or convex.

A widespread and frequent species throughout Europe, Turkey and Caucasia. Two subspecies have been recognized in Turkey:

1. Leaves subsessile, with a broad sinus; peduncle (2) 4-10cm slender subsp. *robur*
1. Leaves with a distinct petiole to 2cm, with a narrow sinus; peduncle 2-6cm stout subsp. *pedunculiflora*

subsp. *robur* Syn.: *Q. haas* Kotschy; *Q. pedunculata* Boiss; *Q. brutia* Ten.
subsp. *pedunculiflora* (C. Koch) O. Schwarz: This is an Euro-Siberian element. It grows in deciduous forest, flood plains, often near streams, 100m-1000m; A1(E) Tekirdag, A2(E) Istanbul, A2(A) Bursa, A3 Bolu, A4 Kastamonu, B3 Konya, B5 Nigde, B6 Sivas, C5 Icel.

subsp. *pedunculiflora* (C. Koch) Menitsky Syn.: *Q. longipes* Steven, *Q. pedunculata* Ehrh. var. *pinnatifida* Boiss: This grows on rocky, generally limestone, slopes in moist places, 1200-1800m; East and South East Anatolia. B7 Tunceli, B8 Erzincan, Bingöl, B9 Bitlis, C9 Van, C10 Hakkari. This subspecies grows in East Anatolia and adjacent parts of Caucasia.

Quercus hartwissiana Steven Syn.: *Q. armeniaca* Kotschy, *Q. stranjensis* Turrill: Deciduous columnar tree 10-30m(33-98 ft.), with narrow branching habit. Leaves usually obovate sometimes oblong-obovate, to 12(14) x 7 (9)cm, subcordate, with 7-10 pairs of regular, shallowly rounded to acute lobes; primary veins 7-10 (12), parallel; intercalary veins absent, rarely present, petiole to 2(3)cm. Peduncule to 2cm, cupule hemispherical, 15-20cm diameter; scales concentric, concrescent except for adpressed apices. A fairly distinctive Euxine species on account of the dark-reddish, glabrous, young shoots, obovate leaves with long petioles and elongated fruiting peduncles. Related to *Q. robur* and *Q. petraea*. It grows in broad-leaved deciduous (*Fagus*, *Fraxinus*, *Quercus*, *Carpinus*, *Alnus*) and mixed (*Pinus*, *Abies*) forest in damp places, 20-1300m; Thrace, N. Anatolia A1(E) Kirklareli, A2(E) Istanbul, A2(A) Kocaeli, A3 Sakarya, A4 Kastamonu, A6 Ordu, A7 Trabzon, A8 Rize.

Quercus macranthera Fisch. and Mey. ex Hohen. supsp. *sypirensis* (C. Koch) Menitsky Syn.: *Q. sypirensis* C. Koch, *Q. bornmuelleriana* O. Schwarz: Deciduous small tree to 10m(33 ft.). Leaves often crowded at tops of shoots, obovate, 5-10 (13) x 3-5 (9)cm, thick textured, with 5-9 regular short obovate, 5-10 (13) x 3-5(9)cm, thick-textured, with 5-9 regular short lobes, secondary lobes absent; primary veins 6-10, parallel, intercalary veins absent or 1-2, lower surface densely pubescent, upper surface glabrous; petiole 5-20mm usually tomentose. Peduncle absent or to 6mm sturdy. Cupule hemispherical 15mm diameter, scales thin-textured, loosely adpressed or spreading. An endemic subspecies. It grows on dry slopes with *Q. pubescens*, *Pinus nigra*, *P. sylvestris*, *Populus tremula*, *Juniperus communis* subsp. *nana*, 1000-1900m; A3 Bolu, A4 Kastamonu, A5 Amasya, A6 Sivas, A7 Gümüşhane, A8 Erzurum, A9 Ankara, B5 Yozgat, B7 Tunceli.



Quercus macranthera subsp. *sypirensis*.
Citadere, Turkey at 1,200m. Aytekin Ertas.

Quercus frainetto Ten. Syn.: *Q. conferta* Kit., *Q. esuliformis* O. Schwarz: Deciduous tree to 25m(82 ft.), round-topped. Leaves crowded at tops of shoots, obovate; to 20 x 2cm, sessile and auriculate, thick-textured, with 6-9 rounded primary lobes and 1-3 secondary lobes usually present; primary veins 6-9, intercalary veins few, indumentum of tufted stellate hairs, denser beneath, rarely above. Peduncle absent; cupule hemispherical 15mm; scales loosely adpressed, pubescent. An Euro-Siberian element and an oligomorphic species generally recognized by the leaves being clustered; sessile, obovate and auriculate. It

usually grows in broad-leaved deciduous (*Castanea*, *Fagus*, *Quercus*), and mixed (*Pinus*) forest,. Sometimes forming pure stands, 20-1000m(66-3280 ft.). It mainly grows N.W. of Turkey A1(E) Edirne, A1(A) Balikesir, A2(E) Istanbul, A2 (A) Kocaeli, Bursa, A3 Sakarya, Bolu, Zonguldak, B1 Canakkale, B2 Kütahya, C1 Izmir.

Quercus petraea (Mattuschka) Liebl. Syn.: *Q. robur* L. var. *petraea* Mattuschka: Deciduous tree to 30m(98ft.). Leaves distributed over shoots, elliptic, obovate to oblong, 6-17 x 3-9cm, cuneate or obliquely rounded, usually glabrous, with 5-9 shallow or deep lobes, regular with or without secondary lobes; primary veins 5-11, parallel, intercalary veins absent, rarely 1-2 near leaf base, petiole 1-3.5cm. Peduncle absent or almost so short; cupule 10-20mm diameter, hemispherical, scales ovate-lanceolate, strongly tuberculate at base or flat, adpressed or loosely so, with a brownish-tip, tomentose.

One of the most important forest trees in Turkey, often forming pure stands. Three subspecies have been recognized in Turkey:

1. Scales of cupule flat, adult leaves densely adpressed, often hairy beneath, often subsp. *petraea* with tufts of hairs in lower vein axil
1. Scales of cupule tuberculate; adult leaves glabrous or finely pubescent beneath
2. Leaves glabrous beneath, shallowly lobed, to 2cm, intercalary veins usually present. subsp. *iberica*
2. Leaves glabrous or pubescent beneath, glaucous and deeply lobed, to 2cm, intercalary veins absent. subsp. *pinnatiloba*

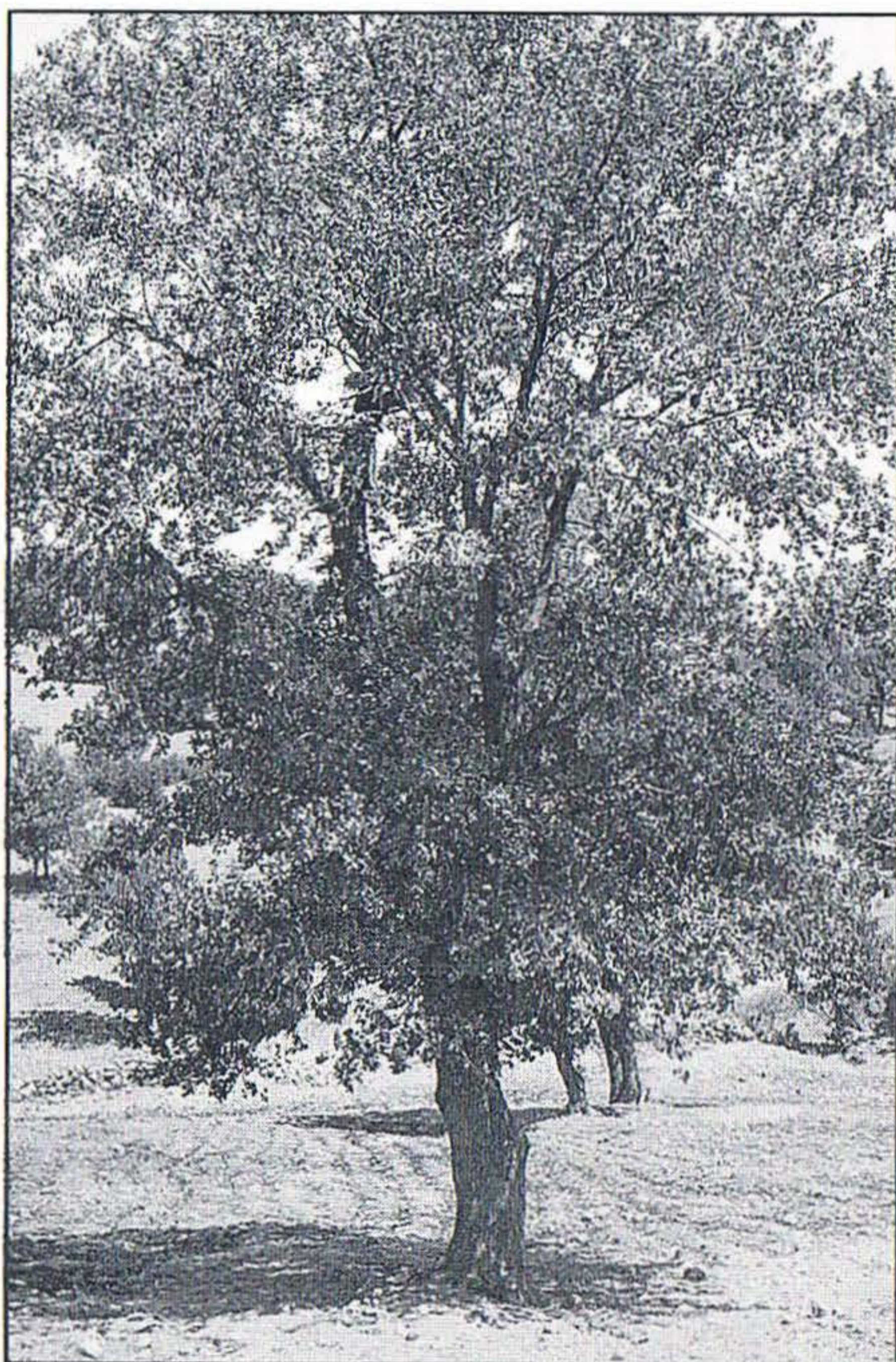
subsp. *petraea* Syn.: *Q. sessiliflora* Salisb.: This grows in northwest Turkey, in *Quercus* and *Fagus* forest, 200m; A1(E) Kirklareli, A3 Bolu.

subsp. *iberica* (Steven ex Bieb.) Krassiln Syn.: *Q. iberica* Steven ex Bieb, *Q. dshorochensis* C. Koch, *Q. polycarpa* Schur: This grows in *Quercus*, *Fagus*, *Carpinus*, *Castanea*, *Pinus*, *Picea* forest from sea level to 1300 (1700)m.

subsp. *pinnatiloba* (C. Koch) Menitsky Syn.: *Q. pinnatiloba* C. Koch, *Q. abietum* Kotschy: This grows on dry slopes with *Q. libani*, *Q. infectoria* subsp. *boissieri*, *Q. cerris* scrub, *Cedrus libani*, *Abies cilicica*, *Pinus nigra*, 1200-2200m, B7 Malatya, B8 Bingöl, B9 Bitlis, Van, C5 Icel, C6 Hatay, C10 Hakkari, This subspecies is endemic and grows at higher altitudes. As a result of centuries of cutting and grazing in eastern Anatolia, it usually occurs as a tall shrub, rarely fruiting.

Quercus vulcanica (Boiss & Heldr. ex) Kotschy Syn.: *Q. sessiliflora* Sm. var. *pinnatifida* sensu Boiss: Deciduous tree to 25-30m, wide-spreading at top. Leaves evenly distributed over shoots, obovate, 9-17 x 5-10cm, with 4-7(8) deep parallel and sometimes overlapping, regularly acute or rounded lobes, with secondary lobes; primary veins 7-8, arching, intercalary veins well developed, indumentum adpressed, stellate-tomentose beneath, yellowish-green or grey, glabrous above or with some stellate hairs, dark green. Petiole 3.5-8cm. Peduncle absent or almost so. Cupule 15mm diameter, hemispherical to cyathiform, scales lanceolate, flat, adpressed, tomentose.

This is an endemic species of Turkish oaks. Similar in facies to *Q. petraea* subsp. *pinnatiloba* and also with affinities to *Q. frainetto*. It differs from the former in the flat scales of the cupule, the secondary leaf lobes and intercalary veins. From the latter it differs in the longer petioles and the leaves evenly distributed over the shoots. It grows in highlands with *Cedrus libani*, *Acer hyrcanum*, *Q. cerris*, *Pinus nigra*, 1300-1800m, on volcanic rocks; B3 Kütahya, Konya, Afyon, Isparta.

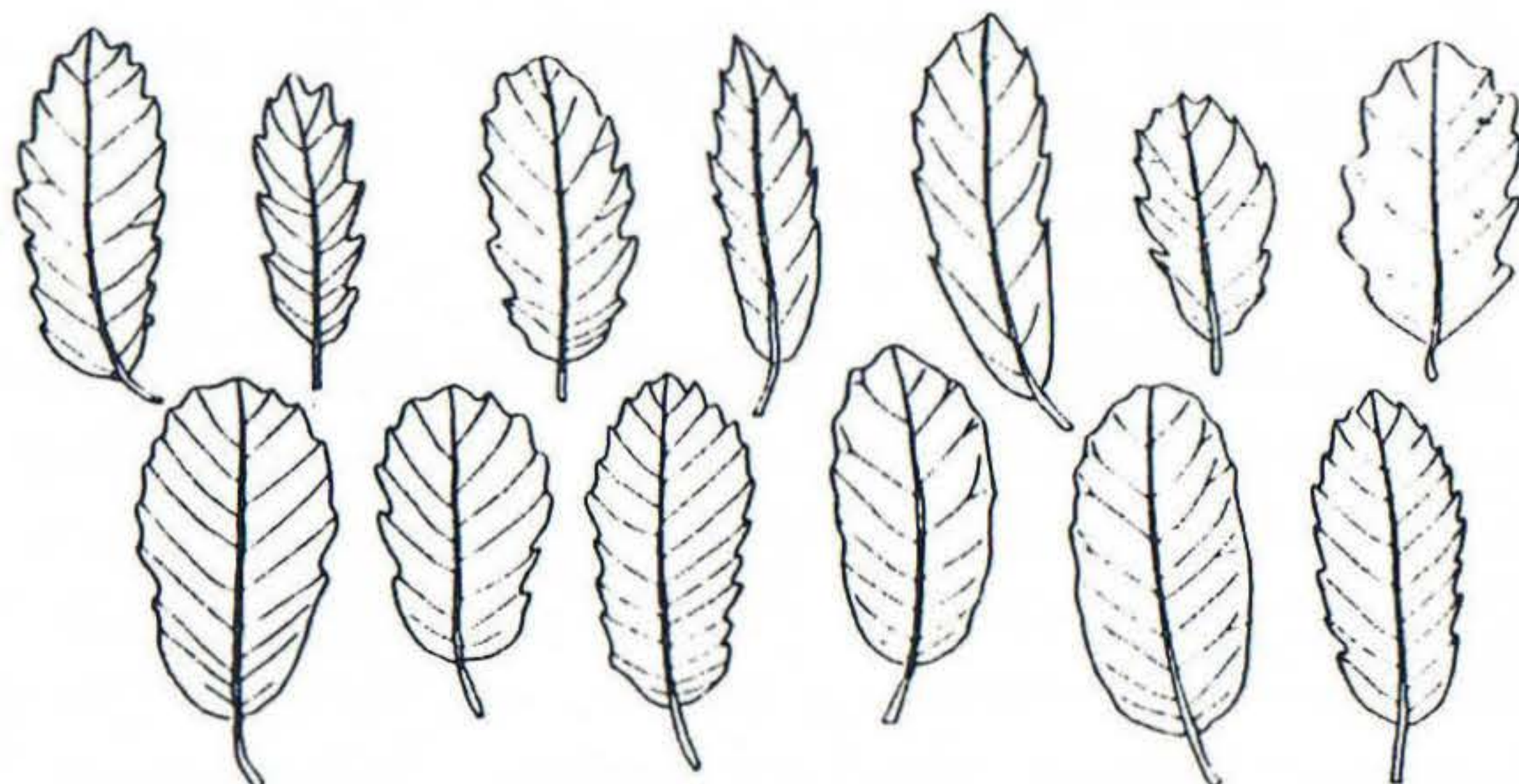


Quercus infectoria. K. Maras, Pazarcik, Armutlukoyu, Turkey: Elevation 830m. Aytekin Ertas

Quercus infectoria Oliver: Semi-evergreen small tree or shrub, 1-4(10)m(3-13ft.). Leaves often overwintering until new leaves appear, very variable in size and colour, 40-70 (100) x 10-45mm, coriaceous, ovate to narrowly oblong, rounded or cuneate at base, margins often undulate with 4-8 crenate to serrate lobes or entire; primary veins 6-11, petiole 1-15 (25)mm. Peduncle absent or to 10mm; cupules solitary or in pairs, hemispherical or cyathiform, 10-18mm diameter; scales strongly adpressed. A widespread species; two subspecies have been recognized:.

1. Petiole 1-5mm; leaves broadly obovate, 50 x 20mm, margins prominently crenate or serrate subsp. *infectoria*

1. Petiole (3) 10-25mm; leaves obovate to narrowly oblong, to 100mm, margins crenate-serrate to entire subsp. *boissieri*



Quercus infectoria. Leaf variations. (Schwarz, 1934-37). From Türkiye Meseleri, Yaltirik.



Quercus infectoria subsp. *boissieri* (Zohary, 1973). From Türkiye Meseleri, Yaltirik.

communities, 200-1850m; A2(A) Bilecik, A4 Ankara, A5 Kastamonu, A8 Artvin, B1 Izmir, B2 Balıkesir, B3 Konya, B5 Niğde, B6 Malatya, B7 Elazığ, B8 Bingöl, B9 Bitlis, C1 Muğla, C3 Burdur, C5 Icel, C6 Adana, C7 Urfa, C8 Siirt, C10 Hakkari.

Quercus pubescens Willd. Syn.: *Q. lanuginosa* Thuill., *Q. crispata* Steven, *Q. sessiliflora* Salisb. var. *pubescens* (Willd.) Boiss, *Q. pubescens* Willd. subsp. *anatolica* O. Schwarz: Deciduous small tree to 10m, round-topped. Leaves variable but generally oblong-obovate, 4.5-8.5 x 2.5-5cm, greyish-green above, brownish-grey beneath, asymmetrically subcordate or rounded, thick-textured, with 3-6 strongly undulate forwardly-pointing, irregular, acute lobes with revolute margins; primary veins 4-8, intercalary veins present; indumentum densely to thinly stellate; tomentose beneath with many scattered minute stellate hairs above; petiole 5-10mm. Peduncle absent. Cupule shallow to 15mm diameter; scales adpressed, lanceolate, pubescent, brownish-grey. *Quercus pubescens* is characterized by short petioles and undulate-margined, lobed, greyish leaves. The leaves persist on the trees in the dried state over winter. It is usually associated with *Pinus nigra*, *Q. cerris*, *Fagus*, *Castanea*, *Pyrus elaeagnifolia*, *Cistus laurifolius*, *Paliurus acuminatum* in anthropogenic steppe or semi-steppe; rarely in macchie, near sea level to 1700m; A1(E) Edirne, A1(A) Canakkale, A2(E) Istanbul, A2(A) Bursa, A3 Bolu, A4 Kastamonu, A5 Sinop, A6 Tokat, A7 Gümüşhane, B1 Manisa, B2 Kütahya, B3 Afyon, B4 Ankara, B5 Kayseri, B6 Sivas, B7 Erzincan, C1 Izmir, C2 Muğla, C3 Burdur, C4 Konya.

Quercus virgiliana Ten.: It differs from *Q. pubescens* in the longer petioles (6-20mm), generally larger flat leaves (5-14 x 4-7cm) often with rounded lobes and rounded at base, often short pedunculate fruits (scales \pm loosely adpressed). It grows on dry slopes in *Quercus* presumably shrub, 100-1150m; A1(E) Kirklareli, Edirne, A3 B3 Bolu, Zonguldak, A5 Sinop, Samsun, Corum.

subsp. *infectoria* Syn.: *Q. thirkeana* C. Koch; *Q. lusitanica* sensu Boiss.; *Q. infectoria* Olivier subsp. *glabra* O. Schwarz: This grows with other oak species and *Pinus brutia*, in scrub (*Paliurus*, *Arbutus*), 150-850m; A1(E) Kirklareli, A1(A) Canakkale, A2(E) Istanbul, A2(A) Bursa, A3 Zonguldak, A5 Sinop, A6 Tokat, A7 Giresun. It can generally be recognized by its short petioles and small leaves; usually a smaller shrub than the following subspecies.

subsp. *boissieri* (Reuter) O. Schwarz. Syn.: *Q. boissieri* Reuter, *Q. petiolaris* Boiss. & Heldr., *Q. syriaca* Kotschy, *Q. infectoria* Olivier subsp. *petiolaris* (Boiss. & Heldr.) O. Schwarz: It grows with other *Quercus* species (*Q. brantii*, *Q. cerris*, *Q. coccifera*, *Q. ithaburensis* subsp. *macrolepis*, *Q. libani*, *Q. pubescens*), *Paliurus*, *Pinus brutia*; in macchie and anthropogenic steppe or pure

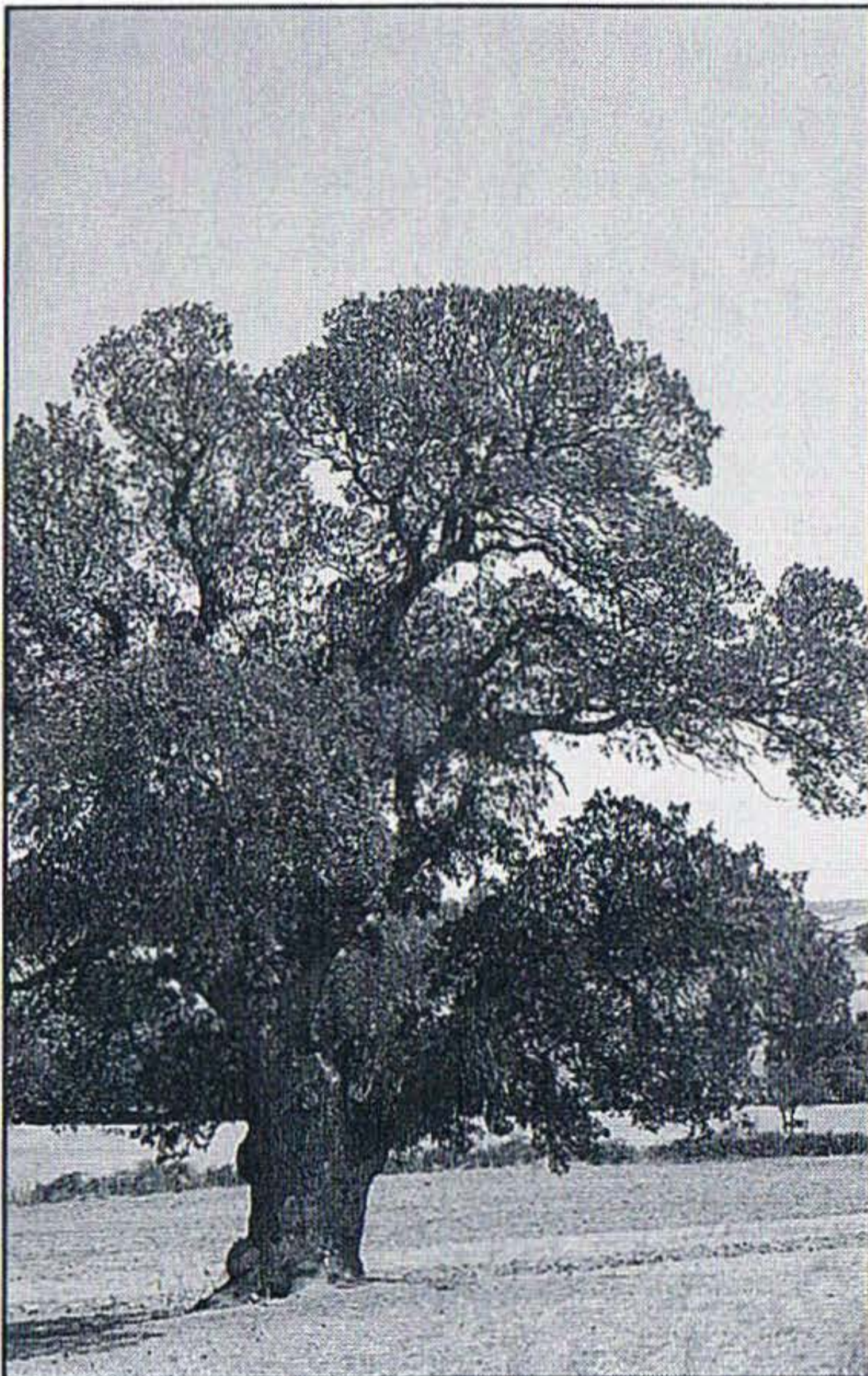
Section II

Quercus cerris L.: Deciduous tree to 25m(82ft.), usually round-topped; bark on old trees deeply fissured, greyish-white. Leaves distributed over shoots, oblong-elliptic in outline, very variable, 5.5-14 (20) x 2.5(9)cm, from simple with entire small shallow lobes to deeply pinnatilobed with or without secondary lobes, lobes 4-9, mucronulate, veins conspicuous, usually densely stellate pubescent above with many stellate hairs regularly dispersed over surface; petiole 3-20mm. Penduncle stout, to 8mm. Cupule hemispherical or cyathiform, inside diameter 20 mm, yellowish-brown; scales linear subulate, irregularly spreading to reflexed, to 12mm, pubescent. It grows in mixed and deciduous forest with other *Quercus* species (*Q. frainetto*, *Q. pubescens*, *Q. infectoria*, *Q. petraea*), *Carpinus*, *Fagus*, *Castanea*, *Pinus nigra*, *P. brutia*, *P. pinea* or forming pure stands; near sea level to 1500 (1900)m. The "Turkey Oak" is widespread and variable; the two varieties recognized here occur throughout the total range of species, but there are also numerous local forms:

1. Leaves pinnatilobed with or without secondary lobes var. *cerris*
1. Leaves simple with shallow lobes var. *austriaca*

var. *cerris*. Syn.: *Q. tournefortii* Willd., *Q. pseudocerris* Boiss., *Q. tukhtensis* Czecz. It grows throughout Turkey except N.E. & E: A1(E) Kirklareli, A1(A) Canakkale, A2(E) Istanbul, A3 Bolu, A4 Kastamonu, A5 Sinop, A6 Samsun, B1 Izmir, B2 manisa, B3 Konya, B5 Nigde, B6 Malatya, B7 Elazig, C1 Mugla, C2 Denizli, C3 Isparta, C4 Icel, C5 Adana, C5 Hatay.

var. *austriaca* (Willd.) Loudon. Syn.: *Q. austriaca* Willd.: This is the more frequent variety in Central Europe, reaching its eastern limit in N.W. Turkey: A1(E) Edirne, A2(E) Bolu, Zonguldak, A5 Sinop.



Quercus ithaburensis subsp. *macrolepis*.
Enez, Haskey, Turkey. Aytekin Ertas

Quercus ithaburensis Decne. subsp. *macrolepis* (Kotschy) Hedge & Yalt. Syn.: *Q. aegilops* Willd., *Q. pyrami* Kotschy, *Q. ungeri* Kotschy, *Q. graeca* Kotschy: Deciduous tree to 10 (15)m(33ft.), with a broad crown, sometimes in old specimens with a massive trunk. Leaves distributed over shoots, very variable, usually ovate, sometimes oblong 5-9 x 3-5cm, cordate or rounded, with 5-8 subtriangular irregular lobes with aristate or mucronate teeth; intercalary veins absent; petiole 1-3.5cm. Peduncle almost absent, sturdy. Fruit maturing in second year. Cupule hemispherical to cyathiform 20-40mm diameter, densely pubescent; scales linear-oblong, adpressed to spreading, becoming woody. The cupules of the "Valonea Oak" are much used commercially for tanning. It grows with other *Quercus* species, forming park-like forest in scrub, with *Pinus brutia*, *P. pinea*, 50-1700m: A1(E) Kesan, A1(A) Canakkale, A2 (A) Bursa, A4 Ankara, B2 Usak, B3 Afyon, C1 Mugla, C2 Antalya, C3 Isparta, C4 Icel.

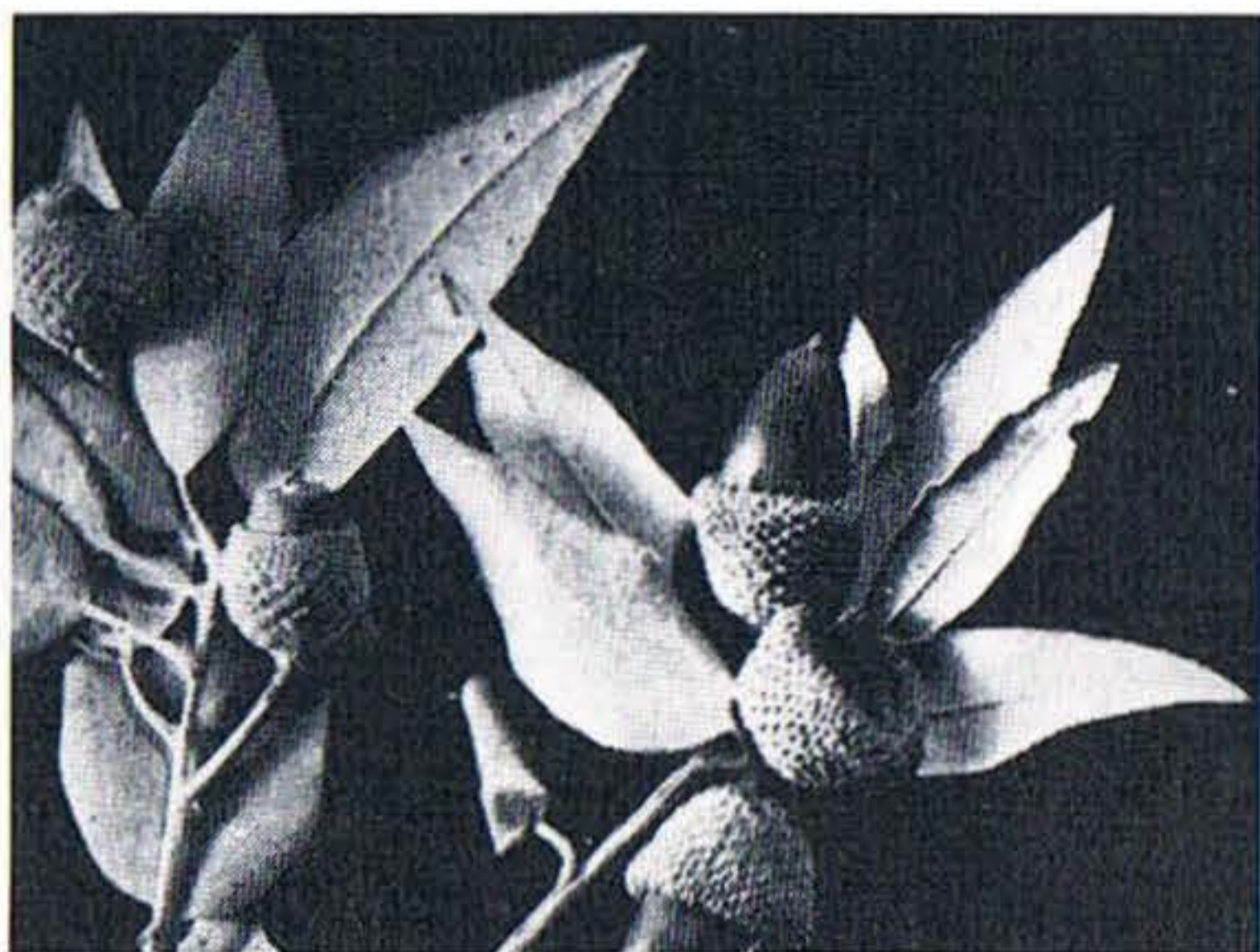
Quercus brantii Lindley. Syn.: *Q. persica* Jaub & Spach, "*Q. aegilops* L." subsp. *brantii* (Lindley) Camus, *Q. brantii* Lindley subsp. *persica* (Jaub & Spach) O. Schwarz: Deciduous shrub or small tree to 6 (10)m(20ft.), with rather smooth bark and rounded crown. Leaves distributed over shoots, regularly ovate-oblong, 6-10 (13) x 3-6cm, cordate, regularly serrate with 8-14 pairs of acuminate, scarcely aristate (1-2mm) teeth, intercalary veins absent; petiole 0.5-2cm. Peduncle nearly absent, to 5mm, sturdy. Cupule hemispherical, 25-30 (35)mm diameter, densely pubescent; scales broadly rhomboid, upper most much elongated, often filiform, spreading-recurved. This grows with *Quercus* species (*Q. infectoria* subsp. *boissieri*, *Q. libani*, *Q. cerris*, *Q. coccifera*), *Pinus brutia*, *Styrax*, *Paliurus* or forming pure communities on limestone slopes, 350-1700m: B6 Malya, B7 Elazig, B8/9 Bitlis, C6 K. Maras, C7 Urfa, C8 Mardin, C9 Hakkari.



Quercus brantii. K. Haras, Pazarcik, Armutlukoyu, Turkey. Elevation 820m. Aytakin Ertas.

Quercus libani Olivier Syn.: *Q. regia* Lindley, *Q. carduchorum* C. Koch.: Deciduous or semi-evergreen shrub or tree to 6m(20ft.). Leaves distributed over shoots, oblong to oblong-lanceolate, 7-12 x 2-3cm, rounded to subcordate at base, margins regularly serrate or irregularly with 11-16 pairs of mucronate aristate (to 3mm) teeth; intercalary veins absent; indumentum of few simple or stellate-dendroid hairs mostly on lower surface, glabrescent, rarely with dense stellate-dendroid indumentum beneath; petiole 8-15 (20)mm. Peduncle almost absent to 2cm, sturdy. Cupule hemispherical, 20-30mm diameter, pubescent; scales broadly rhomboid, either all adpressed, medium recurved or upper most elongate and spreading. It grows mixed with other *Quercus* species (*Q. infectoria*, *Q. brantii*, *Q. cerris*) or forming pure populations, 700-2000m: B6 K. Maras, B7 Tunceli, B8 Bingöl, B9 Bitlis, C5 Adana, C7 Adiyaman, C9 Hakkari.

Quercus trojana P.B. Webb. Syn.: *Q. macedonica* A.DC.: Deciduous or semi-evergreen tree to 18m(59ft.) (usually less) rounded-headed, close to *Q. libani* but differing in the rather small leaves, 3-8 (10) x 1.5-3(4)cm, with mucronate teeth and shorter 2-6(8)mm petioles; cupular scales showing greater variation, being all adpressed, all recurved or lowest adpressed or recurved, middle recurved and upper most elongated, spreading or incurved. It grows in deciduous woodland with other *Quercus* species (*Q. ithaburensis* subsp. *macrolepis*, *Q. pubescens*, *Q. infectoria*, *Q. cerris*), in macchie with *Pinus brutia*, *Styrax*, *Phillyrea*, with *Juniperus excelsa*, in *Abies cilicica* forest, 300-1800m; A1(A) Canakkale, A2(A) Bursa, B1 Manisa, B2 Kütahya, B3 Afyon, C2 Antalys, C3/4 Konya.



Quercus ilex. (E. Ural). From Türkiye Meseleri, Yaltirik.

Quercus ilex L. Evergreen tree to 12-15m(39-49ft.) or tall shrub. Leaves distributed over branches, narrowly oblong elliptic to ovate-lanceolate, acute at apex, base cuneate to rounded, coriaceous, 3-7.5 x 1.5-4cm usually entire, occasionally sharply serrate; veins 10, inconspicuous; glabrous or almost so above, densely and tightly adpressed stellate-tomentose beneath; petiole 3-10mm. Peduncle stout to 9mm. Fruit maturing in one year. Cupule campanulate-hemispherical, 15mm diameter. Leaves on juve

nile shoots are broader than those on adult shoots and are often sharply toothed and glabrous. A Mediterranean element, it grows on slopes with *Laurus*, *Phillyrea*, *Carpinus*, etc., in macchie, sea level to 400m: A2(A) Istanbul, A3 Bolu, A5 Sinop, A6 Samsun, B1 Canakkale, C1 Izmir.

Quercus aucheri Jaub & Spach: Evergreen shrub or tree up to 10m(33ft.), ultimate branches pendulous. Leaves distributed over branches, topmost serrate, lower entire, broadly oblong to ovate, rounded at apex or subapiculate, coriaceous, 0.9-4 x 0.9-2.5cm, rounded or subcordate; veins 5-9, inconspicuous, glabrous or stellate above, tightly adpressed stellate-tomentose, waxy and greyish-white beneath; petiole absent or to 6mm. Peduncle nearly absent. Fruit maturing in second year. Cupule cyathiform, to 25mm diameter, to 18mm long, light brown; scales ovate-lanceolate, adpressed, pubescent. It grows on limestone slopes in macchie, sea level to 400m: C1 Aydin, C2 Mugla, C3 Antalya.

Quercus coccifera L. Syn.: *Q. rigida* Willd., *Q. calliprinos* P.B. Webb, *Q. palaestina* Kotschy, *Q. coccifera* L. var. *calliprinos* (P.B. Webb) Boiss.: Evergreen shrub or rarely a small tree to 10m(33ft.). Leaves distributed over branches, broadly ovate to oblong-ovate to oblong-lanceolate, coriaceous, 1.5-5 x 1-3cm, sharply serrate-spiny, rarely subentire, flat, or undulate, cordate or rounded at base; veins 4-8; glabrous on both surfaces; petiole 1-5mm. Peduncle stout, subsessile to 12mm. Fruit maturing in second year. Cupule hemispherical, broadly campanulate or cyathiform, 10-20mm diameter, to 15mm long, light brown; scales oblong to ovate, adpressed-ascending or recurved, pubescent. A dominant member of phrygana and macchie; it grows in *Pinus brutia* forests, sea level to 1500m: A1(E) Tekirdag, A1(A) Canakkale, A2(E) Istanbul, A2(A) Bursa, A3 Zonguldak, A6 Tokat, A7 Giresun, B1 Ismir, B2 Usak, B3 Konya, C1 Aydin, C2 Denizli, C3 Isparta, C4 Icel, C6 Gaziantep (Hedge; Yaltirik, 1982).

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