***Quercus drymeja* Unger 1967 (Fagaceae)**

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**Leaf description**

- **morphology:**
  **organisation:** simple; **petiole:** leaves long petiolated, up to 25 mm long; **shape:** either narrow elliptic or slightly ovate to rarely minimal obovate, up to 100 mm long; **leaf base:** base angle acute, base shape straight (cuneate) to slightly convex, or (if lamina broad elliptic to ovate) base angle obtuse, base shape rounded; **leaf apex:** apex angle narrow acute, apex shape long acuminate or attenuate; **margin:** lamina base untoothed but margin sharply simple toothed in the upper three quarters to two third of the lamina; teeth widely spaced, one above each secondary vein; teeth spiny, sometimes slightly hook-shaped, sinus rounded; **1°-vein framework:** main venation pinnate, midvein mainly straight; **2°-vein framework:** secondaries camptodromous near the entire-margined base, craspedodromous in the toothed part of the lamina; secondaries widely spaced, originating at acute angles especially in narrow leaves, running rather straight or slightly curved into the marginal teeth; **3°-vein framework:** tertiaries percurrent, almost perpendicular to the secondaries.
- **cuticle:**
  not specified

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**Palecology**

- **habitat:** mesophytic forests
- **vegetation type:** ?
- **life form:** tree
- **foliage persistence:** deciduous leaves ?
- **flower ecology (pollination):** wind-pollinated (anemophilous)
- **fruit ecology (dispersal):** animal-dispersed (zoochorous)

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**Stratigraphy / Distribution**

- **stratigraphy:** Miocene to Pliocene
- **distribution:** Europe, Asia Minor; in Middle Europe *Q. drymeja* is abundant in the late early to middle Miocene; in southern Europe records are present from the early Miocene to the late Miocene and Pliocene. Denk et al. (2017) provide a distribution map for the late Miocene and Pliocene.

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**Miscellaneous**

- **synonyms:** –
- **modern relationship:** There is not a single modern species that shows an almost identical variability with one or the other fossil record. While Kvaček et al. (2002) are skeptical regarding a closer relationship to the *Q. ilex* group, Denk et. al. (2017) favour this relationship.
- **remarks:** Superficially *Q. drymeja* may resemble leaves of *Myrica*. Distinctive are the secondary veins which are craspedodromous, i.e. ending in the spinose teeth in *Q. drymeja*. Leaves of *Q. drymeja* belong to one of the most difficult morpho-species of oaks because there are many transitions. From the type locality Parschlug (Austria, Miocene) *Q. drymeja*, *Q. zoroastri* UNGER, and *Q. mediterranea* UNGER have been confirmed by the revision of this flora (Kovar-Eder et al. 2004) where the delimitation of

*Q. drymeja* and *Q. zoroastri* may be debatable. Therefore, the description of *Q. drymeja* presented here, includes also the variability of *Q. zoroastri*. Especially from more southern parts of Europe unto Asia Minor oak foliage reminding of the oak species from Parschlug have been described enlarging the morphological variability compared to the oaks from the type locality Parschlug. Denk et al. (2017) provided an overview of these records, when they attempted to resolve this complex. Based exclusively on grossmorphology, they arrived at the proposal to define *Q. drymeja* as a very variable complex and to distinguish within *Q. drymeja* several morphotypes (Parschlug, Zoroastri, Floribunda and Güvem and morphotypes). The Güvem morphotype does not occur in Parschlug and is excluded from the here-presented description of *Q. drymeja*. The Floribunda morphotype overlaps with the Parschlug and Zoroastri morphotype. Additionally, Kvaček et al. (2002) and Denk et al. (2017) consider whether *Q. mediterranea* should also be included in the complex of *Q. drymeja*. Cuticular structures may help to resolve this complex but cuticles are rarely available and lacking at the type locality Parschlug. Cuticles have been described from Vegora (Greece, Upper Miocene, Kvaček et al. 2002) and Arjuzanx (southern France, Middle/Upper Miocene, Kvaček et al. 2011) but at both sites the grossmorphology of the leaves only partly conforms that met characteristically in Parschlug.

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**30 macroscopic leaf traits are stored in *Digiphyll***

| # | trait code | trait: charcters state |
|---|---|---|
| 1 | A-1.2 | petiole: present |
| 2 | A-1.2.2 | petiole, present: long |
| 3 | A-2.1 | leaf organisation: simple |
| 4 | A-3.1 | leaf shape: elliptic |
| 5 | A-3.2 | leaf shape: obovate |
| 6 | A-3.3 | leaf shape: ovate |
| 7 | A-4.1 | leaf base angle: acute |
| 8 | A-4.2 | leaf base angle: obtuse |
| 9 | A-5.1 | leaf base shape: without basal extension |
| 10 | A-5.1.1 | leaf base shape, without basal extension: cuneate (straight) |
| 11 | A-5.1.2 | leaf base shape, without basal extension: rounded |
| 12 | A-5.1.4 | leaf base shape, without basal extension: concavo-convex |
| 13 | A-6.1 | leaf apex angle: acute |
| 14 | A-7.2 | leaf apex shape: acuminate |
| 15 | A-8.1 | leaf margin: untoothed |
| 16 | A-8.2 | leaf margin: toothed |
| 17 | A-8.2.2 | leaf margin, toothed: dentate |
| 18 | A-9.1.1 | leaf teeth, order number of teeth: simple order (first order) |
| 19 | A-9.2.2 | leaf teeth, tooth density: not dense |
| 20 | A-9.3.1 | leaf teeth, tooth size: small |
| 21 | A-9.4.4 | leaf teeth, tooth apex shape: spinose |
| 22 | A-9.5.2 | leaf teeth, tooth sinus shape: rounded |
| 23 | B-1.1 | primary vein framework: pinnate |
| 24 | B-2.1 | secondary vein framework: 2° veins reach margin |
| 25 | B-2.1.1 | secondary vein framework, 2° veins reach margin: craspedodromous |
| 26 | B-2.2 | secondary vein framework: 2°-veins do not reach margin |
| 27 | B-2.2.1 | secondary vein framework, 2°-veins do not reach margin: eucamptodromous |
| 28 | B-3.2 | intramarginal vein: absent |
| 29 | B-4.2 | intersecondaries: absent |
| 30 | B-5.1 | tertiary vein framework: percurrent |

For a detailed description of the leaf traits see menu *Manuals*.

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**Fossil images**

images not yet available !

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**References**


- **Denk T., Velitzelos D., Güner T.H., Bouchal J.M., Grímsson F. & Grimm G.W. (2017):** Taxonomy and palaeoecology of two widespread western Eurasian Neogene sclerophyllous oak species: Quercus drymeja Unger and Q. mediterranea Unger. – *Review of Palaeobotany and Palynology*, 241: 98-128.
- **Kovar-Eder J., Kvaček Z. & Ströbitzer-Hermann M. (2004):** The Miocene Flora of Parschlug (Styria, Austria) – Revision and Synthesis. – *Annalen des Naturhistorischen Museums Wien*, 105 A: 45-159.
- **Kvaček Z., Velitzelos D. & Velitzelos E. (2002):** Late Miocene flora of Vegora, Macedonia, N-Greece. – *Korali Athens*: 175 p.
- **Kvaček Z., Teodoridis V. & Roiron P. (2011):** A forgotten Miocene masticioid flora of Arjuzanx (Landes, SW France). – *Palaeontographica*, Abt. B, 285 (30): 1-109.


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