Supplementary Information S3- Focal *taxa* information.

Roburoid Oaks (Sect. *Robur* Endlicher [1])

Quercus robur L. is a Eurosiberian widespread oak not standing summer drought [2] and distributed across the Atlantic belt of IP. We opted to refer to the broad concept of *Q. robur* in spite of the majority of the taxonomic reference, herbaria review and fieldwork refers to *Q. robur* subsp. *broteroana* O. Schwarz [3]. *Quercus estremadurensis* O. Schwarz (=*Q. robur* subsp. *estremadurensis* (O.Schwarz) A. Camus) is considered to be a relictual taxa, distributed through the western IP in transitional areas towards thermophilic Mediterranean and Submediterranean conditions [4,5]. It can also be found in Morocco (North Africa), which presence was confirmed by herbaria review. *Quercus orocantabrica* Rivas Mart. & al. is an endemic oak from the northern range of the Cantabrian mountains [6-8] with disjoint populations in la Rioja and Cuenca. *Quercus petraea* (Matt.) Liebl. distributes throughout northern and continental areas of the IP. The biogeographic overlap of characters between broad *Q. petraea* and the subspecies *Q. petraea* subsp. *huguetiana* Franco & G.López [9], observed throughout its entire distribution range, and in accordance with the scattered distribution of *Q. petraea* stated in SIVIM database [10], led us to assume this subspecies to be the widespread taxon in IP, as putative tertiary relictual taxa [11,12]. *Quercus pyrenaica* Willd. is a common taxon throughout the IP, tolerating summer drought, being distributed in almost all mountain areas of IP, in places with higher annual precipitation and important relictual subpopulations in the Mediterranean half of the IP and North Africa, [13]. *Quercus pubescens* Willd. is the oak species with wider distribution worldwide. It is related with thermophilic areas in basophile soils, that encompasses the Northeast IP, normally in temperate areas, but also in the submediterrenan belt [14], where it contacts with *Q. faginea* Lam., resulting in hybrid masses of *Q. subpyrenaica* Villar [15].

Gall Oaks (Subsection *Galliferae* Gurke) [16-18])

Quercus broteroi (Cout.) Rivas Mart. & C. Sáenz and *Q. faginea* Lam. are predominantly parapatric and independent taxa [19]. The first has a predominant western distribution in areas with oceanic climate, in deep valleys protected from winter cold, while *Q. faginea* endures winter cold and continental climates. *Quercus canariensis* Willd. is a critically endangered tree, with five subpopulations in IP. Normally, this species occurs in places with higher annual and summer horizontal precipitation in mesophytic conditions. Its sympatric distribution along *Q. broteroi* led to the formation of hybrid masses dominated by the nothotaxa *Quercus marianica* C. Vicioso [5,20] which is also included in this study as an endemic oak. The formation of nothotaxa with roburoid Oaks was also considered, so *Q. subpyrenaica* [15,21] was also included in the study. This taxon is the stabilized hybrid between *Q. pubescens* and *Q. faginea* and its forests are mostly found in the Spanish Pre-Pyrenees, mainly in the central and western area, reaching the Douro river basin [22]. The outreach of *Q. subpyrenaica* to the Littoral Catalonian mountains (Fig. 1), is addressed to be related in the formation of the narrow endemic nothotaxa *Q. ×cerrioides* Willk. & Costa, referring to the introgression with *Q. canariensis*. The study of type material and fieldwork done in the type location for both taxa (*Q. subpyrenaica* and *Q. ×cerrioides*) was carefully performed to attain an accurate geographical segregation of both. Finally, we add the Portuguese dwarf-oak (*Q. lusitanica* Lam.), as a narrow-distributed species, living in the westernmost areas of IP, not tolerating winter cold and with a subpopulation in Morocco (North Africa) [23].

1. Endlicher, S. *Generum plantarum supplementum quartum*; Fr. Beck: Vienna, 1847; http://dx.doi.org/10.5962/bhl.title.442pp. 95.
2. Ülker, E.D.; Tavşanoğlu, Ç.; Perktaş, U. Ecological niche modelling of pedunculate oak (Quercus robur) supports the 'expansion–contraction'model of Pleistocene biogeography. *Biological Journal of the Linnean Society* **2017**, *123*, 338-347.
3. Schwarz, O. Monographie der Eichen Europas und des Mittelmeergebietes. *Repertorium novarum speciarum regni vegetabilis* **1937**, *1*, 1-200.
4. Vázquez, F.M.; Coombes, A.J.; García, D.; Márquez, F.; Meireles, C.; Barrena, M.J.; Vila-Viçosa, C. Anotaciones a la nomenclatura del género Quercus L., (FAGACEAE) en la Península Ibérica y NW de África. *Folia Botánica Extremadurensis* **2018**, *12*, 5-79.
5. Vila-Viçosa, C.; Vázquez F.M.; Meireles C; Pinto-Gomes, C. Taxonomic peculiarities of marcescent oaks (Quercus, Fagaceae) in southern Portugal. *Lazaroa* **2014**, *35*, 139–153, doi:10.5209/rev_LAZA.2014.v35.42555.
6. Rivas-Martínez, S.; Aguiar, C.; Aguilella, A.; Alonso, R.; Alvarez, M.; Amich, F.; Arnaiz, C.; Baccheta, G.; Barbero, M.; Barbour, M. Map of series, geoseries and geopermaseries of vegetation in Spain [MEMORY OF MAP OF POTENTIAL VEGETATION OF SPAIN, 2011] PART II. *Itinera geobotanica* **2011**, *18*, 1-764.
7. Rivas-Martínez, S.; González-Días, T.E.; González, F.F.; Loidi, J.J.; Lousã, M.F.; Merino, Á.P. Vascular plant communities of Spain and Portugal: addenda to the syntaxonomical checklist of 2001. Part II. *Itinera geobotanica* **2002**, 433-922.
8. Díaz-González, T.E.; Penas, Á. The High Mountain Area of Northwestern Spain: The Cantabrian Range, the Galician-Leonese Mountains and the Bierzo Trench. In *The Vegetation of the Iberian Peninsula*, Loidi, J., Ed. Springer: 2017; pp. 251-321.
9. Franco, J.A. Quercus L. In *Flora Iberica, (Plantanaceae-Plumbaginaceae [Partim])*, S., C., al., e., Eds. Real Jardín Botánico, CSIC: Madrid, 1990; Vol. 2, pp. pp. 15-36.
10. SIVIM. Quercus petraea (Matt.) Liebl. subsp. petraea. In *The Iberian and Macaronesian Vegetation Information System (SIVIM, www. sivim.info)*, 2012 ed.; Plant Sociology: 2012; Vol. 49, pp 89-95.
11. Vicioso, C. *Revisión del género Quercus en España*; Tipografía Artítica: Madrid, 1950; pp. 194.
12. Schwarz, O. Sobre los Quercus catalanes del subgénero Lepidobalanus Oerst. *Cavanillesia* **1936**, *8*, 65–100.
13. Blanco-Castro, E.; Casado-Gonzáles, M.; Costa-Tenorio, M.; Escribano, R.; García-Antón, M.; Génova-Fuster, M.; Gómez-Mazaneque, Á.; Gómez-Mazaneque, F.; Moreno-Saiz, J.C.; Juaristi, C.M., et al. *Los bosques ibéricos. Una interpretación geobotánica*; Editorial Planeta, Barcelona, Spain: Barcelona, 2005.
14. Pasta, S.; de Rigo, D.; Caudullo, G. Quercus pubescens in Europe: distribution, habitat, usage and threats. In *European Atlas of Forest Tree Species*, San-Miguel-Ayanz, J., de Rigo, D., Caudullo, G., Houston Durrant, T., Mauri, A., Eds. Publications Office of the European Union: Luxembourg, 2016; pp. 156-157.
15. Huget del Villar, E. Sur le nom de quelques Quercus et la systématique du faginea. *Cavanillesia* **1935**, *7*, 57-70.
16. Tschan, G.F.; Denk, T. Trichome types, foliar indumentum and epicuticular wax in the Mediterranean gall oaks, Quercus subsection Galliferae (Fagaceae):

implications for taxonomy, ecology and evolution. *Botanical Journal of the Linnean Society* **2012**, *169*, 611-644.
17. Gürke, M. Quercus. In *Plantae Europaeae [Enumeratio systematica et synonymica plantarum phanerogamicarum in Europa sponte crescentium vel mere inquilinarum]*, Richter, K., Ed. Engelmann: Leipzig, 1897; Vol. 2, pp. 54–72.
18. Huget del Villar, E. Estudios sobre los Quercus del Oeste mediterráneo. *Anales del Instituto Botanico de A.J. Cavanilles* **1958**, *15*, 3-114.
19. Rivas-Martínez, S.; Saénz, C. Enumeración de los Quercus de la Península Ibérica. *Rivasgodaya* **1991**, *6*, 101-110.
20. Vila-Viçosa, C.; Vázquez, F.M.; Mendes, P.; Del Rio, S.; Musarella, C.; Cano-Ortiz, A.; Meireles, C. Syntaxonomic update on the relict groves of Mirbeck's oak (Quercus canariensis Willd. and Q. marianica C. Vicioso) in southern Iberia. *Plant Biosystems* **2015**, *149*, 512-526, doi:10.1080/11263504.2015.1040484.
21. Himrane, H.; Camarero, J.J.; Gil-Pelegrín, E. Morphological and ecophysiological variation of the hybrid oak Quercus subpyrenaica (Q. faginea× Q. pubescens). *Trees* **2004**, *18*, 566-575.
22. Loidi, J.; Herrera, M. The Quercus pubescens and Quercus faginea forests in the Basque Country (Spain): distribution and typology in relation to climatic factors. *Plant Ecology* **1990**, *90*, 81-92.
23. Taleb, M.S.; Fennane, M. *Vascular plant communities of Morocco*; Springer: 2019.