

# Variations in morphological and epidermal features of shade and sun leaves of two species: *Quercus bambusifolia* and *Q. myrsinifolia*

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## Abstract

Premise: Microclimatic differences between the periphery and the interior of tree crowns result in a variety of adaptive leaf macromorphological and anatomical features. Our research was designed to reveal criteria for sun/shade leaf identification in two species of evergreen oaks, applicable to both modern and fossil leaves. We compared our results with those in other species similarly studied. Methods: For both *Quercus bambusifolia* and *Q. myrsinifolia* (section *Cyclobalanopsis*), leaves from single mature trees with well-developed crowns were collected in the South China Botanical Garden, Guangzhou, China. We focus on leaf characters often preserved in fossil material. SVGm software was used for macromorphological measurement. Quantitative analyses were performed and box plots generated using R software with IDE Rstudio. Leaf cuticles were prepared using traditional botanical techniques. Results: Principal characters for distinguishing shade and sun leaves in the studied oaks were identified as leaf lamina length to width ratio (L/W), and the degree of development of venation networks. For *Q. myrsinifolia*, shade and sun leaves differ in tooth morphology and the ratio of toothed lamina length to overall lamina length. The main epidermal characters are ordinary cell size and anticlinal wall outlines. For both species, plasticity within shade leaves exceeds that of sun leaves. Conclusions: Morphological responses to sun and shade in the examined oaks are similar to those in other plant genera, pointing to useful generalizations for recognizing common foliar polymorphisms that must be taken into account when determining the taxonomic position of both modern and fossil plants.

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## Keywords

epidermal features, evergreen oaks, Fagaceae, leaf morphology, paleobotany, shade and sun leaves, South China

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