The effect of leaf orientation to sunlight on stomatal parameters of *Quercus rubra* around the Belgrade Lakes, central Maine

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ABSTRACT

Stomatal frequencies of fossil-plant species are used to estimate past pCO_2 levels based on the physiological functions of living taxa. There is a demonstrable inverse relationship between increasing pCO_2 and stomatal frequency parameters, in which there is a decrease in both stomatal density (SD) and stomatal index (SI). Concentration of CO_2 is not the only factor known to affect SD and SI values, which are a product of leaf development and expansion, as studies have shown a positive correlation between SD and light intensity. The present study tests the hypothesis that SD and SI are not influenced by a leaf's physical orientation relative to the sun during the growing season. Sun leaves of northern red oak, *Quercus rubra*, were collected from trees around the margins of six lakes of the Belgrade Lakes Region, central Maine, United States, in 2007. Lakes in NE–SW, NW–SE, and E–W orientations allowed for sampling of trees exposed to varying light intensities throughout the season day. The SD and SI of each tree were calculated, and statistical comparisons were made between populations exposed to predominant morning or afternoon light intensities for each lake and between populations on lakes of differing orientations. There is no statistically significant difference in either SD or SI between populations growing under different orientations to growing-season sunlight. These data indicate that exposure to various sunlight regimes on opposite sides of a lake does not play a role in the stomatal response as reflected in SD and SI of plants during a single growing season.