

## Phase Transitions in Plant Cuticles

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The effect of temperature on wet plant cuticles (*citrus aurantium* L.) has been investigated with the following techniques: Calorimetry, densitometry, spin label esr-spectroscopy, photo bleaching, light and electron microscopy. At low temperature cuticles of *citrus aurantium* L. (and *hedera helix*) show at 16.3°C a sharp transition ( $T 0.5^\circ\text{C}$ ) with a latent heat of  $4.7 \pm 0.5$  Joule/g-cuticle.

Below transition: Main orientation of polymer network is parallel to the normal of cuticle and main orientation of layer with soluble lipids is perpendicular to normal. The cuticle is in a rigid state. Above transition (between 16.3°C and 38°C): Only the orientation of the polymer network has changed (tilted in parts). There exist several very sharp ( $T 0.1^\circ\text{C}$ ) phase transitions (38°C, 41°C, 45°C, 49°C,...) with a latent heat of the order of 0.4 Joule/g-cuticle. Above 38°C: the lamella of the soluble lipids is in a fluid state. Above 45°C there is a change in the molecular orientation of the soluble lipids as well as in the polymer network. The soluble lipids are mainly oriented parallel to the normal. The dry cuticles show no phase transition between 0°C and 200°C. At room temperature a dry/wet transition can be observed.