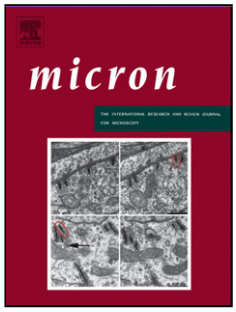

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PII: S0968-4328(17)30016-1
DOI: http://dx.doi.org/doi:10.1016/j.micron.2017.03.013
Reference: JMIC 2413

To appear in: *Micron*

Received date: 12-1-2017
Revised date: 23-3-2017
Accepted date: 24-3-2017

Please cite this article as: Qu, S., Chapman, N., Xia, Z., Feng, M., Feng, S., Wang, Z., Liu, L.,Ultramicroscopy reveals a layer of multiply folded membranes around the tannin-accumulating vacuole in honeysuckle petal trichomes, *Micron* (2017), http://dx.doi.org/10.1016/j.micron.2017.03.013

Ultramicroscopy reveals a layer of multiply folded membranes around the tannin-accumulating vacuole in honeysuckle petal trichomes

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Abstract: Transmission electron microscopy was used to reveal a layer of multiply folded membranes that closely surrounded the tannin-accumulating vacuole in cells of honeysuckle petal trichomes. A huge amount of tannins were deposited in the peripheral region and the center of the vacuole. The prolific membranes extended to the tannins deposited along the vacuole periphery. It was difficult to distinguish the vacuole membrane, and it seemed as if it was the layer of multiply folded membranes that separated the vacuole lumen from the cytoplasm. In addition, there were also membrane assemblies in the cytoplasm away from the vacuole, which were continuous with the proliferated membranes bordering the vacuole. Therefore, the tannin-accumulating vacuole was in close association with a very large network of proliferated membranes. The occurrence of such a layer of multiply folded membranes around the tannin-accumulating vacuole might be a structural strategy for improvement of the efficiency of vacuolar accumulation of tannins.

Key words: membrane proliferation; tannin-accumulating vacuole; trichome; petal; honeysuckle

1. Introduction

A vacuole is an intracellular compartment enclosed by a membrane, which is called tonoplast in plant cells. The tonoplast is a very dynamic membrane and can take many forms to enhance the interaction between the vacuole and the cytoplasm (Reisen et al., 2005; Wiltshire and Collings, 2009). Vacuoles have various biological functions (Matile, 1978; Marty, 1999). In addition to serving as a storage site for metabolites (Ryan and Walker-Simmons, 1983; Kurkdjian and Guern, 1989; Chrispeels, 1991; Pham and Roberts, 1991), vacuoles play important roles in autophagy (Wittenbach