

Developmental changes in guard cell wall structure and pectin composition in the moss *Funaria*: implications for function and evolution of stomata ^[1]

Submitted by [Amelia Merced Alejandro](#) ^[2] on 20 August 2014 - 5:16pm



^[2]

Title	Developmental changes in guard cell wall structure and pectin composition in the moss <i>Funaria</i> : implications for function and evolution of stomata
Publication Type	Journal Article
Year of Publication	2014
Authors	Merced, A ^[3] , Renzaglia, K ^[4]
Journal	Annals of Botany
Pagination	mcu165
Keywords	Arabinan ^[5] , Funaria hygrometrica ^[6] , homogalacturonan ^[7] , immunolabelling ^[8] , LM13 ^[9] , LM19 ^[10] , LM6 ^[11] , moss ^[12] , pectin ^[13] , plant cell wall ^[14] , rhamnogalacturonan ^[15] , stomata ^[16] , ultrastructure ^[17]

Background and Aims In seed plants, the ability of guard cell walls to move is imparted by pectins. Arabinan rham- nogalacturonan I (RG1) pectins confer flexibility while unesterified homogalacturonan (HG) pectins impart rigidity. Recognized as the first extant plants with stomata, mosses are key to understanding guard cell function and evolution. Moss stomata open and close for only a short period during capsule expansion. This study examines the ultrastructure and pectin composition of guard cell walls during development in *Funaria hygrometrica* and relates these features to the limited movement of stomata.

Methods Developing stomata were examined and immunogold-labelled in transmission electron microscopy using monoclonal antibodies to five pectin epitopes: LM19 (unesterified HG), LM20 (esterified HG), LM5 (galactan RG1), LM6 (arabinan RG1) and LM13 (linear arabinan RG1). Labels for pectin type were quantitated and compared across walls and stages on replicated, independent samples.

Abstract

Key Results Walls were four times thinner before pore formation than in mature stomata. When stomata opened and closed, guard cell walls were thin and pectinaceous before the striated internal and thickest layer was deposited. Unesterified HG localized strongly in early layers but weakly in the thick internal layer. Labelling was weak for es- terified HG, absent for galactan RG1 and strong for arabinan RG1. Linear arabinan RG1 is the only pectin that ex- clusively labelled guard cell walls. Pectin content decreased but the proportion of HG to arabinans changed only slightly.

Conclusions This is the first study to demonstrate changes in pectin composition during stomatal development in any plant. Movement of *Funaria* stomata coincides with capsule expansion before layering of guard cell walls is com- plete. Changes in wall architecture coupled with a decrease in total pectin may be responsible for the inability of mature stomata to move. Specialization of guard cells in mosses involves the addition of linear arabinans.

Copyright © 2006-Present CienciaPR and CAPRI, except where otherwise indicated, all rights reserved

[Privacy](#) | [Terms](#) | [Community Norms](#) | [About CienciaPR](#) | [Contact Us](#)

Source URL:<https://www.cienciapr.org/en/developmental-changes-guard-cell-wall-structure-and-pectin-composition-moss-funaria-implications>

Links

[1] <https://www.cienciapr.org/en/developmental-changes-guard-cell-wall-structure-and-pectin-composition-moss-funaria-implications> [2] <https://www.cienciapr.org/en/user/ameliamerced> [3] <https://www.cienciapr.org/en/biblio?f%5Bauthor%5D=3245> [4] <https://www.cienciapr.org/en/biblio?f%5Bauthor%5D=3728> [5] <https://www.cienciapr.org/en/biblio?f%5Bkeyword%5D=2963> [6]

<https://www.cienciapr.org/en/biblio?f%5Bkeyword%5D=2965> [7]
<https://www.cienciapr.org/en/biblio?f%5Bkeyword%5D=2966> [8]
<https://www.cienciapr.org/en/biblio?f%5Bkeyword%5D=2967> [9]
<https://www.cienciapr.org/en/biblio?f%5Bkeyword%5D=2969> [10]
<https://www.cienciapr.org/en/biblio?f%5Bkeyword%5D=2970> [11]
<https://www.cienciapr.org/en/biblio?f%5Bkeyword%5D=2968> [12]
<https://www.cienciapr.org/en/biblio?f%5Bkeyword%5D=2971> [13]
<https://www.cienciapr.org/en/biblio?f%5Bkeyword%5D=2972> [14]
<https://www.cienciapr.org/en/biblio?f%5Bkeyword%5D=2964> [15]
<https://www.cienciapr.org/en/biblio?f%5Bkeyword%5D=2973> [16]
<https://www.cienciapr.org/en/biblio?f%5Bkeyword%5D=2974> [17]
<https://www.cienciapr.org/en/biblio?f%5Bkeyword%5D=2975>