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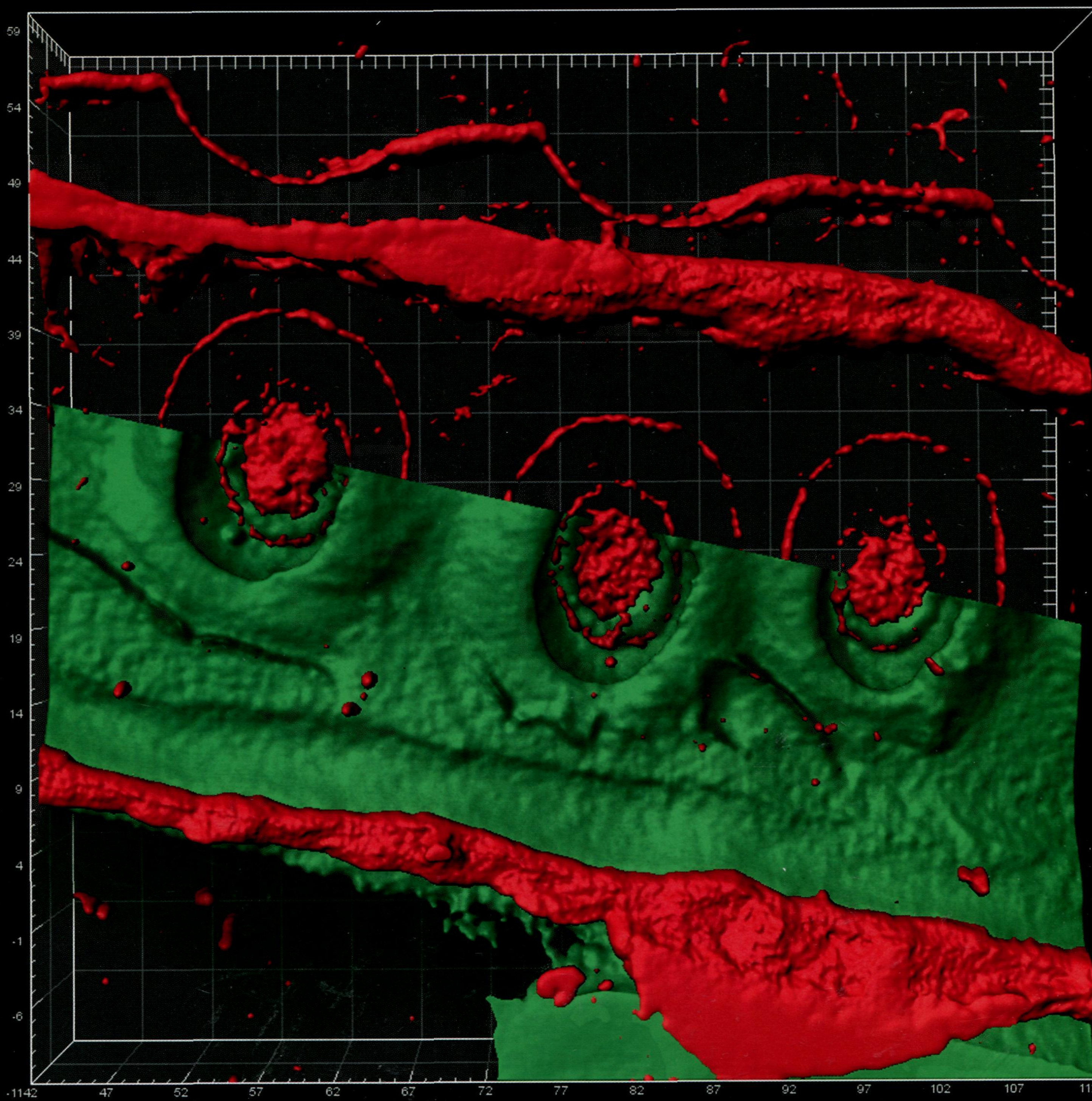

FEATURING A SPECIAL SECTION

## Rhizosphere Interactions: The Root Microbiome

**Cover Illustration:** Three aspirated bordered pits in *Pinus strobus* as viewed using confocal microscopy imaging with selective labeling for pectin (red), with cellulose appearing green. The three bordered pits show a unique chemical component distribution pattern, with an outer "G-ring" of pectin at the margin of the margo and pectin coating the torus. The pectin surrounding the central torus region redistributes upon aspiration, leaving a fringe-like margin around the edge of the torus, described as the L-ring. The redistributed pectin in the torus region helps to seal the pit membrane against the pit aperture. A central void in the interior of the torus, described as the M-zone (not visible in this image) is filled with either a neutral fluid or amorphous (hemi)cellulose, which is hypothesized to maintain the turgor of the pit membrane in its neutral, unaspirated state. During aspiration, the M-zone collapses to allow the pit membrane to more readily conform and bond to the pit aperture and pit chamber region.

Bordered pits have fascinated researchers for more than 100 years because of their biological and industrial significance. Not only do they prevent embolism within the conducting portions of the living tree, the pits are the primary pathways for microorganism penetration in wood fallen to the forest floor, and the aspiration of pits therefore plays a significant role in controlling the rate of biodegradation including the rate of carbon cycling as carbon is redistributed and returned to the atmosphere from coniferous trees. The drying of wood is also the most costly step in the processing of wood products, and the size and structure of pit membranes has been shown to significantly affect that cost. The study of bordered pits in this issue by Maschek et al., "A new approach for the study of the chemical composition of bordered pit membranes: 4Pi and confocal laser scanning microscopy" (pp 1751–1756) identifies features of bordered pits in *Pinus strobus* that have not previously been described and help explain how the pit maintains its integrity in the unaspirated state. Further, the research helps to explain how stresses are relieved when pit aspiration occurs and why the appression of the torus to the pit aperture upon aspiration occurs.

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**Abbreviations**

**Miscellaneous:** AFLP, amplified fragment length polymorphisms; a.s.l., above sea level; bp, base pair; BP, before present; BSA, bovine serum albumin; cpDNA, chloroplast DNA; CTAB, hexadecyltrimethylammonium bromide; cv., cultivar; $ddH_2O$, double-distilled water; dNTP, deoxyribonucleotide E.C., Enzyme Commission; EDTA, ethylene diamine tetra-acetic acid; f. sp., forma specialis; indels, insertions and deletions; ITS, internal transcribed spacer; LM, light microscopy; mya, million years ago; PAGE, polyacrylamide gel electrophoresis; PCR, polymerase chain reaction; RAPD, random amplified polymorphic dimorphism; SDS, sodium dodecyl sulfate; SEM, scanning electron microscopy; s.l., sensu lato; s.s., sensu stricto; subsp., subspecies; TEM, transmission electron microscopy

**Genetics:** $A$, mean number of alleles per locus; $D$, mean genetic distance; CI, consistency index; $F$, fixation index; $F_{IT}$, total deviation from Hardy-Weinberg expectations; $F_{ST}$, genetic diversity among populations; $F_{IS}$, inbreeding within populations; $G_{ST}$, the proportion of genetic diversity among populations; $H_e$, Hardy–Weinberg expected heterozygosity; $H_o$, observed heterozygosity; MP, most parsimonious tree; $n$, individual chromosome number; Nm, mean number of migrants per generation; $P_p$, percentage of polymorphic loci; RI, retention index; $x$, base chromosome number

**Statistics and math:** ANOVA, analysis of variance; CV, coefficient of variation; df, degrees of freedom; $N$, number of individuals; $p$, probability; $P$, level of significance; PCA, principal components analysis; $r$, coefficient of correlation; SE, standard error; SD, standard deviation