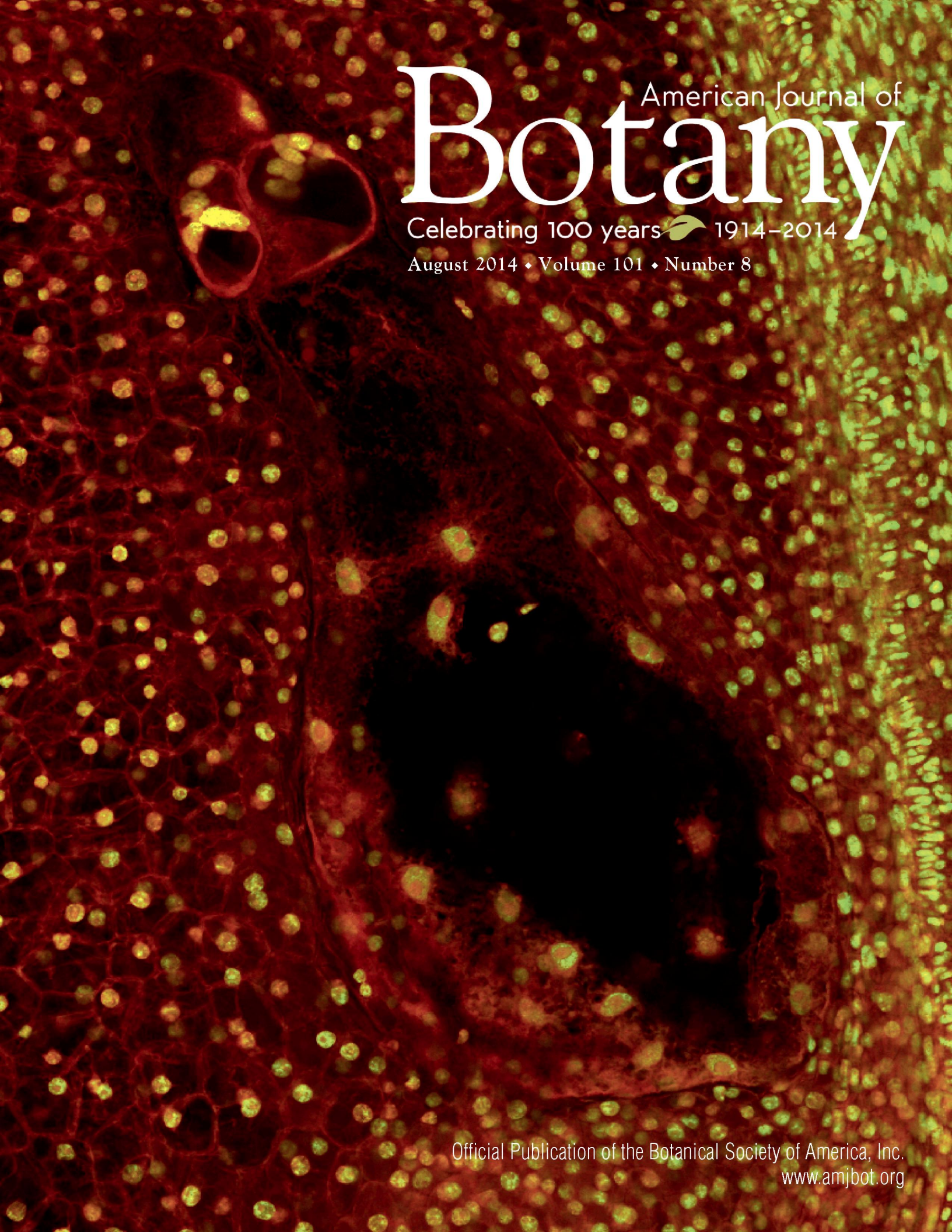

American Journal of
Botany
Celebrating 100 years 1914–2014
August 2014 • Volume 101 • Number 8

Official Publication of the Botanical Society of America, Inc.
www.amjbot.org

Cover Illustration: Coenocytic stage of developing endosperm of maize (*Zea mays* L.; Poaceae), surrounded by maternal nucellus and pericarp tissues. Nuclei share a common cytoplasm around a large central vacuole and divide in tight synchrony without cytokinesis. As the free nuclei divide, starting at the base near the embryo, they migrate toward the large antipodal cells (top) until they completely line the peripheral wall of the tear-drop-shaped endosperm. Cell walls and cytoplasm were stained with propidium iodide, and nuclei were double-stained with propidium iodide and SYTOX Green. Micrograph is a single optical section collected using standard confocal laser scanning optics; magnification ca. 200×. Free nuclear endosperm development in cereal grains has routinely been described as involving three main cytological stages: coenocyte, cellularization by alveolation, and differentiation. This pathway of development is extended to maize, though it is largely based on comprehensive accounts of development in barley, rice, and wheat, with comparison to analogous observations in *Arabidopsis*. The recent genome sequencing of maize inbred B73, and its use with 25 genetically diverse inbred founder lines to develop a nested association mapping (NAM) population for future dissection of maize genetics, necessitate a thorough understanding of B73 endosperm development. In Leroux et al.—Maize early endosperm growth and development: From fertilization through cell type differentiation, pp. 1259–1274 in this issue, high resolution light and confocal microscopy is used to detail B73 early endosperm development in tandem with morphometric analysis of B73 and four NAM founder lines. Transition between the coenocyte and the cellularization by alveolation stage was more coincident with relative endosperm size than with the number of nuclei or age as previously suggested for maize. Cytological analysis revealed that maize endosperm initially cellularizes through alveolation for the first 2–4 cell layers, followed by a novel and unique second stage of cellularization whereby the remaining central vacuole is subdivided through random partitioning. This unique cellularization of maize contrasts with the smaller endosperms of other cereals (wheat, barley, rice) and *Arabidopsis*, which strictly cellularize through repeated alveolation. NAM founder analysis revealed differences in endosperm size during early development, which potentially relates to differences in duration of the coenocytic stage and thus timing of cellularization across diverse lines of maize. A B73-specific model of early endosperm development is presented for future analysis of gene expression and endosperm development in other genotypes.

American Journal of Botany

Celebrating 100 years 1914–2014

August 2014 · Volume 101 · Number 8

Table of Contents

Botanical Society of America
leading scientists and educators
since 1893

Erratum

Volume 101(7): 1102–1126. Razafimandimbison et al.—"Phylogeny and generic limits in the sister tribes Psychotrieae and Palicoureeae (Rubiaceae): Evolution of schizocarps in *Psychotria* and origins of bacterial leaf nodules of the Malagasy species."

The authors regret that the name "Psychotrieae" appears on a wrong node on Fig. 1. Because the tribes Psychotrieae and Palicoureeae are sister groups, the name "Psychotrieae" has been moved to the node subtending the well-supported clade formed by the Pacific Psychotria clade, the Indian-Sri Lankan Psychotria clade, the WIOR Psychotria clade, the Australasian Psychotria clade, the Afro-neotropical Psychotria clade, the Afro-WIOR Psychotria clade, and Afro-Asian-WIOR-neotropical Psychotria clade. The online version of this article has been corrected.

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