

A detailed scanning electron micrograph (SEM) of plant roots and leaves, showing intricate textures and structures. The roots are thin and fibrous, while the leaves are broader and more complex in shape. The image is in grayscale, with the plant material appearing in shades of gray against a dark background.

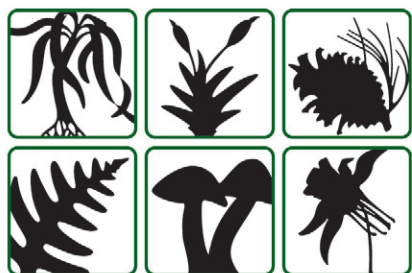
American Journal of Botany

Celebrating 100 years  1914–2014

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Cover Illustration: Scanning electron micrograph of swimming sperm cells of the fern *Ceratopteris richardii* forming a “bouquet” at the entrance (not shown) of an open archegonium (magnification = 3000×). When released from antheridia, the elongated and coiled motile male gametes of ferns and bryophytes lack a cell wall and contain an elaborate locomotory apparatus with flagella. During spermiogenesis in *C. richardii*, an undifferentiated spherical cell is systematically transformed into a streamlined gamete that coils more than four revolutions and bears over 70 flagella. This complex morphogenetic process occurs within an expanding extraprotoplasmic matrix (EPM) that forms between the cell wall and plasmalemma of nascent spermatids. Until now, the EPM has been viewed as an “empty space” within which the cell progressively assumes a coiled configuration and the flagella elongate. In this issue in “Multiflagellated sperm cells of *Ceratopteris richardii* are bathed in arabinogalactan proteins throughout their development,” pp. 2052–2061, Lopez and Renzaglia demonstrate that the EPM is a living, functioning cellular entity that contains abundant arabinogalactan proteins (AGPs), a family of glycoproteins involved in regulating plant growth and development. Temporal variations in the abundance and location of AGP epitopes coupled with inhibition of AGPs with Yariv reagent reveal that these glycoproteins are integral to sperm cell differentiation, including cell shape changes and growth and positioning of flagella. *Image credit:* Renee A. Lopez.



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TABLE OF CONTENTS

Editorial

Trust and scientific publication: *AJB* policy for digital images

JUDY JERNSTEDT, EDITOR-IN-CHIEF

2019

AJB Centennial Review

Neurospora crassa: Looking back and looking forward at a model microbe

CHRISTINE M. ROCHE, JENNIFER J. LOROS, KEVIN MCCLUSKEY, AND N. LOUISE GLASS

2022

Ever since Klekowski: Testing a set of radical hypotheses revives the genetics of ferns and lycophytes

CHRISTOPHER H. HAUFLE

2036

Biomechanics

Novel seed protection in the recently evolved invasive, California wild radish, a hybrid *Raphanus* sp. (Brassicaceae)

SYLVIA M. HEREDIA AND NORMAN C. ELLSTRAND

2043

Developmental Biology and Developmental Genetics

Multiflagellated sperm cells of *Ceratopteris richardii* are bathed in arabinogalactan proteins throughout development

RENEE A. LOPEZ AND KAREN S. RENZAGLIA

2052

Ecology

Yucca aloifolia (Asparagaceae) opts out of an obligate pollination mutualism

JEREMY D. RENTSCH AND JIM LEEBENS-MACK

2062

Competitive outcomes depend on host genotype, but not clavicipitaceous fungal endophytes, in *Lolium perenne* (Poaceae)

GREGORY P. CHEPLICK, AMELIA P. HARRICHANDRA, AND ANNA LIU

2068

Effects of apical meristem mining on plant fitness, architecture, and flowering phenology in *Cirsium altissimum* (Asteraceae)

SUBODH ADHIKARI AND F. LELAND RUSSELL

2079

Photosynthetic and morphological acclimation of seedlings of tropical lianas to changes in the light environment

GERARDO AVALOS AND STEPHEN S. MULKEY

2088

Evolution and Phylogeny

Phylogeny, classification, and fruit evolution of the species-rich Neotropical bellflowers (Campanulaceae: Lobelioideae)

LAURA P. LAGOMARSINO, ALEXANDRE ANTONELLI, NATHAN MUCHHALA, ALLAN TIMMERMANN, SARAH MATHEWS, AND CHARLES C. DAVIS

2097

Several origins of floral oil in the Angelonieae, a southern hemisphere disjunct clade of Plantaginaceae

ALINE C. MARTINS, MARK D. SCHERZ, AND SUSANNE S. RENNER

2113

TABLE OF CONTENTS CONTINUED

Paleobotany

Paleo-Antarctic rainforest into the modern Old World tropics: The rich past and threatened future of the “southern wet forest survivors”

ROBERT M. KOOYMAN, PETER WILF, VIVIANA D. BARREDA, RAYMOND J. CARPENTER,
GREGORY J. JORDAN, J. M. KALE SNIDERMAN, ANDREW ALLEN, TIMOTHY J. BRODRIBB,
DARREN CRAYN, TAYLOR S. FEILD, SHAWN W. LAFFAN, CHRISTOPHER H. LUSK,
MAURIZIO ROSSETTO, AND PETER H. WESTON 2121

Hughmillerites vancouverensis sp. nov. and the Cretaceous diversification of Cupressaceae

BRIAN A. ATKINSON, GAR W. ROTHWELL, AND RUTH A. STOCKEY 2136

Reproductive Biology

Flies as pollinators of melittophilous *Salvia* species (Lamiaceae)

FERHAT CELEP, ZEYNEP ATALAY, FATİH DIKMEN, MUSA DOĞAN,
AND REGINE CLASSEN-BOCKHOFF 2148

Intraspecific variation in gender strategies in *Lycium* (Solanaceae):
Associations with ploidy and changes in floral form following the evolution of
gender dimorphism

CAITLIN M. BLANK, RACHEL A. LEVIN, AND JILL S. MILLER 2160

Systematics and Phylogeography

Species delimitation in the lichenized fungal genus *Vulpicida* (Parmeliaceae,
Ascomycota) using gene concatenation and coalescent-based species tree
approaches

LAURI SAAG, KRISTIINA MARK, ANDRES SAAG, AND TIINA RANDLANE 2169

Brief Communication

Outer bark thickness decreases more with height on stems of fire-resistant
than fire-sensitive Floridian oaks (*Quercus* spp., Fagaceae)

SARAH J. GRAVES, SAMI W. RIFAI, AND FRANCIS E. PUTZ 2183

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; ddH₂O, 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; *N*_m, 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

STATEMENT OF OWNERSHIP FOR V101:12, DECEMBER 2014

STATEMENT OF OWNERSHIP, MANAGEMENT, AND CIRCULATION OF AMERICAN JOURNAL OF BOTANY, REQUIRED BY ACT OF 12 AUGUST 1970: SECTION 3685, TITLE 39, UNITED STATES CODE, FILED OCTOBER 1, 2005.

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I certify that the statements made by me above are correct and complete. Signed, William M. Dahl, Business Manager.