An international journal devoted to basic research into how plants function, ranging from the molecular to the cellular to the whole plant levels, and including the interactions of plants with their biotic and abiotic environments.

## **Editor-in-Chief**

Donald R. Ort

USDA/ARS Urbana, IL, USA

## **Associate Editors**

Bonnie Bartel Houston, TX, USA Alan Jones Chapel Hill, NC, USA Richard Amasino Madison, WI, USA Julia Bailey-Serres Riverside, CA, USA C. Robin Buell East Lansing, MI, USA Sheila McCormick Berkeley, CA, USA Thomas Mitchell-Olds Durham, NC, USA John Ohlrogge East Lansing, MI, USA Susanne von Caemmerer Canberra City, ACT, Australia

## Research Area and Sections

Signal Transduction and Hormone Action
Cell Biology
Development and Hormone Action
Environmental Stress and Adaptation to Stress
Bioinformatics, Breakthrough Technologies, and Genome Analysis
Systems Biology, Molecular Biology, and Gene Regulation
Genetics, Genomics, and Molecular Evolution
Biochemical Processes and Macromolecular Structures
Plants Interacting with Other Organisms
Bioenergetics and Photosynthesis
Whole Plant and Ecophysiology

## **International Board of Monitoring Editors**

Kozi Asada Kyoto, Japan

Antony Bacic

Parkville, VIC, Australia

Neil R. Baker Essex, UK

Malcolm Bennett

Nottingham, UK

Daniel R. Bush

Fort Collins, CO, USA

Joe Chappell Lexington, KY, USA

Alice Y. Cheung Amherst, MA, USA

Tzyy-Jen Chiou Taipei, Taiwan

Vitaly Citovsky Stony Brook, NY, USA

Karl-Josef Dietz Bielefeld, Germany

John R. Evans

Canberra, ACT, Australia

**Edward Farmer** Lausanne, Switzerland

Jennifer Fletcher Albany, CA, USA

Peter Geigenberger Golm, Germany Thomas Girke

Riverside, CA, USA Elzbieta Glaser

Stockholm, Sweden

Zhizhong Gong Beijing, China

Roger Hangarter Bloomington, IN, USA

Martha Hawes Tucson, AZ, USA

Luis Herrera-Estrella Irapuato, Mexico

N. Michele Holbrook Cambridge, MA, USA

**Gregg Howe**East Lansing, MI, USA

Georg Jander

Jacques Joyard Grenoble, France

Elizabeth Kellogg St. Louis, MO, USA

Anthony Kinney Wilmington, DE, USA

Leon Kochian Ithaca, NY, USA

Joachim Kopka Golm, Germany Hsou-min Li

Taipei, Taiwan

Chentao Lin Los Angeles, CA, USA

Amane Makino Sendai, Japan

M. David Marks

St. Paul, MN, USA

Susan Martino-Catt St. Louis, MO, USA

Maureen McCann West Lafayette, IN, USA

Scott D. Michaels

Bloomington, IN, USA
Ron Mittler

Reno, NV, USA Mark O'Brian

Buffalo, NY, USA Katherine Osteryoung

East Lansing, MI, USA
Ralph Panstruga
Cologne Germany

Cologne, Germany **Sara Patterson** 

Madison, WI, USA Corné Pieterse

Utrecht, The Netherlands **Marinus Pilon** Fort Collins, CO, USA

Hendrik Poorter Utrecht, The Netherlands Anireddy S.N. Reddy

Fort Collins, CO, USA

Pamela C. Ronald

Davis, CA, USA

Jocelyn K.C. Rose

Ithaca, NY, USA

David Salt

West Lafayette, IN, USA

**Leslie E. Sieburth** Salt Lake City, UT, USA

Nathan M. Springer St. Paul, MN, USA

Dina St. Clair Davis, CA, USA

Lloyd W. Sumner Ardmore, OK, USA

Carroll P. Vance St. Paul, MN, USA

Guo-Liang Wang Columbus, OH, USA

**Andreas Weber** Düsseldorf, Germany

Eleanore T. Wurtzel Bronx, NY, USA

Shaul Yalovsky Tel Aviv, Israel

Kazuko Yamaguchi-Shinozaki Ibaraki, Japan

Publisher

American Society of Plant Biologists, Crispin Taylor, Executive Director; ctaylor@aspb.org Publications Director Nancy A. Winchester; nancyw@aspb.org Managing Editor Science Writer
Peter V. Minorsky; peminorsky@aspb.org

Production Manager Jon Munn; jmunn@aspb.org

Manuscript Manager

Leslie Ash Csikos; lcsikos@aspb.org



John Long; jlong@aspb.org

Plant Physiology® (ISSN 0032–0889, online 1532–2548) is published monthly, in three volumes per year, by the American Society of Plant Biologists, 15501 Monona Drive, Rockville, MD 20855–2768, USA, and is produced by Dartmouth Journal Services, Waterbury, VT. The institutional price for the print and online versions is based on type of institution; contact institution@aspb.org. A subscription includes both The Plant Cell and Plant Physiology®; single copies may be purchased for \$95 each plus shipping, Members of the American Society of Plant Biologists receive free online access to the journal and may subscribe to the print version of Plant Physiology® for \$210. Nonmember individuals may subscribe for \$400. For matters regarding subscriptions, contact Suzanne Cholwek, 15501 Monona Drive, Rockville, MD 20855–2768, telephone 301–296–0926; fax 301–251–6740; e-mail scholwek@aspb.org. Notify ASPB within 3 months (domestic) or 6 months (foreign) of issue date, and defective copies or copies lost in the mail will be replaced. Send all inquiries regarding display advertising to: FASEB AdNet, 9650 Rockville Pike, Bethesda, MD 20814–3998; telephone 301–634–7791; fax 301–634–7713; e-mail adnet@faseb.org. Periodicals postage paid at Rockville, MD 20850, and at additional mailing offices. Postmaster: Send address changes to Plant Physiology®, American Society of Plant Biologists, 15501 Monona Drive, Rockville, MD 20855–2768. The online version of Plant Physiology® is available at www.plantphysiol.org. Permission to Reprint: Permission to make digital or hard copies of part or all of a work published in Plant Physiology® is granted without fee for personal or classroom use provided that copies are not made or distributed for profit or commercial advantage and that copies bear the full citation and the following notice on the first page: "Copyright American Society of Plant Biologists." For all other kinds of copying, request permission in writing from Nancy A. Winchester, Publications Director. ASPB headdquarters.

Winchester, Publications Director, ASPB headquarters.
© 2010 American Society of Plant Biologists. All rights reserved. Printed on acid-free paper. Printed in the USA.