

Functional Plant Biology

Contents

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Patterns of morphological leaf traits among
pteridophytes along humidity and temperature
gradients in the Bolivian Andes

**Michael Kessler, Yvonne Siorak, Meike Wunderlich
and Caroline Wegner**

963–971

Relationships between leaf traits and temperature and humidity gradients have received little attention in pteridophytes. These authors assess the variability of morphological and anatomical leaf traits in an impressive number of species. Their macroecological approach documents distinct patterns that can be used to test hypotheses about form–function relationships of leaf traits, and will combine well with future ecophysiological studies to elucidate a more comprehensive view of the adaptive value of leaf traits.

Fructan 1-exohydrolase is associated with flower opening
in *Campanula rapunculoides*

**Katrien Le Roy, Rudy Vergauwen, Veerle Cammaer,
Midori Yoshida, Akira Kawakami, André Van Laere
and Wim Van den Ende**

972–983

In addition to its role in mobilising the reserve fructans, fructan 1-exohydrolase (1-FEH) possibly has a role in flower opening. These authors show that a reduction in fructan content in *Campanula rapunculoides* petals during flower opening, as a mechanism to increase cell turgor, is associated with increased activity of a fructan hydrolase and decreased activity of a fructan biosynthetic enzyme.

Characterisation of lanthanum toxicity for root growth of
Arabidopsis thaliana from the aspect of natural genetic
variation

**Yuriko Kobayashi, Takashi Ikka, Kazuhiko Kimura,
Orito Yasuda and Hiroyuki Koyama**

984–994

The La^{3+} ion is often used to mimic another trivalent cation, Al^{3+} . However, its toxic action on growth and development is unclear. These authors characterise La^{3+} toxicity genetically and physiologically in *Arabidopsis* roots in a solution culture system. This paper improves our understanding of La rhizotoxicity by providing genetic support for the conclusion that La, and other lanthanides, block Ca channels.

Early events in the signalling pathway for the activation
of MAPKs in rice roots exposed to nickel

**Po-Yu Chen, Tsai-Lien Huang and
Hao-Jen Huang**

995–1001

Whilst small quantities of Ni are essential for plant growth, higher concentrations actually retard it. The molecular mechanisms for regulation of plant growth by Ni are not well understood. These authors investigated early events in the signaling pathway for the activation of mitogen-activated protein kinases (MAPKs) in rice roots. Their results provide new information on the signal transduction pathway of plant responses to heavy metal stress.

Bicarbonate blocks the expression of several genes
involved in the physiological responses to Fe deficiency
of Strategy I plants

**Carlos Lucena, Francisco J. Romera, Carmen L. Rojas,
María J. García, Esteban Alcántara and
Rafael Pérez-Vicente**

1002–1009

Bicarbonate has long been known to induce Fe deficiency in plants, but the mechanism of action is under debate. These authors investigated the effects of bicarbonate on the induction of various genes associated with acclimation to Fe deficiency in Strategy I plants. They found that bicarbonate inhibits the upregulation of key enzymes and a transcription factor, answering long-standing questions about bicarbonate inhibition of Fe acquisition in calcareous soils.

Cover illustration: The fiddleheads of the tree fern *Cyathea xenoxyla* await suitable climatic conditions of high humidity and moderate temperatures to unfurl (see Kessler *et al.* pp. 963–971). Photo by M. Lehnert.

Comparison of the expression profiles of susceptible and resistant *Eucalyptus grandis* exposed to *Puccinia psidii* Winter using SAGE

David H. Moon, Guillermo R. Salvatierra, Danielle G.G. Caldas, Mayra C. C. Gallo de Carvalho, Raphael T. Carneiro, Livia M. Franceschini, Shinitiro Oda and Carlos A. Labate 1010–1018

The neotropical rust fungus *Puccinia psidii* causes damage in *Eucalyptus* and some native Myrtaceous plants, and has the potential to be a significant threat to many species around the globe. These authors investigate the biology, ecology and host impact of this fungus using ‘state of the art’ technology. They identify differences in gene expression and infection response between susceptible and resistant types of *E. grandis*. This research will help in developing strategies to minimise the impact of *P. psidii* on Myrtaceous plants of economic importance.

Amino acid transporter expression and localisation studies in pea (*Pisum sativum*)

Mechthild Tegeder, Qiumin Tan, Aleel K. Grennan and John W. Patrick 1019–1028

These authors analysed expression of two amino acid transporters, AAP1 and AAP2, in developing pea seeds. They show new expression and localisation patterns of *PsAAP1* that support a role of PsAAP1 in phloem as well as seed loading of amino acids. Moreover analysis of AtAAP1:gluc expression in transgenic pea plants revealed targeting of GUS expression to phloem, seed coat and embryo.

Comparison of xylem sap mineral concentrations between kiwifruit shoot types using spittlebugs for non-destructive sampling of sap

Katrina N. Buxton, Michael J. Clearwater, K. Giles-Hansen, E. W. Hewett and Ian B. Ferguson 1029–1037

Obtaining accurate measures of solute concentrations in intact sap is difficult. These authors employ an ingenious method, the examination and analysis of excreta from spittlebugs, to investigate kiwifruit xylem sap concentrations. Their results explain previously observed differences in the Ca^{2+} , K^{+} , Mg^{2+} and P content of kiwifruit growing on long, non-terminating and short terminating axillary shoots.

The sun-exposed peel of apple fruit has a higher photosynthetic capacity than the shaded peel

Li-Song Chen and Lailiang Cheng 1038–1048

This is a comprehensive physiological study of photosynthesis in apple peel, which advances our understanding of mechanisms for the utilization and dissipation of light energy striking the surface of apple fruit, and the acclimation of these mechanisms to variable light conditions during fruit development. With the increasing incidence of photodamage (sunburn) worldwide, a better basic understanding of these processes is required. The results have important implications for the ability of apple fruit to withstand photoinhibition and photodamage and the fruit contribution to C gain.

Short communication: On the $^{16}\text{O}/^{18}\text{O}$ isotope effect associated with photosynthetic O_2 production

Guillaume Tcherkez and Graham D. Farquhar 1049–1052

The apparent nature of fractionation is an important question for a range of sciences, as photosynthetic water oxidation is the only mechanism for the generation of molecular oxygen for the atmosphere. This thought-provoking Short communication by Tcherkez and Farquhar deals with the ^{18}O fractionation arising from water oxidation catalysed by the PSII complex. The paper is a theoretical account of the reaction, and deals with controversial aspects concerning discrepancies between the apparent experimental measurements of ^{18}O fractionation.

Corrigendum to:

Elastic properties of the forisome

Stephen A. Warmann, William F. Pickard and Amy Q. Shen [Vol. 34, No. 10 (2007) pp. 935–945] 1053