

SPECIAL SECTION

Plant Metabolism

INTRODUCTION

1657 Green Pathways

REVIEWS & PERSPECTIVES

1658 Mining the Biodiversity of Plants:

A Revolution in the Making

V. De Luca et al.

>> Science Podcast

1661 Elemental Profiles Reflect Plant

Adaptations to the Environment

I. Baxter and B. P. Dilkes

1663 Achieving Diversity in the Face of

Constraints: Lessons from Metabolism

R. Milo and R. L. Last

1667 The Rise of Chemodiversity in Plants

J.-K. Weng et al.

1671 The Development of C₄ Rice: Current

Progress and Future Challenges

S. von Caemmerer et al.

1673 Systems Biology for Enhanced Plant

Nitrogen Nutrition

R. A. Gutiérrez

>> Perspective p. 1648; Reports pp. 1704, 1708, and 1711; and Science Careers at <http://scim.ag/PlantSci> and Science Podcast at <http://scim.ag/PlantPod>

page 1630

EDITORIAL

1619 Science Friction

Máire Geoghegan-Quinn

NEWS OF THE WEEK

1624 A roundup of the week's top stories

NEWS & ANALYSIS

1627 Environmental Science Feels Pinch

in Canada's Budget

1628 Fences Make Good Nest Sites

1629 Cassini Spies an Ocean Inside Saturn's

Icy, Gassy Moon Titan

>> Science Express Report by L. Less et al.

NEWS FOCUS

1630 A New Dawn for China's Space Scientists

Milestones of China's Space Program

Entangled Secret Messages From Space

Run by the Army for the Army?

>> Science Podcast

LETTERS

1638 Postdocs: The Power of Unions

N. Sweeney

Postdocs: NPA's Success

L. Tracey et al.

Turing in Context

J. Schmidhuber

Response

A. Hodges

1639 TECHNICAL COMMENT ABSTRACTS

BOOKS ET AL.

1640 The Idea Factory

J. Gertner, reviewed by A. Johnson

1641 The Weighty Body

Museum Boerhaave, Leiden, Netherlands;

reviewed by L. Whiteley

EDUCATION FORUM

1642 European Teacher Training Reforms

J. Bauer and M. Prenzel

PERSPECTIVES

1644 On the Invention of Pottery

G. Shelach

>> Report p. 1696

1645 A New Start for Protein Synthesis

T. E. Dever

>> Report p. 1719

1646 Old and Groovy

M. L. Droser and J. G. Gehling

>> Report p. 1693

1648 Plant Gene Clusters and Opiates

D. DellaPenna and S. E. O'Connor

>> Report p. 1704; Plant Metabolism

section p. 1657

1649 Endless Rots Most Beautiful

C. T. Hittinger

>> Report p. 1715

1650 Rethinking Chemical Reactions

at Hyperthermal Energies

X. Yang et al.

>> Report p. 1687

1651 De-Meaning of Metabolism

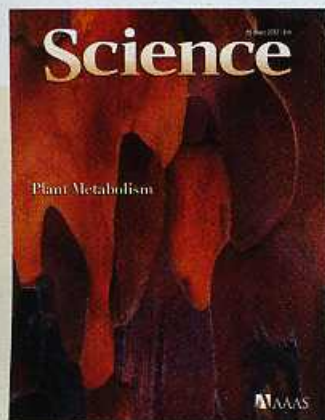
M. A. Lazar and M. J. Birnbaum

1653 Retrospective: Norman L. Letvin

(1949–2012)

G. J. Nabel et al.

CONTENTS continued >>



COVER

Wet bark of a Pacific yew tree (*Taxus brevifolia*) in Union, Washington, USA (vertical dimension ~15 centimeters). Wild Pacific yew thrives in the damp coastal forests of northwestern North America, with thin bark ranging in color from rose to auburn. The anticancer agent paclitaxel was originally derived from yew trees. Such complex and useful compounds are just one of the many outputs from plant metabolic networks, as analyzed in the special issue beginning on page 1657.

Photo: Don Paulson, www.donpaulson.com

DEPARTMENTS

1616 This Week in Science

1620 Editors' Choice

1622 Science Staff

1656 AAAS News & Notes

1730 New Products

1731 Science Careers

SCIENCE PRIZE ESSAY

- 1654 Engaging Students in Earthquakes via Real-Time Data and Decisions
A. E. Egger

REVIEW

- 1676 A Decade of Imaging Cellular Motility and Interaction Dynamics in the Immune System
R. N. Germain et al.

BREVIA

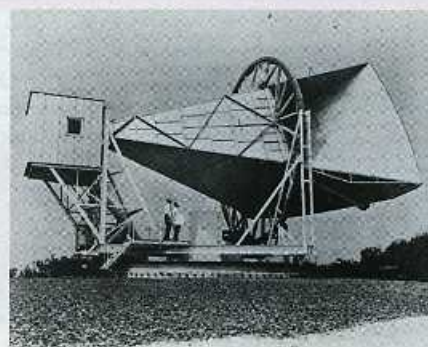
- 1683 Hesperian Age for Western Medusae Fossae Formation, Mars
J. R. Zimbelman and S. P. Scheidt
Counts of impact craters provide age for a region on Mars close to the landing site of rover Curiosity.

REPORTS

- 1684 Synthesis of Self-Pillared Zeolite Nanosheets by Repetitive Branching
X. Zhang et al.
Single-step synthesis of pillared zeolite nanosheets is achieved with a common structure-directing agent.
- 1687 Seemingly Anomalous Angular Distributions in H + D₂ Reactive Scattering
J. Jankunas et al.
An elementary chemical reaction manifests unexpectedly complex rotational dynamics.
>> *Perspective p. 1650*
- 1690 Major Earthquakes Occur Regularly on an Isolated Plate Boundary Fault
K. R. Berryman et al.
Evidence of past earthquakes from sediments along New Zealand's Alpine Fault improves seismic hazard estimates.
- 1693 Bilaterian Burrows and Grazing Behavior at >585 Million Years Ago
E. Pecoits et al.
Neoproterozoic trace fossils from Uruguay indicate that early animals appeared at a time between global glaciations.
>> *Perspective p. 1646*
- 1696 Early Pottery at 20,000 Years Ago in Xianrendong Cave, China
X. Wu et al.
Shards from a cave in China imply that humans had invented pottery and used it for cooking by about 20,000 years ago.
>> *Perspective p. 1644*
- 1700 Photonic Crystal Light Collectors in Fish Retina Improve Vision in Turbid Water
M. Kreysing et al.
Layering cones on top of rods allows the elephantnose fish to see low-contrast objects in a murky environment.
>> *Science Podcast*

- 1704 A *Papaver somniferum* 10-Gene Cluster for Synthesis of the Anticancer Alkaloid Noscapine
T. Winzer et al.
A biosynthetic pathway inherited as a gene cluster generates a pharmaceutically useful alkaloid in poppies.
>> *Perspective p. 1648; Plant Metabolism section p. 1657*
- 1708 Structural Basis for Prereceptor Modulation of Plant Hormones by GH3 Proteins
C. S. Westfall et al.
Crystal structures of plant GH3-proteins reveal how these enzymes accommodate jasmonates, auxins, and benzoates.
>> *Plant Metabolism section p. 1657*
- 1711 Uniform ripening Encodes a Golden 2-like Transcription Factor Regulating Tomato Fruit Chloroplast Development
A. L. T. Powell et al.
Controlling when tomatoes turn from green to red requires knocking out the gene that adds flavor.
>> *Plant Metabolism section p. 1657*
- 1715 The Paleozoic Origin of Enzymatic Lignin Decomposition Reconstructed from 31 Fungal Genomes
D. Floudas et al.
The enzyme family that enables fungi to digest lignin expanded around the end of the coal-forming Carboniferous period.
>> *Perspective p. 1649*
- 1719 Leucine-tRNA Initiates at CUG Start Codons for Protein Synthesis and Presentation by MHC Class
S. R. Starck et al.
T cells can use leucyl-transfer RNA (tRNA), instead of methionyl-tRNA, to initiate translation.
>> *Perspective p. 1645*
- 1723 CTD Tyrosine Phosphorylation Impairs Termination Factor Recruitment to RNA Polymerase II
A. Mayer et al.
Phosphorylation of a tyrosine inhibits the binding of termination factors and promotes the binding of elongation factors.
- 1726 Elastic Coupling Between RNA Degradation and Unwinding by an Exoribonuclease
G. Lee et al.
Rrp44 stores the energy from snipping off four bases and then uses it to unwind duplex RNA spasmodically.

CONTENTS continued >>



page 1640



pages 1644 & 1696



page 1676