

Science

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Arabia's Ancient Crossroads



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A row of 5000-year-old stone tombs lines a ridge in Al-Ayn, near the village of Bat in the foothills of the Hajar Mountains, Oman. During the third millennium B.C.E., a surprisingly sophisticated culture developed in this region and ultimately linked the early civilizations of the Indus, Iran, and Mesopotamia. See the special News Focus section beginning on page 1092.

Photo: Wikimedia Commons

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- 1128** Horizontal Gene Transfer by the Parasitic Plant *Striga hermonthica*
S. Yoshida et al.
Genes have transferred from a crop plant to an evolutionarily divergent parasitic weed.

RESEARCH ARTICLE

- 1129** Neural Crest–Derived Pericytes Promote Egress of Mature Thymocytes at the Corticomedullary Junction
M. A. Zachariah and J. G. Cyster
Cells that ensheath blood vessels promote exit of the developing T lymphocytes from the thymus.

REPORTS

- 1135** Self-Assembled Plasmonic Nanoparticle Clusters
J. A. Fan
A hierarchy of nanoscale optical structures is created from nanoparticles that have metal shells and dielectric cores.
- 1138** How Grain Growth Stops: A Mechanism for Grain-Growth Stagnation in Pure Materials
E. A. Holm and S. M. Foiles
Smooth, low-mobility grain boundaries limit crystallite growth when a pure metal is heated.
- 1141** Interface-Confined Ferrous Centers for Catalytic Oxidation
Q. Fu et al.
The interface between ferrous oxide islands and a platinum support contains sites that activate dioxygen for catalytic reactions.
- 1144** Self-Assembled $M_{24}L_{48}$ Polyhedra and Their Sharp Structural Switch upon Subtle Ligand Variation
Q.-F. Sun et al.
A slight change in ligand geometry determines whether a 12- or 24-vertex polyhedron will form.
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- 1147** Ventilation of the Deep Southern Ocean and Deglacial CO_2 Rise
L. C. Skinner et al.
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- 1151** Mirid Bug Outbreaks in Multiple Crops Correlated with Wide-Scale Adoption of Bt Cotton in China
Y. Lu et al.
The use of more specific pesticides results in the resurgence of nontargeted insect populations.

- 1154** Prion Strain Mutation Determined by Prion Protein Conformational Compatibility and Primary Structure
R. C. Angers et al.
The stability of two related strains is influenced by a species-specific amino acid difference in deer and elk prions.
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- 1158** Cyclooxygenase-2 Controls Energy Homeostasis in Mice by de Novo Recruitment of Brown Adipocytes
A. Vegiopoulos et al.
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- 1161** Genome-Wide Kinetics of Nucleosome Turnover Determined by Metabolic Labeling of Histones
R. B. Deal et al.
Differences between active and silent chromatin states are critical for maintaining the epigenome.

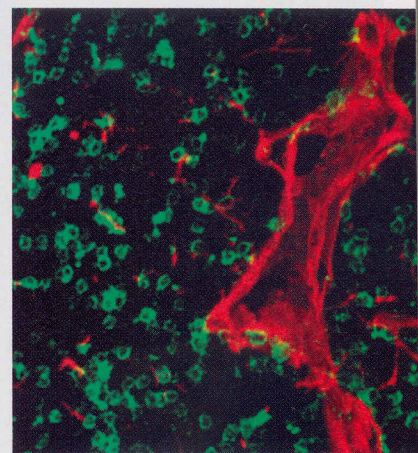
- 1164** Global Biodiversity: Indicators of Recent Declines
S. H. M. Butchart et al.
An analysis of 30 indicators shows that the Convention on Biological Diversity's 2010 targets have not been met.

- 1168** Plectasin, a Fungal Defensin, Targets the Bacterial Cell Wall Precursor Lipid II
T. Schneider et al.
Some metazoan and fungal host defense peptides are specific inhibitors of bacterial peptidoglycan biosynthesis.

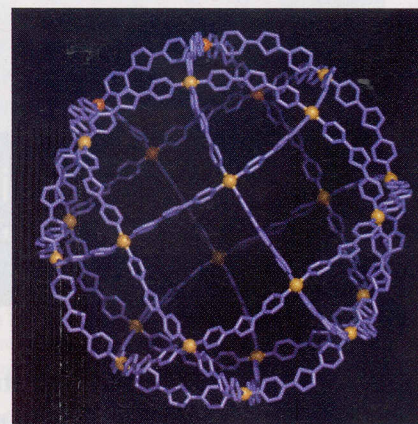
- 1172** mTORC1-Mediated Cell Proliferation, But Not Cell Growth, Controlled by the 4E-BPs
R. J. O. Dowling et al.
Control of cell proliferation and cell size is separately regulated in mammals.

- 1176** Fairness and the Development of Inequality Acceptance
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SCIENCEONLINE

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Structure of the Human BK Channel Ca^{2+} -Activation Apparatus at 3.0 Å Resolution
P. Yuan et al.

A tetramer of two regulatory domains forms a gating ring that regulates calcium ion activation.
10.1126/science.1190414

Control of Membrane Protein Topology by a Single C-Terminal Residue
S. Seppälä et al.

The orientation of a multispinning inner membrane protein can be engineered by a single positively charged residue.
10.1126/science.1188950

c-di-AMP Secreted by Intracellular *Listeria monocytogenes* Activates a Host Type I Interferon Response
J. J. Woodward et al.

Within the host cell, a small secondary signaling molecule from a pathogen triggers a pathway of innate immunity.
10.1126/science.1189801

Stochastic Community Assembly Causes Higher Biodiversity in More Productive Environments
J. M. Chase

A long-term experiment in ponds addresses the influence of primary productivity on broad-scale patterns of biodiversity.
10.1126/science.1187820

Explaining the Structure of the Archean Mass-Independent Sulfur Isotope Record
I. Halevy et al.

Modeling suggests that volcanic output and microorganisms created a distinctive profile of sulfur isotopes on early Earth.
10.1126/science.1190298

The Climate Change Debates
P. Kitcher

10.1126/science.1189312
>> Join the discussion at <http://tiny.cc/clcngh>

TECHNICALCOMMENTS

Comment on the Paleobiology and Classification of *Ardipithecus ramidus*
E. E. Sarmiento

Full text at www.sciencemag.org/cgi/content/full/328/5982/1105-b

Response to Comment on the Paleobiology and Classification of *Ardipithecus ramidus*
T. D. White et al.

Full text at www.sciencemag.org/cgi/content/full/328/5982/1105-c

Comment on the Paleoenvironment of *Ardipithecus ramidus*
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Full text at www.sciencemag.org/cgi/content/full/328/5982/1105-d

Response to Comment on the Paleoenvironment of *Ardipithecus ramidus*
T. D. White et al.

Full text at www.sciencemag.org/cgi/content/full/328/5982/1105-e

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Highlights From Our Daily News Coverage

Animal Reserves Can Be Good for People, Too
Detailed analysis of Thailand and Costa Rica shows less poverty near protected areas.

Body Temperature Time Machine
New technique allows scientists to determine extinct animals' body temperatures.

Genetic Discovery Promises to Boost Rice Yields
Two groups find gene variant that boosts test plot yields by 10%.

SCIENCE SIGNALING

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RESEARCH ARTICLE: The Balance of WNT and FGF Signaling Influences Mesenchymal Stem Cell Fate During Skeletal Development
T. Maruyama et al.

PODCAST
W. Hsu and A. M. VanHook

Imbalance of WNT and FGF signaling promotes premature closure of skull bones by inducing bone formation.

RESEARCH ARTICLE: Negative Feedback in Noncanonical NF- κ B Signaling Modulates NIK Stability Through IKK α -Mediated Phosphorylation
B. Razani et al.

PERSPECTIVE: Controlling the Fate of NIK—A Central Stage in Noncanonical NF- κ B Signaling
S.-C. Sun

Feedback inhibition of the central regulator of noncanonical NF- κ B signaling is mediated by its target kinase.

RESEARCH ARTICLE: TRAF6 and A20 Regulate Lysine 63—Linked Ubiquitination of Beclin-1 to Control TLR4-Induced Autophagy
C.-S. Shi and J. H. Kehrl

Regulation of the ubiquitination of Beclin-1 may be a general mechanism that controls autophagy.

SCIENCE CAREERS

www.sciencereers.org/career_magazine
Free Career Resources for Scientists

The Successful Physician-Scientist in the 21st Century
A. Schafer

Physician-scientists must learn to thrive, despite a divided culture and rigid institutional structures.

Ten Years of Bologna: Threats and Opportunities for Students
E. Pain

Reforms in Europe may offer students opportunities to shape higher education around their needs.

Science Careers Communities
Science Careers Staff

MySciNet and CTSciNet offer opportunities to connect with like-minded scientists.

SCIENCE TRANSLATIONAL MEDICINE

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Integrating Medicine and Science

PERSPECTIVE: Achalasia and Viral Infection—New Insights from Veterinary Medicine
D. Ganem et al.

A viral disease in parrots mimics features of achalasia, a human disorder of esophageal motility.

PERSPECTIVE: Rong's Numbers—Accelerating Progress in HCV Therapeutic Research
D. L. Wyles and R. T. Schooley

Mathematical modeling and other modern translational research tools can expedite the development of drugs that target hepatitis C virus.

RESEARCH ARTICLE: Metabolic Signatures of Exercise in Human Plasma
G. D. Lewis et al.

Profiles of plasma metabolites show that people who are more fit respond more effectively to exercise.

RESEARCH ARTICLE: Proteins Required for Centrosome Clustering in Cancer Cells
B. Leber et al.

Proteins that prevent spindle multipolarity in human cancer cells may prove to be promising drug targets.

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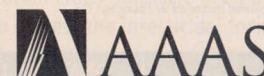
Download the 28 May Science Podcast to hear about how adolescents gauge fairness, Arabia's ancient crossroads, your letters to Science, and more.

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Science Policy News and Analysis

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