



## COVER

A mouse embryo at 9 days of gestation, stained for  $\alpha$ -fetoprotein in the liver bud and yolk sac (upper left and right green domains) and for the transcription factor Pdx-1 in the ventral and dorsal pancreas buds (upper and lower red domains). Understanding the basis for organ development can provide insights into disease and stem cell programming. See the special section beginning on page 1489.

*Image: Ewa Wandzioch and Ken Zaret*

## SPECIAL SECTION

# Organ Development

## INTRODUCTION

New Release: *The Complete Guide to Organ Repair* 1489

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Generation and Regeneration of Cells of the Liver and Pancreas *K. S. Zaret and M. Grompe* 1490

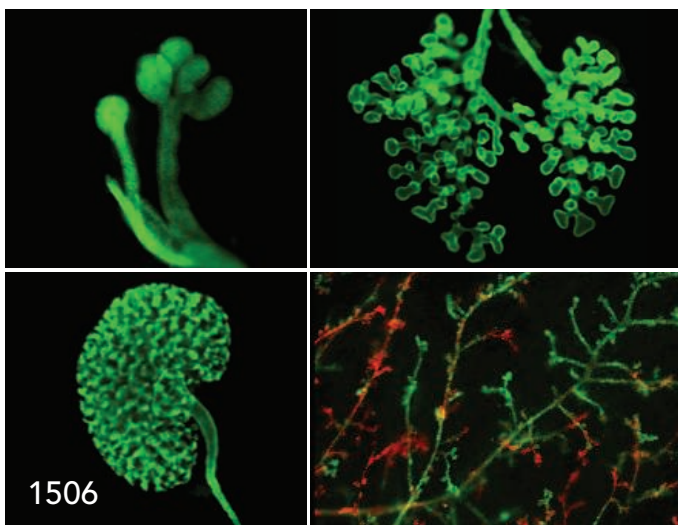
Cardiogenesis and the Complex Biology of Regenerative Cardiovascular Medicine *K. R. Chien et al.* 1494

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www.scienceexpress.org

## DEVELOPMENTAL BIOLOGY

Human Fetal Hemoglobin Expression Is Regulated by the Developmental Stage-Specific Repressor *BCL11A*

V. G. Sankaran et al.

A way to reactivate a fetal form of  $\gamma$ -globulin in adults—by releasing it from repression by an inhibitor—may prove useful for treating certain genetic anemias.

10.1126/science.1165409

## CELL BIOLOGY

## Nascent RNA Sequencing Reveals Widespread Pausing and Divergent Initiation at Human Promoters

L. J. Core, J. J. Waterfall, J. T. Lis

RNA sequencing identifies antisense transcription immediately upstream of genes with transcriptionally engaged RNA polymerase.

10.1126/science.1162228

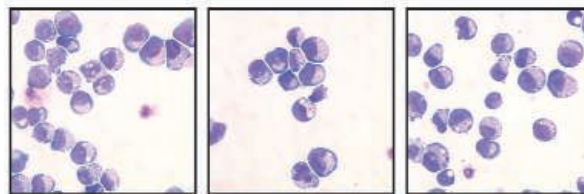
## CELL BIOLOGY

## Divergent Transcription from Active Promoters

A. C. Seila et al.

Active genes produce promoter-localized sense and antisense short RNAs, suggesting frequent transcription by divergently oriented RNA polymerase II complexes at mammalian promoters.

10.1126/science.1162253



## CELL BIOLOGY

## RNA Exosome Depletion Reveals Transcription Upstream of Active Human Promoters

P. Preker et al.

Highly unstable transcripts exist upstream of active human promoters.

10.1126/science.1164096

## CELL BIOLOGY

## The Antisense Transcriptomes of Human Cells

Y. He, B. Vogelstein, V. E. Velculescu, N. Papadopoulos, K. W. Kinzler

The abundance and nonrandom genomic origin of antisense transcripts in human cells suggest that these RNAs are an important feature of gene regulation.

10.1126/science.1163853

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[full text at www.sciencemag.org/cgi/content/full/322/5907/1466b](http://www.sciencemag.org/cgi/content/full/322/5907/1466b)Response to Comment on "Phytoplankton Calcification in a High-CO<sub>2</sub> World"

M. D. Iglesias-Rodriguez et al.

[full text at www.sciencemag.org/cgi/content/full/322/5907/1466c](http://www.sciencemag.org/cgi/content/full/322/5907/1466c)

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S. Gächter, E. Renner, M. Sefton

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## RESEARCH ARTICLES

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Dynamic Proteomics of Individual Cancer Cells in Response to a Drug 1511  
A. A. Cohen et al.

Cells that escape death from a chemotherapy drug express a different array of proteins than do genetically identical cells that die, which may help to inform cancer therapeutics.

## MATERIALS SCIENCE

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*P. Eckle et al.*

A technique based on resolving the momentum of an electron escaping from a helium atom in an elliptically polarized light field clocks tunneling at less than 34 attoseconds.

### GEOPHYSICS

#### Optical Absorption and Radiative Thermal Conductivity of Silicate Perovskite to 125 Gpa 1529

*H. Keppler, L. S. Dubrovinsky, O. Narygina, I. Kantor*

At high pressures, silicate perovskite, abundant in Earth's mantle, is not opaque to optical and infrared light, implying that radiative heat flow is important in the deep Earth.

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#### Quasi-Periodic Bedding in the Sedimentary Rock Record of Mars 1532

*K. W. Lewis et al.*

Stereo topographic mapping on Mars shows that some large impact craters were filled with sedimentary rock sequences made up of cyclical packages of meter-scaled beds.

### MOLECULAR BIOLOGY

#### Photoexcited CRY2 Interacts with CIB1 to Regulate Transcription and Floral Initiation in *Arabidopsis* 1535

*H. Liu, X. Yu, K. Li, J. Klejnot, H. Yang, D. Lisiero, C. Lin*

Blue light triggers the association of a photoreceptor, transcription factor, and DNA site, thus inducing expression for the gene *FT* (flowering time) and initiating flowering.

### CELL SIGNALING

#### A Stress Signaling Pathway in Adipose Tissue Regulates Hepatic Insulin Resistance 1539

*G. Sabio et al.*

In mice, some detrimental effects of a diet high in fat—insulin resistance, for instance—result from hormonal signals sent from fat cells to the liver. >> *Perspective p. 1483*

### CELL BIOLOGY

#### Inhibition of Rac by the GAP Activity of Centralspindlin Is Essential for Cytokinesis 1543

*J. C. Canman et al.*

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### NEUROSCIENCE

#### Activation of Pannexin-1 Hemichannels Augments Aberrant Bursting in the Hippocampus 1555

*R. J. Thompson et al.*

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*L. Fishman and A. Saunders*

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*J. E. Mold et al.*

Exposure of the human fetus to maternal cells during pregnancy can prompt development of regulatory T cells that prevent responses to non-inherited maternal antigens.

>> *News story p. 1450; Science Podcast*



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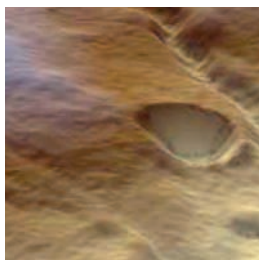
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Hidden impact crater in Canada unmasked.

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HIGHLIGHTS FROM OUR DAILY NEWS COVERAGE

### Lasers Uncover Craters

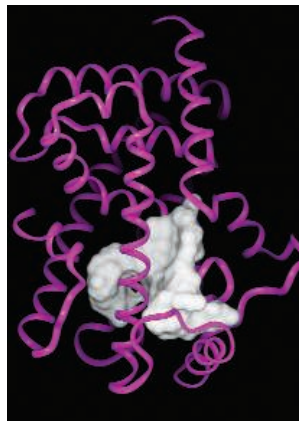
New technology pinpoints previously unknown meteor impacts.

### The Long Road to Modernity

Archaeological dating suggests modern humans may have inherited some fancy tools.

### Most Planets May Be Seeded With Life

Discovery of RNA precursor in planet-forming cloud suggests building blocks of life are common in the universe.



Ligand-binding pocket of PPAR $\gamma$ .

## SCIENCE SIGNALING

[www.sciencesignaling.org](http://www.sciencesignaling.org)

THE SIGNAL TRANSDUCTION KNOWLEDGE ENVIRONMENT

### PERSPECTIVE: Ligand-Dependent and -Independent Regulation of PPAR $\gamma$ and Orphan Nuclear Receptors

*H. E. Xu and Y. Li*

It is too soon to conclude that the physiological activities of PPAR $\gamma$  are truly ligand-independent.

### PODCAST

*S. W. Lee, P. P. Ongusaha, A. M. VanHook*

Sam Lee and Pat Ongusaha discuss their research on the mechanisms by which ultraviolet B radiation induces cell death.

### GLOSSARY

Find out what TSC, NG2, and ASIC mean in the world of cell signaling.

### PREVIEW

Get a sneak peek at articles coming up in the 9 December issue related to this week's *Science* special section on organ development.

>> *Organ Development* section p. 1489 and [www.sciencemag.org/organdevlopment/](http://www.sciencemag.org/organdevlopment/)



How will scientists fare in the new administration?

## SCIENCE CAREERS

[www.sciencereers.org/career\\_development](http://www.sciencereers.org/career_development)

FREE CAREER RESOURCES FOR SCIENTISTS

### The Job Outlook for Physician Scientists

*K. Hede*

Job opportunities make a bright future for scientists with clinical degrees.

### Taken for Granted: Can Scientists Believe in Change?

*B. L. Benderly*

Science is one of many priorities for the new presidential administration.

### Beating the Odds

*G. Sinha*

Cinzia Casiraghi won €1.65 million for setting up her own lab in Germany.

### December 2008 Funding News

*J. Fernández*

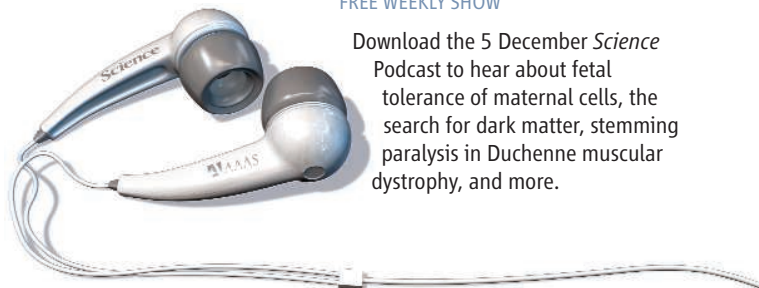
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