COVER
A mouse embryo at 9 days of gestation, stained for α-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

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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 γ-globulin in adults—by releasing it from repression by an inhibitor—may prove useful for treating certain genetic anemias.
10.1126/science.1165409

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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

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U. Riebesell et al.
full text at www.sciencemag.org/cgi/content/full/322/5907/1466b
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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

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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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A. A. Cohen et al.
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MATERIALS SCIENCE

Tough, Bio-Inspired Hybrid Materials
E. Munch et al.
Lamellar ice is used as a template to form an aluminum oxide scaffold that can be pressed and filled with a polymer, producing a tough layered structure reminiscent of nacre.

PHYSICS

Metallic and Insulating Phases of Repulsively Interacting Fermions in a 3D Optical Lattice
U. Schneider et al.
A cold atom cloud confined to an optical lattice can be tuned from a metal to an insulator. >> Perspective p. 1480
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Attosecond Ionization and Tunneling Delay Time

Measurements in Helium

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

Silicate Perovskite to 125 Gpa

H. Kepler, 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.

**PLANETARY SCIENCE**

Quasi-Periodic Bedding in the Sedimentary Rock Record of Mars

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

H. Liu, X. Yu, K. Li, J. Kleijnos, 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 BIOLOGY**

A Stress Signaling Pathway in Adipose Tissue Regulates Hepatic Insulin Resistance

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]

**DEVELOPMENTAL BIOLOGY**

Dynamic Analyses of Drosophila Gastrulation Provide Insights into Collective Cell Migration

A. McMahon, W. Supatto, S. E. Fraser, A. Stathopoulos

Live fluorescence imaging of over 1500 cells within a Drosophila embryo during gastrulation reveals that a fibroblast growth factor coordinates cell migration.

**NEUROSCIENCE**

Astrogial Metabolic Networks Sustain Hippocampal Synaptic Transmission

N. Rouach, A. Koulakoff, V. Abudara, K. Willecke, C. Giaume

The glial astrocytes that surround neurons supply glucose or lactate to excitatory synapses though gap junctions that open when the neurons are active.

**NEUROSCIENCE**

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

R. J. Thompson et al.

Activation of a glutamate receptor in hippocampal cells leads to secondary opening of a gap junction–like channel that can contribute to seizure-like bursting.

**EVOLUTION**

Centromere-Associated Female Meiotic Drive Entails Male Fitness Costs in Monkeyflowers

L. Fishman and A. Saunders

Competition between chromosomal homologs causes non-Mendelian meiotic segregation and fitness polymorphism in a natural monkeyflower population. [>> Perspective p. 1484]

**IMMUNOLOGY**

Maternal Alloantigens Promote the Development of Tolerogenic Fetal Regulatory T Cells in Utero

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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Taken for Granted: Can Scientists Believe in Change?
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