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

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

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

Origin of Stem Cells in Organogenesis 1498
J. M. W. Slack

Morphogenetic Cell Movements: Diversity from Modular Mechanical Properties 1502
D. J. Montell

Patterning Mechanisms of Branched Organs 1506
P. Lu and Z. Werb

>> News story p. 1460; for related online content, see page 1429 or go to www.sciencemag.org/organdevelopment/
Human Fetal Hemoglobin Expression Is Regulated by the Developmental Stage-Specific Repressor \textit{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

\textbf{CELL BIOLOGY}

\textbf{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

\textbf{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

\textbf{TECHNICAL COMMENT ABSTRACTS}

\textbf{CLIMATE CHANGE}

Comment on ”Phytoplankton Calcification in a High-CO\textsubscript{2} World”

U. Riebesell et al.

full text at www.sciencemag.org/cgi/content/full/322/5907/1466b

Response to Comment on ”Phytoplankton Calcification in a High-CO\textsubscript{2} World”

M. D. Iglesias-Rodriguez et al.

full text at www.sciencemag.org/cgi/content/full/322/5907/1466c

\textbf{BOOKS ET AL.}

Science Books for Fun and Learning—Some Recommendations from 2008

1468

BROWSINGS

1471

\textbf{POLICY FORUM}

The Gender Gap in NIH Grant Applications

T. J. Ley and B. H. Hamilton

Science Policy in Kazakhstan

G. E. Schweitzer

1474

\textbf{PERIODICALS}

How Cold Is Cold Dark Matter?

G. Gilmore

A Curious Antipathy for Water

S. Granick and S. C. Bae

Crops for a Salinized World

J. Rozema and T. Flowers

Controlling Cold-Atom Conductivity

L. Fallani and M. Inguscio

Elements and Evolution

A. D. Anbar

Fat Stress and Liver Resistance

W. Ogawa and M. Kasuga

1483

\textbf{PERSPECTIVES}

Competitive Centromeres

D. Charlesworth

GE Prize Winner: Understanding a Minimal DNA-Segregating Machine

E. C. Garner

The Long-Run Benefits of Punishment

S. Gächter, E. Renner, M. Sefton

In human social groups, punishment of uncooperative behaviors increases teamwork, but the benefits of cooperation only outweigh the costs of punishment after a long time.

1486

\textbf{RESEARCH ARTICLES}

\textbf{CELL BIOLOGY}

Dynamic Proteomics of Individual Cancer Cells in Response to a Drug

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.

1511

\textbf{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.

1516

\textbf{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

1520
REPORTS

PHYSICS
Attosecond Ionization and Tunneling Delay Time
Measurments 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. Keppler, L. S. Dubrovinsky, O. Narvygin, 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. Klejnott, 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. Sabia 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.

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.

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.
It is too soon to conclude that the physiological activities of PPARγ 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/organdevelopment/

How will scientists fare in the new administration?

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
Learn about the latest in research funding, scholarships, fellowships, and internships.