COVER
Detail from The Last Automat III by Max Ferguson. Sluggish operation of the reward circuitry in the brain may lead individuals to eat calorie-dense foods (such as pie) to try to compensate, placing them at risk for obesity. See page 449.

Image: The Last Automat III, 2003 (oil on panel); Max Ferguson/Bridgeman Art Library/Getty Images

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Cell Signaling

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Getting Your Loops Straight

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Feedback Loops Shape Cellular Signals in Space and Time
O. Brandman and T. Meyer

Optical Switches for Remote and Noninvasive Control of Cell Signaling
P. Gorostiza and E. Y. Isacoff

From Signals to Patterns: Space, Time, and Mathematics in Developmental Biology
J. Lewis

For related online content, see page 339 or go to www.sciencemag.org/cellsignaling08/

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BIOCHEMISTRY
Structure and Molecular Mechanism of a Nucleobase-Cation-Symport-1 Family Transporter
S. Weyand et al.
The structure of a membrane transporter in an open state suggests that in- and out-facing cavities reciprocally open and close coordinated by two transmembrane segments.
10.1126/science.1164440

ASTRONOMY
The Fermi Gamma-Ray Space Telescope Discovers the Pulsar in the Young Galactic Supernova Remnant CTA 1
G. Kanbach et al.
The Fermi Space Telescope has detected a gamma-ray pulsar associated with a young supernova remnant, implying that such stars may be unidentified gamma-ray sources.
10.1126/science.1165572

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Conservation and Rewiring of Functional Modules Revealed by an Epistasis Map in Fission Yeast A. Roguev et al.
Comparison of genetic wiring in two types of yeast reveals that protein complexes are conserved, but the interactions between them can change radically between species.

PHYSICS
Current-Induced Spin-Wave Doppler Shift V. Vlaminck and M. Bailleul 410
A current-induced shift in the frequency of propagating spin waves provides a simple technique to probe spin-polarized currents in engineering spintronic devices. >> Perspective p. 386

APPLIED PHYSICS
Complex Patterning by Vertical Interchange Atom Manipulation Using Atomic Force Microscopy Y. Sugimoto et al.
Atoms of tin and silicon are reversibly and controllably exchanged between the tip of an atomic force microscope and a substrate, allowing atomic patterning of a surface.

CHEMISTRY
Catalytic Conversion of Biomass to Monofunctional Hydrocarbons and Targeted Liquid-Fuel Classes E. L. Kunkes et al.
A set of two reactors, one that breaks down biomass sugars and a second that directs chain formation, can synthesize various hydrocarbon fuels.
REPORTS CONTINUED...

CHEMISTRY

Accurate Temperature Imaging Based on Intermolecular Coherences in Magnetic Resonance

G. Galiana, R. T. Branco, E. R. Jenista, W. S. Warren

The shift of water nuclear magnetic resonance peaks relative to those of lipids provides an accurate thermometer of internal temperatures, for example, in a mouse.

Molecular Layering of Fluorinated Ionic Liquids at a Charged Sapphire (0001) Surface

M. Mezger et al.

Reflections of high-energy X-rays reveal that when in contact with a sapphire surface, and likely other surfaces, an ionic liquid forms alternating layers of cations and anions.

MATERIALS SCIENCE

Evolution of Block Copolymer Lithography to Highly Ordered Square Arrays

C. Tang et al.

The addition of hydrogen bonding units to two block copolymers leads to a template with square patterns that can be used for manufacturing integrated circuits.

PLANETARY SCIENCE

The Extreme Kuiper Belt Binary 2001 QW$_{132}$

J.-M. Petit et al.

Two small, weakly bound objects in the outer solar system orbit each other more than 100,000 kilometers apart, distances that challenges ideas for such binaries form.

GENETICS

Species-Specific Transcription in Mice Carrying Human Chromosome 21

M. D. Wilson et al.

An aneuploid mouse carrying a human chromosome shows that genetic sequence can dominate epigenetic, cellular, and organismal effects in determining transcriptional regulation and gene expression.

CHEMISTRY

Surface Sites for Engineering Allosteric Control in Proteins

J. Lee et al.

Two allosterically regulated proteins can be engineered to interact so that when light activates one, it triggers the enzymatic output (dihydrofolate reductase) of the other.

BIOCHEMISTRY

A Stochastic Single-Molecule Event Triggers Phenotype Switching of a Bacterial Cell

P. J. Choi, L. Cai, K. Frieda, X. S. Xie

A stochastic process, in which a regulatory repressor dissociates from either one or two DNA sites, determines which of two phenotypes is seen in genetically identical bacteria.

BIOCHEMISTRY

Remeasuring the Double Helix

R. S. Mathew-Fenn, R. Das, P. A. B. Harbury

Pieces of DNA in solution are much softer than DNA under tension and unexpectedly stretch large amounts over several helical turns.

NEUROSCIENCE

Relation Between Obesity and Blunted Striatal Response to Food Is Moderated by TaqIA A1 Allele

E. Stice, S. Spoor, C. Bohon, D. M. Small

Individuals whose reward centers of the brain respond sluggishly after eating prefer calorie-dense foods, which may account for their greater propensity to gain weight. >> Science Podcast

CELL BIOLOGY

Phosphorylation Networks Regulating JNK Activity in Diverse Genetic Backgrounds

C. Bakal et al.

Data from an RNA interference screen, combined with genetic interaction analysis, allow construction of a comprehensive kinase cellular signaling network in Drosophila.

CELL BIOLOGY

Higher-Order Cellular Information Processing with Synthetic RNA Devices

M. N. Win and C. D. Smolke

The intrinsic ribosome of a simple RNA-based Boolean logic device that can be engineered into cells is activated when it is bound by two particular molecules. >> Perspective p. 387

IMMUNOLOGY

Innate Immunity in Caenorhabditis elegans Is Regulated by Neurons Expressing NPR-1/GPCR

K. L. Styer et al.

In the worm Caenorhabditis elegans, sensory neurons surprisingly can inhibit innate immune responses, in part through the mitogen-activated protein kinase (MAPK) signaling pathway.
SCIENCE SIGNALING
www.sciencesignaling.org
THE SIGNAL TRANSDUCTION KNOWLEDGE ENVIRONMENT

RESEARCH ARTICLE: Regulation of P2X2 Receptors by the Neuronal Calcium Sensor VILIP1
S. Chaumont, V. Compan, E. Toulme, E. Richler, G. D. Housley, F. Rassendren, B. S. Khakh
Optics and electrophysiology reveal the dynamics of an ATP-gated ion channel signaling complex.

RESEARCH ARTICLE: BDNF Selectively Regulates GABA_A Receptor Transcription by Activation of the JAK/STAT Pathway
Brain-derived neurotrophic factor regulates a GABA receptor subunit through the repressor ICER.

PERSPECTIVE: Acetylation of MKP-1 and the Control of Inflammation
H. Chi and R. A. Flavell
Toll-like receptor signaling is inhibited by acetylated MKP-1, a mitogen-activated protein kinase phosphatase.

PREVIEW
Get a sneak peek at articles coming up in the 21 October issue related to this week’s Science special issue on cell signaling.

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E. Pain
Synthetic biology offers new opportunities for scientists willing to challenge their ways of thinking and doing research.

A Multidisciplinary Approach to Life
E. Pain
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K. Travis
Hear three scientists talk about their career paths and the future of synthetic biology research.

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