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Science

Synthetic Biology

 AAAS

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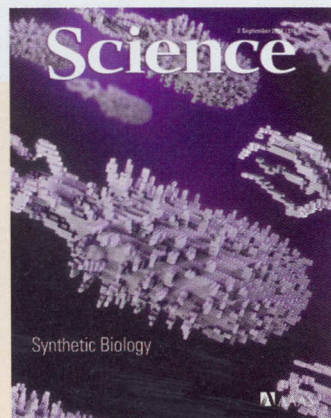
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Bacteria constructed from toy building bricks represent the potential of synthetic biology to design and construct genetic modules that can be used to introduce new functions into existing organisms or even to engineer new biological systems. A special section highlights how this field is contributing to our understanding of biology and harnessing this understanding to benefit humanity. See page 1235 and www.sciencemag.org/special/syntheticbio.

Image: Equinox Graphics/Photo Researchers, Inc.

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The doubling of genomes does not cause increased plant speciation unless the progenitor lineages are highly fit.

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The large amount of dust produced by this supernova may help explain the dust observed in young galaxies.

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H. Tanji-Suzuki et al.

The transmission of light through an atomic gas can be controlled by manipulating the confining cavity.

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K. C. Nowack et al.

Independent readout of two single-spin qubits in quantum dots is achieved in an all-electrical setup.

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1285 Out of Tibet: Pliocene Woolly Rhino Suggests High-Plateau Origin of Ice Age Megaherbivores

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B. K. Swan et al.

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1300 Tet Proteins Can Convert 5-Methylcytosine to 5-Formylcytosine and 5-Carboxylcytosine

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1303 Tet-Mediated Formation of 5-Carboxylcytosine and Its Excision by TDG in Mammalian DNA

Y.-F. He et al.

Evidence for a possible route for DNA demethylation in animals is suggested.

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1307 Multi-Input RNAi-Based Logic Circuit for Identification of Specific Cancer Cells

Z. Xie et al.

A synthetic biomolecular circuit identifies abnormal cell states by the integration of multiple endogenous microRNA inputs.

>> *Synthetic Biology section p. 1235*1311 Epigenetic Licensing of Germline Gene Expression by Maternal RNA in *C. elegans*

C. L. Johnson and A. M. Spence

Expression of a gene in an offspring needs an RNA (but not the protein it codes for) provided by its mother.

1315 Entrainment of a Population of Synthetic Genetic Oscillators

O. Mondragón-Palomino et al.

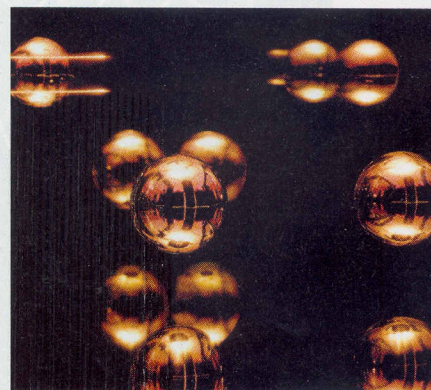
A positive-feedback loop in a biological oscillator allows effective setting of the clock by external cues.

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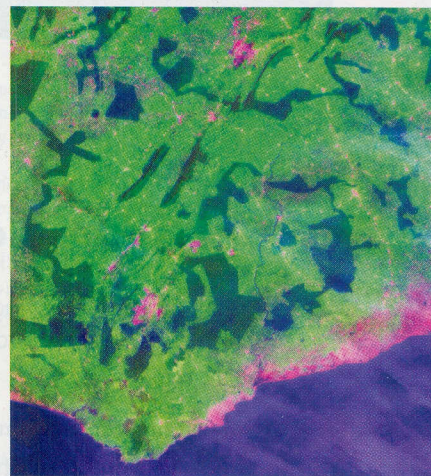
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SCIENCEONLINE

SCIENCEEXPRESS

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Light Propagation with Phase Discontinuities: Generalized Laws of Reflection and Refraction
N. Yu et al.

Light propagation can be controlled with plasmonic interfaces that introduce abrupt phase shifts along the optical path.

10.1126/science.1210713

Linking Long-Term Dietary Patterns with Gut Microbial Enterotypes

G. D. Wu et al.

The basic composition of the human gut microbiome is influenced by long-term diet: high fat and protein versus high fiber.

10.1126/science.1208344

ER Tubules Mark Sites of Mitochondrial Division

J. R. Friedman et al.

Mitochondrial division occurs at positions where endoplasmic reticulum tubules contact mitochondria and mediate constriction.

10.1126/science.1207385

Glutamatergic and Dopaminergic Neurons Mediate Anxiogenic and Anxiolytic Effects of CRHR1

D. Refojo et al.

Imbalance in the bidirectional role of corticotropin-releasing hormone receptor 1 in anxiety might lead to emotional disorders.

10.1126/science.1202107

Implementing the Quantum von Neumann Architecture with Superconducting Circuits

M. Mariantoni et al.

A quantum version of a central processing unit was created with superconducting circuits and elements.

10.1126/science.1208517

Universal Digital Quantum Simulation with Trapped Ions

B. P. Lanyon et al.

A series of trapped calcium ions was used to simulate the complex dynamics of an interacting spin system.

10.1126/science.1208001

TECHNICALCOMMENTS

Comment on "Additive Genetic Breeding Values Correlate with the Load of Partially Deleterious Mutations"

E. Postma

Full text at www.sciencemag.org/cgi/content/full/333/6047/1221-b

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SCIENCENOW

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Highlights From Our Daily News Coverage

'Time Cells' Weave Events Into Memories

Neurons in the hippocampus keep track of empty moments.

<http://scim.ag/timecells>

'Jurassic Mother' Found in China

An ancestor of placental mammals appeared while dinosaurs roamed.

<http://scim.ag/jurassicmom>

Mind-Altering Bugs

Bacteria in the gut alter brain chemistry and behavior in mice.

<http://scim.ag/mind-altering>

SCIENCE SIGNALING

www.sciencesignaling.org

The Signal Transduction Knowledge Environment

30 August issue: <http://scim.ag/ss083011>

RESEARCH ARTICLE: AKT Promotes rRNA Synthesis and Cooperates with c-MYC to Stimulate Ribosome Biogenesis in Cancer

J. C. Chan et al.

In addition to promoting translation, AKT also stimulates protein synthesis and cell growth by enhancing ribosome biogenesis.

REVIEW: Inositol Pyrophosphates as Mammalian Cell Signals

A. Chakraborty et al.

Identification and knockout of their biosynthetic enzymes has shed light on the diverse functions of the inositol pyrophosphates.

PRESENTATION: Merlin/NF2 Functions Upstream of the Nuclear E3 Ubiquitin Ligase CRL4^{DCAF1} to Suppress Oncogenic Gene Expression

J. Cooper et al.

The closed conformer of Merlin inhibits tumorigenesis by inhibiting a ubiquitin ligase implicated in promoting cell cycle progression and inhibiting growth arrest, apoptosis, and adhesion.

SCIENCE TRANSLATIONAL MEDICINE

www.sciencetranslationalmedicine.org

Integrating Medicine and Science

31 August issue: <http://scim.ag/stm083111>

RESEARCH ARTICLE: Identification of a Disease-Defining Gene Fusion in Epithelioid Hemangioendothelioma

M. R. Tanas et al.

PERSPECTIVE: Understanding the Enemy

V. E. Velculescu and L. A. Diaz Jr.

A genomics approach shortens the path to discovery of a diagnostic gene fusion for a specific vascular cancer.

RESEARCH ARTICLE: A Computational Model to Predict the Effects of Class I Anti-Arrhythmic Drugs on Ventricular Rhythms

J. D. Moreno et al.

Two- and three-dimensional models of cardiac excitability based on sodium-channel kinetics can predict the adverse effects of class I anti-arrhythmic drugs.

RESEARCH ARTICLE: Noninvasive Electroanatomic Mapping of Human Ventricular Arrhythmias with Electrocardiographic Imaging (ECGI)

Y. Wang et al.

FOCUS: Imaging Cardiac Arrhythmias

K. Shivkumar and S. M. Narayan

Electrocardiographic imaging can noninvasively provide an activation map of the heart's surface to help treat arrhythmias.

SCIENCE CAREERS

www.sciencereers.org/career_magazine

Free Career Resources for Scientists

What Is Wrong With High-Skill Immigration Policy?

B. L. Benderly

A Senate hearing highlights the split between institutions' and workers' interests.

http://scim.ag/TFG_Skilled

A Father-and-Son Journey Into Synthetic Biology

E. Pain

Justin Siegel rationally engineered unnatural enzymes partly thanks to technology his dad helped develop.

<http://scim.ag/JustinSiegel>

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SCIENCE PODCAST

www.sciencemag.org/multimedia/podcast

Free Weekly Show

On the 2 September Science Podcast: a special show all about synthetic biology, from clinical applications and regulatory issues to the do-it-yourself biology movement.

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Science Policy News and Analysis

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