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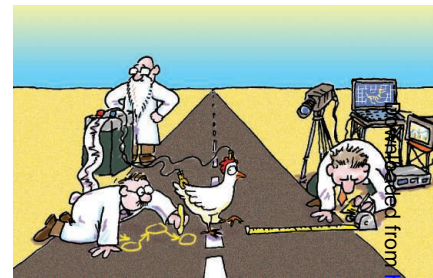
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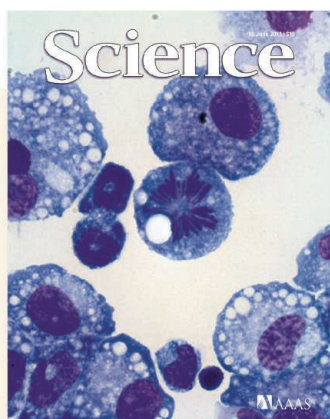


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http://science.sciencemag.org/ on March 21, 2019



## COVER

Bright-field light microscopy image of peritoneal cells, including a macrophage undergoing cell division (center cell, ~20 micrometers across), taken from mice treated with the cytokine interleukin-4. On page 1284, Jenkins *et al.* describe a mechanism of inflammation in response to parasitic nematode infection whereby macrophages expand in number through cell division rather than by recruitment from the blood.

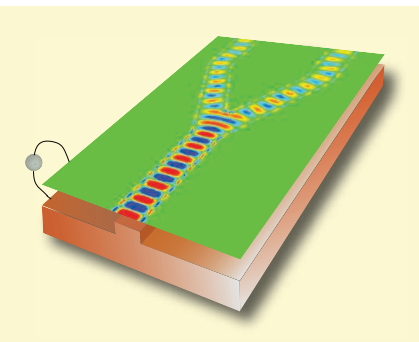
*Photo: Stephen Jenkins, University of Edinburgh, UK*

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## REVIEW

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*D. A. Wardle et al.*

## RESEARCH ARTICLES

- 1278 **Microcredit in Theory and Practice: Using Randomized Credit Scoring for Impact Evaluation**  
*D. Karlan and J. Zinman*  
A randomized controlled trial reveals both expected and surprising effects of microcredit.  
>> *Perspective p. 1271; Science Podcast*
- 1284 **Local Macrophage Proliferation, Rather than Recruitment from the Blood, Is a Signature of T<sub>H</sub>2 Inflammation**  
*S. J. Jenkins et al.*  
Proliferation in situ, rather than immune cell recruitment, drives macrophage expansion in response to parasitic infection.  
>> *Perspective p. 1268*

## REPORTS

- 1288 **Real-Time Dynamics of Quantized Vortices in a Unitary Fermi Superfluid**  
*A. Bulgac et al.*  
A generalized theoretical approach is developed to describe the dynamics and phase transitions of Fermi superfluids.
- 1291 **Transformation Optics Using Graphene**  
*A. Vakil and N. Engheta*  
Simulations show that control of the conductivity of a region within a graphene sheet could guide optical waves.
- 1294 **Wafer-Scale Graphene Integrated Circuit**  
*Y.-M. Lin et al.*  
Components such as inductors were fabricated alongside graphene transistors to create integrated radio-frequency mixers.
- 1297 **Endotoxin-Induced Structural Transformations in Liquid Crystalline Droplets**  
*I.-H. Lin et al.*  
Bacterial lipid A was detected by its interactions with defects in droplet-confined liquid crystals.

- 1300 **Methylhydroxycarbene: Tunneling Control of a Chemical Reaction**  
*P. R. Schreiner et al.*  
Quantum tunneling induces the opposite outcome expected from traditional kinetic factors in a chemical rearrangement.  
>> *Perspective p. 1269*
- 1304 **Origin and Evolution of Prebiotic Organic Matter As Inferred from the Tagish Lake Meteorite**  
*C. D. K. Herd et al.*  
The study of organic matter in a well-preserved meteorite provides insight into processes that affected its parent asteroids.
- 1307 **Activation of Visual Pigments by Light and Heat**  
*D.-G. Luo et al.*  
Thermal activation of visual pigments involves the same chromophore-isomerization reaction as does light activation.
- 1313 **A DNA Damage Response Screen Identifies RHINO, a 9-1-1 and TopBP1 Interacting Protein Required for ATR Signaling**  
*C. Cotta-Ramusino et al.*  
A screen identifies proteins not previously known to function in protecting cells from DNA damage.
- 1317 **The mTOR-Regulated Phosphoproteome Reveals a Mechanism of mTORC1-Mediated Inhibition of Growth Factor Signaling**  
*P. P. Hsu et al.*
- 1322 **Phosphoproteomic Analysis Identifies Grb10 as an mTORC1 Substrate That Negatively Regulates Insulin Signaling**  
*Y. Yu et al.*  
A search for substrates of a growth-promoting kinase revealed a regulatory feedback loop involved in tumor suppression.  
>> *Perspective p. 1270*
- 1327 **Adaptation and Evolutionary Rescue in Metapopulations Experiencing Environmental Deterioration**  
*G. Bell and A. Gonzalez*  
Dispersal and previous exposure to stress help yeast adapt to highly stressful environments.
- 1330 **Nicotine Decreases Food Intake Through Activation of POMC Neurons**  
*Y. S. Mineur et al.*  
Nicotine decreases weight gain by targeting a brain pathway involved in the regulation of energy balance and food intake.

## SCIENCEONLINE

## SCIENCEEXPRESS

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

**The Unusual Nature of Recent Snowpack Declines in the North American Cordillera**

*G. T. Pederson et al.*

The snowpack covering the mountains of western North America has decreased dramatically during the past 50 years.

10.1126/science.1201570

**School-Based Early Childhood Education and Age-28 Well-Being: Effects by Timing, Dosage, and Subgroups**

*A. J. Reynolds et al.*

A little bit of preschool goes a long way.

10.1126/science.1203618

>> [Science Podcast](#)

**Long Unfolded Linkers Facilitate Membrane Protein Import Through the Nuclear Pore Complex**

*A. C. Meinema et al.*

Natively unfolded linkers facilitate nuclear membrane protein import.

10.1126/science.1205741

**Climate-Forced Variability of Ocean Hypoxia**

*C. Deutsch et al.*

The spatial extent of ocean hypoxic zones, which are uninhabitable by many marine organisms, is very sensitive to dioxygen content.

10.1126/science.1202422

**Palladium-Catalyzed Aerobic Dehydrogenation of Substituted Cyclohexanones to Phenols**

*Y. Izawa et al.*

Phenol derivatives are prepared from nonaromatic ring compounds that can bear a wide variety of substituents.

10.1126/science.1204183

## SCIENCE NOW

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

Highlights From Our Daily News Coverage

**Bat Hibernation Keeps Rabies Going**

A mathematical model helps researchers understand how the virus spreads.

<http://scim.ag/bat-hibernation>

**Antiatoms, All Out of Energy and Ready for Work**

Reaching the least-energetic state is a milestone in efforts to compare antimatter and matter.

<http://scim.ag/antiatoms>

**Melanoma Drug Combo Shows Promise in Early Trial**

A widely hailed new drug for melanoma, which was tested in combination with another drug to boost its tumor-fighting power, has done well in a key safety trial.

<http://scim.ag/melanoma-drug>

## SCIENCE SIGNALING

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

The Signal Transduction Knowledge Environment

**7 June issue:** <http://scim.ag/ss060711>

**RESEARCH ARTICLE: TWIK-1 Two-Pore Domain Potassium Channels Change Ion Selectivity and Conduct Inward Leak Sodium Currents in Hypokalemia**

*L. Ma et al.*

Very low extracellular K<sup>+</sup> concentrations, which can trigger cardiac arrhythmias, cause TWIK-1 potassium channels to become permeable to Na<sup>+</sup>.

**RESEARCH ARTICLE: The cis-Regulatory Logic of Hedgehog Gradient Responses—Key Roles for Gli Binding Affinity, Competition, and Cooperativity**

*D. S. Parker et al.*

**PERSPECTIVE: Beyond the Balance of Activator and Repressor**

*T. Whittington et al.*

Transcription factor binding site affinity has a counterintuitive effect on the regulation of gene expression in response to Hedgehog.

**RESEARCH ARTICLE: Antigen Potency and Maximal Efficacy Reveal a Mechanism of Efficient T Cell Activation**

*O. Dushek et al.*

Efficient T cell activation depends on the rate with which T cell receptors and antigens bind and unbind, rather than simply their equilibrium affinity.

## GLOSSARY

Find out what BL, DUB, and FX mean in the world of cell signaling.

## SCIENCE TRANSLATIONAL MEDICINE

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

Integrating Medicine and Science

**8 June issue:** <http://scim.ag/stm060811>

**PERSPECTIVE: Broken Barriers—A New Take on Sepsis Pathogenesis**

*N. M. Goldenberg et al.*

Loss of the endothelial barrier and subsequent leakiness in the microvasculature might be key determinants of the pathogenesis of sepsis.

**RESEARCH ARTICLE: Protein Interactome Reveals Converging Molecular Pathways Among Autism Disorders**

*Y. Sakai et al.*

An autism protein interaction network provides a framework for studying autism pathogenesis.

**RESEARCH ARTICLE: Off-Target Lapatinib Activity Sensitizes Colon Cancer Cells Through TRAIL Death Receptor Up-Regulation**

*N. G. Dolloff et al.*

The breast cancer drug lapatinib increases the sensitivity of colon cancer cells to apoptosis through a HER2- and EGFR-independent mechanism.

**RESEARCH ARTICLE: Host Alloreactive Memory T Cells Influence Tolerance to Kidney Allografts in Nonhuman Primates**

*O. Nadazdin et al.*

**PERSPECTIVE: Transplantation Tolerance—Memories That Haunt Us**

*M. L. Ford and C. P. Larsen*

Screening for preformed donor-reactive memory T cells may advance the goal of organ transplant acceptance without immunosuppression.

## SCIENCE CAREERS

[www.sciencereers.org/career\\_magazine](http://www.sciencereers.org/career_magazine)

Free Career Resources for Scientists

**Mind Matters: Resilience**

*I. S. Levine*

A growing body of research and experience suggests that individuals possessing personal resilience are more likely to overcome career roadblocks.

[http://scim.ag/mm\\_resilience](http://scim.ag/mm_resilience)

**Presenting Science for the Anxiety Averse**

*S. A. Holgate*

Presenting your work effectively is an important part of a scientific career, but dealing with the anxiety it provokes is rarely taught.

[http://scim.ag/presentation\\_anxiety](http://scim.ag/presentation_anxiety)

## SCIENCE PODCAST

[www.sciencemag.org/multimedia/podcast](http://www.sciencemag.org/multimedia/podcast)

Free Weekly Show

On the 10 June *Science* Podcast: assessing microcredit programs, preschool's lasting impacts, the archaeology of human cognition, and more.

## SCIENCE INSIDER

[news.sciencemag.org/scienceinsider](http://news.sciencemag.org/scienceinsider)

Science Policy News and Analysis

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