

SPECIAL SECTION

## Cancer Crusade at 40

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*R. D. Schreiber et al.*

>> See also Editorial p. 1491; Report p. 1612; and Science Translational Medicine including Research Article by L. Sequist et al., Science Signaling, Science Careers, Video, and Science Podcast at [www.sciencemag.org/special/cancer2011/](http://www.sciencemag.org/special/cancer2011/)



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### COVER

False-color scanning electron micrograph of cells from pancreatic cancer (cell in center is ~10 μm across), one of the cancer types whose incidence and mortality rates have not changed significantly since the 1970s. The United States National Cancer Act, signed in 1971, aimed to eliminate cancer deaths through a massive increase in research funding. A special section beginning on p. 1539 examines the state of this Cancer Crusade 40 years later.

Image: Anne Weston, Cancer Research UK, Visuals Unlimited, Inc.

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## 1533 A Helix for the Final Cut

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## SCIENCE PRIZE ESSAY

## 1535 Building Botanical Literacy

*C. Hemingway et al.*

## RESEARCH ARTICLE

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**TDRD7 Cause Cataract and Glaucoma**  
*S. A. Lachke et al.*  
 A Tudor domain protein mediates posttranscriptional control of gene expression and is required for eye-lens development.  
 >> Perspective p. 1523

## REPORTS

## 1576 Baryons at the Edge of the X-ray-Brightest Galaxy Cluster

*A. Simionescu et al.*  
 The Suzaku satellite provides a census of the gas, metals, and dark matter out to the outskirts of the Perseus Cluster.

## 1579 From a Single-Band Metal to a High-Temperature Superconductor via Two Thermal Phase Transitions

*R.-H. He et al.*  
 Three techniques are used to probe the pseudogap state of cuprate high-temperature superconductors.

## 1583 The Bonding Electron Density in Aluminum

*P. N. H. Nakashima et al.*  
 A combination of microscopy and first-principle calculations is used to study the bonding charge density in aluminum.  
 >> Perspective p. 1528

## 1587 Revealing Extraordinary Intrinsic Tensile Plasticity in Gradient Nano-Grained Copper

*T. H. Fang et al.*  
 Nanometer-sized grain copper confined by a graded substrate leads to a material with both high strength and high ductility.

## 1590 Self-Recognition Among Different Polyprotic Macroions During Assembly Processes in Dilute Solution

*T. Liu et al.*  
 Differences in surface charge and water mobility allow slightly different inorganic macroions to self-assemble separately.

## 1592 Widespread Persistent Thickening of the East Antarctic Ice Sheet by Freezing from the Base

*R. E. Bell et al.*  
 A large fraction of the ice at Dome A, Antarctica, did not form by the usual process of snowfall compaction.  
 >> Perspective p. 1524

## 1596 Early Pleistocene Presence of Acheulian Hominins in South India

*S. Pappu et al.*  
 Dates from a site in southeast India imply an early migration of *Homo* through Eurasia about 1.1 to 1.5 million years ago.  
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## 1599 The Buttermilk Creek Complex and the Origins of Clovis at the Debra L. Friedkin Site, Texas

*M. R. Waters et al.*  
 A large artifact assemblage dating to 15,000 years ago lies beneath a Clovis assemblage in central Texas.  
 >> News story p. 1512

## 1603 Dental Occlusion in a 260-Million-Year-Old Therapsid with Saber Canines from the Permian of Brazil

*J. C. Cisneros et al.*  
*Tiarajudens* extends the date of dental occlusion and suggests why the members of this Permian group were such diverse and successful herbivores.  
 >> Perspective p. 1525

## 1606 Social and Ecological Synergy: Local Rulemaking, Forest Livelihoods, and Biodiversity Conservation

*L. Persha et al.*  
 Participation in tropical forest governance by local people results in positive outcomes for conservation and subsistence.

## 1609 Impacts of Salmon on Riparian Plant Diversity

*M. D. Hocking and J. D. Reynolds*  
 A survey of Canadian forests reveals the effects of nutrient subsidies from salmon on plant community structure.

## 1612 CD40 Agonists Alter Tumor Stroma and Show Efficacy Against Pancreatic Carcinoma in Mice and Humans

*G. L. Beatty et al.*  
 CD40 immunotherapy shows efficacy in treating pancreatic cancer in mice and humans by eliciting antitumor immunity.  
 >> Cancer Crusade at 40 section p. 1539

## 1616 Cortical Constriction During Abscission Involves Helices of ESCRT-III-Dependent Filaments

*J. Guizetti et al.*  
 The process by which animal cells are physically separated after cell division is dissected in molecular detail.  
 >> Perspective p. 1533

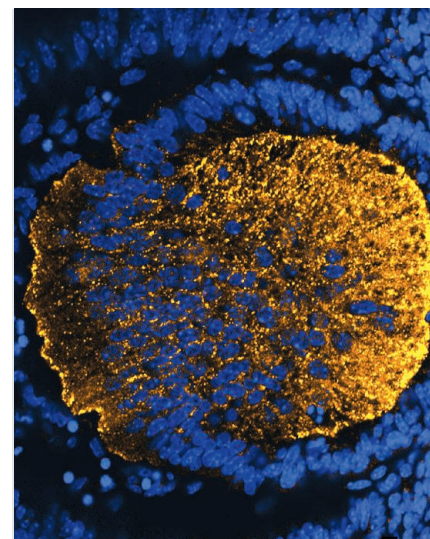
## 1621 FGF19 as a Postprandial, Insulin-Independent Activator of Hepatic Protein and Glycogen Synthesis

*S. Kir et al.*  
 Fibroblast growth factor 19 regulates liver metabolism through a mechanism distinct from that of insulin.  
 >> Perspective p. 1529

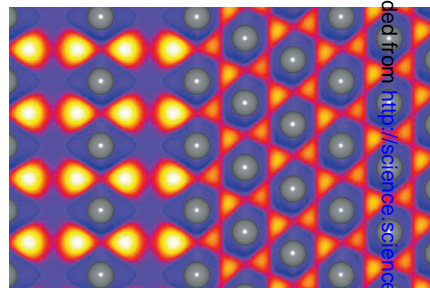
## 1624 Clr4/Suv39 and RNA Quality Control Factors Cooperate to Trigger RNAi and Suppress Antisense RNA

*K. Zhang et al.*  
 A histone methyltransferase and an RNA export protein team up to clobber aberrant RNAs in fission yeast.

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## SCIENCEONLINE

## SCIENCEEXPRESS

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

**Eosinophils Sustain Adipose Alternatively Activated Macrophages Associated with Glucose Homeostasis**

*D. Wu et al.*

Regulation of adipose tissue macrophages by eosinophils reveals an unexpected role for eosinophils in metabolic homeostasis.

10.1126/science.1201475

**Conserved Eukaryotic Fusogens Can Fuse Viral Envelopes to Cells**

*O. Avinoam et al.*

A *Caenorhabditis elegans* cell-surface fusion protein can promote viral fusion with mammalian cells.

10.1126/science.1202333

**AMP-Activated Protein Kinase Regulates Neuronal Polarization by Interfering with PI 3-Kinase Localization**

*S. Amato et al.*

A bioenergy-sensing pathway determines axon initiation and growth in neurons.

10.1126/science.1201678

**Global Trends in Wind Speed and Wave Height**

*I. R. Young et al.*

Wind speeds over the world's oceans have increased over the past two decades, as have wave heights.

10.1126/science.1197219

**Polarized Gamma-Ray Emission from the Galactic Black Hole Cygnus X-1**

*P. Laurent et al.*

This gamma-ray emission originates from a jet of relativistic particles that is formed in close proximity to the black hole.

10.1126/science.1200848

## SCIENCE NOW

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

Highlights From Our Daily News Coverage

**Long-Neglected Experiment Gives New Clues to Origin of Life**

A 53-year-old flask containing brown sludge may reveal how the first amino acids were created.

<http://scim.ag/old-experiment>

**Navy Sonar May Mimic Killer Whale Sounds**

This finding could explain cetacean strandings.

<http://scim.ag/whale-sonar>

**Cause of Lethal Disease in China Unmasked**

A new bunyavirus poses some riddles.

<http://scim.ag/lethal-disease>

## SCIENCE SIGNALING

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

The Signal Transduction Knowledge Environment

**22 March issue:** <http://scim.ag/22Mar2011>

**RESEARCH ARTICLE: In Vivo Systems Analysis Identifies Spatial and Temporal Aspects of the Modulation of TNF- $\alpha$ -Induced Apoptosis and Proliferation by MAPKs**

*K. S. Lau et al.*

A systems-level analysis of signaling in the mouse intestine identifies critical mediators of inflammation and regionally specific responses.

**PERSPECTIVE: CD69—An Unexpected Regulator of T<sub>H</sub>17 Cell-Driven Inflammatory Responses**

*P. Martín and F. Sánchez-Madrid*

CD69 deficiency promotes differentiation of inflammatory T<sub>H</sub>17 cells and exacerbates autoimmune diseases in mice.

**MEETING REPORT: The Yin and Yang of Signaling in T<sub>regs</sub> and T<sub>H</sub>17 Cells**

*F. Pan et al.*

This meeting in Shanghai focused on the relationship between regulatory and inflammatory T cells.

## FUNDING SOURCES

Check out the new opportunities for funding signaling research and training.

## SCIENCE CAREERS

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

Free Career Resources for Scientists

**CTSciNet: Conducting Cancer Clinical Trials**

*K. Hede*

Training courses teach young cancer researchers the skills needed to design and carry out clinical trials.

<http://scim.ag/cancertrialstraining>

**CTSciNet Q&A: Finding and Exploiting Cancer's Weaknesses**

*K. Travis*

Clinician-investigator David Solit studies the genetic basis of cancer tumors and looks for novel therapies that target specific mutations.

<http://scim.ag/solitqanda>

## SCIENCE TRANSLATIONAL MEDICINE

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

Integrating Medicine and Science

**23 March issue:** <http://scim.ag/stm032311>

**COMMENTARY: A National Cancer Clinical Trials System for Targeted Therapies**

*J. Mendelsohn*

Clinical cancer research requires a well-supported and efficient national clinical trials network that engages in innovative trials of modern cancer therapies.

**COMMENTARY: Accrual to Cancer Clinical Trials in the Era of Molecular Medicine**

*R. L. Schilsky*

In the testing of targeted cancer therapies, new issues can complicate the decision by patients or providers to participate in clinical trials.

**RESEARCH ARTICLE: Breast Cancer Methylomes Establish an Epigenomic Foundation for Metastasis**

*F. Fang et al.*

## PODCAST

*T. A. Chan and A. Colmone*

Breast cancer methylomes contribute to metastatic potential, modulate the metastasis transcriptome, and predict disease outcome.

**RESEARCH ARTICLE: Genotypic and Histological Evolution of Lung Cancers Acquiring Resistance to EGFR Inhibitors**

*L. V. Sequist et al.*

Lung cancers undergo dynamic genetic and histological changes upon developing resistance to EGFR inhibitors.

>> *Cancer Crusade at 40 section p. 1539*

## SCIENCE PODCAST

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

Free Weekly Show

On the 25 March Science Podcast: targeted cancer therapy, progress with cancer genomes, mechanisms of metastasis, immunity's role in cancer, and more.

## SCIENCE INSIDER

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

Science Policy News and Analysis

## VIDEO FEATURE

[video.sciencemag.org](http://video.sciencemag.org)

**Sequencing Cancer Genomes: Targeted Cancer Therapies**

Applying DNA sequencing to cancer genomes is providing insights that have allowed researchers to turn some cancers into chronic diseases rather than deadly ones. Still, the ultimate goal is to kill the cancer.

>> *Cancer Crusade at 40 section p. 1539 and www.sciencemag.org/special/cancer2011/*

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