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As students become absorbed with technology-based games, educators grapple with how best to use technology. Immersive simulations represent one way in which new media can enhance traditional learning experiences. See the special section beginning on page 53.

Photo Illustration: Yael Kats; Images: Walter Bibikow/ Getty Images (desks); Alamy (girl)

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- 94 Nanodiamonds in the Younger Dryas Boundary Sediment Layer  
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Nanodiamonds in sites across North America suggest that an asteroid impact coincided with cooling 12,900 years ago.  
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## RESEARCH ARTICLES

- 95 Glucosinolate Metabolites Required for an *Arabidopsis* Innate Immune Response  
*N. K. Clay et al.*
- 101 A Glucosinolate Metabolism Pathway in Living Plant Cells Mediates Broad-Spectrum Antifungal Defenses  
*P. Bednarek et al.*  
Plant cells defend against fungal attack through an innate immunity pathway in which infection triggers glucosinolate synthesis, stimulating formation of a protective callose.

## REPORTS

- 106 Mott Insulating State in Ultraclean Carbon Nanotubes  
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Both metallic and semiconducting carbon nanotubes exhibit a radius-dependent energy gap arising from correlated electrons in the tubes.
- 110 Broadband Invisibility by Non-Euclidean Cloaking  
*U. Leonhardt and T. Tyc*  
In theory, materials with a negative refractive index deployed in a curved, non-Euclidean space can provide a route to cloaking and invisibility across a range of wavelengths.  
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- 112 Control of Self-Assembly of DNA Tubules Through Integration of Gold Nanoparticles  
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Gold particles incorporated into DNA strands drive the formation of a variety of three-dimensional spiral architectures.

- 116 Declining Coral Calcification on the Great Barrier Reef  
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Calcification by Great Barrier Reef corals decreased by about 14% since 1990, the largest decline in the past 400 years.  
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- 119 Stretching the Envelope of Past Surface Environments: Neoproterozoic Glacial Lakes from Svalbard  
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Unusual oxygen isotope compositions indicate that a Precambrian glacial period had an anomalous, perhaps extremely CO<sub>2</sub>-rich, atmosphere.

- 122 Why Peer Discussion Improves Student Performance on In-Class Concept Questions  
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In the classroom, discussion among students improves understanding and leads to more accurate answers to questions.  
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- 124 Regulation of Neuronal Survival Factor MEF2D by Chaperone-Mediated Autophagy  
*Q. Yang et al.*

The degradation of a key neuronal survival factor by chaperone-mediated autophagy may contribute to Parkinson's disease.

- 127 Signal Sequences Activate the Catalytic Switch of SRP RNA  
*N. Bradshaw et al.*

Newly made proteins destined to be inserted into membranes trigger an RNA switch that promotes initiation of this process.

- 130 Floral Iridescence, Produced by Diffractive Optics, Acts as a Cue for Animal Pollinators  
*H. M. Whitney et al.*

The iridescence of tulip petals, as well as their pigmentation, affects foraging behavior by bumblebees.

- 133 Real-Time DNA Sequencing from Single Polymerase Molecules  
*J. Eid et al.*

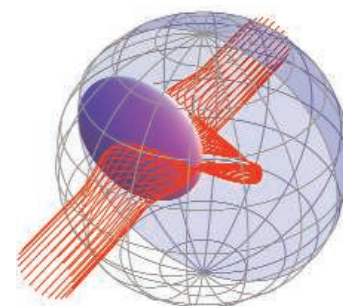
Arrays of narrow waveguides can record the action of a DNA polymerase stepping along a primer template, potentially providing a way to sequence DNA molecules.

- 139 Phage-Mediated Intergeneric Transfer of Toxin Genes  
*J. Chen and R. P. Novick*

Viruses may transfer toxin genes among pathogenic bacteria in raw milk, complicating veterinary use of phage therapy as a bactericide.



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- 141 Stable Introduction of a Life-Shortening *Wolbachia* Infection into the Mosquito *Aedes aegypti*  
*C. J. McMeniman et al.*

Infection of mosquitoes with a bacterium shortens their lives and reduces disease transmission, without development of resistance.

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## SCIENCEONLINE

## SCIENCEEXPRESS

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

**Cytosolic Viral Sensor RIG-I Is a 5'-Triphosphate-Dependent Translocase on Double-Stranded RNA**  
*S. Myong et al.*

A host protein that recognizes invading viruses activates innate immunity defenses only when it senses both double-stranded RNA and a 5' triphosphate.  
10.1126/science.1168352

**Neuronal Activity-Induced Gadd45b Promotes Epigenetic DNA Demethylation and Adult Neurogenesis**  
*D. K. Ma et al.*

Neural activity induces an immediate early gene that triggers epigenetic modifications needed for neurogenesis.  
10.1126/science.1166859

## TECHNICALCOMMENTS

**Comment on "Log or Linear? Distinct Intuitions of the Number Scale in Western and Amazonian Indigene Cultures"**

*J. F. Cantlon et al.*

full text at [www.sciencemag.org/cgi/content/full/323/5910/38b](http://www.sciencemag.org/cgi/content/full/323/5910/38b)

**Response to Comment on "Log or Linear? Distinct Intuitions of the Number Scale in Western and Amazonian Indigene Cultures"**

*S. Dehaene et al.*

full text at [www.sciencemag.org/cgi/content/full/323/5910/38c](http://www.sciencemag.org/cgi/content/full/323/5910/38c)

## SCIENCENOW

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

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**The Top 10 ScienceNOWs of 2008**

A selection of our favorite and most read stories.

**A Whiff of Mad Cow**

Normal form of protein linked to neurodegenerative conditions may aid sense of smell.

**Is Morphine a Guy Drug?**

New research may explain why males benefit more from opioid painkillers.

## SCIENCE SIGNALING

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

The Signal Transduction Knowledge Environment

**EDITORIAL GUIDE: Beyond Microarrays**

*M. B. Yaffe*

Studies of global changes in messenger RNA abundance may be less than insightful.

**RESEARCH ARTICLE: mAKAP Compartmentalizes Oxygen-Dependent Control of HIF-1 $\alpha$**

*W. Wong et al.*

The scaffold protein muscle A kinase-anchoring protein (mAKAP) regulates the stability and localization of the transcription factor HIF-1 $\alpha$ .

**RESEARCH ARTICLE: Type I IL-4Rs Selectively Activate IRS-2 to Induce Target Gene Expression in Macrophages**

*N. M. Heller et al.*

**PERSPECTIVE: Untangling the Complex Web of IL-4- and IL-13-Mediated Signaling Pathways**

*M. Wills-Karp and F. D. Finkelman*

Understanding how IL-4 and IL-13 signaling differ could result in the development of better anti-inflammatory therapies.

**PERSPECTIVE: Bursting into the Nucleus**

*G. R. Crabtree and I. A. Graef*

Calcium elicits bursts of nuclear localization of a yeast transcription factor, which may enable the coordinated activation of target genes.

**REVIEW: Structure and Function of the Phosphothreonine-Specific FHA Domain**

*A. Mahajan et al.*

The forkhead-associated (FHA) domain binds specifically to phosphothreonine residues and possesses unique structural and functional features.

**MEETING REPORT: Regulatory T Cells—The Cunning Fox and Its Clinical Application**

*D. S. Game et al.*

A conference in Beijing, China focused on the biology of regulatory T cells and their potential uses in treating various diseases.

## SCIENCE CAREERS

[www.sciencereers.org/career\\_development](http://www.sciencereers.org/career_development)

Free Career Resources For Scientists

**Taken for Granted: Brother, Can You Spare a Temporary Worker Visa?**

*B. L. Benderly*

The controversial H-1B visa program needs major reform.

**In Person: Eggheads and Cheeseheads**

*D. Albert*

A researcher reflects on the institutional cultures between the Ivy League and Big Ten.

**Smarter Than the Average Desk**

*A. Saini*

Engineer Andrew Hatch hopes to create the paperless classroom of the future.

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**January 2009 Funding News**

*J. Fernández*

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

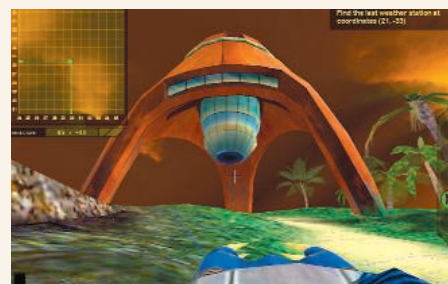
## SCIENCEPODCAST

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Free Weekly Show

Download the 2 January special *Science* Podcast on education and technology to hear about immersive interfaces for learning, computer-assisted military training, and a new home-learning system in Korea.

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[www.sciencemag.org/education\\_technology/](http://www.sciencemag.org/education_technology/)



## SCIENCEONLINE FEATURE

**VIDEO: Education and Technology**

An introduction to this week's special section about how education is changing in the face of technology.

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