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Breakthrough of the Year

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ON THE WEB THIS WEEK
>> Science Podcast
Listen to a special show on this year’s breakthrough, runners-up, and the top stories from our daily news site.

>> Breakthrough Online
Check out all the science highlights from 2013, including videos on the breakthrough, our genomes-of-the-year slideshow, and a special year-end podcast at www.sciencemag.org.

COVER
Antibodies (pink) zoom toward a T cell (gray, with CTLA-4 receptor proteins shown in light blue), giving the T cell a push to attack tumor cells. In 2013, new therapies targeting the immune system to treat cancer surged ahead, with promising but still preliminary results in people with many forms of the disease. See the Breakthrough of the Year special section beginning on page 1431 and at http://scim.ag/Breakthrough13.

Image: Valerie Altounian/Science
1468 Horizontal Transfer of Entire Genomes via Mitochondrial Fusion in the Angiosperm *Amborella*  
D. W. Rice et al.  
Much of the mitochondrial DNA genome of the flowering plant *Amborella trichopoda* originated from other organisms.  
>> Perspective p. 1456; Report p. 1516

1467 The *Amborella* Genome and the Evolution of Flowering Plants  
*Amborella Genome Project*  
The *Amborella* genome retains features of the ancestral angiosperm and illuminates flowering plant genomic evolution. Research Article Summary; for full text: [http://dx.doi.org/10.1126/science.1241089](http://dx.doi.org/10.1126/science.1241089)

1473 Constraining Exoplanet Mass from Transmission Spectroscopy  
J. de Wit and S. Seager  
The mass of an exoplanet can be derived based on the properties of its atmosphere.

1477 Crystal Structure of a Soluble Cleaved HIV-1 Envelope Trimer  
J.-P. Julien et al.  
Key structural features dictate how the HIV envelope protein functions and interacts with the human immune system.

1490 Detection of Berry’s Phase in a Bulk Rashba Semiconductor  
H. Murakawa et al.  
Transport measurements indicate a nontrivial spin texture stemming from strong spin-orbit coupling in the material BiTeI.

1494 Photon-Mediated Interactions Between Distant Artificial Atoms  
A. F. van Loo et al.  
Interaction between two separated superconducting qubits can be mediated and controlled by microwave.

1496 Relaxation Mechanism of the Hydrated Electron  
M. H. Ekins et al.  
Spectroscopy of excited-state hydrated electrons in a liquid jet implicates nonadiabatic relaxation.

1499 Dynamical Resonances Accessible Only by Reagent Vibrational Excitation in the F + HD→HF + D Reaction  
T. Wang et al.  
A protocol for efficient vibrational excitation enabled discovery of an unusual reaction trajectory in a well-studied system.

1502 Unexpected Stable Stoichiometries of Sodium Chlorides  
W. Zhang et al.  
Several phases in the Na–Cl system are stable at high pressures and temperatures.  
>> Perspective p. 1459

1506 Brood Parasitism and the Evolution of Cooperative Breeding in Birds  
W. E. Feeny et al.  
The skewed global distribution of cooperatively breeding birds may result from their coevolution with brood parasites.  
>> Perspective p. 1452

1508 CS7BL/6N Mutation in Cytoplasmic FMRP Interacting protein 2 Regulates Cocaine Response  
W. Kumar et al.  
Acute locomotor responses to cocaine differ significantly in the most widely used inbred strains of laboratory mice.

1513 Revealing Nature’s Cellulase Diversity: The Digestion Mechanism of Caldicellulosiruptor bescii CelA  
R. Brunecky et al.  
Electron microscopy reveals that a cellulose-degrading enzyme operates by drilling down, as well as by roaming the surface.  
>> Perspective p. 1454

1516 Assembly and Validation of the Genome of the Nonmodel Basal Angiosperm *Amborella*  
S. Chamala et al.  
Fluorescence in situ hybridization allows for next-generation sequencing of a large, difficult genome.  
>> Perspective p. 1456; Research Articles pp. 1467 and 1468

1518 CRL4 Complex Regulates Mammalian Oocyte Survival and Reprogramming by Activation of TET Proteins  
C. Yu et al.  
Continuing female fertility in mammals requires the function of a ubiquitin ligase complex in oocytes.

1521 Serial Femtosecond Crystallography of G Protein–Coupled Receptors  
W. Liu et al.  
The structure of a human serotonin receptor was solved using a free-electron laser to analyze nanocrystals.

1524 mTOR Inhibition Alleviates Mitochondrial Disease in a Mouse Model of Leigh Syndrome  
S. C. Johnson et al.  
A drug in clinical use for other disorders delays progression of an untreatable mitochondrial disease in knockout mice.  
>> Perspective p. 1453