

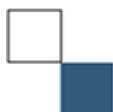


ANNUAL REPORT 2008-2009



2009 Year in Review

NOTE: Click on the postcard (below right) to view President Jean-Lou Chameau's New Year greeting, which reviews the accomplishments and events of 2009. For more information about last year's research highlights, follow the links (in orange) below.

**January**

The Cahill Center for Astronomy and Astrophysics is dedicated

February

Geologists lead a deep-sea discovery voyage

Chemists find that self-regulating molecular "transformers" control the intracellular delivery of proteins

Caltech and UCSD chemists shed light on how proteins find their shapes



Biologists find evidence for precise communication across brain areas during sleep

March

Economists say that markets are better than patents in promoting discovery

Biologists find that optimistic worms are ready for rapid recovery

Biologists discover the mechanism for wind detection in fruit flies

Neuroscientists conduct the most comprehensive brain mapping to date of the cognitive abilities measured by the Wechsler Adult Intelligence Scale

Chemists find that a tiny genetic change keeps nicotine from binding to muscle cell

Chemical engineers create new enzymes for biofuel production

New radiation-free targeted therapy detects and eliminates breast-cancer tumors in mice

April

Researchers train computers to analyze fruit-fly behavior

Scientists control complex nucleation processes using DNA origami seeds

Biologists show why anti-HIV antibodies are ineffective at blocking infection

Researchers pinpoint the mechanisms of self-control in the brain

May

Physicists use uncertainty principle to detect entanglement of a photon

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shared among four locations

Caltech and UCSF biologists determine how the body differentiates between a scorch and a scratch

Scientists reveal how neuronal activity is timed in the brain's memory-making circuits

June

Applied physicists create nanoscale zipper cavity that responds to single photons of light

Geobiologists predict greater longevity for planets with life

Bioengineers find that maple seeds and animals exploit the same trick to fly

Unique sky survey brings new objects into focus

Materials scientists use high-pressure "alchemy" to create nonexpanding metals

Chemical engineers explore how cells reconcile mixed messages in decisions about growth

Physicists devise new method to detect quantum mechanical effects in ordinary objects

July

Chemists say antibody surrogates are just a "click" away

Caltech and JPL scientists say that microbial mats built 3.4-billion-year-old stromatolites

Team led by Caltech biologists shows how evolution can allow for large developmental leaps

Physicists create first nanoscale mass spectrometer

Bioengineers link tiny sea creatures to large-scale ocean mixing

August

Environmental researchers show how organic carbon compounds emitted by trees affect air quality

Scientists help launch the first standard graphical notation for biology

Planetary scientists discover storms in the tropics of Titan

Caltech and IBM scientists use self-assembled DNA scaffolding to build tiny circuit boards

Caltech researchers pinpoint neurons that control obesity in fruit flies

LIGO listens for gravitational echoes of the birth of the universe

Neuroscientists find the brain region responsible for our sense of personal space

September

Economists and neuroscientists develop novel use of neurotechnology to solve classic social problem

Biologists get a detailed glimpse of chemoreceptor architecture in bacterial cells

Cells in developing tissue consider their signaling exposure history to determine location

October

Geobiologists reveal unexpected sources of nitrogen fixation

Physicists create a robot that can simulate the “visual” experience of a blind person who has been implanted with a visual prosthesis

Scientists solve decade-long mystery of nanopillar formations
Caltech applied physicists are the first to trap light and sound vibrations together in a nanocrystal

Biologists show the efficacy of gene therapy in mouse models of Huntington's Disease

The Annenberg Center for Information Science and Technology opens

November

Scientists develop DNA origami nanoscale breadboards for carbon nanotube circuits

Biologists find emotion-like behaviors, regulated by dopamine, in fruit flies

Planetary scientists explain puzzling lake asymmetry on Titan

December

Biologists show how ubiquitin chains are added to cell-cycle proteins

High-energy physicists set a new record for network data transfer

Biologists discover an aggression-promoting pheromone in flies

Scientists film photons with electrons