

## RESEARCH HIGHLIGHTS

## CANCER BIOLOGY

## Suicide by nucleotide

*Cancer Cell* **16**, 103–114 (2009)

A synthetic molecule that mimics double-stranded RNA viruses can trigger melanoma cells to digest and kill themselves.

Melanoma cells often evade the immune system and deactivate cell-death pathways. But María Soengas at the Spanish National Cancer Research Centre in Madrid and her colleagues have found that the cells respond to a viral RNA mimic called polyinosine-polycytidylic acid, an adjuvant that boosts immunity.

When administered alongside the carrier molecule polyethyleneimine, the complex caused melanoma cells — but not normal cells — to digest their organelles and eventually undergo programmed cell death. The process seems to happen without the help of other immune cells: the complex efficiently killed melanoma cells in immunocompromised mice.

## ATMOSPHERIC CHEMISTRY

## Isoprene's fate

*Science* **325**, 730–733 (2009)

Isoprene emitted by trees has long been thought to form aerosols in the atmosphere, but how it does so was unclear.

Fabien Paulot of the California Institute of Technology in Pasadena and his colleagues used chemical ionization mass spectrometry to monitor the photooxidation products resulting from the reaction of isoprene with hydroxyl radicals in an experimental environmental chamber. They found that isoprene initially forms hydroxyhydroperoxides. Surprisingly, further reaction with hydroxyl radicals results in the production of dihydroxyepoxides and reformation of the hydroxyls. These epoxides are readily taken up by acidic aerosols, forming tetraols and polymers.

The researchers estimate that these epoxides account for nearly 100 teragrams of carbon in the atmosphere every year. Further understanding of this secondary aerosol formation should help to improve models of atmospheric chemistry.



## Stray genes

*Proc. Natl Acad. Sci. USA*  
doi:10.1073/pnas.0902129106  
(2009)

Semi-feral village dogs around the world carry complex mixtures of native and introduced genes, and could point to the origins of man's best friend.

Adam Boyko of Cornell

University in Ithaca, New York, and his colleagues analysed mitochondrial and nuclear DNA in 318 dogs from seven areas of Africa and compared them with Puerto Rican street dogs, US mutts and representatives of 126 recognized breeds. They were able to determine the mixture of indigenous and non-native breed-dog genes

in each population.

On the basis of mitochondrial DNA diversity, the authors urge closer scrutiny of recent suggestions that domesticated dogs have East Asian origins. The results also suggest that Pharaoh hounds and Rhodesian Ridgebacks, putatively African breeds, have non-African origins.

## PHYSICS

## Salt mined

*Phys. Rev. Lett.* **103**, 058501 (2009)

Mixing fresh water with salt water releases a substantial amount of energy, but scientists have struggled to find a way to harvest this inexpensively. Doriano Brogioli at the University of Milan-Bicocca, based in Monza, Italy, has proposed a new technique.

He charged two porous carbon electrodes in salty water, then flushed the device with fresh water. Salt ions diffused away from the electrodes, increasing the voltage between them from 300 to 333 millivolts. Discharging the electrodes allowed energy to be extracted. (Apparatus and technique are detailed in graphic, below.)

Brogioli estimates that the device could yield about 1.6 kilojoules per litre of fresh water, which is on a par with the power produced by costly membrane-based methods.

## SPECIATION

## Multiplying effects

*Proc. Natl Acad. Sci. USA* doi:10.1073/pnas.0811575106 (2009)

Duplications of the genome that result in 'polyploid' organisms seem to be responsible for more plant-speciation events than was thought.

Troy Wood of the University of Münster in Germany and his colleagues have used existing genetic data on vascular plants to establish the frequency of speciation events in which an increase in ploidy — the number of copies of the genome — occurred. They find that 15% of angiosperms and almost one-third of fern species are derived from a polyploid event that may have rendered a plant morphologically distinct from and sexually incompatible with its former brethren. This is four times higher than previous estimates and, the authors say, may

