RESEARCH HIGHLIGHTS

Fiery fountains

Geology **37,** 219–222 (2009)

On Earth, volcanic 'fire fountains' burst from the ground, driven by the fizz of carbonated magma rushing up narrow-necked vents. The same spectacular displays occurred on the Moon 3 billion–4 billion years ago, despite big differences in gravity, magma composition and magma viscosity, say Malcolm Rutherford of Brown University in Providence, Rhode Island, and Paolo Papale of the National Institute of Geophysics and Volcanology in Pisa, Italy.

By studying data collected from lunar samples, the researchers found that gases — primarily carbon monoxide rather than the carbon dioxide of terrestrial magma — form by graphite oxidation in lunar magma at a depth of about 8 kilometres. Modelling the upwelling for lunar conditions, they found that the magma escapes at the surface at about the same speeds as on Earth, and with similar gas volumes.

CORBIS

EVOLUTION

Painful pairing

Curr. Biol. **19,** 404–407 (2009)

Evolution of male sexual traits that harm females can be due to some reproductive benefit afforded the male by the harm, or to a negative side effect of a gene with some other positive benefit.

Cosima Hotzy and Göran Arnqvist of Uppsala University in Sweden examined the relationship between the vicious spines on the gentialia of male seed beetles (*Callosobruchus maculatus*), the damage these cause to females during mating, and sperm competition success.

They found a positive correlation between spine size and both harm to females and male fertilization success. However, statistical modelling showed that spine size still correlated with sperm success when harm was kept constant. This suggests that harm to females is simply an unfortunate side effect of the spines.

CHEMISTRY

Buckyball expansion

Angew. Chem. Int. Edn doi:10.1002/anie.200805870 (2009)

'Buckyball' molecular structures aren't confined to carbon. Uranium fullerenes that contain various numbers of uranium atoms have now joined the club, thanks to Peter Burns and his colleagues at the University of Notre Dame in Indiana.

Fullerene U60 (pictured right, top) looks just like its carbon analogue, whereas U44 (bottom) is peanut-shaped, comprising 12 hexagons and 12 pentagons. Fullerenes usually have as few adjacent pentagons as possible, but the peanut bucks this trend. This is because the peanut shape has higher symmetry, which the uranyl clusters prefer over minimizing pentagon neighbours, the authors say.

Uranium fullerenes are stable in solution for several months and easy to make by a self-assembly process in water — in contrast to carbon fullerenes, which have to be zapped into being with a huge current.

WILEY-VCH

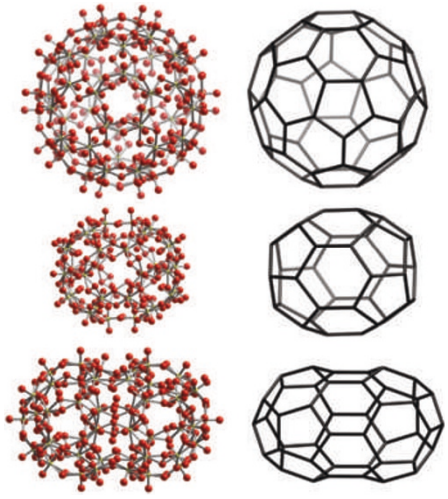
CANCER THERAPEUTICS

Socking it to melanoma

J. Clin. Invest. doi:10.1172/JCI34015 (2009)

Human melanoma is resistant to treatment with retinoic acid, which is effective against several other cancers. But by activating the transcription factor SOX9, researchers at the National Cancer Institute in Bethesda, Maryland, may have discovered a way to make retinoic acid effective after all.

In a series of cell culture and tissue experiments, Vincent Hearing and his colleagues identified mechanisms by which promoting SOX9 activity slows cell division and sensitizes melanoma cells to the drug. In mice injected with melanoma cells, a drug that activates SOX9 had mild effects on its own, but when combined with retinoic acid significantly reduced the size of tumours.



GENOMICS

Staying in shape

Science 10.1126/science.1169050 (2009)

Researchers have wondered why some regions of DNA that do not code for proteins but nevertheless are functionally important have sequences that have not been maintained by evolution. It could be because evolution is instead working to conserve the DNA's structure, say Elliott Margulies at the National Human Genome Research Institute in Bethesda, Maryland, Thomas Tullius at Boston University in Massachusetts and their colleagues.

A DNA helix can have subtle structural variations in its grooves and its physical arrangement that affect how well proteins bind to it. By comparing a portion of DNA structure across 36 different species, the team estimates that 12% of the human genome is conserved — twice the estimate based on sequence conservation. The method should help to identify new non-coding regions with important biological roles.

SEXUAL SELECTION

Cheap flights

Proc. R. Soc. B doi:10.1098/rspb.2009.0090 (2009)

A flashy tail is often a way for a male bird to attract a mate, but the adornment has been assumed to make flying more arduous.