required for invasion, and are distinct from cells that make up the bulk of tumours.

Andrew Ewald at Johns Hopkins University in Baltimore, Maryland, and his colleagues studied mouse and human tumour 'organoids', which consist of hundreds of diverse cancer cells.

They found that cells on the leading edge of the organoids' invasive strands express two genes, *K14* and *p63*. These are normally turned on only in cells that lie at the outer edges of epithelial tissue, which lines cavities and surfaces.

Blocking the expression of *K14* or *p63* in organoids disrupted invasion, suggesting that these and certain other genes in epithelial tissue could be targets for therapies that stop tumours spreading.
Cell **http://doi.org/qhc (2013)**

YONG-HEE LEE/JOO-SEONG KIM/JONGHYEON NOH

GEOSCIENCE

Volcanic lightning made in the lab

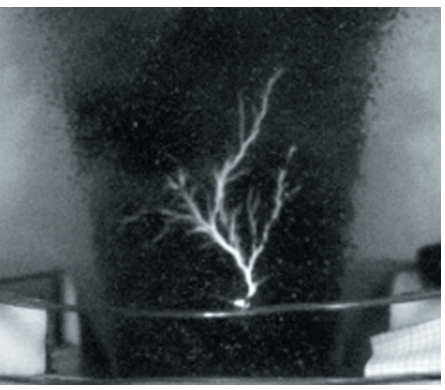
By replicating the lightning seen at the throats of erupting volcanoes, scientists have found that a greater abundance of fine particles spewing out of an eruption creates more lightning.

Corrado Cimarelli of Ludwig Maximilian University in Munich, Germany, and his colleagues simulated a volcanic eruption by placing ash in a shock tube — an instrument that generates blasts. Drastically decompressing the ash caused it to explode upwards into a tank.

High-speed cameras and other instruments captured a rare glimpse of the lightning that formed (**pictured**).

Clustering of charged particles in the ash jet triggers electrical discharges, the authors propose.
Geology **http://doi.org/qfz (2013)**

CORRADO CIMARELLI/MIGUEL ALATORRE IBARGÜENGOITIA



EVOLUTIONARY BIOLOGY

Biofilms block bacterial cheaters

Bacteria that secrete digestive enzymes in communities keep nutrients close at hand to avoid being exploited by cheating neighbours that do not chip in to enzyme production.

Bonnie Bassler and her colleagues at Princeton University in New Jersey studied *Vibrio cholerae*, which causes cholera and secretes an enzyme that digests the natural polymer chitin.

They found that cheaters do not thrive as well as enzyme producers when they are grown in communities called biofilms — probably because the thick sticky film slows the diffusion of nutrients, keeping them close to the producers. Exposing the biofilms to flowing water, which washes away nutrients before they reach the non-producers, also allowed the producers to outcompete the cheaters.

The results suggest ways in which cooperation has evolved in bacterial populations.
Curr. Biol. **http://doi.org/qg9 (2013)**

PHYSIOLOGY

A road block for blood vessels

An alternative way of shutting down blood-vessel growth could lead to better therapies for certain inflammatory and eye diseases.

Stopping the growth of blood vessels is important for treating several diseases, and some therapies aim to block it by inhibiting a protein called VEGF. Peter Carmeliet of the University of Leuven in Belgium and his colleagues found another target: a protein called PFKFB3, which is involved in the breakdown of sugars and helps blood vessels to form.

In embryos of zebrafish (*Danio rerio*), blocking PFKFB3 with a chemical inhibitor reduced vessel sprouting and enhanced the effects of a VEGF-blocking compound. The PFKFB3 inhibitor also hindered vessel growth in mouse models of inflammatory disorders and age-related macular degeneration, a condition that can cause blindness.
Cell Metab. **http://doi.org/qhb (2013)**

MICROBIOLOGY

Bacteria adapt to diseased lungs

Bacteria in the lungs of people with cystic fibrosis (CF) adapt to this environment in multiple ways, resulting in a diverse bacterial community even within the same person.

Roy Kishony at Harvard Medical School in Boston, Massachusetts, and his colleagues sequenced multiple isolates of *Burkholderia dolosa* from the lungs of five patients with CF. Genes involved in antibiotic resistance and scavenging iron (a limiting nutrient) showed signs of adaptation. Individual patients harboured microbes with a variety of adaptive mutations in these genes.

In separate work, a team led by Jeremy Dettman at the University of Ottawa, Canada, sequenced *Pseudomonas aeruginosa* isolates from 24 patients with CF and compared their genomes to eight previously sequenced ones. The team found that genes involved in biofilm formation, antibiotic resistance and coping with oxidative stress seemed to help the bacteria adapt to the CF lung. The analysis also showed that a strain with increased antibiotic resistance has spread between North America and the United Kingdom.
Nature Genet. **http://doi.org/qf4 (2013)**
Proc. Natl Acad. Sci. USA **http://doi.org/qf3 (2013)**

COMMUNITY CHOICE

The most viewed papers in science

ELECTRONICS

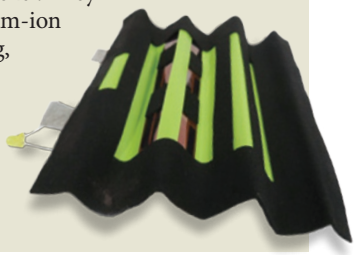
Battery woven into textiles

HIGHLY READ on pubs.acs.org in November

A rechargeable battery has been built into clothing and watch straps and performs as well as inflexible batteries do, even when folded and unfolded repeatedly.

Key to the battery is a flexible current collector — the metal that helps to transfer electrons between battery electrodes and an external circuit. Jang Wook Choi and his colleagues at the Korea Advanced Institute of Science and Technology in Daejeon made their current collector by coating fibres of a woven polyester yarn with nickel. They then attached conventional lithium-ion electrode materials using a strong, flexible polyurethane binder.

The device was also recharged by lightweight solar cells (**pictured,** green) integrated in the battery surface.
Nano Lett. 13, **5753–5761 (2013)**



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