RESEARCH HIGHLIGHTS

Spotted!

Behav. Ecol. Sociobiol. doi:10.1007/s00265-008-0607-3 (2008)

Eyespots on the wings of butterflies and moths (such as the emperor moth, pictured) are thought to scare predators such as woodland birds. Alternatively, the spots may deflect attention away from the central part of the insects' bodies. But when researchers made model moths and distributed them around Madingley Woods near Cambridge, UK, some of the fake moths with eyespots attracted more predators than those without.

Martin Stevens and his colleagues at the University of Cambridge pinned greyscale paper 'moths' with dark, light or no eyespots on their wings to ash and oak trees. The wings were either obvious shades of grey or the same shade as the bark behind them, and were placed over a dead mealworm to provide a reward for predators.

Eyespots proved costly to those targets that were otherwise well-camouflaged, which suggests that eyespots may evolve more easily in already conspicuous species. The markings were previously thought to be merely less advantageous — not costly — in suboptimal circumstances.

K. TAYLOR/NATUREPL.COM

STATISTICS

Who's the driver?

Phys. Rev. Lett. **100,** 234101 (2008)

Faced with a correlation between two variables — chickens and eggs, say — how do you know which is causing the other? Questions such as this, common to fields as disparate as climatology and physiology, are typically unravelled with a statistical technique called Granger causality. But Guido Nolte of the Fraunhofer FIRST institute in Berlin, Germany, and his co-workers say that this method can falsely attribute causality.

They describe a new technique that relies on how phase differences between the driving and dependent variables change with the frequency of their fluctuations. This proves more reliable when the data contain a lot of noise. The authors use their discovery to identify the order in which certain brain regions stimulate others when human subjects shift from a relaxed to an alert state.

EVOLUTION

Model lives

PLoS One **3,** e2282 (2008)

In evolutionary terms, homosexuality might be a detrimental trait that stops people from passing on their genes. But population geneticists have successfully modelled several theoretical explanations for its maintenance. A trio in Italy has now come up with a simple model that involves just two genes.

At least one of these genes, say the University of Padua's Andrea Camperio Ciani and his co-workers, must be on the X chromosome and act to increase fitness when expressed in females. These conditions produce a population within which a small proportion of individuals is gay and in which this proportion remains stable over time.

ALAMY

MATERIALS SCIENCE

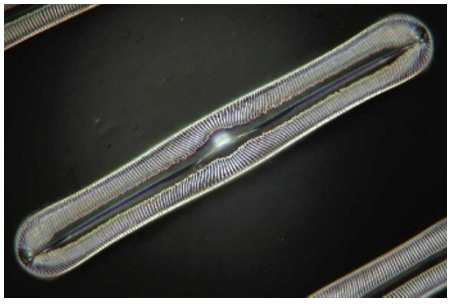
Diatomic power

Adv. Mater. doi:10.1002/adma.200800292 (2008)

Single-celled plankton that have been duped into doping their silica-based shells with germanium can be incorporated into semiconductor chips and made to glow.

Gregory Rorrer of Oregon State University in Corvallis and his colleagues report that the siliceous shells from diatoms (*Pinnularia* sp., pictured below) that were grown for some of their lives in a germanium-rich solution can be incorporated into the devices. On application of an electric field, the shells emit light.

The researchers found resonant frequencies in these emissions that they explain by the geometry of the shells' latticework of pores. They hope that further combinations of semiconductor technology and biologically produced nanostructures may yield novel devices.



MICROBIOLOGY

Infection injection

Science **320,** 1651–1654 (2008).

Two types of disease-causing bacterium use a special injection system to deliver proteins into host cells, researchers have found. The proteins involved contain regions known as 'Anks' (ankyrin repeat homology domains), which often form scaffolds that enable other proteins to interact.

Craig Roy and his colleagues at Yale University School of Medicine in New Haven, Connecticut, report that *Legionella pneumophila*, the bacterium that causes Legionnaires' disease, injects four Ank proteins into mammalian cells via a complex called a 'type IV secretion system'. *Coxiella burnetti*, which causes Q fever, injects eight such proteins.

One of the *L. pneumophila* proteins, AnkX, prevents host vesicles — bags of membrane-bound fluid that contain the bacteria — from moving towards the lysosome, where the bacteria would be destroyed. This may contribute to the bacterium's virulence.

GEOSCIENCE

The geyser forecast

Geology **36,** 451–454 (2008)

The discharge rates of four geysers in North America's Yellowstone National Park — Old Faithful, Daisy, Aurum and Depression — reflect precipitation in the watershed of the Madison River. For decades geologists have tried to link geyser eruptions to external forces including atmospheric pressure and the tides, but until now had little success.