RESEARCH HIGHLIGHTS

Now hear this, or not

PLoS One doi: 10.1371/journal.pone.0005413 (2009)

Although many mammals can hear very high frequencies, other vertebrates are less au fait with ultrasound.

Victoria Arch, of the University of California, Los Angeles, and her colleagues now report that a frog from Borneo, Huia cavitympanum, is the first non-mammalian vertebrate discovered to communicate with calls purely in the range above 20 kilohertz, which is about the upper limit of human hearing. This species had been known to produce these ultrasonic calls, and when playing them back in the field, the team found that male frogs nearby increased the frequency of their calls in response.

On examining the frog's brain and ears, the researchers showed that its hearing was most sensitive above 20 kilohertz.

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NEUROGENETICS

Psychosis genes exposed

Science **324,** 605 (2009)

Scientists in Germany have provided the first evidence that genetic risk for psychotic illnesses is linked, at least in part, to abnormal connections between different brain areas.

Andreas Meyer-Lindenberg of the University of Heidelberg and his colleagues studied 115 healthy people with or without a particular variant of the gene *ZNF804A*. The variant has been identified in genome-wide association studies as possibly conferring a small risk for developing schizophrenia or bipolar disorder. The authors performed brain imaging while volunteers carried out cognitive tasks relevant to these disorders.

The team found that although the risk gene does not influence the strength of activation in various brain areas, connectivity between some areas is either reduced or increased in risk-gene carriers — in a pattern reminiscent of that seen in patients.

VIROLOGY

HIV at the gates

Cell **137,** 433–444 (2009)

HIV enters human cells through a more complex pathway than previously predicted.

Researchers had long thought that HIV binds to cell-surface receptors, and then fuses directly with the cell membrane, dumping its dangerous payload into the cell within about 10 minutes.

Gregory Melikyan and his colleagues at the University of Maryland School of Medicine in Baltimore show that successful infection includes an additional step, in which the virus becomes enveloped by membrane and internalized by the cell through a process called endocytosis. Thirty minutes to an hour can pass before the virus fuses with the internalized membrane and delivers its genetic material.

The findings may necessitate re-evaluation of drug candidates meant to block HIV's entry into cells.

For a longer story on this research, see http://tinyurl.com/d5nuze

DNA REPAIR

Chemo's modus operandi

PLoS Biol. **7,** e1000091 (2009)

The chemotherapeutic 5-fluorouracil has been a first-line treatment for diseases such as colorectal cancer for decades, even though it's not clear exactly how the drug works.

In cells, 5-fluorouracil is converted into several metabolites that mimic the natural RNA base uracil. The metabolites inundate the cell, some becoming incorporated into RNA and even DNA in dividing cells. Uracil in DNA activates a family of DNA-repair proteins devoted to removing it, but the unnatural 5-fluorouracil triggers incomplete repair, causing an accumulation of strand breaks in the DNA and eventual cell death. Primo Schär of the University of Basel in Switzerland and his colleagues examined mouse and human cells responding to the drug and identified thymidine DNA glycosylase (TDG) as the uracil-removing protein responsible for the breaks. Without TDG activity, cancer cells become more resistant to the drug.

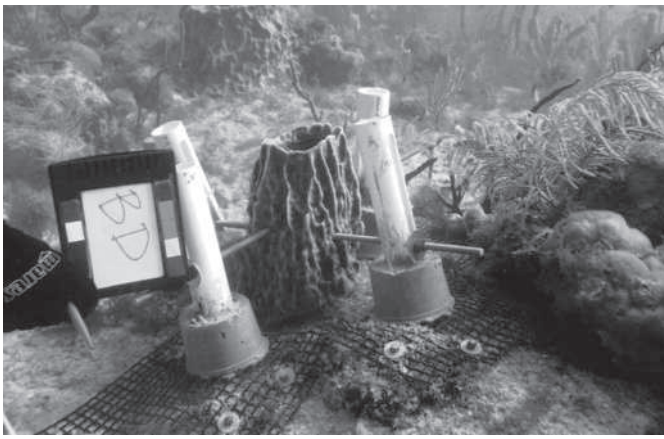
CONSERVATION

Reef repair

Restor. Ecol. **17,** 192–195 (2009)

Some large marine sponges, such as the barrel sponge *Xestospongia muta*, can live for hundreds of years. But when dislodged from the reefs they inhabit by storms, ship groundings or fishing lines, these organisms have little chance of reattaching naturally. Steven McMurray and Joseph Pawlik of the University of North Carolina in Wilmington have stumbled across a new method of reattaching them that could be useful in conservation efforts.

The duo skewered sponges with two perpendicular steel rods, then secured the rods to bases made from PVC piping, concrete and mesh that had been nailed to the reef's limestone bed (pictured below). The method, designed for temporary experiments, surprised the researchers by helping half of the 40 transplanted sponges to reattach, despite three passing hurricanes. The apparatus was removed once attachment was complete.



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