

# 2013

## EDITORS' CHOICE

Adapted extracts from selected News & Views articles published this year.

### FISHERIES

#### CLIMATE CHANGE AT THE DINNER TABLE

Mark R. Payne (*Nature* 497, 320–321; 2013)

Marine species tend to occupy the full range of temperatures that they can tolerate physiologically, and therefore, on a broad scale, their distributions closely track temperature boundaries in the ocean. Thus, over the multi-decadal to centennial scale, warming, acidification and deoxygenation of the oceans are expected to change the species composition of fish communities in a given region. However, Cheung *et al.* present startling evidence that global fisheries catches have already changed in a manner associated with the warming trend. Furthermore, they suggest that catch composition in tropical regions has stabilized, implying that these regions have already become too hot for all but the warmest-water species. The fact that the catch composition seems to have reached the terminal hot-water state in these regions means that further warming may reduce fishery yields, if it has not already done so.

*Nature* 497, 365–368 (2013).

### NEUROSCIENCE

#### THE UNITS OF A SONG

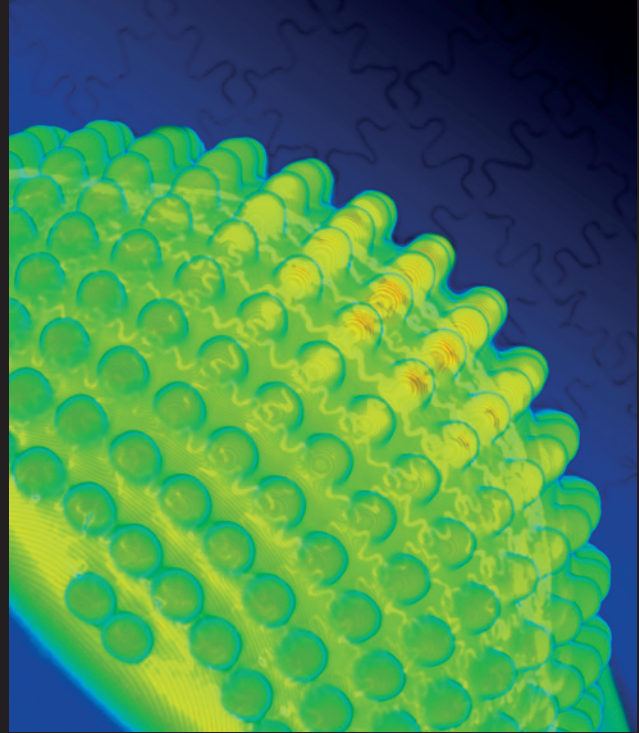
Todd W. Troyer (*Nature* 495, 56–57; 2013)

What is the basic unit of speech? This question has vexed speech and language researchers for decades, and similar questions have challenged those who study songbirds. Whereas behavioural evidence supports the grouping of songs into 100–250-millisecond vocalizations called syllables, neurophysiological data suggest that the premotor areas at high levels in the hierarchy of motor neurons in the brain act more like a clock, providing a continuous stream of activity on a 10-millisecond timescale. Amador *et al.* reconcile these data, providing evidence that the song code generated by HVC motor neurons in zebra finches (*Taeniopygia guttata*) is indeed broken into discrete 'gestures', which are significantly shorter than song syllables. Although the clock and gesture hypotheses lead to different views of the motor code for song, it is possible that, whereas bursting activity in HVC neurons tends to align with gesture transitions, enough HVC neurons are active throughout each gesture to sustain clock-like functionality.

*Nature* 495, 59–64 (2013).



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### OPTICAL DEVICES

#### SEEING THE WORLD THROUGH AN INSECT'S EYES

Alexander Borst & Johannes Plett (*Nature* 497, 47–48; 2013)

Flies are usually treated with disdain. Most commonly associated with spreading disease, they are at best considered simply annoying. Conversely, flies have also inspired mankind for centuries. An early report along these lines dates back to the seventeenth century, when the young René Descartes, while lying sick in bed, observed a fly walking along the ceiling of his room. Thinking about how he could describe the path of the fly in quantitative terms, he came up with what have become known as Cartesian coordinates. The most recent example of such insect-inspired research is described by Song *et al.* — the authors have transferred the design of an insect's compound eye to a digital camera. The result is a small, artificial faceted eye with a near-hemispheric field of view, but without off-axis aberration and with an almost infinite depth of field. It could prove a stepping stone towards autonomous navigation of micro aerial vehicles, in their manifold possible uses.

*Nature* 497, 95–99 (2013).

### GLOBAL HEALTH

#### PERSUASIVE EVIDENCE ON HIV POLICY

Grace John-Stewart (*Nature* 495, 452–453; 2013)

As emergency investment to fight HIV/AIDS evolves into a long-term response, it remains crucial to measure the direct and indirect benefits of HIV treatment to sustain investment. Two studies published in *Science* (Tanser *et al.* and Bor *et al.*) show a large increase in the overall population life expectancy and a decrease in new cases of HIV infection after expanded use of antiretroviral therapy in South Africa. Population studies such as these, which involve individuals who may have much lower drug adherence than those participating in carefully controlled clinical trials, are a powerful complement to clinical trials. They give us a sense of impact in the 'real world'. The new studies focus on a fairly specific real world — one in which HIV prevalence was staggeringly high, allowing detection of the impact of therapy on overall adult life expectancy. Nonetheless, the studies are persuasive in the larger landscape of global HIV. These data should persuade policy-makers to sustain or increase investment in this form of therapy.

*Science* 339, 961–965, 966–971 (2013).

## QUANTUM PHYSICS

## THE RIGHT AMBIENCE FOR A SINGLE SPIN

Michael E. Flatté (*Nature* 503, 205–206; 2013)

Anyone whose dinner at a favourite restaurant has been ruined by noisy neighbours understands the disruption caused by too much interaction with one's environment. Most electronic spins in a solid are also buffeted by naturally occurring 'noises.' The resilience of single-spin dynamics to these noises is quantified by the spin coherence time or the closely related zero-field spin lifetime. Just as one might make modifications that sound-proof a restaurant and thus improve the ambience for diners, so using methods to reduce the noises influencing a single spin leads to long spin coherence times. Unfortunately, these methods also limit the materials in which long spin coherence times can be observed. Miyamachi *et al.* demonstrate an approach to making a single spin deaf to the dominant noises around it. With a single holmium atom adsorbed on the surface of platinum, they measured a spin lifetime that exceeded 6 minutes — a remarkably high value for any solid-state spin system.

*Nature* 503, 242–246 (2013).

## EARTH SCIENCE

## MAINLY IN THE PLAIN

James W. Kirchner & Ken L. Ferrier (*Nature* 495, 318–319; 2013)

On million-year timescales, landscapes disappear, gradually consumed by physical erosion and chemical dissolution. How quickly these processes transform Earth's surface has been a question of great interest to geologists and geochemists. But they may have mostly been looking for the answer in the wrong places, Willenbring *et al.* report in *Geology*. Geologists have focused their attention on steep terrain, where rapid erosion is thought to drive rapid chemical weathering. However, Willenbring and colleagues say that there is just not enough mountainous terrain to account for much of the global flux of sediment (from erosion) or solutes (from chemical weathering) reaching the oceans. This argument is likely to arouse interest, and some measure of controversy. There are details in the paper that one can argue over. Nonetheless, the authors' analysis suggests that more geologists should climb down from their beloved mountains, to explore the erosion and weathering of the surrounding lowlands.

*Geology* 41, 343–346 (2013).

## SOCIAL SCIENCE

## THE MATHEMATICS OF MURDER

Adeline Lo & James H. Fowler (*Nature* 501, 170–171; 2013)

The mass killing on 14 December 2012 at Sandy Hook Elementary School in Newtown, Connecticut, has revived an enduring controversy about gun control in the United States. Gun-control advocates believe that widespread gun ownership increases the rate of gun-related crime and homicide, whereas critics argue that gun availability decreases gun violence because potential assailants are less likely to commit such crimes if they believe citizens are armed. But who is right? Writing in *PLoS ONE*, Wodarz and Komarova describe a mathematical model designed to answer exactly this question. In an extremely cautious way, they suggest that more guns make things worse. This is social science at its very best. Rather than crafting yet another highly abstract formal model, the authors create a model that is directly relevant to this issue. And rather than overly emphasizing their model's results, they conduct an exercise in caution, highlighting the importance of grounding models in sound and accurate assumptions.

*PLoS ONE* 8, e71606 (2013).

FORUM: Genetics  
A SOCIAL  
REARRANGEMENT

(Nature 493, 612–613; 2013)

Some worker fire ants (*Solenopsis invicta*) will tolerate multiple queens in their colony, but others only one. It turns out that this behaviour is governed by a gene cluster on an unusual pair of chromosomes. Two scientists describe what these findings mean to the fields of social evolution, genetics and beyond.

## GENES AND QUEENS

Andrew F. G. Bourke

Social evolution — the evolution of behaviours that have effects beyond the individual — requires genetic variation to influence social behaviour. The fire ant's social polymorphism is associated with inheritance of variants of the gene *Gp-9*, but Wang *et al.* show that *Gp-9* sits within a super-gene containing other genes that are differentially expressed between the two colony forms. The system shows that a multifaceted social trait can be under genetic influence.

## CHROMOSOME MYSTERIES

Judith E. Mank

At first glance, it might be difficult to see what, if anything, fire-ant behaviour can tell us about the evolution of sex chromosomes. However, Wang and colleagues show that the fire-ant 'social chromosomes' are, in many ways, similar to X and Y chromosomes. At least one massive inversion on the chromosome that encompasses *Gp-9* prevents recombination between the two chromosome forms, in much the same way as we think inversions might prevent recombination between the X and Y chromosomes.

*Nature* 493, 664–668 (2013).



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