

Truth Be Told?

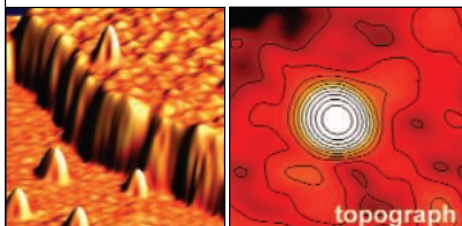
Obtaining and acting on judgments from experts or from the general population form the basis for many surveys and for public policy decisions, such as cost-benefit analyses. However, in many surveys, such as those of sexual history, it can be difficult to get respondents to give their own answer or opinion, as opposed to what may be seen as the "right" answer. **Prelec** (p. 462) has developed an approach in which a respondent not only chooses an answer but also predicts what fraction of people will agree with their answer. Those answers that are more common than would be expected from the overall predictions score highest, even when they represent a minority view.

Organic Boost for Hydrogen Storage

One approach for storing hydrogen as a fuel is to use clathrates, which are loose water-ice structures that have large cages surrounding other molecules. Pure hydrogen clathrates, however, are only stable at high pressures, which complicates synthesis and storage. **Florusse et al.** (p. 469) show that when a guest molecule, tetrahydrofuran, is incorporated in the larger cages, a clathrate containing significant hydrogen can be formed and is stable up to pressures near ambient.

Probing Atomic Magnetism

A low-temperature scanning tunneling microscope has been used to probe the magnetic excitation spectra of single manganese atoms adsorbed on metallic and oxide surfaces. **Heinrich et al.** (p. 466, published online 9 September 2004; see the Perspective by **Bode**) show that the technique not only provides the ability to determine the energy required to flip the magnetic moment of single atoms, but can also probe how the immediate environment of the atom influences those magnetic properties.



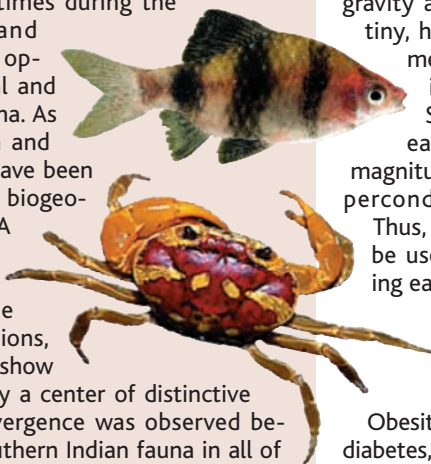
Ambient Sampling for Mass Spectrometry

The power of modern mass spectrometry for analyzing samples is often limited in practice because vacuum conditions are usually needed to create the ions needed for determining mass-to-charge ratios. **Takáts et al.** (p. 471; see the news story by **Cho**) show that charged microdroplets of water can be electrospayed onto a surface

of interest and that desorbed ions form that can be collected and introduced into a mass spectrometer under ambient conditions. Samples can be collected from surfaces ranging from plant stems to human skin, and chemical reactions can be run on sample surfaces to create derivatives that help verify compound identification.

Distinctive Pearl of the Orient

Sri Lanka has been connected by a broad land bridge to southern India five times during the past 500,000 years, and these events provided opportunities for dispersal and mixing of flora and fauna. As a result, the Sri Lankan and southern Indian fauna have been regarded as an integral biogeographic unit. Using DNA sequence comparisons of a range of vertebrate and invertebrate groups from both locations, **Bossuyt et al.** (p. 479) show that Sri Lanka is actually a center of distinctive fauna. High genetic divergence was observed between Sri Lanka and southern Indian fauna in all of the groups examined.



Gravity on the Move

Earthquakes displace material, which changes the distribution of mass within Earth and hence the local acceleration of gravity at the surface. Such changes are tiny, however. **Imanishi et al.** (p. 476) measured a 1-microGalileo change in acceleration caused by the 25 September 2003 Tokachi-oki earthquake, which had a moment magnitude of 8, with a suite of three superconducting gravimeters on Japan. Thus, gravimetry is precise enough to be useful for modeling and interpreting earthquake dynamics.

Obesity, Stress, and Diabetes

Obesity is a major risk factor for type 2 diabetes, but how the two conditions are linked is not fully understood. **Özcan et al.** (p. 457; see the Perspective by **Muoio and Newgard**) identify endoplasmic reticulum (ER) stress as a possible connection. The ER is a network of intracellular membranes involved in membrane and secretory protein synthesis and processing, and its function is sensitive to pathological stress, such as changes in nutrient levels. Obesity triggers ER stress in liver and fat cells, and this stress in turn disrupts insulin signaling. When placed on a high-fat diet, genetically manipulated mice with elevated levels of ER stress developed peripheral insulin resistance at a higher rate than controls. The ER stress signaling pathway may be a useful target for the development of new therapeutics for type 2 diabetes.

Doing Double Duty

Gene expression in eukaryotes is normally believed to be controlled by transcriptional regulators that activate the expression of genes encoding structural proteins and enzymes. **Hall et al.** (p. 482) have used proteome chips and chromatin immunoprecipitation to identify a metabolic enzyme, Arg 5,6, that binds to DNA and directly regulates gene expression. Arg 5,6 not only catalyzes two steps of arginine biosynthesis in yeast but also directly binds to several genes. Knockouts of this enzyme result in changes in transcript levels of nuclear and mitochondrial target genes.

Topical HIV Prevention?

To date, no microbicide candidate has provided complete protection from vaginal acquisition of simian or human immunodeficiency virus (HIV). **Lederman et al.** (p. 485) tested a modified

CONTINUED ON PAGE 371

form of the chemokine RANTES, which is known to block HIV entry in cultured cells through the down-regulation of expression the chemokine receptor CCR5, the dominant coreceptor used by HIV to infect cells. Topical vaginal application of a RANTES-containing formula in rhesus macaques protected against subsequent vaginal infection with a hybrid laboratory strain of the virus.

Proteases, Neurotrophins, and Memory

Brain-derived neurotrophic factor (BDNF)-dependent plasticity in the nervous system is thought to be essential for synaptic growth during development as well as during learning. Both tissue plasminogen activator (tPA) and BDNF have been implicated in activity-dependent plasticity, including long-term potentiation (LTP). **Pang et al.** (p. 487; see the news story by **Couzin**) provide a mechanistic link between tPA and BDNF. The late-phase of LTP depends on a sequence of extracellular proteolytic processes involving the proteases tPA and plasmin, and BDNF. Activation of tPA cleaves plasminogen, yielding plasmin, which in turn converts proBDNF to mature BDNF. Interference with any step in this sequential pathway blocks late-phase LTP, which could be rescued by reintroducing elements that occur later in the pathway.



The Nuts and Bolts of Channel Gating

Voltage-dependent cation channels have sensor domains that alter the conformation of the channel gate in response to changes in transmembrane voltage, but how this regulation is achieved remains a matter of debate. **Cuello et al.** (p. 491) have used site-directed spin labeling and electron paramagnetic resonance spectroscopy to analyze the local structure and dynamics of the prokaryotic voltage-dependent K^+ channel KvAP. The results are not in complete agreement with any of the current models for channel gating, but find common ground between contrasting models and provide constraints that can be used in future analyses.

Delaying Gratification

Imagining and valuing the prospect of a larger delayed reward, rather than opting for a smaller pleasure right away, like learning to save in a piggy bank, is not a "natural" behavior and must be learned. By offering college students choices between immediate and late rewards, **McClure et al.** (p. 503; see the Perspective by **Ainslie and Monterosso**) establish that two distinct neural systems differentially participate: the limbic areas evaluate immediate gains while prefrontal areas make hard-nosed calculations of delayed value.

Numbers Without Names

Would we be able to count if we used the word "one" to mean either one or a small number of things? (See the Viewpoint by **Gelman and Gallistel**.) **Gordon** (p. 496, published online 19 August 2004) studied the numerical abilities of the Amazonian tribe, the Pirahã. Their language contains words only for one, two, and many, yet even these do not seem to be used in the same way that we would use them, with our larger and more precisely defined set of number words. Members of this tribe do not perform well on numerosity tasks when quantities larger than three are involved. In an independent study, **Pica et al.** (p. 499) used a battery of comparison, addition, and subtraction tasks represented in pictures to interrogate a group of Mundurukú-speaking individuals dwelling in the Amazon. This language also lacks words for numbers larger than five and thus fails to support accurate arithmetical operations involving quantities larger than five. Nevertheless, these individuals can make approximate comparisons and additions, even of large quantities for which they have no exact words.