

## GENETICS

**Many but rare***Science* **320**, 539–543 (2008)

In April, Jon McClellan at the University of Washington in Seattle and his colleagues confirmed that schizophrenia is largely genetic in origin, and found many individually rare mutations that make a person more likely to develop it. Scientists had thought that the combined effects of common variants were responsible.

The team analysed the DNA of 150 individuals with schizophrenia and 83 with childhood-onset schizophrenia, searching their subjects' genomes for rare deletions and duplications that disrupt genes. These were much more common in the genomes of people with schizophrenia than in those of healthy controls. Most schizophrenia patients had mutations that others did not have but that tended to be in the same genes. The genes altered by these mutations were disproportionately involved in neurodevelopmental pathways.

## ASTROPHYSICS

**Cosmic tiara***Astrophys. J.* **680**, 295–311 (2008)

A halo of stars surrounds the Milky Way, but researchers disagree how it got there. One theory proposes that it formed from the same cloud of gas as the Galaxy itself; the other says the halo is the remains of several 'dwarf galaxies' that were originally separate from but close to the Milky Way proper. A survey of about three million halo stars weighs heavily in favour of the latter hypothesis.

Eric Bell of the Max Planck Institute for Astronomy in Heidelberg, Germany, and his colleagues compared data from the Sloan Digital Sky Survey with several models. The halo's structure, they say, suggests that it is what remains of several smaller galaxies that were subsumed into the Milky Way after it formed.

## EVOLUTION

**Genetic bric-a-brac***Science* **320**, 1210–1213 (2008)

Many single-celled organisms collect genes from other organisms — a process known as horizontal gene transfer — but multicellular organisms tend not to. Tiny invertebrates called bdelloid rotifers were found to buck this trend, taking on genetic material from a range of other species, including bacteria, fungi and plants.

Multicellular creatures rarely do this because their germ line is sequestered in the gonads, explain Eugene Gladyshev,

Matthew Meselson and Irina Arkhipova at Harvard University. Bdelloid rotifers are different. They often experience desiccation, potentially opening up their cell membranes to chunks of outsider DNA. This unusual way of injecting diversity into their genomes may help to explain why these rotifers have gone 40 million years without having sex.

## BIOCHEMISTRY

**Catalytic creator***Science* **319**, 1387–1391 (2008)

In March, David Baker at the University of Washington in Seattle and his colleagues reported the rational design of enzymes for reactions that have no known catalysts.

The team took advantage of the down time of many other people's computers to perform the calculations necessary to build models of how synthetic enzymes would interact with substrates. They then made 72 different enzymes (including that pictured above), 32 of which catalyse a 'retro-aldol' reaction, which involves the breaking of a carbon-carbon bond in a certain non-biological molecule. They verified the structures of two of their enzymes with X-ray crystallography.

Many other labs have since worked with Baker's enzymes and confirmed their activity.

## ORGANIC CHEMISTRY

**Tag-team catalysts***Science* **322**, 77–80 (2008)

David Nicewicz and David MacMillan at Princeton University in New Jersey created a double-headed catalytic system to give an

aldehyde molecule an alkyl group in a specific position, and with a specific geometry.

Their technique depends on a pincer movement. A ruthenium-based 'photoredox' catalyst that shifts electrons one at a time when hit with fluorescent light is one prong; an organocatalyst developed to move single electrons is the other.

The light-activated ruthenium catalyst creates an alkyl halide radical; the aldehyde is dealt with by the organocatalyst; and the reactants are brought together with precision so as to give most of the product the desired handedness. The reaction is easy to perform and broadly applicable, say the authors, and will make life easier for those developing new drugs.

## NEUROSCIENCE

**MRI beebop***PLoS ONE* **3**, e1679 (2008)

The inside of an MRI scanner may not have the ambience of a jazz club, but Charles Limb and Allen Braun of the National Institutes of Health in Bethesda,

Maryland, think it brings out the process of improvisation in unprecedented detail.

They watched six professional jazz pianists first playing a scale on a specially created keyboard, and then improvising using only the notes from that scale. In a second experiment, the musicians followed a given melody exactly and then made up new trills and transitions around it. A pre-recorded quartet occasionally provided accompaniment.

When the musicians improvised, their brains showed greater activity in the medial prefrontal cortical area — a region associated with self-expression. Lateral prefrontal areas, which are linked to self-monitoring, became less active. These changes (pictured as warm and cool colours, respectively, left) may occur in all types of spontaneous creativity, Limb and Braun say.

## HUMAN BIOLOGY

**Bird's eye view***Biol. Psychiatry* **65**, 17–21 (2009)

People with autism have incredibly keen eyesight, seeing almost as acutely as birds of prey.

The surprise finding from Emma Ashwin and her colleagues at the University of Cambridge, UK, showed that the unusually keen senses that have been associated with

