the California Institute of Technology in Pasadena and his colleagues used functional magnetic resonance imaging to investigate.

The team made participants pretend to take meals away from orphans. They could take away either fewer meals in a more efficient distribution, or more meals in a fairer distribution. The researchers found that more efficient decisions correlated with more activity in a brain region called the putamen, whereas decisions that emphasized fairness correlated with more activity in the insula, which is involved with emotional processing. Differences in decisions came down to how averse participants were to inequity.

ASTRONOMY

A galaxy far, far away

Asrophys. J. **678,** 647–654 (2008)

Astronomers have spotted what seems to be the most distant galaxy ever observed.

The galaxy dates to 13 billion years ago, when the Universe was less than a billion years old. Larry Bradley of Johns Hopkins University in Baltimore, Maryland, and his colleagues spotted it by pointing the Hubble Space Telescope at a nearby galaxy cluster. The cluster's mass, about a thousand times that of the Milky Way, worked as a lens, magnifying the light from the galaxy behind it.

Bradley says the team now plans to try and obtain the galaxy's spectrum in order to confirm its distance. Such data could also provide important insights into how galaxies formed in the early Universe.

ECOLOGY

Hand-me-down bacteria

Int. Soc. Microbial Ecol. **2,** 510–518 (2008)

Developing earthworm embryos weed out unwanted microbes, while attracting their favoured bacterial symbionts to colonize their excretory organs.

Eisenia foetida bequeath their offspring a gift of *Acidovorax*-like bacteria, deposited directly into egg capsules where embryos will develop. Seana Davidson and David Stahl of the University of Washington in Seattle watched as the bacteria colonized the developing earthworm embryo. They found that the *Acidovorax*-like bacteria were selectively recruited to a small canal in each segment of the earthworm, where they lingered until excretory organs called nephridia developed sufficiently for the bacteria to colonize them. This selectivity for their symbionts suggests that the embryos fend off colonization by other microbes.

ECOLOGY

Hot chicks

Science **320,** 800–803 (2008)

A 47-year study of British great tits (*Parus major*; pictured below) shows that these birds can adapt to a changing climate purely through changes in behaviour, a phenomenon known as phenotypic plasticity.

Great tits at Wytham, near Oxford, now lay eggs an average of 14 days earlier than in 1961, keeping in step with the earlier profusion of moth larvae for feeding their chicks, report Ben Sheldon at the University of Oxford and his colleagues. This has been achieved purely through behavioural change rather than genetic selection, as shown by the fact that laying is tightly coupled to peak larval abundance even though springtime weather varies randomly from year to year.

E. JANES/NHPA

CHEMISTRY

Disulphide dichotomies

J. Am. Chem. Soc. doi: 10.1021/ja800180u (2008)

Chemists have measured how much a bond between two atoms stretches in the transition state, which is the short-lived phase between the initial and end states in a chemical reaction.

Sri Rama Koti Ainavarapu and Julio Fernandez at Columbia University in New York and their colleagues developed a force clamp technique to use in 'single-molecule force spectroscopy'. Using this, they held onto individual molecules and stretched them so as to trigger the reduction of a disulphide bond in a protein, invoking the transition state of the reaction. The researchers could then measure the distance between the sulphur atoms as they stretched apart.

JOURNAL CLUB

Carl Bergstrom
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An evolutionary biologist considers the virulence of emerging infectious diseases.

When a pathogen — for example, HIV — emerges into the human population, it adapts to growth and transmission in human hosts. At the same time, its virulence (often measured by case mortality) typically changes as well. On the basis of theoretical arguments and examples such as the myxoma virus, conventional wisdom holds that if a disease is highly virulent at first, it will rapidly evolve reduced virulence so as to maximize transmissibility. The idea is that pathogens face a virulence–transmissibility trade-off: strains that kill or even incapacitate their hosts are unlikely to spread as broadly as those that keep their hosts alive and mobile.

One might think — and some have argued — that we can take comfort from such reasoning. By this logic, the 60% mortality rate seen in human cases of H5N1 avian influenza should rapidly attenuate were a human pandemic to occur. But in the inaugural issue of *Evolutionary Applications*, Bull and Ebert refute this thinking using a clear, simple mathematical model (J. J. Bull & D. Ebert *Evol. Appl.* **1,** 172–182; 2008).

As someone working on the dynamics of emerging infectious diseases, I find this paper fascinating and sobering in equal measure. The gist of its argument is that trade-off models may not apply well to emerging infectious diseases, precisely because they are still emerging. When a disease first enters a new host, it can be far from the optimum point on the virulence–transmissibility trade-off curve. Its early evolutionary trajectory may be contingent on mutation supply and thus very hard to predict: virulence might decline, but could also initially rise.

The implications are clear. We need to invest now in disease surveillance, public-health infrastructure and pandemic planning. We cannot count on evolution to do our work for us.

Discuss this paper at **http://blogs.nature.com/nature/journalclub**