ribosomes or by targeting them for destruction. A few examples of microRNAs inducing gene expression have been reported, but the paucity of details as to how they might do so has prompted scepticism.

Working with human embryonic kidney cells, Joan Steitz and her colleagues at Yale University School of Medicine in New Haven, Connecticut, have determined that a microRNA called miR369-3 brings three proteins together, including one with an important role in intracellular communication. This turns up protein expression.

Steitz and her team then looked at two often-studied microRNAs and found that they also stimulate protein production on cell-cycle arrest, leading them to propose that this may be a common function of microRNAs. Their work adds to evidence linking microRNAs to various cancers.

COSMOLOGY

Listening to inflation

Phys. Rev. Lett. **99,** 221301 (2007)

The very early Universe is widely believed to have expanded rapidly during a process known as inflation. Richard Easther and his co-workers at Yale University in New Haven, Connecticut, calculated that the end of this inflationary period would have excited gravitational waves that we may soon have the technology to detect.

They model how, immediately after inflation, the Universe would have oscillated like a ball coming to rest at the bottom of a bowl. Its oscillations would have produced background gravity waves 'loud' enough to be picked up by planned observatories, such as future iterations of the Big Bang Observer and the Laser Interferometer Gravitational Wave Observatory. According to the team's calculations, these instruments should provide a rare glimpse of inflation itself, and might help to discriminate between different theoretical models of how it happened.

GEOLOGY

Fresh advances

Geology **35,** 1075–1078 (2007)

Periods of massive runoff from melting land ice have been linked to rapid shifts in global climate, through changes in the circulation of the northern Atlantic Ocean. New research led by Norway's Geological Survey suggests that these freshwater incursions might be more common than previously thought.

Jochen Knies, of the Geological Survey, and his colleagues analysed the oxygen and carbon isotopes in a seabed sediment core drilled in 1993, at a point off Greenland's east coast where the Arctic and Atlantic oceans meet. The researchers expected to find evidence of freshwater peaks during glacial to interglacial transitions. But instead they uncovered freshwater discharges spread liberally over the past 800,000 years, including some during periods when the global climate was relatively stable.

These events could be helpful to climate modellers seeking to shed light on abrupt climate changes, the researchers suggest.

ZOOLOGY

Advantageous offspring

Biol. Lett. doi:10.1098/rsbl.2007.0482 (2007);
Proc. R. Soc. B doi:10.1098/rspb.2007.1401 (2007)

Evolutionary theory posits that sexual creatures maximize their number of descendents if they have more sons than daughters when conditions are optimal, and more daughters than sons in less ideal circumstances. Yet the cues that mammals use to achieve this are unclear.

Samuli Helle, of the University of Turku in Finland, and his colleagues report a correlation between the annual mean temperature in northern Finland and the sex ratio of newborns in three populations of indigenous Sami people (pictured below) for the years 1745–1890. The team compared demographic data from the parish registers of Lutheran churches with a climatic record reconstructed from tree rings and an index of the North Atlantic Oscillation. Warmer years brought an increased proportion of boys, in keeping with theory.

Meanwhile, Elissa Cameron, of the University of Pretoria in South Africa, and her colleagues raised the proportion of daughters in mouse litters by lowering the blood glucose levels of females during conception. The researchers added dexamethasone, a steroid that blocks glucose uptake into the blood, to the drinking water of female mice for three days while the animals had access to a mate. Only 41.9% of the litters of dexamethasone-treated mice were male, compared with 53.5% in control litters.

JOURNAL CLUB

Sarah E. Hitchcock-DeGregori, Robert Wood Johnson Medical School, Piscataway, New Jersey

A molecular biophysicist muses on how a vital structural protein might have turned out differently.

One thing I love about science is its surprises. One signature eukaryotic protein is actin, a cytoskeletal protein involved in cell migration and muscle contraction. Few would have guessed that actin has a similar structure to proteins with little sequence homology or shared function beyond hydrolysis of the energy-storage molecule ATP.

Some prokaryotic cytoskeletal proteins share actin's folding pattern and, like actin, can form filaments. Electron microscopy initially indicated that the filament structure of the DNA-segregation protein ParM, for example, is similar to actin's. With improved methods, Orlova *et al.* revealed another surprise: ParM's helix winds in the opposite direction to actin's (A. Orlova *et al. Nature Struct. Mol. Biol.* **14,** 921–926; 2007). The main differences between actin and ParM filaments are in contact regions between subunits, which are crucial for constructing this new molecular model of the filament.

If we consider each evolutionary change as a 'mutagenesis experiment', the number required for a common ancestor to become actin or ParM is mind-boggling. There would be new functions and failures along the way — even a single amino-acid substitution in haemoglobin can cause sickle-cell anaemia. Without a record of genetic changes we cannot know the intermediate successes and failures, as we do for some bizarre invertebrates found in the fossil record. Stephen Jay Gould recounts these discoveries in *Wonderful Life*, in which he warns of being bound by conventional thinking.

Eukaryotic life settled on the actin filament, constrained by evolution to be dynamic, to work with its motor protein, myosin, and myriad binding proteins. Just think, if actin filaments had different inter-subunit contacts — such as those in ParM — myosin would be unable to bind to it, an important helical protein, tropomyosin, would coil in the wrong direction for binding along the filament and ... well, it's like me wondering what I would be like if I had a different father.

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