To find out whether this is true, Christopher Clark and Robert Dudley at the University of California, Berkeley, trained Anna's hummingbirds (*Calypte anna*) to fly in a wind tunnel with and without hugely elongated feathers from another species tacked onto their tail feathers. Elongated tails slowed the birds' average top speed from 15.1 to 14.6 metres per second. The increased metabolic cost of flight at high speeds was about 10%, but negligible at lower speeds.

The researchers suggest that by hiding tails aerodynamically in the wake of the body, diverse sexual signals can be kept relatively cost-free.

GENOMICS

Big is beautiful

PLoS ONE **4,** e4688 (2009)

Finding gene regulators in the fruitfly *Drosophila melanogaster* has proved difficult: looking for conserved non-coding DNA sequences, a method that works well in vertebrates, has been unsuccessful. Michael Eisen at the University of California, Berkeley, and his co-workers suggest that this is because the fly's genome is compact — not because its regulatory architecture differs substantially from that of vertebrates.

Eisen's group sequenced various loci from four species of tephritid — 'true' fruitflies — which have large genomes containing islands of conserved non-coding DNA sandwiched between unconserved stretches. This allowed the researchers to pinpoint six conserved tephritid non-coding regions that functioned as gene enhancers in *D. melanogaster* embryos. Until now, the compact size of the *D. melanogaster* genome has been considered a boon to scientists.

MOLECULAR IMAGING

Nailing the molecule

Science **323,** 1464–1468 (2009)

Molecules in gases and liquids are always moving thanks to their thermal energy. This means that measuring many details of their dynamics, which would require accessing the interaction of the molecule with nearby molecules and light, is impossible. However, by using a short laser pulse, a molecule can be 'frozen' for a few picoseconds (10^{-12} seconds), a time sufficient to examine, using ultrafast spectroscopy, the characteristics of its molecular dynamics.

Albert Stolow of the Steacie Institute for Molecular Sciences in Ottawa, Canada, and his colleagues demonstrate their method with the carbon disulphide molecule, observing its dynamics in a photochemical reaction.

EVOLUTION

Fishy fangs

Proc. R. Soc. B doi:10.1098/rspb.2009.0141 (2009)

Carp-like cypriniform fishes lost their teeth millions of years ago, but a newly described species has come close to redeveloping them.

Males of the tiny *Danionella dracula* have a series of fang-like pieces of bone projecting from their jaws, report Ralf Britz of London's Natural History Museum and his colleagues. So far, the maximum size reported for the fish, from Myanmar, is 16.7 millimetres. Its development also appears stunted; it retains many larval body features into adulthood and lacks 44 bones or parts of bones seen in its close relative the zebrafish (*Danio rerio*).

Remaining mysteries include the function of the toothy projections and whether they are formed through the genetic pathway for true tooth formation, which is known to be conserved in zebrafish.

R. BRITZ

MATERIALS

Five-star ice

Nature Mater. doi:10.1038/nmat2403 (2009)

As a snowflake's sixfold symmetry shows, ice crystals contain water molecules locked into hexagonal arrays.

But Angelos Michaelides at the London Centre for Nanotechnology and his colleagues have identified circumstances in which ice breaks this rule. Water molecules forming nanometre-wide chains on a particular copper surface at 100–140 kelvin are arranged in pentagons. The motif arises from a balance of hydrogen-bonding interactions between water molecules and the strain induced by fitting to the lattice of the copper surface beneath.

Correction

The Research Highlight 'Pogo-stick pictures' (*Nature* **458,** 11; 2009) described the subject of the accompanying image as a mouse cochlear hair cell. It is in fact a hippocampal neuron.

JOURNAL CLUB

Ahmad M. Khalil
Harvard Medical School

A geneticist views two theories of X-chromosome inactivation in a broad context.

Female mammals have two X chromosomes, one of which is inactivated to ensure that females get the same dose of X-linked genes as males. Two long, non-coding RNA molecules mediate this process. One, *Xist*, initiates silencing of the chromosome to be inactivated, whereas its antisense partner, *Tsix*, blocks such silencing of the remaining X. The exact mechanism by which *Xist* and *Tsix* exert their functions is not known.

RNA interference (RNAi) describes a process by which RNA fragments 'interfere' with the creation of proteins from their RNA recipes. The recent discovery of RNAi in mammalian cells made it tempting to postulate that sense and antisense non-coding RNA partners, such as *Xist* and *Tsix*, are processed by the RNAi-associated enzyme DICER into small RNAs. Jeannie Lee and her team at Harvard Medical School have presented several lines of evidence in support of this, including data that demonstrate improper X inactivation in DICER's absence (Y. Ogawa *et al. Science* **320,** 1336–1341; 2008).

By contrast, a study by David Livingston of Harvard's Dana-Farber Cancer Institute and his colleagues has shown that, in the absence of DICER, the inactive X chromosome in stem cells remains coated with *Xist* and several other repressive markers (C. Kanellopoulou *et al. Proc. Natl Acad. Sci. USA* **106,** 1122–1127; 2009). This group suggests that the effects observed by Ogawa *et al.* may have been indirect because DICER is also involved in the processing of a class of small, non-coding RNAs known as microRNAs that can alter gene expression by fine-tuning protein production.

Despite their differences, these studies should provide an incentive to further investigate the potential role of the RNAi pathway in the nucleus of mammalian cells. This will shed light on both X inactivation and gene regulation in general.

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