



J Scherschel/National Geographic/Getty

Eggshell science.....

Scientists have discovered that fossil eggshell is an excellent, previously unrecognised source of DNA. They successfully extracted it for the first time from the ancient shells of ducks, owls, emus and extinct moas and elephant birds.



The secret to mussels' stick.....

The threads mussels produce to attach themselves to surfaces are wear-resistant yet extensible due to their structure – a unique matrix of proteins and metal ions. The findings could lead to super-hard but flexible coatings for various products.

NEWS OF THE EARTH

IN BRIEF

WILD HORSES

Feral horses in California hurt but also help the biodiversity of desert ecosystems. Biologists have found that the animals trample plants and severely compact the soil along their preferred paths. But when they graze off-trail, they spread seeds and add fertiliser. Their impacts, both good and bad, may extend to nearly 1km² per horse (BMC Ecology, vol 9:22).

SWIFT SWIFTS

Biologists have clocked the common swift *Apus apus* flying at 112kmph, the fastest flapping flight reported for the species. The recordings were made during 'screaming parties', when the swifts race around in small, raucous flocks. Such high-speed flight, about twice as fast as that reached during migration, may be a competition-related show of strength (J. of Avian Bio., vol 41, pp94–8).

DEE FOR DANGER

The 'dee' in the predator-warning call of the Carolina chickadee *Poecile carolinensis* stands for danger. In tests, the birds made fewer 'chicks' and more 'dees' in response to higher-threat predators, and flock mates reacted accordingly. The meaning behind the call varies on a graded scale depending on the threat (Anim. Behav., vol 78, pp1447–53).



William Leaman/Alamy



Scott Linstead/Minden/FLPA

Not just a fair-weather hunter, a veiled chameleon bags a cricket with its long, powerful tongue.

Sticking its tongue out at the cold

Not even the cold can stop a chameleon's tongue.

When temperatures drop, the muscles of the veiled chameleon *Chamaeleo calytratus* essentially freeze up, like those of all cold-blooded critters. They fire more slowly, greatly hindering movement. But new research shows an exception: its tongue.

Christopher Anderson and Stephen Deban, from the University of South Florida, filmed veiled chameleons hunting crickets in their lab at three temperatures (15°C, 25°C and 35°C). They found that, as the lizards' bodies cooled, tongue-ejection speed slowed, but only slightly – the organ still functioned at about 90 per cent of its normal capacity. In contrast, lizards are known to run and fish to swim at least 33 per cent slower when they're cold.

Furthermore, projection distance and accuracy and cricket-capture rate were unaffected. In other words, the chameleon's tongue keeps on zinging under conditions that trip up the rest of its body. So, even if it can barely move, it can still feed.

In addition, the findings reveal that the spring-like mechanism that powers the tongue, which can produce higher speeds than contracting muscle, can also be more reliable. The organ is like a jack-in-the-box. When packed into place, it is ready for take-off. Unlike muscle-powered movement, bad weather won't stop it: once triggered, it's going to fly.

This previously overlooked perk, say the scientists, may explain why the chameleon hunts earlier in the morning, on cooler days and in higher altitudes than other lizards, giving it a significant advantage.

COLD SNAP

- » The most extreme movements tend to be powered by spring-loaded mechanisms, from the strike of the mantis shrimp's claws to the leap of bushbabies. This new study is the first to show that cold has little effect on this mechanism.
- » Low temperature has a much more dramatic impact on muscle power. In cold chameleons, tongue retraction, driven by muscle, was 35 per cent slower and had 60 per cent less power.
- » Tongue-ejection speed is vital for hunting; if prey takes longer to reel in, so be it.
- » Temperature-independent tongue ejection may explain why chameleons can live in cold habitats, such as alpine zones. It may also reduce basking time, and thus vulnerability to predation.

SOURCE: PNAS, doi/10.1073/pnas.0910778107 LINK: www.eol.org/pages/791826



DAVID BRIAN BUTVILL, ZOOLOGIST

Our *Discoveries* sleuth David writes about science and nature for magazines, radio and tv. He lives in Costa Rica, where he eagerly assists his marine-biologist wife in the field.

DISCOVERIES

Cloak of invisibility

Biologists shed light on a most mysterious black bear.

For the Kermode black bear *Ursus americanus kermodei* in western Canada, it's sometimes better to be blonde, according to new research.

Black bears come in many hues, which tend to match the dominant colour of the local habitat – from truly black in well-shaded forests to cinnamon in arid regions and even blue-grey among the glacial till of Alaska. Then there's the Kermode black bear, many of which are stark white. These so-called 'spirit bears' may have blended into the scenery during the Ice Age, but that benefit melted away with most of the glaciers about 20,000 years ago. To potential predators such as wolves and grizzlies, they stick out like a sore thumb. Yet the pale morph makes up a quarter of the population in some areas. Why?

Biologist Thomas Reimchen and his student Dan Klinka from the University of Victoria, British Columbia, studied the situation from the perspective of the bear's primary prey, salmon. They played the part of predator, wading into rivers wearing white or black linen

sheets (with cut-out eyeholes) to see how the fish would react to the two colours at different times of day. They found that, in daylight, the salmon tended to avoid the black apparition, but not the white one – a few minutes after the initial disturbance, about a dozen fish would typically gather within striking distance. (The fish were oblivious to both cloaks at night and twilight.) Hence, to salmon, the spirit bear is virtually invisible, even during the day.

Indeed, when the duo compared the capture rates of the two colour morphs over three seasons, they found that white bears' fishing skills shined in the daytime: they snagged about nine per cent more prey than their black counterparts. That's an extra meal for every 10 attempts, bringing to light a huge plus to being pale.

But it's only an asset as long as there are prey. The coastal areas these bears frequent are being deforested, while the numbers of all salmon species they rely on have plummeted by nearly 70 per cent in the past 50 years. If these trends continue, the spirit bear may indeed vanish before our eyes.

SOURCE: Biological Journal of the Linnean Soc., vol 98, pp479–88 **LINK:** www.bearlife.org



Thanks to its pale coat, the spirit bear enjoys more fish-hunting success by day than its dark-coated kin.

THE BEAR TRUTH

- » The spirit bear is not an albino. Its white coat results from a mutation of a single recessive gene – the same one that makes a human a redhead.
- » The spirit bear will remain rare, since both parents must carry the gene variation in order to produce a white cub.
- » This study found that a hunting white bear standing in a river has

- about twice as many fish within striking distance as a black one.
- » Kermode bears live throughout western British Columbia, but the white morph is more common on a smattering of predator-free islands off the coast.
- » Local people believed that white bears had mythical powers, calling them the 'spirit of the forest'.

M Watson/istock.com



Boys will be boys... and girls, when exposed to a certain herbicide.

Simon Colmer/naturepl.com

Mr Mum

A herbicide is turning male African clawed frogs into mothers.

For a male African clawed frog *Xenopus laevis*, the globally ubiquitous herbicide atrazine not only takes away your manhood – it transforms you into a fully functional female.

A research team led by Tyrone Hayes from the University of

California at Berkeley, USA, exposed lab-reared male tadpoles to low levels of the pesticide (lower than that allowed by the US Environmental Protection Agency) throughout their development and for the first three years of adulthood. Then they gave each frog a physical.

Their subjects had less testosterone, a low sex drive, fewer sperm and a feminised larynx – they looked and sounded like 'girlie-men'. Worse still,

10 per cent of them had also sprouted fully functioning ovaries. Some even mated with unexposed male partners and laid fertilised eggs.

And the nightmare doesn't stop there. A 'born-again' male may have the equipment to reproduce like other mothers, but chromosomally he's still a chap, so his offspring will all be male. This state of affairs, say the researchers, could result in large die-offs and even extinction.

SOURCE: PNAS, doi/10.1073/pnas.0909519107 **LINK:** www.eol.org/pages/1038993