Twisted tale of snail evolution

Dextral snail shells coil rightwards, and sinistral shells coil leftwards. Sinistral Satsuma snails cannot mate with right-coiling Satsuma species, leading scientists to wonder how sinistrality could have spread through dextral populations.

Masaki Hoso of Tohoku University in Sendai, Japan, and his colleagues show that sinistrality has arisen independently multiple times in Satsuma, and more often where snakes in the Pareatidae family occur.

The team found that the Pareas iwasakii snake, which preys on the molluscs, must stick to right-coiling species as its jaws are specialized for grasping them. (Snake jaw, with extra teeth on the lower mandible, pictured.) That gave sinistral individuals an adaptive advantage, allowing left-coiling species to emerge.

For a longer story on this research, see go.nature.com/9fetev.

Caterpillars whistle for safety

When under attack, walnut sphinx caterpillars (Amorpha juglandis; pictured), whistle. An 1868 Canadian Entomologist paper, “Musical larvae,” first reported these shrieks, but their purpose wasn’t clear.

Jayne Yack at Carleton University in Ottawa, Canada, and her team now show that the whistle, produced through openings along the body called spiracles, is a defence against predators. Simulated attacks with blunt tweezers caused the caterpillars to pull their heads back, forcing air through two of the spiracles in a succession of squeaks.

When confronted by their real predators, yellow warblers, the caterpillars whistled each time the birds swooped in for attack, repelling multiple assaults until the warblers gave up.

For videos, see go.nature.com/zgeqyc.

NANOTECHNOLOGY

Pressed to breaking point

Every day in labs around the world, a technique using high-frequency sound waves — ultrasonication — is used to break up carbon nanotubes. But no one really understands the underlying mechanism. Kyung-Suk Kim at Brown University in Providence, Rhode Island, and his collaborators have shed some light on the interplay between nanotubes and the minute bubbles created by the sound waves under water.

When the bubbles implode, tubes in the water near them are suddenly compressed along their lengths. The tubes buckle, and some atoms
Sex and the social slime mold

A single gene is sometimes all it takes to change a slime mold’s sexual identity.

The social amoeba Dictyostelium discoideum has three different sexes — members of one sex, or ‘mating type’, can fuse with either of the other two to form giant, dormant cysts. But little is known about what genes determine the sexual identity of a slime mold.

Gareth Bloomfield of the Medical Research Council molecular biology lab in Cambridge, UK, and his colleagues found a region of the D. discoideum genome that differed among sexes. Deleting a gene from this region prevented mating-type I from coupling with mating-type II; reintroducing the gene restored normal sexual orientation. Meanwhile, swapping sex genes from one mating-type to another caused the amoebae to switch sexual partners.


Mother’s dinner, daughter’s nose

The smell of mouse mothers’ food influences the olfactory anatomy of their pups, and primes them to prefer the same flavours as their mothers.

Josephine Todrank at the University of Colorado, Denver, and her colleagues studied lines of mice in which select olfactory sensory neurons that responded to smells such as cherry or mint were tagged with the gene for green fluorescent protein. The mothers were given scented food while either gestating or nursing their litters, or during both phases. When their pups were tested at 20 days old, fluorescence revealed larger glomeruli — bundles of synapses — formed by neurons specific to the smells added to their mother’s food. Pups also preferred the smells of the food their mothers ate.

Such preferences could predispose animals to choose familiar and safe foods, although in humans they could backfire to plant the seed of preference for alcohol or unhealthy foods, the authors say.


Currency circuitry

Modern anti-counterfeiting features on banknotes are getting more sophisticated, ranging from complex and colourful watermarks to holograms and foil strips.

Now Ute Zschieschang of the Max Planck Institute for Solid State Research in Stuttgart, Germany, and her colleagues have added yet another weapon to the arsenal: trackable digital circuits.

The researchers fabricated low-voltage organic transistors on the surface of a €5 note (pictured), using a 3-nanometre-thick insulating layer made of aluminium oxide and octadecylphosphonic acid that could be deposited without damaging the surface of the banknote. A total of 92% of the deposited transistors were functional — a high enough proportion for the circuits to work reliably.


Making maoecrystal V

The complex molecule maoecrystal V has been synthesized in the laboratory, after six years of intense effort by high-profile chemists. Zhen Yang and his colleagues at Peking University in Beijing created the sought-after compound — which shows potent activity against cancer cells — in a concise 16-step synthesis. It was originally extracted from a Chinese herb (Isodon eriocalyx) that has long been used as a folk medicine to treat flu and inflammation, and has already produced a number of potential anticancer agents. By varying the laboratory synthesis, chemists will be able to make and test closely related structures that may prove better medicines than maoecrystal V itself.


Impacts sent bling to early Earth

Call it a gift. Late in the Solar System’s formation, a shower of objects up to the size of Pluto delivered to Earth a large quantity of rock containing gold, platinum and other elements that bind readily with iron. Researchers believe these elements were added to the mantle late in Earth’s development, because if they had been present when the planet was molten, they would have sunk to its core, with iron.

William Bottke of the Southwest Research Institute in Boulder, Colorado and his colleagues used abundances of iron-loving elements on Earth, the Moon and Mars to model how later impacts from large objects could have replenished reserves in the planets’ mantles. The findings may also explain the sizes of the oldest craters on the Moon and Mars.


For a longer story on this research, see go.nature.com/ bddewm.

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GENETIC TESTING

It’s never too early to get sequenced

A developing baby’s entire genome is hidden in its mother’s blood, potentially offering a non-invasive test for congenital diseases. Dennis Lo of the Chinese University of Hong Kong and his colleagues sequenced billions of DNA base pairs from the plasma of a pregnant woman and then developed a way to distinguish her DNA sequences from the fetus’s.

Both parents carried a single mutation for β-thalassaemia, a rare blood disorder caused by two faulty copies of the gene HBB. Lo’s analysis demonstrated that the father had passed on his mutation, but the mother had given the fetus a healthy copy of HBB, sparing it from β-thalassaemia. Such genetic screening could replace invasive prenatal diagnostic tests such as amniocentesis.


For a longer story on this research, see go.nature.com/ djxvga.