Farming shifts bird reproduction

Exposure to agricultural habitat early in life seems to speed up the reproductive schedule of a tropical bird species.

Samantha Cartwright at the University of Reading, UK, and her colleagues looked at 23 years of life-history data for 79 female Mauritius kestrels (Falco punctatus; pictured), a threatened, forest-dwelling bird. The authors found that birds born in nests near agricultural areas had lower survival rates as young adults, but also bred earlier in life, compared with birds born in forested habitats.

This reproductive shift could be an adaptive response to nutritional stress in early life that foreshadows a harsh or unpredictable adult life, the authors suggest.

Molecule makes blind mice see light

A chemical injected into the eyes of blind mice restores the animals’ sensitivity to daylight.

Richard Kramer at the University of California, Berkeley, and his colleagues tested a small synthetic molecule called DENAQ, which interacts with retinal ganglion cells and changes shape when exposed to white light of moderate intensity. In mice missing the light-sensing rod and cone cells in the retina and treated with DENAQ, light altered the interaction between the chemical and retinal ganglion cells so that the cells, which normally do not respond to light, became responsive. These animals were also more active when exposed to light.

The chemical works for several days, and only in retinas with degenerated rods and cones. DENAQ could be a possible drug candidate for the treatment of blinding diseases such as age-related macular degeneration, the authors say.

Permafrost grows thanks to plants

Despite rising temperatures in the Arctic, permafrost has been expanding around some lakes, probably because of vegetation sprouting up nearby.

Twelvemile Lake in Alaska has been shrinking, causing permafrost and willow-shrub growth to expand along its shores. A team led by Martin Briggs of the US Geological Survey in Storrs, Connecticut, modelled the response of ground ice to shading and transpiration by plants. The simulations show that, thanks to the effects of vegetation (for example, by cooling and drying the surface), shallow permafrost can persist and even expand in warmer temperatures.

However, the team calculates that, within 70 years, rising air temperatures will win out and cause this permafrost to thaw.

Materials

Laying wires in fractal patterns could improve stretchable electronics. Devices such as wearable sensors require circuits that can withstand stretching. A team led by John Rogers at the University of Illinois at Urbana-Champaign bonded wires in fractal motifs to elastic materials (pictured). Fractals are complex patterns that, when divided into smaller parts, look the same as they do when whole. The authors showed that their devices were more stretchable than those that had repeating loop and S-shaped patterns, with certain fractal designs allowing for stretching in specific directions.

The authors say that such structures could be used in sensors worn on the skin or radio antennas that can be mechanically tuned.