RESEARCH HIGHLIGHTS

Selections from the scientific literature

ASTROPHYSICS

Supernova clues from neutrinos

Neutrinos detected by Earth-based observatories could one day help to reveal the sequence of events that occur in supernovae.

When a white-dwarf star becomes too massive to support itself, the internal pressure is thought to trigger a runaway thermonuclear reaction followed by an explosion — known as a Type Ia supernova — but the events involved in the explosion are unknown. Warren Wright at North Carolina State University in Raleigh and his colleagues simulated a supernova and calculated the number of neutrinos it would generate, and the timing of their release, if the star's gravity initially limited the explosion, and the nuclear reaction spread across the star's entire surface before the star exploded.

This would create two distinct neutrino bursts that would be much fainter than the single burst that would be made by a faster explosion, which the team calculated in a previous study published last year. Over time, neutrino observatories searching for supernovae in our Galaxy should be able to use these predictions to tell whether either scenario is accurate, the authors say.

Phys. Rev. D 95, **043006 (2017)**

DOUGLAS KENNETT/PENN STATE UNIV.

GENOMICS

Prehistory's female dynasties

One of the first complex societies in North America transferred power through the female line, genomic evidence suggests.

In some of the earliest recorded societies, power was passed down along family lines, but little is known about how prehistoric societies without writing systems transferred power. Douglas Kennett at Pennsylvania State University in University Park and his colleagues examined DNA from nine individuals buried in a crypt at Chaco Canyon in New Mexico (pictured), a major population centre between AD 800 and 1130.

The crypt contained thousands of turquoise and shell artefacts, finely made pottery and musical instruments, suggesting that the people belonged to an elite class. All of them shared identical mitochondrial genomes, which are inherited from the mother. Further analysis confirmed a mother–daughter pair and a grandmother–grandson pair in the crypt, suggesting a matrilineal dynasty.

The findings are consistent with the presence of matrilineal leadership systems in some Native American groups living in the area today.

Nature Commun. 8, **14115 (2017)**

AGRICULTURE

Pesticide-free farms can pay

It may be possible to curb pesticide use on some farms without lowering yields or cutting profits.

Martin Lechenet and Nicolas Munier-Jolain at the French National Institute for Agricultural Research in Dijon and their colleagues assessed whether herbicides, fungicides and insecticides are associated with productivity or profitability at 946 arable farms across France. They found that pesticides do not drive yields or income for 77% of the farms, but noted that results varied between crops. Cereal yields, for example, were not adversely affected by decreased pesticide use, but the profitability of potato and sugar-beet crops relied heavily on chemicals.

All farms could change their practices and rely on other technological innovations to reduce pesticide use while protecting crops from disease, the authors say.

Nature Plants 3, **17008 (2017)**

MICROBIOME

Skin cream kills pathogen

A lotion containing specific bacteria kills a pathogen associated with an inflammatory skin disorder.

Atopic dermatitis causes dry, itchy and inflamed skin, and is often marked by high levels of the pathogenic bacterium *Staphylococcus aureus*. Other bacteria that normally live harmlessly on the skin are known to produce antimicrobial compounds, so Richard Gallo at the University of California, San Diego, and his colleagues set out to investigate whether these bacteria help to combat *S. aureus*. The researchers isolated and sequenced the genomes of a range of *Staphylococcus* species from the skin of both healthy people and those with atopic dermatitis. They found that people with the disorder had