

RESEARCH HIGHLIGHTS

Selections from the scientific literature

NUCLEAR FORENSICS

Reconstruction of 1945 nuclear test

By measuring concentrations of stable isotopes in bomb debris, researchers have worked out the details of a nuclear test performed 70 years ago.

Scientists have long debated the efficiency and yield of the first atomic bomb, called Trinity, which was detonated in 1945 in New Mexico. Susan Hanson and her colleagues at the Los Alamos National Laboratory in New Mexico analysed bomb debris and measured changes in both the isotope ratios and the total levels of molybdenum — a stable decay product of zirconium isotopes, which form as a result of nuclear detonation and are short-lived. The team then calculated the original concentrations of the zirconium isotopes and came up with a yield for the Trinity detonation that was in line with that officially reported.

This approach could prove useful in ongoing nuclear non-proliferation and verification efforts, the authors say.

Proc. Natl Acad. Sci. USA
<http://doi.org/bmjik> (2016)

NEUROSCIENCE

Brain can retrieve baby memories

'Lost' infant memories can be reinstated later in life, thanks to specific mechanisms in the hippocampus, the brain's memory centre.

Humans and other animals are often unable to recall early-life events, but these experiences can still affect the brain and behaviour later in life. To figure out how, Cristina Alberini at New York University in New



THOMAS P. PESCHAK/NATL GEOGR./GETTY

MARINE SCIENCE

Shark-tracking study shapes marine park

Monitoring the movements of sharks can help researchers to advise on the areas best served by marine reserves.

In the Seychelles in the Indian Ocean, a proposed marine protected area has been designed to safeguard mainly turtles and coral reefs. To see how well it might protect sharks, James Lea at the Marine Biological Association of the United Kingdom in Plymouth and his colleagues used acoustic transmitters to track 116 sharks (five species, including *Carcharhinus melanopterus*; pictured)

over a three-and-a-half-year period in and around an area earmarked for a reserve in the Seychelles. They also tracked 25 turtles. When they compared the areas that these animals favoured with two proposed reserve sizes, they found that the larger reserve covered about 34% more of the animals' movements than the smaller one.

In response to the research, the Seychelles government agreed to use the larger protected area.

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York City and her colleagues administered electric shocks to the feet of infant rats and showed that the animals seemed to lose this memory within 24 hours. However, when presented with contextual reminders and another footshock several days later, the rats behaved as if they remembered the initial shock. The researchers pinpointed specific mechanisms in the hippocampus — including a shift in the relative levels of two forms of a receptor for a molecule called NMDA — that are involved in the formation and storage of early-life memories.

The results suggest that the hippocampus goes through a critical period of rapid development during infancy. *Nature Neurosci.* <http://dx.doi.org/10.1038/nn.4348> (2016)

GENOMICS

Mitochondrial mismatch in mice

Mouse embryos containing DNA from three animals may not survive gestation, and those that do could go on to develop reproductive problems — a finding with potential implications for a proposed human therapy.

Energy-producing cell organelles called mitochondria carry their own DNA, which when mutated can cause disease. Mitochondrial-replacement therapy is being developed to prevent the inheritance of such diseases and involves the replacement of the organelles with donor ones, resulting in embryos with DNA from three people. To look for potential incompatibilities between the mitochondrial and nuclear genomes, a team led by Shoukhrat Mitalipov at the Oregon Health and Science University in Portland replaced the mitochondria