



Environment, pollution and human health

Developing solutions to reduce the damaging health effects of pollutants and pathogens

Infectious parasites linked to economic growth

The world is getting smaller: human and agricultural populations are more connected than ever before. Theory states that this may lead to more infectious strains of parasites developing. An experiment by scientists at the University of Sheffield, using moth larvae infected with a virus, has given the first empirical support for this idea.

Lead author Mike Boots said, 'As populations become more mixed, we might expect that not only will the extent of disease outbreaks increase, but also that more infective strains of parasites may emerge.'

The finding has implications for how society manages more virulent disease in human and wildlife populations.

■ Local Interactions Select for Lower Pathogen Infectivity. *Science*, 2007.

New treatment for malaria?

Algae found in coral from Australia's Sydney Harbour has potential as a new treatment for malaria and other parasites, according to research at the NERC collaborative centre, the Scottish Association for Marine Science (SAMS).

Australian co-researchers, who shipped the algae to SAMS for analysis in NERC's Culture Collection of Algae and Protozoa, were unaware of what they had discovered. As part of an international team, scientists at SAMS revealed that the algae is the first close relative in the plant kingdom of a parasite that infects over 500 million people worldwide each year.

David Green, a researcher at SAMS, said, 'It turns out to be an important evolutionary missing link between free-living photosynthetic marine plants and a large group of parasites, including the one responsible for malaria.'

This algae contains chloroplasts – cellular structures where photosynthesis takes place in plants and algae. The malaria parasite contains remnants of these chloroplasts, known as apicoplasts. But, because apicoplasts are not found in humans, scientists

can target them in new malarial drug treatments.

■ A photosynthetic alveolate closely related to apicomplexan parasites. *Nature*, 2008.

Discovery of genes for roundworm disease

Dozens of new genes that allow parasitic worms to infect and cause disease, have been found by scientists at the University of Liverpool.

The team, led by Steve Paterson, say that these genes could lead to new drugs or vaccines to treat roundworm disease.

Steve said, 'Roundworms infect around a billion people in the developing world, and much of UK livestock. These parasites are now developing resistance to the drugs we currently use against them, so we desperately need to develop new treatments.'

■ Microarray analysis of gender- and parasite-biased transcription in the parasitic nematode *Strongyloides ratti*. *International Journal for Parasitology*, 2008.

New test for depleted uranium

A new test to detect depleted uranium in Gulf War veterans has unexpectedly uncovered high levels of the radioactive material in the urine of former workers and residents around a disused weapons factory in upstate New York.

Researchers at the NERC Isotope Geosciences Laboratory (NIGL), based at the British Geological Survey, with partners in government and universities, developed urinary uranium isotope tests of unprecedented sensitivity. The team tested 800 Gulf War veterans: all results came back negative for depleted uranium. But depleted uranium showed up in a related study by the team near a former munitions plant in upstate New York. The US plant closed in 1982 amid controversy over health and safety breaches.

Head of NIGL Randy Parrish said, 'We found depleted uranium contamination 5.8km from the plant and it is likely to have travelled even farther.'

■ Depleted uranium contamination by inhalation and its detection after 20 years: implications for human health assessment. *Science of the Total Environment*, 2008.

Nanoparticles can harm wildlife

Nanoparticles in rivers can cause brain damage in fish and alter their behaviour, according to scientists working on the Environmental Nanoscience Initiative. The research is the first evidence of the adverse effects of nanoparticles, such as carbon nanotubes – tiny, hollow tubes used by the electronics industry – on wildlife.

Richard Handy from the University of Plymouth, who led the research, said, 'The fish showed quite extraordinarily aggressive behaviour.'

Nanoparticles can enter the environment through sewage works. Concentrations in rivers are minute, but can accumulate.

The team's research fed into a Defra report on the known dangers of nanomaterials. The report sets out the UK's position for the Organisation for Economic Co-operation and Development (OECD).

■ The ecotoxicology and chemistry of manufactured nanoparticles. *Ecotoxicology*, 2008.

■ Toxicity of single-walled carbon nanotubes to rainbow trout (*Oncorhynchus mykiss*): Respiratory toxicity, organ pathologies, and other physiological effects. *Aquatic toxicology*, 2007.

Is pollution driving antibiotic resistance?

'Pollution may be driving the evolution of antibiotic-resistant bacteria in the environment', say Elizabeth Wellington, William Gaze and colleagues from the University of Warwick.

When the researchers analysed bacteria in soil contaminated with industrial effluent, they found some bacteria carried new genes that may confer resistance to antibiotics.

Co-investigator Peter Hawkey, professor of clinical bacteriology at the University of Birmingham, said, 'This antibiotic resistance could be transferred to bacteria, directly causing human infections.'

The team demonstrated that mobile genetic elements, able to transfer resistance genes between bacteria, were more prevalent in soils contaminated with disinfectants and detergents. The diversity of novel genes was also significantly higher in contaminated compared to control soils.

■ Molecular epidemiology of class 1 integrons and cassette gene diversity in industrial effluent and sewage contaminated soils. 2008, *in prep.*



Coloured scanning electron micrograph of roundworms.

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