

# 2003

## IN CONTEXT

It was a year with more than its fair share of unsettling events. Impressive advances, such as a high-resolution microwave map of the Universe, were tempered by war, SARS and the loss of the space shuttle Columbia. *Nature's* reporters explore the highs and lows of 2003.

### Climate of conflict

## In the shadow of war

No one knows exactly what was going through the mind of David Kelly, an expert on bioweapons employed by the UK Ministry of Defence, on the afternoon of 17 July. All we know is that this softly spoken microbiologist had been driven over the edge, following his identification as the source of a now infamous BBC radio story. This item alleged that the British government "sexed up" a dossier detailing Saddam Hussein's weapons of mass destruction to justify the attack on Iraq. Police found Kelly's body at 9.20am on 18 July, in woods near his Oxfordshire home; his left wrist had been slashed.

The events that led to Kelly's presumed suicide have since been subjected to a full public inquiry. Its chair, the judge Lord Hutton, is now preparing his report, which will be published in January. The BBC, government officials and ministers are all expected to come in for heavy criticism. But for Kelly's family, and his scientific colleagues, the report will do little to lessen the sense of loss.

Unfortunately, Kelly wasn't the only scientist whose life was this year torn apart by the ongoing 'war on terror'. On 1 December, Thomas Butler, a microbiologist at Texas Tech University in Lubbock, shook his head and fought back tears as he was convicted of defrauding his employer, and of illegally

sending samples of the plague bacterium to Tanzania. Butler was found innocent of most of the charges that first landed him in trouble — that he illegally imported plague samples from the same country, and that he lied to federal investigators in claiming that they had gone missing. But many scientists have been chilled to the bone by his prosecution. Butler's case is widely perceived as simply a warning to scare biologists who might be tempted to pay mere lip service to regulations on the handling of potential bioweapons.

### Clamp-down

The circumstances that engulfed Kelly and Butler were admittedly extreme. But this year's climate of conflict is affecting science, and scientists, in myriad ways — especially in the United States. Thousands of researchers working on human, animal and plant diseases are now struggling to get to grips with red tape designed to prevent pathogens getting into the wrong hands. The funding landscape in the United States has been transformed, with hundreds of millions of dollars being poured into projects to counter the terrorist threat. And for scientists trying to enter the United States from countries other than its close allies, immigration requirements have become stifling.

If you look at the US federal science

budget, there is little doubt that this is a country on a war footing. Since the mailed anthrax attacks of October 2001, the National Institute of Allergy and Infectious Diseases (NIAID) has distributed some \$1.8 billion for projects in biodefence. And in January, the new Department of Homeland Security opened its doors. With an annual research budget of almost \$900 million, the department aims to develop countermeasures, such as sensors, to thwart terrorist attacks. No other country has responded to the threat posed by groups such as al-Qaeda by redirecting its research effort in quite such a fundamental way. Indeed, speak privately with senior European science-policy officials, and they'll tell you that they regard the US reaction as over the top.

As you might expect, trying to ramp up a huge counter-terrorist research programme has entailed a few teething troubles. Funding from the Department of Homeland Security has suffered delays. The NIAID, meanwhile, came under criticism for diverting cash from projects on AIDS and other diseases to fund the development of an anthrax vaccine.

The US government's research priorities are also being influenced in more subtle ways by the ongoing conflict. For President George Bush's administration, becoming independent of the oil imported from Middle East



## HIGHLIGHTS

**Bon voyage**

NASA's Voyager 1 spacecraft has left the Solar System — probably. Space scientists are still quibbling about whether the probe has or hasn't actually crossed the critical boundary, called the terminal shock layer, where the solar wind hits the interstellar medium. Either way, Voyager is now 13.5 billion kilometres away from us — about 90 times the distance between Earth and the Sun. It should reach the next nearest star in 40,000 years.

**Meet the ancestors**

Fossils found near the village of Herto in Ethiopia were revealed to be the oldest yet of modern *Homo sapiens*. The skulls — of two adults and a child who lived 160,000 years ago — support the idea that modern humans originated in Africa, and that Neanderthals were a branch of the human evolutionary tree that later went extinct. Cut marks on the skulls suggest that the first modern humans had some mortuary practices. And marks on nearby animal bones suggest that these people may have dined on hippopotamuses.

**Condensed matter**

Two teams of physicists cracked the problem of making Bose–Einstein condensates out of molecules rather than atoms. Such condensates are a strange state of matter in which the constituent particles occupy the same quantum state and so behave as a single particle. Atomic condensates were achieved in 1995, but their molecular equivalents proved a harder nut to crack. By cooling atoms with a laser and squeezing them together with magnetic fields, researchers managed to create loose molecular bonds — the molecules then collapsed into a condensate.

**Look, no gonads!**

Both eggs and sperm were produced in the lab from mouse embryonic stem cells. Sperm cells, which were grown in culture from male embryonic cells, were even used successfully to fertilize natural mouse eggs. The lab-made eggs were, intriguingly, grown from both female and male cells. The ability to grow eggs in a dish should provide a boost for studies of fertility and cloning — if they turn out to be normal.

**Blow up**

The origins of long  $\gamma$ -ray bursts — which last longer than a few seconds — were pinned down at last. These bursts are some of the most energetic events in the Universe. Astronomers witnessed the death of a massive star and recorded a  $\gamma$ -ray burst from the same event. The spectacular stellar show proved that some, if not all, long  $\gamma$ -ray bursts are associated with supernovae, the catastrophic explosions that end the lives of the largest stars. The origin of shorter  $\gamma$ -ray bursts remains a mystery.

countries where support for al-Qaeda is strongest has become a long-term priority. In his State of the Union address in January, Bush announced a \$1.2-billion initiative to develop hydrogen-powered cars. The United States also this year re-entered the \$5-billion international ITER project to develop a prototype nuclear-fusion power plant.

But for US microbiologists, the main issue is not so much the new funding landscape, but rather how to cope with new regulations designed to prevent bioweapons proliferation. As Butler claimed in his defence, many scientists find these regulations bureaucratic and confusing. The main new provisions cover pathogens from a list of about 80 judged to be of interest to terrorists wanting to attack people, crops or livestock. Labs working on these agents must register with the Centers for Disease Control and Prevention or the US Department of Agriculture (USDA), submit themselves to background checks by the FBI and complete a mountain of paperwork.

Plant pathologists, who were used to working with minimal government scrutiny, got a particularly rude awakening. Many plant scientists were puzzled by the inclusion of certain organisms on the list, and by the omission of others that seemed at least as dangerous. “The list needs some adjustment,”

*Nature* drew up a set of guidelines designed to prevent the publication of research that would provide a ‘cookbook’ for would-be bioterrorists (see *Nature* 421, 771; 2003). But the US government has yet to introduce policies on the issue. “My own guess is that it will require some minor crisis to clarify the situation, such as a dispute between the US government and some scientific journal about whether an article should be published,” says Will Happer, a physicist at Princeton University in New Jersey, who has advised the US government on numerous issues relating to science and security.

**Shut out**

Heightened concerns about security have also caused problems for foreign scientists trying to visit the United States. A new rule enacted in July requires virtually every visitor coming to the country for work or study to undergo an interview with an official at a US embassy. Foreign scientists are also subjected to security reviews involving several government departments. For hundreds of researchers, especially those from the Middle East, the countries of the former Soviet Union and China, this has meant delays that can last for months. “The most frustrating part is the lack of any information,” says Olexei Motrunich, a physicist who has worked in the United States for the past eight years, and who in September was supposed to take up a postdoctoral position at the University of California, Santa Barbara. But he has been shut out of the country since July, when he went home to his native Ukraine for what should have been a brief visit.

As well as hampering scientists seeking employment in the United States, immigration delays have disrupted scientific meetings. “We had a number of difficulties getting visas for our overseas participants,” says Keith Ellis, a theorist at Fermilab in Batavia, Illinois, who helped to organize the XXI International Symposium on Lepton and Photon Interactions at High Energies, held in August. All but one of the Chinese delegation were forced to cancel, and many Russian researchers were similarly unable to attend.

Looking to the future, US science advocates are worried about the knock-on effects of the money being spent on the occupation and rebuilding of Iraq. “Spending on the war has to have some impact,” says Sam Rankin, who heads the Coalition for National Science Funding, a lobby group in Washington DC. “We are going to have to work pretty hard.” ■

Geoff Brumfiel and Jonathan Knight



**On guard:** the conflict in Iraq has dominated the year and brought unexpected pressures to bear on the scientific community.

says Anne Vidaver of the University of Nebraska at Lincoln, who is serving on a committee of the American Phytopathological Society that is trying to develop objective criteria for placing agents on the list. Confusion was heightened in July by the sudden cancellation of a USDA meeting to discuss the list of restricted agents. No explanation was forthcoming, but some scientists believe that officials were worried about discussing information that might be useful to terrorists.

Similar confusion surrounds the question of whether results from certain projects should be published in the open literature. In February, a group of journals including