such as the Dutch agriculture minister Laurens Jan Brinkhorst, argue that it's irresponsible not to start vaccinating anew. But so far, the E.U. has not budged.

A test to distinguish vaccinated from infected animals could end the current impasse. United Biomedical Inc., a company in Hauppauge, New York, has developed one that works well, says company scientist Alan Walfield. As his team described in a 1999 paper in *Vaccine*, the test specifically detects antibodies against proteins involved in viral replication, which the virus produces but the vaccine doesn't. The test, which still needs to be approved and registered, will likely make vaccines more acceptable, Walfield predicts.

Another approach would be to develop a vaccine whose immunologic footprint is distinct from that of an FMD virus; ideally, such a vaccine would also protect against as many strains as possible, instead of just one. But because the different types vary greatly, this is difficult to do. Brown says he's currently testing vaccines that simply consist of a short protein sequence expressed by the virus, as is United Biomedical; another group at Plum Island, led by Marvin Grubman, is trying to develop a vaccine by sticking FMD virus genes into an adenovirus that has been crippled by removing some of its own genes.

Although Walfield says big vaccine makers have recently shown a little more interest in the disease, most FMD researchers expect progress to be slow. After the memories of the devastating 1967–68 outbreak started to fade, Britain decreased its funding for FMD research, says Brown, and currently, the disease is studied by just a handful of labs around the world. "There's a certain degree of complacency," says Brown. "We haven't had foot and mouth for so long, so why should we worry about it?"

–MARTIN ENSERINK

SCIENCE POLICY

Can a King of Catalysis Spur U.K. Science to New Heights?

David King, one of the world's leading physical chemists, is now the U.K.'s chief scientific adviser. He describes the challenges of his new job

LONDON—If politics is supposed to mean catalyzing change for the greater good, David King ought to be a master of the art. After all, few people have a finer grasp on the intricacies of catalysis than the Prime Minister's new chief scientific adviser, a leading expert on the interactions of atoms at surfaces.

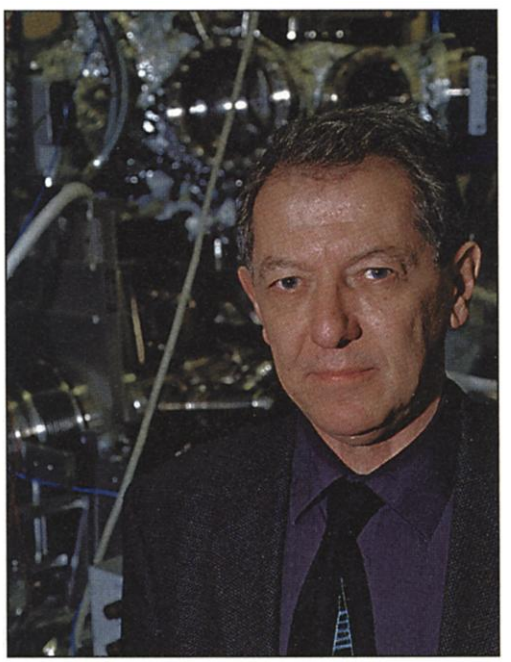
Positioned to exert more political influence than any other scientist in the United Kingdom, King has spent the early days of his 5-year term as chief scientific adviser—he was appointed last October—getting a feel for his new milieu. Earlier this month, King carved out time from a calendar jammed with meetings with key science players in the Parliament, in the government, and among advocacy groups to share his thoughts with *Science* on a range of issues, from low salaries for British scientists to coping with a series of crises culminating in the ongoing outbreak of foot-and-mouth disease.

Although King thus far has refrained from pushing for shifts in science policy, that should change after national elections, which the current Labour government is widely expected to win. (The election could be called as early as 3 May.) "Immediately after the election, he's going to have to swing into action and make sure that science is high on the political agenda," says biologist Ian Gibson, a member of Parliament who serves on the Science and Technology select committee.

Observers predict that King will be an effective advocate for science. The chief scientific adviser should be "somebody who is an excellent scientist" with "a strong and independent voice"—and King fits the bill, says his predecessor, Sir Robert May, who is now president of the Royal Society. But perhaps the biggest asset King brings to the job is his power of persuasion, says Gibson: "He can seduce people into doing things."

Skimming the surface

Born in Durban, South Africa, in 1939, King earned a doctorate in chemistry from the University of Witwatersrand in Johannesburg in 1963, followed by a postdoc at Imperial College London. He spent more than 2 decades at the University of East Anglia in Norwich, U.K., and the University of Liverpool before landing a professorship at his current home, the University of Cambridge, in 1988.



Getting everything done by Friday. David King crams his government job into 4 days a week to make time for research.

CREDIT: JOHN HOLMAN

One of King's early passions was scrutinizing the encounters of gaseous hydrogen and metallic tungsten. He found that as the hydrogen molecules cleave, the individual atoms glom onto the surface, elbowing the tungsten atoms into new configurations. His studies helped show that "metal surfaces are not rigid checkerboards; they are flexible," says physical chemist Richard Lambert, a Cambridge colleague. King also helped improve low-energy electron diffraction, a technique used to build up atomic-scale images of surfaces.

But the innovation that has won King the most plaudits from his peers so far is the single-crystal microcalorimeter. This device measures the heat shed by molecules as they break apart at a surface. Pulses of molecules are fired at a crystal wafer barely two-tenths of a micrometer thick. A thermal camera monitoring this molecular barrage picks up infrared radiation as the wafer heats up by anywhere from 0.1 to 1.0 degrees Celsius per pulse. The device offered a new way to measure the energy liberated when atomic bonds are broken. "It's really a quantum leap above what anybody else has done," says physical chemist John Yates of the University of Pittsburgh.

Such insights are highly prized by industry. "If you understand in detail the mechanisms going on on a surface, then perhaps you can develop better catalysts," says buckyball Nobelist Harry Kroto of the University of Sussex. Indeed, King and his team have recently unraveled how ammonia reacts with oxygen in the presence of platinum—a discovery that, by suggesting a more efficient way to drive the reaction, could save the fertilizer industry millions of dollars on plat-

inum catalysts. In the hot field of surface chemical physics, Kroto says, "there's no doubt that Dave King is a leading scientist."

Culture change

King hasn't forsaken his thriving research career. He works 4 days a week here in a stark room (bare walls, empty bookshelves) at the Department of Trade and Industry's Office of Science and Technology before decamping to Cambridge to spend Fridays with his research team. "When I took this job," he says, "I made it a condition that I could keep doing research."

King has inherited a hot seat in the science adviser post. In the last several months, uncertainties over health risks posed by bovine spongiform encephalopathy (BSE), genetically modified crops, the measles-mumps-rubella vaccine, and depleted uranium armaments have dominated in the newspapers—issues all overtaken by the grim vigil on the foot-and-mouth disease outbreak. In this unsettling context, King says, "science has hardly been out of the news." The string of crises has posed a huge challenge, he says: "The single biggest problem is public confidence in science."

Part of the solution is ensuring greater transparency in the way policy-makers take scientific advice, King argues. He describes the recent Phillips Commission report on the government's fumbling of the BSE crisis as "an invaluable audit" and gives May credit for having anticipated many of the report's recommendations: "He could clearly see what needed to be done in response" to the fiasco. In the past, King says, his predecessors and each ministry's chief scientist were discouraged from being forthcoming about risks, no matter how negligible, posed by new technologies. The new policy, King says, is that "you have to come straight out with it and say what you know about the risks ... and what your decisions are and why you took those decisions."

King holds up the 1-year-old Food Standards Agency as the "flagship" effort to change the culture within the government. By holding meetings in public and posting minutes to the Web, he says, the agency "is spearheading this whole notion of engaging with the public in the decision-making process." But although everyone across government has bought into this idea, he claims, "it takes quite a while before people actually behave, on each occasion, according to the new culture." An important part of his job, he says, will be to ensure that this culture change takes hold: "I'm keeping a very watchful eye on it."

Among his core constituents, a preeminent concern is salaries. Not surprisingly, King, a former president of the Association of University Teachers, believes these must be raised. "When we advertise a top position in a top university in the U.K., we ought to judge whether salaries are being paid properly by looking at the people who apply," he says. King concludes that many departments are failing to attract the best applicants and says he will fight to double top salaries. (The salary scale for university lecturers—comparable to assistant and associate professors in the United States—currently tops out at just under 40,000 pounds a year, or $57,000). But all levels of scientists are underpaid, he insists. As a former department head, King says, "one of the most upsetting things for me was year after year watching the brightest crop of graduating students not going into careers in science" but opting instead for high-salary careers in finance, for example.

King promises that his initiation into the world of British science policy "won't last much longer." One of his main priorities after the election, he says, will be to shore up energy research, from biomass to fusion. "We need ... to be working very, very hard on future energy scenarios," he says.

Observers are watching to see how King's tenure will differ from May's. Although both grew up outside the United Kingdom, each brings to the table entirely different people skills. "Bob May is the outback Australian," says Gibson, a former colleague of King's at the University of East Anglia, "whereas Dave is more the smooth, sherry-drinking type, although he tells me he doesn't drink sherry now." That King has managed to sustain this illusion is another sign that, as a student of surfaces, he should easily grasp the contours of the political world as well.

–KIRSTIE URQUHART AND ANDREW WATSON

Andrew Watson writes from Norwich, U.K.

CONDENSED-MATTER PHYSICS

Doing the Bose Nova With Your Main Squeeze

In Bose-Einstein condensates, dancing atoms merge into a chorus line. Now physicists are teaching them some new steps

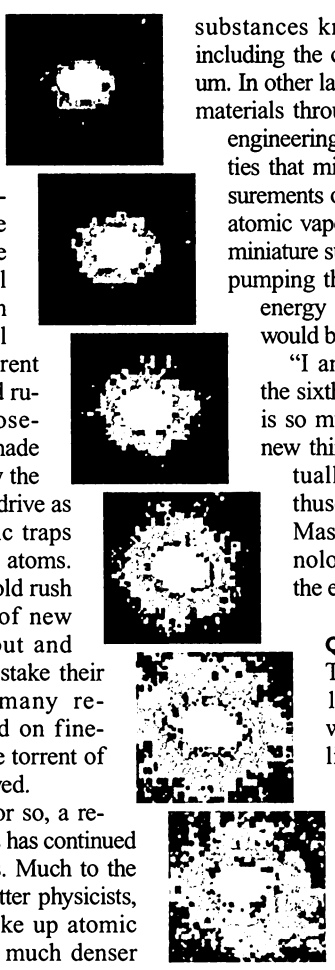
Six years ago, researchers in Boulder, Colorado, hit the physics jackpot when they created a new state of matter. By trapping a wisp of rubidium atoms and cooling them to a few hundred billionths of a degree above absolute zero, the physicists managed to get all the atoms to lock together in one quantum mechanical state—as uniform and coherent as a single particle. The frigid rubidium vapor, the first Bose-Einstein condensate (BEC) made out of an atomic vapor, threw the physics community into overdrive as labs raced to build magnetic traps and create colder and colder atoms. Since then, the condensate gold rush has slowed as easy veins of new physics ore were mined out and fewer physicists came in to stake their claims. More recently, many researchers have concentrated on fine-tuning their gadgetry, and the torrent of preprints and papers has slowed.

Yet within the past year or so, a remarkably diverse set of results has continued to amaze the atom wranglers. Much to the satisfaction of condensed-matter physicists, the tenuous vapors that make up atomic BECs turn out to resemble much denser substances known as quantum fluids—including the classic superfluid, liquid helium. In other labs, researchers are putting the materials through some weird contortions: engineering them with quantum properties that might lead to ultraprecise measurements of distance or time; imploding atomic vapors at will to create a kind of miniature supernova or "Bose nova"; and pumping their atoms so full of internal energy that less uniform substances would be instantly destroyed.

"I am truly amazed that even in the sixth year of BEC research, there is so much excitement and so many new things happening, both conceptually and experimentally," enthuses Wolfgang Ketterle of the Massachusetts Institute of Technology (MIT), leader of one of the early groups to achieve BEC.

Quantum fluid tricks

The history of BECs began in 1937, when Pyotr Kapitsa, working in Moscow, cooled liquid helium below its 4.2-kelvin boiling point and discovered an astonishing



Star quality. Collapsing rubidium-85 condensate ends with a burst like a tiny supernova.

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