

convert universities into semi-autonomous 'agencies' is being presented as an attempt to introduce more efficiency, accountability and cost-effectiveness. But the real drive behind this proposal is merely a shallow attempt by politicians to reduce, on paper, the number of government employees by removing university staff from the official government payroll, while taxpayers will continue to foot the bills.

Japan's best scientists will no doubt soldier on, making significant contributions to science in the face of adversity. Their situation, however, will only improve if scientists themselves join together to form more effective bodies to lobby the government and to build greater public awareness and under-

standing of science. They also need to make far greater efforts to bring about much-needed reform within their own institutions.

Some small steps in this direction have been taken. Early last year, for example, Earth, marine and atmospheric scientists from various departments at the University of Tokyo linked up to create a new interdisciplinary regrouping of departments. The new arrangements were then opened to external comment and review by a team of foreign and Japanese scientists.

Only through such grassroots activity by scientists themselves can there be hope for significant improvement in the working environment of Japanese scientists in the new millennium.

David Swinbanks

## 'I have reported on astonishing achievements in times of hardship'



Alison Abbott is senior European correspondent for *Nature*, and has been based in Munich since 1992.

### Munich

I seem to have spent much of my seven years as *Nature's* Munich correspondent reporting depressing news of recession, budget cuts, broken political promises and disappointed scientific hopes.

Certainly all the European science organizations, including the European Southern Observatory (ESO), the European Laboratory for Particle Physics (CERN), the European Molecular Biology Laboratory and

the European Space Agency (ESA) have seen their budgets fall in real terms during these years. And the erosion of research budgets in Germany, Italy and neighbouring countries have confirmed the fickleness of political promises.

But I have also reported on astonishing achievements in times of hardship. For example, CERN is building the Large Hadron Collider, which will be the world's most powerful particle accelerator when it begins the search for the Higgs boson in 2005.

ESO's Very Large Telescope, now being built atop a remote mountain in northern Chile, will be the world's largest and most advanced optical telescope when it becomes fully operational in 2003. ESA, despite its clipped wings, has launched several important scientific missions, including the X-ray satellite XMM launched just before the end of the millennium. Unfortunately, no such grand visions are pushing the frontiers

in the life sciences, where investment is sadly lacking both in Germany and Italy.

But the greatest achievement that I have witnessed has been the rebuilding of research in east Germany after reunification (see *Nature* 401, 635; 1999). This has been more than just watching buildings sprout up among the *Plattenbau* (concrete apartment and office blocks). It has also been about watching the complex social readjustments within the east German scientific community, which had lost so much during the last ideologically and financially bankrupt years of communism.

Many scientists lost even more following reunification. More than half lost their jobs,

and most of those who did not found themselves working for west German research directors. Few could seek refuge in a sense of injustice, as personal restrictions and material shortages were immediately replaced by freedom and plenty, courtesy of the west. Even those most deeply humiliated by the west German take-over admit to its historical inevitability, even necessity.

Interviewing in east Germany has always been a poignant experience, leaving feelings of both optimism and sadness, and a vague guilt for my luck at having been born in peacetime and on the right side of the Iron Curtain. The saddest story I covered concerned the suicide of an east German professor who was cleared of abusing communist party connections to the detriment of his colleagues — but only after his job had been given to someone else.

The most frustrating stories to unravel have been those on the restructuring of a reunited Berlin, for which the western side of the city paid a high price. It was hard to feel too sorry for west Berlin scientists, who had been kept in relative luxury — sometimes indolence — by subsidies that vanished when the city lost its island status, and who were forced to share their bounty with their new colleagues in the east.

Interviewing in Berlin was exhausting, as both sides of the divide expressed their deep frustration, or even anger, with gusto, wearing their mutual antipathy and lack of understanding with pride.

In the relative calm that now prevails, it is clear that east Germany has gained much more than it has lost from post-communist restructuring. So has west Germany, in that cash shortages have forced it to become more competitive.

Further east, the balance is less clear-cut.



Walls came tumbling down: the reunification of Germany led to a short, sharp shock for east German scientists, but the whole country's science has emerged the better for it.

Central and eastern European countries, waiting hopefully in line for membership of the European Union, have been through much the same as east Germany. The structures of the old academies have been replaced, for example, and new university laws have been approved.

But without the cash injection that east Germany enjoyed, progress has been slow. Moreover, the passive mentality bequeathed by decades of communism seems to be harder to shift without the short, sharp shock experienced in east Germany.

Most depressing has been the failure of Italy, with its long and admirable scientific tradition, to reform its scientific structures to curb the power of the *baroni*, as powerful professors are known, and let a competitive and meritocratic system flourish.

Opportunities that opened up with the demise of the corrupt Christian Democrat governments in the mid-1990s were grabbed only half-heartedly, and the mystery of Italy's introspective stagnation continues, along with the mystery of its occasional successes.

Alison Abbott

## 'If knowledge is king, we may need a republican revolution'



London

Last month, more than 300 years after the philosopher Francis Bacon coined the phrase 'knowledge is power', a British cabinet minister came up with an even stronger aphorism. In the years ahead, he said, "knowledge will be king".

David Dickson has been news editor of *Nature* since 1993, and was its Washington correspondent in 1978–82.

The steady growth in the importance of science over the past decade — and the unprecedented growth in science budgets over the past 50 years — confirms this statement, and the way in which it sets a theme for the next millennium.

Some scientists will, no doubt, continue to claim well into the next century that they are failing to receive the recognition they deserve. But, with politicians and economists committed to the expansion of a global knowledge economy, there is ample evidence that any remaining financial restrictions are more the result of economic constraints than a lack of political (or popular) will.

Yet the 'regal' power bestowed on science has its dangers. Some, as Declan Butler points out above (see page 6), feel that the authority it appears to provide — particularly to those grasping for platforms of apparent certainty in an uncertain world — is misguided at best and tragic at worst.

One constant theme of the news pages of *Nature* over the past decade has been the unedifying sight of politicians trying to wriggle off the hook on which they have impaled themselves by a commitment to the 'guaranteed' safety of processes and products. Examples range from the storage of nuclear waste to beef contaminated with bovine spongiform encephalopathy.

Scientists often distance themselves from such guarantees; they are the first to recognize that scientific 'truth' is approximate and transitory. The problem has come not from the respect that scientific knowledge deserves, but from the 'absolute' authority it can be given in a political context.

Or take the issue of knowledge as intellectual property. Before coming to *Nature*, I had little idea of what a patent was, and even less of its implications. Since then, I have covered stories ranging from the Supreme Court's key decision in the early 1980s that life can be patented, to recent disputes over the rights to the enzyme *Taq* polymerase.

A glance at this week's news pages, with separate stories about patents on high-temperature superconductors, on plants and on genes, will confirm how far science's evolution from public knowledge into an essentially private commodity has penetrated to the core of the scientific enterprise.

The dominant theme of this coverage is not the legitimacy of the patent system, acknowledged in the US constitution as an appropriate way of rewarding inventors,

including scientists. Rather it is the way in which the power given to an inventor is used, and the danger of it being used in an absolutist fashion.

### The rights to life

In principle, patents were meant to ensure that individuals shared their inventions for an appropriate reward, and in most cases this is what happens. But much of our news coverage has, by its nature, highlighted allegations of this reward being wrongly claimed (as in the recent court disputes over *Taq* or human growth hormone), too greedily pursued or too aggressively exercised.

Directly related to this is the increasing reluctance of scientists to share data on the grounds that it is potentially profitable — but only if patented. A footnote to a recent press release from a leading US genome-sequencing company puts it eloquently when it warns that one risk to its business prospects is the "adverse effect of public disclosure of genomic sequence data".

There is, of course, no room for populism in science — the spectre of creationism shows this. Nor can science be democratic in the political sense. The quality of a scientific idea is not measured by the number of votes it is able to gather, even in the scientific community; it can only be judged by a rigorous peer-review process with its own tested rules of procedure.

But the authority that this process gives to science can be used or abused. Used responsibly, it offers the prospect of a healthier, better-fed and more prosperous world — hopefully the prospect opening before us. Used irresponsibly, it can increase the control of the powerful over the powerless, and widen the gap between haves and the have-nots.

If science has, indeed, become 'king', it may be time for a truly republican revolution. And perhaps the opening of a new millennium is an appropriate setting for such an event.

David Dickson



Private property? Protesting against the patenting of cloned animals.