
R. DEPARDON/MAGNUM PHOTOS

# SCALING THE WALL

The collapse of communism opened up the world to scientists from eastern Europe. **Quirin Schiermier** talks to researchers about what changed.

On the 9 November 1989, the lights were out early for Pavel Jungwirth. Jungwirth had recently graduated from Charles University in Prague, Czechoslovakia, and he was hoping eventually to pursue a PhD in physics. But his plans had been interrupted when he was drafted into the army, and for now he was quartered in barracks outside the city. With a 10 p.m. curfew, Jungwirth had little opportunity to watch the historic spectacle that was captivating audiences around the world, as an ecstatic crowd breached the Berlin wall.

That year, Soviet-controlled communist governments throughout central and eastern Europe had been stumbling in a historic chain reaction. In May, Hungary had begun to dismantle the Iron Curtain. In June, the Polish anti-communist Solidarity party led by shipyard worker Lech Wałęsa had won by a landslide in free elections. But for many, the most powerful symbol of communism's collapse was on the November day when East Germany's rulers surrendered to weeks of peaceful rebellion by its citizens and announced that people from East Berlin could pass through the formidable barrier that had divided the city since 1961.

One of those watching the events on her family television was Alicja Józkowicz, a 22-year old then studying zoology at the Jagiellonian University in Kraków, Poland. "It was a very emotional moment," she says. Like Jungwirth, Józkowicz was set on becoming a scientist. The drama unfolding on the screen made her realize, she says, "it would change my professional opportunities".

Neither Jungwirth nor Józkowicz could anticipate how dramatically their professions would change. The region's political transformation meant that universities and research institutes that had been isolated from international science were now expected to take part in it. Some researchers found this a formidable challenge, grappling for the first time with having to publish their work and compete for funding. But many others, such as Jungwirth, Józkowicz and a generation of eastern European students who in 1989 were embarking on a career in science, saw it as an opportunity. These researchers soon became a common sight at labs in western Europe and North America, and many of them have gone on to establish competitive laboratories.

"Compared with 1989, our academic community is profoundly different — inspiring, self-confident and international."
— Alicja Józkowicz

"I consider it a small miracle that within the past 20 years sprouts of excellence have grown in my country," says Jungwirth, who now runs a chemistry laboratory in Prague. "Compared with 1989, our academic community is profoundly different — inspiring, self-confident and international." Józkowicz, now a group leader in the Department of Medical Biotechnology at Jagiellonian University, agrees: "Personally I have a feeling I am a rightful member of an international society of scientists."

## Lost tradition

Yet something could have been lost in the internationalization of eastern Europe, says Wolf Lepenies, a sociologist and former director of the Institute of Advanced Study in Berlin. When he and others used to visit the East, "institutions were poor, instruments were lacking, but intellectual traditions had prevailed that we had barely taken notice of", he says. "Debates were conducted with an earnestness and a responsibility that were largely unfamiliar to us." Lepenies says that the 'we will help you' approach that western Europe has often used in its interactions with the East carries a whiff of condescension. "Eastern Europe is a good place to shake the complacency of the West," he says. "'We need each other!' would have been a more appropriate guideline."

Jungwirth's family expected him to study science. His father, a physicist himself, went frequently to Novosibirsk, a strong centre of Soviet physics and chemistry, and he would years later become a vice-president of the Academy of Sciences of the Czech Republic in Prague. But in 1970, Jungwirth's father was kicked out of the Communist Party because of his open disagreement with the 1968 Soviet occupation. This stance affected his son's plans. Jungwirth had hoped to study medicine, but according to an unwritten rule, children of politically unreliable citizens should not enrol in subjects through which they might exert an undue influence on people. Medicine was one such discipline.

Jungwirth instead opted for physics, which was considered socially neutral. As a student, he followed the 1989 political events with eager anticipation. When writing his diploma thesis he had access to a computer and a printer — a rarity in a country where the few functioning photocopiers were rigidly controlled for fear of dissident activity. Some like-minded friends asked him to print copies of a letter they had written in support of Václav Havel, the playwright and essayist who had become the political figurehead of the anti-communist movement and had been taken into custody. Jungwirth helped them out, but a copy of the letter fell into the wrong hands and he was summoned to the dean. "I thought 'that's it, I'm out'," he says. He faced the dean over a massive rosewood desk surrounded by insignia of communism and the portrait of the Czech party leader Gustáv Husák. Then something unexpected happened. After lecturing him for a minute or two, the dean crumpled up the ill-fated letter and flung it into a corner of his study. Perestroika, Jungwirth thought, had definitely arrived in Prague.

By November, huge momentum was building for Havel's 'Velvet Revolution' and a student rebellion had expanded into a nationwide general strike. On 25 November, Jungwirth slipped out of the barracks to join the millions shouting for freedom on the streets of Prague. Husák resigned on 10 December, paving the way for democracy, and on 29 December Havel was installed as the new President of Czechoslovakia.

Jungwirth switched from military to civil duty as soon as this option was made possible in 1990 and resumed his studies a year later. He was interested in atmospheric chemistry and, at the J. Heyrovský Institute of Physical Chemistry in Prague, started putting together molecular simulations of hydrophobic molecules such as methane. Soon he was embarking on his long-awaited PhD.

## Shades of grey

During Józkowicz's school years in Kraków in the 1980s, the Western world and Western science seemed unimaginably far away. "I never even dreamed of going there," she says. "I remember my childhood and youth as a time when everything was grey, and each year things just seemed to get worse," she says. "The stores were empty all the time."

Józkowicz was curious about the natural world and she remembers her science teachers — and textbooks — as being excellent. "Much better actually than the science education my son is getting now," she says. The high standard of science education was true of many eastern European countries.

Józkowicz was aware early on of the Solidarity movement that began in the early 1980s and that was to become the nucleus for political changes in Poland. Solidarity, led by Wałęsa and the first independent trade union in the Soviet-controlled Eastern bloc, quickly turned into an openly anti-communist political and social movement supported by millions of Poles. For Józkowicz, the most significant time was when Solidarity was elected and Tadeusz Mazowiecki became prime minister. "We really felt that a new era was about to begin," she says.

Lech Wałęsa founded the Polish Solidarity party that won free elections in 1989.

A. KEPLICZ/AP PHOTO

But when capitalism eventually arrived in Poland it also brought problems, as it did in other countries. The political and intellectual freedom was invigorating but, at least in the early days, disillusionment was never far behind. "The stores filled up," she says. "But salaries dropped just as quickly."

Scientists found the transition particularly harsh. Until that time their research money had been guaranteed by the government. With the collapse of communism, many countries were close to bankrupt and science funding dropped abruptly to almost zero. It was impossible in the early years for most scientists to make a living without getting second jobs, and many gave up altogether.

Those who managed to hold onto their labs could travel freely to other countries for the first time, meet their counterparts there and begin to integrate with the international scientific community. But this came with tough international competition and new codes of conduct. Conferences were rare, peer review was unknown, and few researchers spoke English. Many developed something of an inferiority complex. The national science academies, which operate hundreds of basic-research institutes throughout central and eastern Europe, today have a disproportionate number of members close to or above the age of retirement who have continued to pursue their research and have domestic influence but have never really entered the international science arena.

Jungwirth and other young scientists, though, had little to lose. Pitifully low salaries, poorly equipped labs and a lack of grant money quickly led to thousands of mainly


The anti-communist movement led to the 1989 election of Václav Havel as Czechoslovakia's President.

AP PHOTO

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young scientists leaving for the West. Jungwirth was lucky: his PhD supervisor, chemist Rudolf Zahradník, had good contacts and used them to send Jungwirth to Switzerland in 1992. He spent a year there working with Thomas Bally at the University of Fribourg, where his 3,000 Swiss-franc (US$2,290) monthly salary made him feel "rich beyond measure". (During his PhD Jungwirth also became casual acquaintances with another former PhD student of Zahradník's, Angela Merkel).

Later, Jungwirth worked as a postdoc for a few months at the Hebrew University of Jerusalem in Israel and at the University of California, Irvine, with the same supervisor, Benny Gerber. He became interested in computational modelling of atmospheric chemistry. "In Switzerland, and later in the United States, I saw that scientists acquired positions because they knew something, not because they knew somebody," says Jungwirth. He was impressed by how his supervisor "developed new methods in amazing outbursts of creativity. I felt on top of the world."

Józkowicz was also learning about science abroad. Her first international meeting — the 1991 world immunology congress in Budapest — was a shock. Not only did she realize that she could hardly understand the English-language talks, she also found that her group's science was hopelessly behind. She had recently started a PhD comparing the amphibian immune system to those of mammalian species in the department of evolutionary immunology at Jagiellonian University. "Our research was completely outside the mainstream," she says. "Worse, the methods we used were just totally outdated." Her lab had no cell sorters and only the most basic molecular-biology apparatus and microscopes.

Józkowicz realized that she needed to change direction. She started to learn English intensively and decided that as soon as she had completed her PhD she would switch from zoology to medicine. She did this in 1996, moving to the Department of Clinical Biochemistry in the medical school at Jagiellonian University. She studied the control of blood-vessel growth — angiogenesis — by the gas nitric oxide. But she was still not happy with the pace at which things were improving.

In Poland, as in other countries, grant systems for science were being established and foreign aid and philanthropic aid were providing some relief. In 1992, for example, Hungarian-born billionaire George Soros founded the International Science Foundation, which provided emergency grants to more than 20,000 researchers across eastern Europe. In Poland, grants were provided by the Warsaw-based Ministry of Science and Higher Education and Foundation for Polish Science. But individual grants were still small, modern equipment remained mostly unaffordable and Józkowicz felt that Polish science generally lacked international flair and recognition.

P. KRALIK; COURTESY OF P. JUNGWIRTH

**From army to lab: Pavel Jungwirth now runs a chemistry group in Prague.**

An opportunity presented itself in 1997 when a poster of hers on *in vitro* gene therapy was shown at a congress in Germany. Diabetes researcher Lawrence Chan of the Baylor College of Medicine in Houston, Texas, noticed it and invited her to join his group for a year. Four weeks later she landed in Houston, leaving behind her husband and six-year-old son. She threw herself into her work. "I felt painfully lonely," she says.

## Culture shock

Texas was quite an experience for the then 30-year-old, now officially a postdoc (a job term that at the time hadn't been much used in eastern Europe). Józkowicz found the style with which Chan ran his 40-strong research team inspiring. "Each postdoc got a gene, human, mouse or monkey, to work on, and within one week of their arrival everybody was busy doing experiments and producing results," she says. Józkowicz got mice, and her experiments with them identified a way to perform gene therapy that protected against atherosclerosis for the animal's lifetime. It was to become her most cited paper[1]. "The year with Chan taught me what real teamwork can achieve — it was really the first crucial step in my development." She later signed up for three years of postdoctoral research at the Medical University of Vienna.

## Heading home

Many scientists from eastern Europe choose to stay in their native countries — or return to them — even though salaries there are often much lower and the labs are less-generously funded than those in western Europe, the United States or other areas (see page 682).

Deep personal attachment to home is one of the reasons. Another is tradition. Under communist rule, many scientists spent their entire career in the same lab. The mobility of researchers has greatly increased since, but students and scientists from the region are still more reluctant to change labs, or spend time abroad, than those from China, western Europe and the United States.

In the United Kingdom and Denmark, for example, nearly 10% of the science and technology workforce changed jobs in 2005; the figure for most eastern European countries is less than half that.

On the flip side, only a few universities and institutes in eastern Europe are capable of attracting foreign scientists. In Poland, the International Institute of Molecular and Cell Biology in Warsaw is one such example. The best institutes run by the national science academies in Poland, Hungary and the Czech Republic also employ foreign talent, particularly from Germany, but senior-level North American or Asian researchers are still a rare sight in labs in eastern Europe.

Some researchers think that eastern European scientists' preference to stay at home is sometimes too pronounced — and it may be one reason that academic institutions in these countries struggle to compete on the international stage.

Only five universities in the region — Charles University in Prague, the University of Szeged in Budapest, the University of Ljubljana in Slovenia, Poland's University of Warsaw and Jagiellonian University in Kraków — are ranked among the world's top 500 by an often-cited academic ranking drawn up by China's Jiao Tong University in Shanghai. The other reasons are many: across the region, public expenditure on science is notably below the European Union average, and industrial research capacities are generally underdeveloped (see graphic, page 590). Moreover, the region is under-resourced when it comes to large research infrastructures such as synchrotron machines, super-computers and particle accelerators. **Q.S.**

M. JÓZKOWICZ

J. DULAK

1980s to 2000s: Alicja Józkowicz took postdocs abroad to pursue biomedical research.

Just as Józkowicz was leaving home, Jungwirth was returning. Like many young scientists who had taken the opportunity to leave eastern Europe, he decided to go back there (see 'Heading home'). In 1995 he took up a group-leader position in his native country — by this time the Czech Republic after its split with Slovakia — at the Institute of Organic Chemistry and Biochemistry of the Academy of Sciences of the Czech Republic in Prague.

With the help of a 200,000-Deutschmark (US$143,000) grant from the German Volkswagen Foundation, Jungwirth was able to quickly establish a reasonably competitive group. He also secured grants from the US National Science Foundation in Arlington, Virginia, and the North Atlantic Treaty Organization (NATO) Science Programme in Brussels. "Buying serious equipment was still out of the question," Jungwirth says. "But the students were excellent and the computers were just fine." As a theorist, computers were the main thing he needed and Jungwirth started to establish a reputation with his molecular models[2].

Over time Jungwirth started to feel that things were getting better. The Czech government invested relatively generously in science, and the Academy of Sciences was less resistant to reform than its counterparts in some other countries. Jungwirth expanded his research interests. By the late 1990s he was exploring atmospheric chemistry, simulating ions such as chloride at aqueous surfaces to try to work out how they could react with ozone and other pollutants[3]. He also ventured into biology, studying how salt ions influence the properties of proteins[4]. "I had a lot of luck," he says. "The timing was just right. I see many people 5–10 years older than me who are now in a much worse situation."

In 2003, Józkowicz returned home too — to Kraków, where her son had just celebrated his twelfth birthday. She had maintained a formal affiliation with Jagiellonian University, and was eager to teach a group of her own the new methods and styles she had learned abroad.

But although the world had been changing, Polish academic circles had not. For 18 months all her applications for independent funding came to nothing. The academic establishment was still very hierarchical, with advancement based on favouritism rather than merit. Changing labs was — and sometimes still is — considered an act of disloyalty. Józkowicz found that the years spent abroad pretty much debarred her from the national funding system.

Her break came in 2004 when she won a prestigious Central European Senior Research Fellowship worth some £350,000 (US$570,000) awarded by the British Wellcome Trust, which is open to researchers in Estonia, Poland, the Czech Republic and Hungary. The money supported projects aimed, among other things, at studying blood vessels in tumours and during cardiovascular disease.

## Home for good

The grant seemed to make it easier for her to convince Polish grant-givers of the quality of her research and since 2007 she has won funding totalling €330,000 (US$488,000) from the Polish Science Ministry, the Wellcome Trust and from Adamed, a Warsaw-based pharmaceutical company. Her small group — now with access to modern fluorescent microscopes and other equipment — has become the nucleus for Jagiellonian's Department of Medical Biotechnology, created in 2005, where she hopes to receive tenure soon. "My plans?" she says. "Make the most of the new money, produce papers in leading journals — and live in Kraków with my family for the rest of my life."

Some of the region's catch-up has been aided by the expansion of the European Union (EU), which was joined in May 2004 by ten countries, including Poland and the Czech Republic, followed by Bulgaria and Romania in 2007. Józkowicz's department this year received around €6,000,000 from EU structural funding, which is aimed at generating equal living conditions across the EU and can be used to fund research infrastructure and equipment. The university received an extra 45 million zloty (US$16 million) to establish a new Jagiellonian Center for Experimental Therapeutics, due to open later this year. The European Research Council has also begun to make generous grants available to young investigators across Europe.

> "I saw that scientists abroad acquired positions because they knew something, not because they knew somebody."
> — Pavel Jungwirth

Both Jungwirth and Józkowicz believe that the East–West gap will narrow further as old cultural habits die away and scientific borders dissolve. "Don't forget we started from empty walls," says Józkowicz. "But we now have a young and energetic environment for science, with excellent students who are eager to work. I do believe that at least some labs in Poland and elsewhere will very soon become attractive to foreign scientists."

Some of that change is palpable in the attitudes of the scientists that Jungwirth now meets. "Until the turn of the decade or so I could still play the game of coming from a poor country," says Jungwirth. "People had been eager to see us, and keen to help. The feeling of being welcomed with open arms made things a lot easier for us when times were not so good." Not so now, he says, as the history starts to fade from memory: scientists who are starting their PhDs today were born after the Berlin Wall fell. "We cannot say now that we do not publish well," says Józkowicz, "or we do not make valuable research because of 'them' or 'circumstances beyond our control'. I remember that, when I was a teenager, the often repeated sentence was 'in the West it would be obvious or easy but here — forget about it. Never-ever would it be possible in Poland'. And it is possible."

If any further evidence was needed of what is possible for scientists in the Eastern bloc, it was apparent at a party last year in Prague. Jungwirth was attending the 80th birthday of his former supervisor, Zahradník, who served as president of the Czech Academy of Sciences between 1993 and 2001.

Late in the evening a black limo with a German licence plate pulled up. Merkel, now the German Chancellor, had spontaneously decided to come down from Berlin to congratulate her aged PhD supervisor. Free from rules of protocol, she chatted the hours away, in fluent Russian, with her science colleagues of old. The word is that it was a good party. ■

**Qurin Schiermier is *Nature*'s Germany correspondent.**

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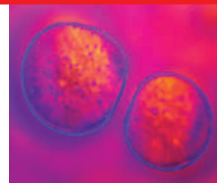
**For more on eastern Europe, see http://tinyurl.com/eeurope.**



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**Q&A: MAKING A CELLULAR MENAGERIE**
Caroline Kane talks about a new image library of the cell.
go.nature.com/N9duow

# Jury still out on HIV vaccine results

Some experts see hope in trial findings, but others say that the data do not back up such optimism.

**PARIS**
More than 1,000 researchers in Paris last week rapturously applauded formal results from the largest-ever HIV vaccine trial. In a preliminary announcement in September, the trial, which included 16,402 people in Thailand, was said to show that a vaccine combination reduced the risk of HIV infection by nearly one-third (see *Nature* doi:10.1038/news.2009.947; 2009).

But some scientists are sceptical, arguing that the response of the HIV research community, long deprived of any good news from vaccine trials, is based more on hope than on rigorous science.

K. KASMAUSKI/SCIENCE FACTION/CORBIS

**Infection rates dropped slightly during a large HIV-vaccine trial.**

The US$119-million phase III trial, sponsored by the health ministry of Thailand and the US Army, started in 2003. Half of the recipients served as a control group; the other half were given four shots of ALVAC-HIV, an attenuated canarypox virus carrying HIV genes, and two shots of AIDSVAX, a recombinant form of the gp120 HIV surface protein. The trial's results were published on 20 October to coincide with the AIDS vaccine meeting in Paris (S. Rerks-Ngarm *et al. N. Engl. J. Med.* doi:10.1056/NEJMoa0908492; 2009).

The results are a "milestone in HIV vaccine research", says first author Supachai Rerks-Ngarm, of the Thai Ministry of Public Health.

"Because the history of preventive interventions against HIV has been so poor, the HIV research community has seized on this," counters Peter Smith, a tropical epidemiologist at the London School of Hygiene & Tropical Medicine. "There is not much evidence from the data that it protects at all."

The trial was set up to measure the number of people in each group who became infected with HIV, and the amount of the virus that was circulating in the blood (the viral load) of those who became infected during the trial.

The teams analysed infection rates in three ways (see table). Two of those methods (known as intention to treat (ITT) and per-protocol) found a 26% drop — not statistically significant — in infection rates in the vaccine group compared with the control group. The third method (mITT), the only one presented on 24 September, excluded participants who had contracted HIV between the time they enrolled in the trial and their first vaccination. In this analysis, the reduction between the vaccine and control group infections was 31%, which just scraped into statistical significance.

This showed that statistical significance was highly dependent on whether very small numbers of individuals were excluded from either group. The small numbers of infected individuals in the trial — 132 across both groups — also meant that none of the subgroup analyses was statistically significant.

The ITT analysis is generally considered the main yardstick of the outcome of drug clinical trials, although an mITT analysis is acceptable if agreed by independent experts. For vaccine trials, the per-protocol analysis — in which patients are excluded if they don't strictly adhere to the vaccine schedule — is the most valid, says Adel Mahmoud, former president of Merck Vaccines and now a molecular biologist at Princeton University in New Jersey.

"The results of this trial should be treated with caution and some scepticism," says Tim Peto, a researcher in tropical diseases and clinical medicine at the University of Oxford, UK. "My view is that a more balanced interpretation of the data is that the results show some evidence that the vaccine might be effective and that, unlike previous vaccine studies, this study cannot clearly rule out that the vaccine is ineffective."

Nelson Michael, a researcher at the Walter Reed Army Institute of Research in Silver Spring, Maryland, and director of the US Military HIV Research Program, which co-organized the trial, argues that including people who didn't stick to their shots reflects a real-world vaccination scenario, and that excluding those who were HIV-positive before the trial began was justified.

The trial also failed to detect any difference between the viral load in the two cohorts. Mahmoud calls this "very, very disturbing", because an effective vaccine would be expected to at least reduce the viral load in people who become infected. However, Michael suggests that this finding might still prompt new vaccine leads, and that scientists should see whether they can uncover the immunological origin of any possible vaccine protection.

Dan Barouch, a HIV vaccine researcher at Harvard University in Cambridge, Massachusetts, says that the results are ultimately positive. "We don't understand why we saw the protection that we did, and the results are only modest, but nevertheless the Thai trial provides the first evidence of vaccine protection in humans," he says.

"Everyone is saying let's try to have hope, and this is a hope that the results mean something," says Mahmoud. "But raising expectations with no fundamental scientific base is dangerous." ■

**Declan Butler**

**See Editorial, page 1174.**

**ONE TRIAL, THREE METHODS, THREE RESULTS**

| Method of analysis | Number of patients | Patients who became infected rate in treated *vs* control group | Reduction in infection |
|---|---|---|---|
| Intention to treat | 16,402 | 56 *vs* 76 | 26.4% |
| Per protocol* | 12,542 | 36 *vs* 50 | 26.2% |
| Modified intention to treat† | 16,395 | 51 *vs* 74 | 31.2% |

*Analysis excluded participants who failed to strictly adhere to the trial protocols, such as the calendar of vaccinations. †Analysis excluded participants who contracted HIV between the time they enrolled in the trial and their first vaccination.

**Correction**
The News Feature 'Scaling the wall' (*Nature* **461,** 586–589; 2009) incorrectly located the University of Szeged in Budapest, Hungary. It is, of course, in Szeged.