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A voyage through the new Member States

Hungary and the Czech Republic



Philippe Busquin
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Editorial

European cultural capital in 2004, Genoa was the capital of scientific culture for two days. On 22 and 23 March, scientists welcomed the opportunity to come face-to-face with philosophers, artists, journalists and members of the general public to discuss the impact of developments in modern biology on society and on the latter's most human dimension: culture (see page 28). A few days previously, the Commission had co-organised a meeting in Paris between scientists and representatives of science museums to look at the various ways climate change is being communicated. Three strong messages emerged from these two almost simultaneous meetings.

The first is an awareness that the development

The Genoa debates

of scientific culture is not a matter of knowledge alone. It is also a question of dialogue. The Anglo-Saxon notion of the 'public understanding of science' is being replaced increasingly by that of 'public engagement'. Writing recently in UK broadsheet *The Guardian*, Steven Rose invoked the 'scientists' understanding of the public'. The public is discovering to its pleasure that science can be interactive and central to the notion of citizenship. Was Talking science not the title of a previous edition of RTD info?

The second message is that the scientists involved in these events proved to be excellent 'players'. Contrary to the cliché of the scientist as the poor and reluctant communicator, experience showed that, when the conditions are well defined, researchers are able to present their results in a very

convivial fashion. But, of course, why wouldn't they be able to?

Finally, the public expressed a keen interest in these initiatives – and want to see more of them. In Paris, for example, the representatives of museums expressed their satisfaction but also a certain frustration. The exhibitions on climate warming attracted a large number of visitors, many of them wanting to explore the subject further and with a lot of questions on their mind: 'What can we do?', 'What should we do?' In short, a motivated, active and responsible public.

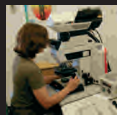
Three messages then, which we are pleased to see, belie the usual stereotypes. ■

FEATURE

Enlargement

Excellence in the Czech Republic and Hungary

Although Union enlargement took effect on 1 May 2004, the new Member States were participating in European research programmes long before that fateful day. *RTD info* brings you the first in a series of reports from Centres of Excellence, laboratories and universities in these countries. We kick off with the Czech Republic and Hungary.



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How do Europeans' see the present and what do they expect from the future? Do they believe in politics and do they trust politicians? Which causes will they take up and in what way? The European Social Survey (ESS) sheds some light on these important questions.



Interview

18 Doubling EU research investment

The European Commission is proposing a doubling of the Union's research budget for the 2007-13 period. This major increase is to support the objectives of the Lisbon strategy aimed at establishing an effective knowledge-based Europe in terms of growth, competitiveness and employment. European Commissioner Philippe Busquin explains.



Science centres and museums

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Original presentations and themes, an experience which is fun as well as educational, serious content for a demanding public and the financial resources to make it all possible. *RTD info* takes a look at the questions facing the directors of institutions bringing science to the general public.



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Health research

34 The allergy enigma

One in four European children under the age of 10 suffers from an allergy. As our knowledge of the subject improves, this growing phenomenon is becoming the subject of increasingly effective treatment. What exactly causes allergies, nevertheless, continues to be a major headache for researchers.



Portrait

38 De Gennes – in perpetual motion

Pierre-Gilles de Gennes, a Nobel prizewinner in physics, now works on memory neurons and certain aspects of cancer. We chronicle his voyages of scientific discovery through the fields of superconductivity, liquid crystals, polymers, and interfacial science.



European elections

40 A parliament in search of voters

In 1979, at the time of the first elections to the European Parliament, voter turnout in the 'Europe of Ten' stood at two-thirds. But over the past 20 years, the abstention rate has assumed worrying proportions. Researchers in political and social sciences analyse the causes of this rising tide of indifference.

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completed the Ecole normale supérieure with a teaching degree in physics. He is talent-spotted by a manager from the Atomic Energy Commission (CEA) at Saclay. "They sent a limousine to fetch me. There were new buildings, accelerators, atomic piles on every side. I was amazed – active research usually takes place in much less sumptuous surroundings. I signed an engineering contract and got on like a house on fire with the experimental researchers – they were just starting to use neutrons at the time."

Pierre-Gilles de Gennes spent two years at the CEA, working on neutron scattering and magnetism. After gaining a doctorate in science, he left for Berkeley where he worked under Charles Kittel, one of the masters of solid physics. 'It felt like we were not doing very much. We spent a lot of time at the pool, but in fact we were working very hard.' Then came the Algerian war and 27 months in the armed forces, part of it undertaking research. ('I learned to delve into subjects far removed from my initial interests, which I would never have studied otherwise, for example, marine sciences.')

Back on civvy street, Pierre-Gilles de Gennes' career moved into higher gear. In the early sixties he found himself lecturing on quantum mechanics at the new Orsay faculty. Very soon he became fascinated by a subject that had just caused an upheaval in the world of physics – superconductivity, a phenomenon identified by the Dutch physicist Kammerlingh Onnes half a century earlier, but still unexplained. We created an experimental group and persuaded another team to put together a theoretical research unit and cooperate with us. We all worked together in a very collegial manner with most of the scientific communications appearing under the common signature of the Orsay Superconductivity Group. We did not define a thesis subject for each researcher, but our entire pool of experimental researchers worked in a single research area which we then split up, as necessary, into different areas, giving us very valuable flexibility.

Liquid crystals and tangled polymers

This chapter came to an end four years later. New advances – theoretical and applied – in low temperature superconductivity were slowing. De Gennes' Orsay researchers switched direction to liquid crystals. The experimental dynamism resurfaced and seven teams from the faculty (optics, nuclear resonance, defect research, chemistry, X-rays, hydrodynamics and

the theoreticians) decided to pool their specific knowledge to form a liquid crystals group. This research contributed several important advances on the road to liquid crystal screens, including those developed a few years later by the Thomson company. Our big mistake was failing to concern ourselves with the applications. In those days research was well funded and we gave little thought to patenting our findings.

After this, Pierre-Gilles de Gennes went on to work in polymer physics. Taking advantage of synergies between the Collège de France, which he had just entered, and researchers from Saclay and Strasbourg (the Strasacol Group), he set up a team to focus on molten polymers.

“ In Latin countries, there is a tendency to believe that theory governs the universe. I totally disagree. Contact with reality is vital. It is only then, after careful reflection, that one tries to explain. ”

'These polymeric chains look like a mass of spaghetti. We wanted to understand how these chains become tangled and untangled in a process that I named reptation, from the way snakes interweave. Our work shed new light on the rheological mechanics of polymers, their plasticity and elasticity and their response to constraints, for example, in the weaving of synthetic textiles.'

For de Gennes, the field of 'plastics' represents an exemplary mixture of physics and chemistry, two sciences which 'need to be treated like twin sisters'. His enthusiasm was confirmed when, in 1976, he was asked to head up an institute combining the two sciences, l'Ecole supérieure de physique et de chimie industrielle (ESPCI) in Paris, which trains research engineers.

The usefulness of Nobel Prizes

The new boss had his own wish list. For years he fought to modernise the ESPCI and to

teach more avant-garde fields. The decisive moment came when he was awarded the Nobel Prize for Physics in 1991 for his research into 'phenomena of order in simple systems which can be generalised to more complex forms of matter, and in particular for liquid crystals and polymers'.

So the Nobel Prize was important after all? 'Of minor importance,' de Gennes replies, with a dismissive sweep of his hand, jokingly or out of coquetry, while relighting his ever-present cigarillo. What was important was that they finally listened to what I had to say. This has allowed us to introduce a course in biology and, more recently, a masters in bioengineering taught by neurologists, opticians and acoustic scientists. It took two Nobel Prizes, George Charpak's and mine, to get there...

Pierre-Gilles de Gennes has now left the ESPCI – but he has not quit research. As an adviser to the President of the Institut Curie (which runs a hospital and a cancer research institute) he has been working intensively over recent months on memory problems. We know very little about the brain. In fact it's the greatest scientific problem of our time. I became interested in it through my daughter, who is writing a thesis in neurobiology. I get accused of hopping from one subject to another. Other people spend 20 years on the same problem. Both approaches are necessary.

Is there one field in which Pierre-Gilles de Gennes would claim to be an expert? Experts, you know, are often like military people, experts in the past war but not in the next one. ■

Handwritten notes in red ink:

- Two vectors labeled V and v .
- Equation: $x = V \cdot t = V \cdot v^{1/2} \cdot \eta^{1/2}$
- A circled g .
- Equation: $v(z) = V \cdot \ln\left(\frac{z}{z_0}\right) = d \frac{\rho}{\rho_a}$

A parliament in search of voters

The European institutions are often accused of being too distant from the citizens whose lives they increasingly regulate. Yet paradoxically, in most countries people have constantly failed to make the most of the main means at their disposal for influencing these institutions. Will the June 2004 European elections mark a turning point in the increasingly low voter turnout of the past 25 years? We present the results of a socio-political study into the causes of this paradox.

Initially, the level was 'acceptable'. At the time of the first European Parliament elections in 1979, two-thirds of the citizens who made up the then 'Europe of Ten' turned out to vote. The figure would have been even higher were it not for the impact of a UK turnout of just 32%.

The four elections over the subsequent 20 years saw a marked erosion in the number of voters in a majority of countries. In 1999, in what was by then the 'Europe of Fifteen', the turnout dropped to 52%. After correcting this figure by eliminating the Member States where voting is compulsory⁽¹⁾, as well as those where the European elections coincided with a national ballot, which is clearly likely to boost the vote, the 'spontaneous' turnout works out at just 39%.

The turnout has fallen most dramatically in Germany (down 20% against 1979), the Netherlands (down 19%), and France (down 14%). In the United Kingdom, the abstention rate climbed to 76%. Southern Europe nevertheless offers three exceptions to the general pattern: although suffering a slight erosion, turnout in Italy and Greece saw more than seven out of ten voters fulfil their civic duty in the 1999 European elections, while Spain actually saw the turnout increase, from 54% to 64%, in the course of a decade.

Political science researchers from nine countries recently studied this growing disaffection as part of a European project. Richard Sinnott of University College, Dublin (IE), believes that voter turnout depends a great deal on the socio-demographic characteristics of individuals. European elections interest older people and members of a social elite who have had access to education. Abstention is characteristic of the working classes, the less well educated, and young people.'

Behind this crude categorisation, we find the recurrent problem of the difficulty – and weakness – of communication on European integration. Between 20% and 35% of registered voters feel neither concerned by, nor interested in, the Union's future.

Secondly, the image of the European Parliament, of its powers (or lack of powers), and its system of trans-national parties is decidedly confused.

Among the possible remedies, the researchers highlight the scope for improving the dynamism of election campaigns. Elected representatives are often not household names and have few direct contacts with the voters on European issues. The messages which get across to voters, through the media or at meetings, are clearly insufficient.

A second area for action is to enhance the electorate's awareness of its 'European identity'. Studies carried out by the project identified a limited group representing just 15% of voters who said they were 'proud to be European'. This category showed the maximum propensity to vote. A second somewhat larger group is also likely to vote: those who, while being committed primarily to a national identity, nevertheless recognise a secondary allegiance to Europe. A significant section of the population are indifferent to any European identity, and there is a minority of committed opponents who either abstain or vote for candidates clearly expressing this view.

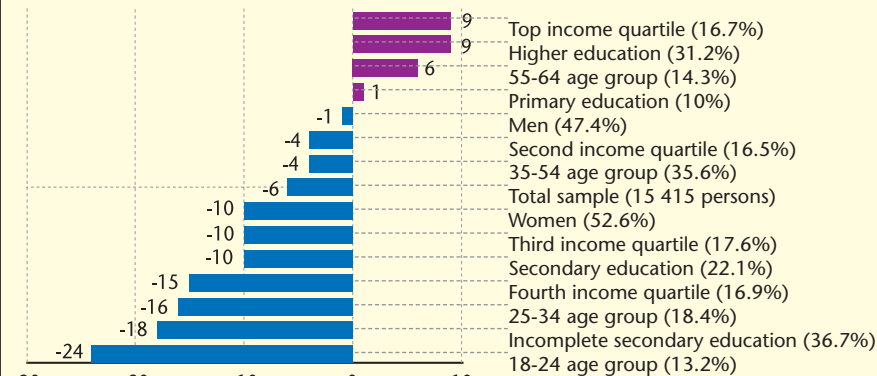
The remaining question is that of electoral logistics which can also have a negative effect on participation. This is the case, for example, for countries where voting takes place on a weekday rather than on a Sunday. Although this is not seen as a handicap for national ballots, it has a very negative effect on a European vote for which the motivation is weaker. ■

To find out more

- Democratic Participation and Political Communication in Systems of Multi-Level Governance
www.ucd.ie/dempart/

(1) Belgium and Luxembourg, where the rates are an average of 91% and 88% respectively over five elections.

EUROPEAN ELECTIONS: PROPENSITY TO VOTE BY AGE, SEX, INCOME AND EDUCATION



The percentages between brackets relate to the total number of people in the survey sample (15 415 persons).

The propensity to vote or not for a given category measures the difference between the proportion expressing a firm intention to vote (PH) and the proportion which hesitates or has a clear intention to abstain (PL), all of which are weighted against the proportion of those who do not give an indication one way or another, according to the formula: $(PH - PL) \times (1 - PDK / 100)$.

* When we examine the distribution of income in decreasing order within the same sample, a quartile refers to the number of persons whose income represents one quarter of total income. The successive quartiles therefore establish four groups with decreasing income: high, average-high, average-low, low.

Source: analysis of Eurobarometer 57 (Spring 2002) – Richard Sinnott, University College Dublin

An impressive restructuring

On 1 May 2004, the European Union welcomed 10 new Member States. For the 150 000 scientists in these countries, this historic occasion did not mark the day everything changed. After several years of 'preparatory co-operation' under the PECO-Copernicus and then the INCO programmes, research became the first EU policy area to open up fully to the candidate countries. As a result, they have been actively participating as full members in European research programmes since 1998.



This early integration into the European Research Area (ERA) nevertheless involved a long and difficult period of reorganisation and 'catching up' on the part of the scientific structures in these states. The process was particularly painful for the former communist

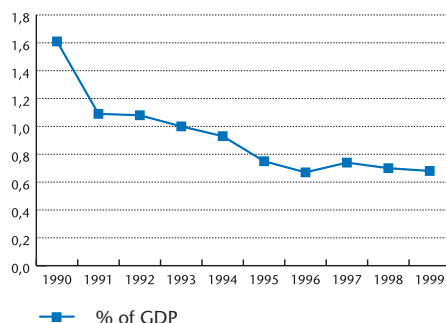
countries whose artificially developed and protected research structures were shaken to the core by the political and economic upheavals of the 1990s.

What were these years of difficult restructuring really like? What was the role of Union support? And what role will these countries

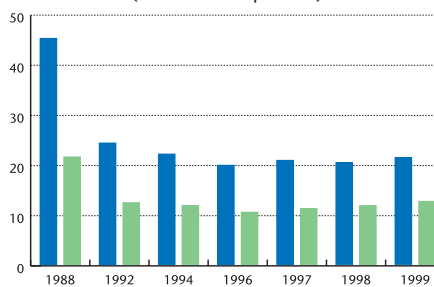
now play in the ERA? In this issue, RTD info makes the first of a series of 'field trips' which will take us to each of the new Member States in turn. We begin with a report and investigation from two central European countries – Hungary and the Czech Republic – with a long-standing tradition of scientific and technological excellence.



Hungary: R&D expenditure as % of GDP

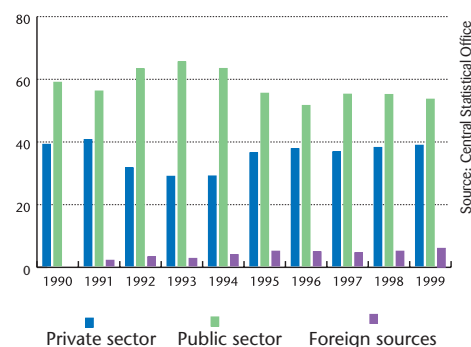


— % of GDP

Employment in R&D in Hungary, 1988-1999
(Thousands of persons)

■ Total R&D personnel
■ Scientists & engineers

Hungary: R&D expenditure by source of funding, 1990-1999



■ Private sector ■ Public sector ■ Foreign sources

Source: Central Statistical Office



When the Communist regimes in Hungary and the former Czechoslovakia collapsed in the autumn of 1989, they left behind shrunken and bureaucratic research systems, but which had, nevertheless, a pool of highly talented and qualified researchers. These cumbersome and costly structures rested on two pillars: the academies of sciences, where most fundamental research was concentrated, and a plethora of state-run institutes of applied research working in the service of industry. University laboratories were often the poor relations.

Science's labours lost

These structures felt the full brunt of the economic difficulties that accompanied transition. In 1996, the share of gross domestic product

(GDP) allocated to research was just 0.67% in Hungary and 1.02% in the Czech Republic, representing a fall of 40% and 50% respectively in the five years since 1991. The consequences in terms of staff cuts were painful. 'For a scientific output which remained constant, the Czech Academy of Sciences reduced its personnel from 14 000 to 6 500,' recalls its Vice-President, physicist Vladimir Nekvasil. 'The job losses were even more dramatic at the institutes of applied research. Some of these were privatised, but many simply disappeared. A lot of their researchers had been employed on tasks which were rendered totally obsolete with the opening up of the borders, such as the copying of high-tech equipment which the Communist regime was unable to import due to a lack of foreign currency.'

'I would never have believed it could be so painful,' admits the physicist Norbert Kroo, Secretary-General of the Hungarian Academy of Sciences, as he looks back on the traumas suffered by his country's research system over the past 15 years. 'Some days I really did ask myself whether our laboratory would still be operating the next day.'

Universities and companies take off

Slowly, the process of restructuring began to produce results. The enforced trimming of the state system was partially offset by a progressive revitalising of university research. 'One of our aims was to concentrate on our strengths,' stresses the Czech Foundation of Science's President Joseph Syka, a biologist by training and the key figure in the 1990s restructuring. 'Our policy was to promote centres of excellence by developing a system of contractual financing for the best teams.'

The most spectacular change came with the increased strength of private sector research. High-tech multinationals were soon attracted to these regions by the quality of the researchers. The French pharmaceutical group Sanofi-Synthelabo and the Finnish mobile telephone giant Nokia both set up research centres in Hungary, while the German car manufacturer Volkswagen invested in research in the Czech Republic.

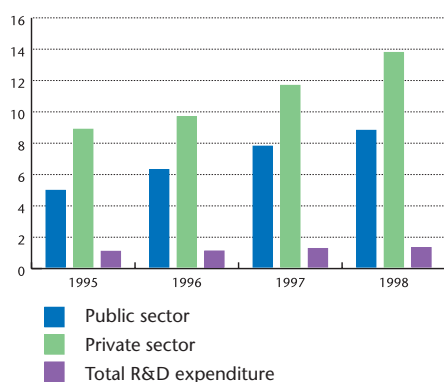
By the latter half of the 1990s, research investments were rising again. 'The threshold of 1% of GDP was again crossed in Hungary in 2002,' observes Hungarian Secretary of State for Research András Siegler. 'Today, companies account for 44% of national research expenditure, compared with 31% at the beginning of the 1990s.' By 2001, the Czech Republic –

The European catalyst

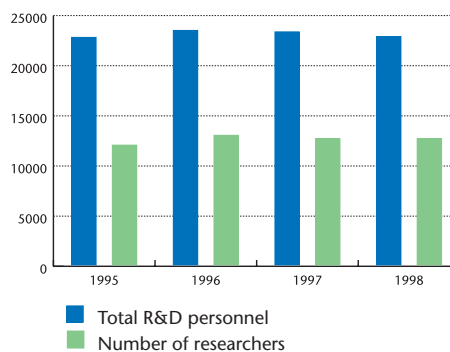
'The prospect of accession to the Union and the ability to participate fully in European programmes was a decisive stimulus,' recalls Vladimir Nekvasil, Vice-President of the Czech Academy of Sciences. During the difficult hours of restructuring, Hungarian and Czech researchers appreciated the aid provided by the European Union. The Union initiated a policy of scientific co-operation with the candidate countries back in 1992, under the PECO-Copernicus programme. This was strengthened under the Fourth Framework Programme, or FP4, (1994-1998) and, above all, under FP5 and FP6 which saw 12 states sign association agreements allowing the integration of their researchers on an equal footing with the EU-15's. Czech and Hungarian researchers participated in 387 and 358 FP5 projects respectively. 'This concrete policy of opening up on the part of the Union was a powerful lever for our integration into the European Research Area,' says an appreciative Norbert Kroo, Secretary-General of the Hungarian Academy of Sciences.

Another very positive EU initiative was the awarding of the Centre of Excellence label to some 34 institutes selected in the candidate countries, including six in Hungary and three in the Czech Republic. 'This recognition enabled us to welcome more foreign students, especially from the Union countries, and to hold a number of international conferences,' explains Czech biologist Eva Sykova, Head of the Institute of Experimental Medicine at the Academy of Sciences in Prague.

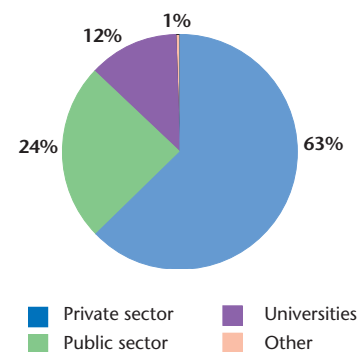
R&D in the Czech Republic: Funding sources
(Billions of CZK – 100 CZK = €0.33)



Employment in R&D in the Czech Republic
(Number of personnel)



Czech Republic: R&D expenditure by source of funding



Source: Czech Statistical Office

which now ranks second after Slovenia among the new Member States – was already investing 1.35% of GDP in research, three-fifths of it by the private sector.

Brain drain or brain gain?

Hungarian and Czech leaders are fully committed to the objective laid down in the Lisbon strategy of creating a world-class knowledge-based economy in Europe founded on sound research and development. At this point in time, however, the objective of investing 3% of GDP in research by 2010 does not seem feasible – which does not alter the fact that investment in research, in particular by companies, is set to grow substantially.

Somewhat paradoxically, in the wake of the drastic cutting back of research staff, the problem faced today is a serious shortage of trained staff. In relative terms, the two countries now have half as many people employed in R&D as the European average.

Is this due to the exodus of researchers during the difficult 1990s? In part, but it is difficult to gauge the precise extent of this movement since there are no precise statistics on the outflow and inflow of researchers into these two countries.

Hungarian and Czech research officials do not believe that this brain drain is still a significant threat. 'If there is a brain drain, it is more

in the direction of management posts in such sectors as insurance or finance which like to recruit people with scientific training. These also offer better-paid careers than in research,' explains Vladimír Nekvasil. 'Our problem is therefore not so much an external brain drain as an internal one.'

A rough ride for the social sciences

If there is one field in which the transition was a particularly rough ride, it is the social sciences. First of all, the working conditions of researchers were rendered extremely precarious. Seen as less vital than other scientific sectors, public budgets for these disciplines were cut dramatically. ' [In Hungary], the brain drain in the social sciences has clearly been considerable,' explains Rudolphe Andorka, a sociologist at the University of Economic Sciences in Budapest. 'Many researchers and academics went into politics and abandoned, at least temporarily, their scientific activity. A great many others chose to go into business, where salaries are four times higher than at research institutes or in higher education. A third group went abroad.'

At the same time, sociology finds itself lacking the resources to track the rapid and radical transformation of the social and political fabric – which requires the gathering of new data and the development of new analytical approaches – of these transition countries. 'We are living in a social laboratory which is particularly rich in subjects

for research,' notes Andorka. This has led some sociologists to feel a sense of frustration exacerbated by the interest shown in these phenomena by many Western researchers working in Central and Eastern Europe on international co-operation projects. In a rather provocative article published in the renowned Hungarian journal *Replika*, sociologists György Csepeli and Antal Örkény, backed up by their US colleague Kim L Scheppele of Pennsylvania University, launched a controversial attack on the 'colonisation' of social research by the West. They condemn the way poorly paid local researchers play 'second fiddle' to foreign researchers, their knowledge of the field being 'exploited' as the results are repatriated to be published to acclaim by Western parent institutions.

To find out more

- www.replika.c3.hu/

The genes of a biocity

The industrial capital of Hungary's Great Plain, Szeged has a long tradition of excellence. Inaugurated in 1973, the Centre for Biological Research at the Hungarian Academy of Sciences today

employs 450 researchers. It was this unique concentration of brainpower – unmatched elsewhere in central Europe – which gave its director, Dénes Dudits, the idea to set up the Szeged Biopolis. The aim is to reap the economic rewards of the centre's know-how, especially in the field of plant biology.

It was back in 1971 that the Hungarian Academy of Sciences first decided to set up a Centre for Biological Research (CBR) to help develop the life sciences, whose potential was already becoming clear. The government at the time was also seeking to decentralise the national research infrastructure which was concentrated in Budapest. Its choice was Szeged, recognised for the quality of its university⁽¹⁾.

This ambitious project gave birth to five institutes (biophysics, biochemistry, enzymology, genetics and plant biology) housed in a huge 13-floor building equipped with all the latest high-tech equipment. The project was financed largely by UNESCO, which brought much needed foreign currency into the country. 'The centre's inauguration, in 1973, was a clear sign of communist Hungary opening up to the other bloc. The international press was quick to pick up on the event,' remembers Árpád Párducz, Director of the Laboratory for Neuronal Adaptation.

Open to the west

Unlike their Czech counterparts, Hungarian researchers under the Communist regime were able to travel freely abroad and extend invitations to Western researchers. This early inclusion in the international scientific community enabled the CBR to make many contributions to developments in the biotechnologies from the 1980s onwards, including the first *in vitro* production of hybrid cells, the first genetically modified lucerne with improved nitrogen fixing abilities (1986), and the first transgenic wheat (1993).

The transition to democracy in 1989 – which briefly saw the centre's founder, the biologist Bruno Straub, hold the post of Prime Minister – brought no slackening of the pace of

⁽¹⁾ One notable figure is Albert Szent-Györgyi, winner of the Nobel Prize for medicine in 1937. He was the only Hungarian Nobel prizewinner to be awarded the distinction for research carried out inside the country. He subsequently went into exile in 1949.



Recognised as a *Centre of Excellence* by the Commission, the Centre for Biological Research concentrates its research in the fields of development genetics, enzymology and plant biology.

research. 'The time of the Socialist regime taught us how to survive difficult economic times, finding salvation in international co-operation,' Párducz remarks wryly.

Today, the CBR is continuing to make the most of opportunities within the wider European context: seventeen researchers from various Union countries, headed by the German biologist Kai Simons, sit on its present Scientific Com-

mittee. In pursuing this international research, the CBR had no trouble winning the Commission's Centre of Excellence label. Its main strengths are in the fields of the development of genetics, enzymology and plant biology.

The appliense of science

After leaving its mark on the biotechnology revolution, the CBR is now planning to move on to the next stage: converting scientific advances into economic innovation. 'Before, all that counted was the quality of the scientific publications. We were very late in exploiting our research,' admits Dudits, the centre's Director for the past 18 years. The key element in the mechanism designed to change all this is a specially created limited company. Biopolis Szeged Innovation is owned by the town of Szeged, the CBR, the University of Szeged and a Hungarian venture capital firm.

Biopolis Szeged aims to exploit the intellectual property rights stemming from the work of the town's one thousand biologists – researchers and teachers – and to provide financial support for start-ups formed by local researchers. The CBR is not starting from scratch in this field as it has a solid portfolio of patents, some of which – exploited by the Canadian company Chromos – are of vital importance in the field of artificial chromosomes.

'Apart from this technological transfer of existing strengths, Biopolis Szeged also plans to provide the town with an advanced technical platform in functional genomics,' explains its Director. The CBR already has four operational services in this field: proteomics, sequencing, DNA chips and bioinformatics. These tools will





Centre for Biological Research at the Hungarian Academy of Sciences – Szeged. 'The centre's inauguration, in 1973, was a clear signal of communist Hungary opening up to the other bloc.'

be developed for use by the widest range of projects. 'We are already working on cancer diagnosis, the plant selection of pear trees and stag genomics. The annual growth of timber in fact provides an excellent model for studying the metabolism of calcium, with possible applications in the field of osteoporosis,' explains László Puskás, Head of the Laboratory for Functional Genomics.

Breathing life into the city

As a specialist in plant resistance to stress, Dudits pays particular attention to agronomic research. He makes no secret of his feelings about the current heated debate on GMOs within the Union, in which he detects certain anti-scientific tendencies: 'People pretend to believe that agriculture is not going to need any more innovations. That is an aberration... Research on genetically modified organisms deserves to be pursued further as it could bring solutions to new problems. In 1993, for example, drought slashed 25% off Hungary's wheat production, of which we are a major exporter. Climatologists warn that we should expect such low rainfall more frequently, to the point where it could become European agriculture's number one problem. Transgenic plants could be the solution. So why ban them from the outset?'

Dudits' dream is that the life sciences will become the foundation for Szeged's development, with biotech companies taking over from the ageing factories. ■

Apprentice researchers

Since 1996, biochemist Péter Csermely, Professor at Budapest's Semmelweis University, has devised an original system for introducing secondary school students to research. This has enabled more than 7 000 young people to discover the joys, and the hardships, of laboratory life. No diploma is required to participate in the activities of the Foundation for Student Researchers (FSR). Candidates simply have to answer two questions: Why do you want to carry out research? Why do you think you are better than the others? 'All replies are acceptable,' explains Péter Csermely. 'We are simply seeking to test motivation.'

Motivation is indeed something these young people will need. Once over the hurdle of the initial acceptance, these budding researchers then have to contact one of the 700 Hungarian researchers who have agreed to act as mentor and convince them to agree to take these hopeful apprentices on at their laboratories. Once again, there is no hard and fast rule. The apprentice researchers may just be content to observe or, in their free time, they can actually participate in scientific research. During her summer holidays, one young secondary school student played a part in discovering an asteroid.

Every year, the FSR holds a conference at which the young people present their work and have the opportunity to talk to researchers. 'The FSR began its activities in 1996 and we now have the pleasure of counting among our members former secondary school students who have gone on to become researchers. They discovered science through our action and today they want to share their passion,' notes Csermely, who has just been awarded the prize for scientific communication from the European Molecular Biology Organisation.

The apprentice researchers are also involved in the administration of the FSR and in managing its annual budget. The organisation is supported by the Hungarian Ministry



To find out more

- Centre for Biological Research
www.szkb.u-szeged.hu



Péter Csermely, Head of the Foundation for Student Researchers and winner of the prize for scientific communication awarded by the European Molecular Biology Organisation.

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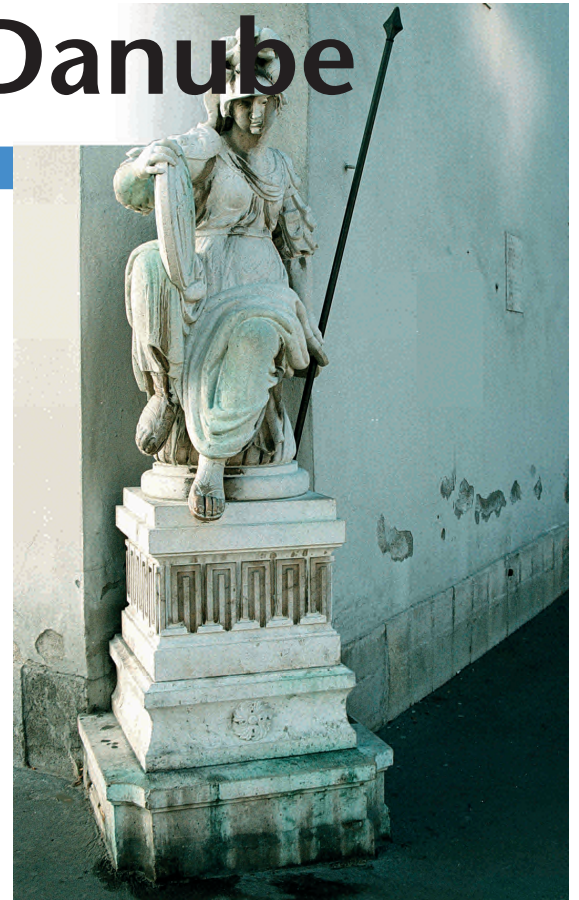
of Education, private sponsors, international organisations such as Unesco and NATO, and the European Commission.

A summer session for future researchers during which they present their work and discuss with scientists.

Princeton on the Danube

The Collegium Budapest, modelled on the Princeton Institute for Advanced Study in the United States, was founded ten years ago.

Today, it is a prestigious 'temple' of pan-European excellence and interdisciplinarity. Every year, it welcomes guest researchers in the life and social sciences, biology and theoretical physics for periods of between three and ten months. A genuine platform for the dissemination of knowledge, it also runs study cycles to which many renowned scientists contribute.



Statue of Athena on the north-east corner of the Collegium.

Far from the hustle and bustle of downtown Pest, the Collegium stands opposite the Church of Notre Dame of Budapest – better known as the Church of St. Matthias – overlooking the Danube from the top of Buda Hill. With high ceilings, huge windows looking out onto the baroque architecture of this medieval district, and offices with their imposing earthenware stoves, the atmosphere is one of calm and serenity, perfect for study and reflection.

For the past ten years, more than 350 researchers (both Hungarian and foreign) have benefited from this exceptional atmosphere of intellectual inquiry. Free of administrative burdens or teaching tasks, and housed with their families just a few minutes from the Collegium, these guest researchers are at liberty to pursue their research in the most diverse fields.

View from the institute showing the Trinity column on the Szentharomsag Square.

After initially concentrating on the human and social sciences (in particular anthropology, linguistics, sociology, history and economics), the institute progressively widened its field of research to include biology and theoretical physics. 'Hungary can pride itself on an excellence recognised worldwide in both these fields. This is why we decided they would benefit from a strengthening of the international dimension,' explains Eörs Szathmáry, member of the Collegium's permanent team of researchers.

Rebuilding bridges between the two Europes

The institution's roots lie in the intellectual ferment of the early 1990s, marked by the coming together of the two Europes. It was clear that this reconstruction of the European identity would not be possible without a better respective understanding of the historical, cultural and structural specificities of these two territories, so long separated by the Iron Curtain. The initiative to create this centre for interdisciplinary research came from Wolf Lepenies, Rector of the Berlin Wissenschaftskolleg (DE), and Ivan Berend, President of the Hungarian Academy of Sciences. Five countries (Austria, France, Hungary, the Netherlands and Switzerland), two German Länder (Baden-Württemberg and Berlin), and six private foundations agreed to finance this genuinely pioneering project in the context of the post-Communist world. With a governing structure modelled on that of Princeton in the United States, the Collegium is managed by the General Assembly on which all the donors are represented. An Academic Board of 16 members, all of them renowned researchers, decides scientific policy. A select committee of five permanent members oversees implementation of the institute's activities.

Special guests

In 1993, the Collegium welcomed its first visiting researchers. It also launched its first series of interdisciplinary seminars which attracted many scientists of global renown. A dozen Nobel prizewinners have shared their thoughts within these walls, including the Americans Saul Bellow, Carleton Gajdusek and Robert

Applied research: the heritage of Zoltán Bay



The bronze statues on Heroes Square, in Budapest, have been restored to their former glory after being taken down and treated by the Institute for Material Sciences and Technology (BayAti).

Under the Hungarian Socialist system, applied research was carried out by a number of technical institutes linked to major public companies. For material sciences alone, there were 18 entities devoted to aluminium, steel, plastics, etc. Following the privatisation of industrial consortiums in the early 1990s and the closure of the most out-

dated factories, a radical rethink was needed.

In 1992, the government took inspiration from the German Fraunhofer Institut to launch the Zoltán Bay Foundation, named after the illustrious Hungarian physicist (1900-1992). He is famed, in particular, for developing radio tubes for the Hungarian company Tungstam in the 1930s and making the first radar observations of the moon.⁽¹⁾ The foundation, which is independent of the state, was allocated start-up capital, the interest on which is used to finance applied research.

In 1993, the foundation opened the first two research institutes: one dedicated to biotechnology (BayBio), and the other to products and logistics (BayLogi). Three years later, it founded its Institute for Material Sciences and Technology (BayAti) in Budapest, which is today its flagship institute. With 38 researchers and 12 students, it is active in just about all the latest fields: 3D steel sectioning using lasers (which enabled it to participate in the European VELI and IPcim programmes); nanotechnologies, with research on new zinc, iron and nickel alloys at the atomic level; new composite polymers of interest to the automotive industry; and the recasting of used plastics into new materials.

'One of the common features of all this work is the shared interest in phenomena which occur at the surface of materials,' explains the institute's Director, Erika Kálmán. She cites the example of the spectacular restoration work on the bronze statues on Budapest's Heroes Square. 'Using electronic microscopy we were able to determine the corrosion points at the finest level of the material, whether due to the reaction between the bronze of the statues and the iron of the screws, or atmospheric pollution.' After being dismantled and transported by special convoys to the institute for restoration, the sculptures, which were first erected in 1896 to commemorate the millennium of the birth of Hungary, once again stand resplendent.

(1) Despite his scientific renown, Bay was obliged to leave Hungary in 1948 and ended his career in the United States.

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To find out more

- Bay Zoltán Foundation
www.bzlogi.hu/bzaka/index_a.html
- Bay Zoltán Institute for Research on Material Sciences and Technology (BayAti)
www.bayati.hu
(in Hungarian only)
- European projects
- VELI: Virtual European Laser Institute
www.veli.net
- IPcim: Integrated Processing and Control for Large Section and Sheet Metal Steel Welding
www.ipcim.org/main_frame.html



Imre Kondor, Rector of the Collegium: 'We want to counter the brain drain by encouraging scientific exchanges in the direction of west to east.'

Sollow, the Hungaro-American John Harsányi, the Belgian Ilya Prigogine, and the Swiss Richard Ernst. The subjects covered include "Economic transition after communism", "Interaction between politics and economic policy during the post-socialist transition", "Jews in modern Europe", and "The structure and structuring of the European area in the Middle Ages".

The Collegium also seeks to function as an international platform for scientific exchanges with other comparable institutions, such as the Princeton IAS, its European counterparts at Wassenaar (NL) and Uppsala (SE), the Berlin Wissenschaftskolleg (DE), the Vienna Forschungszentrum für Kulturwissenschaften (AT) and the Maison des Sciences de l'Homme in Paris (FR). At the European level, it has included EU enlargement among its priorities, working in close co-operation with the Commission. In 1997, it hosted the founding conference of the network of Centres of Excellence in the candidate countries and has organised meetings on forward studies (Carrefours 2000), the state of the social sciences in Central and Eastern Europe (2002), and preparations for integrating research policy in the adhesion framework (2002). The Collegium also co-operates with the New Europe College (NEC), a centre of excellence in the field of human and social sciences founded in Bucharest (RO) in 1994.

Interdisciplinarity as a state of mind

The present Rector of the Collegium, Imre Kondor, was Professor of theoretical physics until the 1990s when he switched to... banking, where he applied his knowledge of methods of statistical physics to financial risk management. Describing himself as having a 'very low boredom threshold', he returned to research in October 2002, taking up the reins at the Collegium, where he is also responsible for activities linked to theoretical physics and economics.

'Interdisciplinarity is not just an intellectual requirement,' he believes. 'It is also a way of considering scientific or technical problems which can find very concrete applications.' He cites as examples two contracts awarded to researchers at the institute under the Sixth Framework Programme, one on robotic intelligence (the Ecagents project) and the other, conducted with Swedish telecommunications giant Ericsson, on developments in the internet and its infrastructure through to 2025 (the Evergrow project).

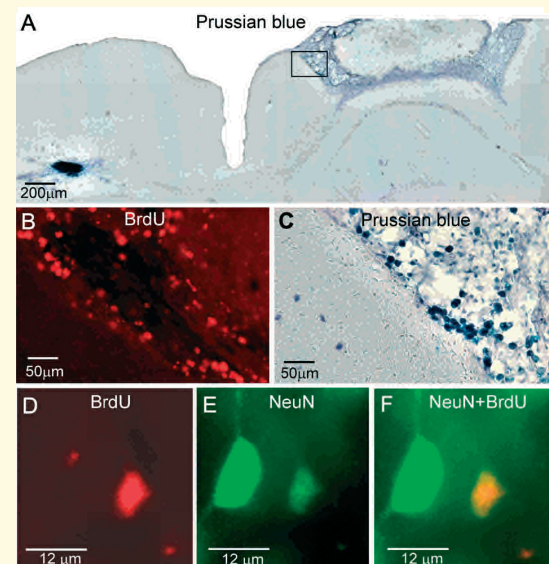
After a decade's existence, and in a changed context, these contracts are replacing the original state funding which permitted the institution's launch. From August 2004, the Collegium will also be charged with managing a Marie Curie training network on nanostructures. 'The times are changing, but our ambition remains the same. We want to counter the brain drain by promoting scientific exchanges in the direction of West to East,' concludes Kondor. ■

To find out more

- Institute for Advanced Study – the Collegium Budapest
www.colbud.hu/



Confocal microscope analysis enabling tridimensional study of cell structures.
© IEM laboratory – Prague



Research on diseases of the central nervous system: observation of an intracerebral injection of stem cells into a lesion in a rat's brain.
© IEM laboratory – Prague



Medical research bounces back

Cellular biology, neuroscience, molecular biology, developmental biology, pharmacology and teratology... The 88 researchers and engineers at the Institute of Experimental Medicine (IEM) at the Czech Republic's Academy of Sciences are working in many important fields of biomedicine. Eva Syková, director of this European excellence centre in Prague, tells the story.

■ What was your Institute's experience of the 'Velvet Revolution' of 1989 and the decade which followed?

Eva Syková: The IEM was founded by the Academy of Sciences in 1975, in what was then Czechoslovakia. It was the result of the merger of four laboratories of medicine linked to the Saint Charles University which had already acquired an enviable international scientific reputation in plastic surgery, ophthalmology, otolaryngology and also cellular and tissue biology. The histological research by Professors Vrabec and Smetena was particularly notable at that time. But during the 1980s the dynamic was gradually lost. Like all the country's scientific structures, the IEM suffered from international isolation, rigid management which hindered internal dialogue, and all the cumbersome procedures associated with the political system at that time.

The Velvet Revolution produced a welcome shake-up both in the way the Institute operated and also as regards the often excessively diverse directions research was taking. The changes were guided by a desire to rationalise the internal organisation and attract a younger team. Some laboratories were closed and others integrated into more promising fields. I joined the IEM in 1991 to head a new cellular neurophysiology laboratory. Another field of research opened up in genetic eco-toxicology. An open system of competition for obtaining funding from the Academy of Sciences was introduced between projects.

In 1993 we moved to the Academy of Sciences campus, in the south of Prague, where there are four other institutes. The restructuring is now complete. In 2001, an evaluation by a committee of international experts – with not a single Czech among them – gave a



Eva Syková: "In 2001, an evaluation by a committee of international experts gave a positive appraisal of our work. This was further corroboration of our designation the previous year as an EU excellence centre."

positive appraisal of our work. This was further corroboration of our designation the previous year as an EU Centre of Excellence.

■ What has this European recognition meant for the IEM?

First of all, renown and confirmation of our international position which is based, in particular, on our involvement in six major European contracts. One of these is in the neurosciences, through a consortium studying new molecules against epilepsy. We are working alongside Austrian, French, German and Spanish researchers on this. The five other European projects are looking at the effects of the environment on health, especially the effects of pollution.

The funding linked to the Centre of Excellence label has also enabled us to welcome foreign students – in particular through the Marie Curie fellowships – and organise international conferences. The last meeting of the International Brain Research Organisation was held in Prague, for example, in the summer of 2003.

■ How do you see yourself in the context of present developments in biomedical research?

A lot of hope is being placed in the possibility of developing regenerative medicine based on stem cells. In July 2003, Czech researchers described a new method of obtaining human embryonic stem cell lines. This very effective method has produced six new lines on the basis of embryos obtained by artificial insemination. It complements the work of IEM researchers on the embryonic stem cells of mice – the next step is to exploit these results.

That is why we set up a centre for cell therapy and tissue repair, which employs a staff of 50 and of which I am in charge. It is a flexible structure bringing together the Czech Republic's best laboratories in this field. Their activities range from fundamental research in developmental biology to preclinical trials and the study of biopolymers encapsulating cells for grafting during transplant surgery. Through this centre, I believe we will be very much a part of the present international competition in the field of regenerative medicine. ■

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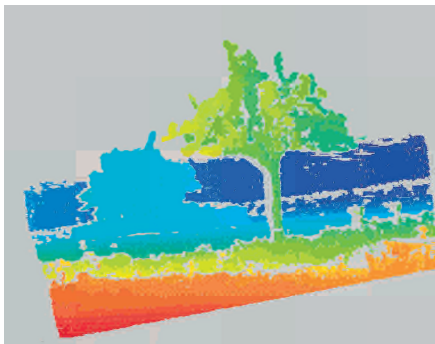
Cybernetics pole at Charles University

Vladimir Marík, an expert on artificial intelligence at Prague University, worked with only two researchers 13 years ago. Today, several dozen scientists are employed at his cybernetics laboratory. Soon, he will be expanding his team further to keep pace with international co-operation projects in partnership with industry and universities.



sensors. Perception of distances calculated by computer on the basis of two images of a tree: the colours – red means 'near', dark blue means 'far' – represent distance.

© CMP (Centre of Machine Perception), Department of Cybernetics, Charles University (Prague)



Vladimir Marík likes to illustrate his comments. On his laptop screen, he displays the slides presenting a series of partnerships: a common laboratory shared with the Johannes Kepler University in Linz (AT); an agreement for the continuous exchange of researchers with the University of Surrey (UK); co-operation with the Danish firm Grundfos which specialises in water pumps; the European Miracle⁽¹⁾ project, which holds conferences and seminars in the field of artificial intelligence – the most recent of which, in September 2003, was attended by Research Commissioner Philippe Busquin. 'We participated in 15 contracts under the Fifth Framework Programme and are already involved in five others under the first call for proposals launched by the Sixth Framework Programme,' explains Marík.

A dual teaching/research engine

The department of cybernetics at the Faculty of Electrical Engineering at the prestigious Charles University – which he heads – has certainly earned the Centre of Excellence label awarded to it by the European Commission. Yet, as recently as 1990, the department employed just two researchers. The change came in 1992, with the launch of the Doctoral School for Artificial Intelligence and Bio-cybernetics, which proved an immediate success. 'First research, and then teaching through research,' is Marík's motto.

Since then, this influx of students has fuelled the laboratory's growth. In 1996, it split into two units: the Gerstner Laboratory devoted to artificial intelligence and the Centre for Artificial Perception which concentrates on visual recognition. Together, they employ 18 lecturers, with 28 researchers and 47 students – their average age is 32. Its budget is €2.2 million, nearly three-quarters of which comes from contracts. English is the sole working language and recruitment is pan-European. 'I make sure there is always at least one foreign lecturer. Also, since the Bologna⁽²⁾ declaration, a term spent at

Prague counts as credit for university courses elsewhere. This has encouraged students to come here from elsewhere in Europe, mainly Austria, but also Germany, the Netherlands and the United Kingdom.'



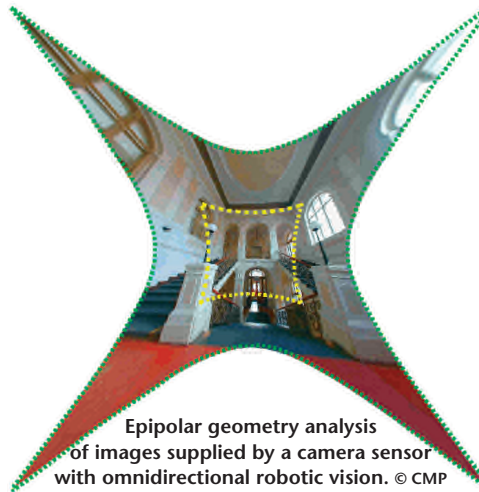
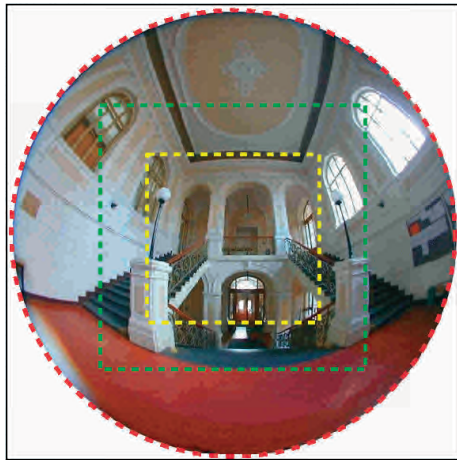
An electroencephalogram – which measures electrical activity in the brain – of an auditory stimulus. © CMP

The strength of software testing

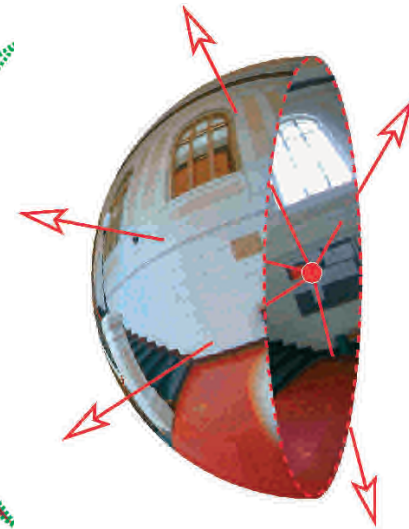
When asked what he believes is the field of advanced research in which his department most excels, Marík hesitates: 'Perhaps automatic systems for the detection of software errors.' A new series of images is promptly dis-

(1) Machine Intelligence Research and Application Centre Learning Excellence

(2) After the European Research Area, a European higher education area was created by the Bologna declaration, in June 1999, favouring the equivalency of diplomas.



Epipolar geometry analysis
of images supplied by a camera sensor
with omnidirectional robotic vision. © CMP



played to illustrate the point: first, in the medical field. The Gerstner Laboratory is particularly proud of having developed a software testing program in co-operation with the Dutch company Vitatron Medical. A leader in the heart pacemaker sector, this company is currently using procedures developed at the Charles University to test its systems. 'This is a field where one cannot afford to make mistakes. Human lives are at stake.' Then there is the Czech company CertiCon, with its origins in the department, which employs a staff of 50 in developing forecasting algorithms for medical software testing.

Modes of operation

But the know-how of Charles University's cyberneticians is not limited to health alone. Marik's portable computer screen displays pictures

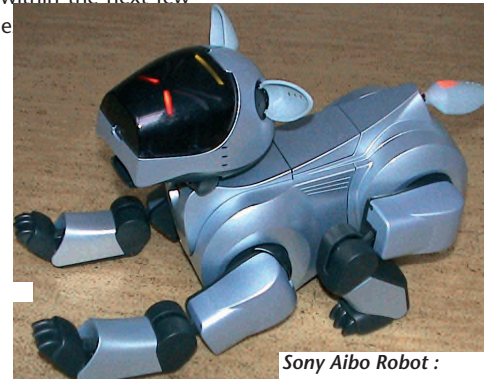


detect intrusion into US Air Force systems. 'We were contacted three days after the Czech Republic joined NATO,' he explains. A third slide shows the Berlin/Vienna high-speed rail link, whose switching control system for the Czech section of the line was developed here.

More slides followed, all of them illustrating co-operative research projects involving big names from industry or prestigious universities. And the future? 'Our laboratory lacks space and will have to split into two within the next few years, if it is to e

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- **Website of the Cybernetics Department**
<http://cmp.felk.cvut.cz/>



Sony Aibo Robot :
four-legged robot fitted
with a program for
interaction with the
environment.

© CMP

Evolution robotics ERI:
experimental mobile
robot fitted with a
navigation function
(vision and distance
measurement), as well
as object recognition
and odometry.

© CMP

The bridgehead of a technological revolution

Business incubator, innovation consultancy office, assistance centre for the transfer of technologies, a showcase for national research and development... The Technology Centre at the Czech Academy of Sciences is all that and more. For Czech researchers seeking to participate in European projects, it functions as a critical lever.

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http://www.czechrttd.info

The Czech Republic is rightly proud of its reputation as a historic centre of technological excellence in Europe. With a long tradition of entrepreneurship and openness to innovation, it has a remarkably dense fabric of SMEs. In 1993, several member institutions of the Czech Academy of Sciences helped set up the Prague Technology Centre (TC), a tool designed specifically to promote the transfer of technology to industry. At the same time, the TC opened the first Innovative Enterprise Incubator to offer advice and financial assistance to start-ups originating in research projects. It proved a rapid success.

A showcase for Czech technology

Alongside its other missions – forward-looking strategic studies, advice and consultancy – the TC also acts as a ‘showcase for national research and development’. Its remarkable internet site provides an access portal (in English) to all the country’s major players: 136 faculties at 39 universities, 111 research institutes (including 59 linked to the Academy of Sciences), 90 high-tech companies and all the political, administrative and financial bodies involved in R&D. There is also a database enabling any industrialist or scientist wishing to develop links with the country to launch a search for a Czech partner.

Among the many fields of excellence, biomedicine and biotechnologies for agriculture and the environment are particularly important. Academic teams, as well as the country’s 20 biotechnology companies, are active in all fields of this research area. One of the most remarkable recent successes can be credited to the Institute of Organic Chemistry and Biochemistry, headed by Antonin Holy, which developed – up to the point of marketing – two new antiviral molecules which are active against AIDS and hepatitis B.

A unifying exchange

The TC is becoming a very active bridgehead for integration with the Union and is stepping up exchanges by participating in various European networks – European Business and Innovation Centres, Innovating Regions in Europe (IRE) and Innovation Relay Centres (IRC). A significant result of this policy is that Czech SMEs topped the new Member States in terms of Exploratory Awards granted by the Fifth Framework Programme.

The TC has a key mission in ensuring that Czech R&D becomes an inherent part of European research policy and is a focal point for the participation of Czech researchers in the Sixth Framework Programme. Its staff of 13 experts receive an average of four telephone calls and 15 e-mails a day requesting information, and its newsletter is sent out to 4 000 subscribers. The TC has also organised the translation of European forms and model contracts into Czech and, in January 2003, held an information day attended by 540 researchers.



Presentation of the Sixth Framework Programme at the Prague TC

‘There are a number of contractual research funding agencies in the Czech Republic. Scientists too often prefer to turn to these for funding rather than presenting themselves as candidates for participation in European projects which are unjustly seen as complex and cumbersome,’ explains Vladimír Albrecht, assistant coordinator of the national contact points for the Sixth Framework Programme at the TC. ‘To facilitate Czech participation in Union programmes, we can, for example, finance the necessary travel and provide information on the benefits of Community financing.’ These efforts are clearly bearing fruit. For the first call for proposals under the Sixth Framework Programme, 1667 Czech teams are participants in the projects submitted, which is already half the number of candidacies submitted during the four years of the previous programme.

A good return

A statistician by training, Vladimír Albrecht has done his sums in terms of the ‘pluses and minuses’ of Czech participation in the Fifth Framework Programme. For a financial ‘contribution’ of 0.45% of the global budget granted by the Union to the programme, he estimates that the Czech Republic received a ‘return’ of 105%. It is in research linked to the environment and energy sectors that the involvement of Czech teams in European projects is most extensive. In these two fields, they participated in 345 and 123 proposals respectively and recorded a very satisfactory success rate: one-quarter of them were selected during the energy evaluation and one-third for the environment. The success rate was noticeably lower for the life sciences and information and communication technologies – the number of project proposals with a Czech partner (677 and 514 respectively) nevertheless reflecting a healthy interest.

The participation of Czech companies in European thematic research programmes presents a mixed picture. Large companies are partners in just 100 projects, but have a 25% success rate. SMEs, on the other hand, show a remarkable interest in participation (involved in 700 projects, as are university laboratories), but their results are more disappointing, with a 17% success rate. It is on the latter point that the Czech effort under the present Framework Programme must be concentrated. With a strong tradition of industrial research, the Czech Republic is well placed to succeed. ■

Europeans' political blues?

How do Europeans see the present and what do they expect from the future? Do they believe in politics and do they trust politicians? Which causes will they take up and in what way? The European Social Survey (ESS), undertaken by researchers from 22 countries, allows us to analyse the values, hopes and fears of the inhabitants of the 'Old Continent'. Innovative, rigorous, scientific and based on tens of thousands of interviews, the ESS produces comparative data at regular intervals to track social trends in Europe.

The European Social Survey is a joint project run by sociologists, political scientists and economists from the European Science Foundation. They launched a survey to gather meticulous, comparable data, across Europe, on people's attitudes and expectations with regard to politics and society.

'We wanted this to be a high-quality, serious survey, controlled by a rigorous and strictly academic method', explains Max Kaase, the Chairman of the ESS Steering Committee and Professor at the University of Bremen. 'What is new is the geographical scope of the project – which includes a number of central and eastern European countries – and the fact that it will be repeated at regular intervals. This will enable us to identify trends over time, to measure shifts in attitudes and values, and to compare these within individual countries and between them.'



The value of time

The continuation of the survey over time (one of the key scientific benefits of the ESS) is made possible by support from the European Commission Framework Programmes. The survey will be repeated every two years, offering a targeted picture of changing attitudes across our continent.

Available data

Initial ESS results are available to researchers, students and all citizens via the Internet; 1 800 people, 25% of them "non-specialists", visited the survey site in the space of just a few weeks.
www.europeansocialsurvey.org

A barometer of political mistrust

The ESS links research centres in 22 countries which carried out the first survey between September 2002 and September 2003 in the 15 Member States, four candidate states (Czech Republic, Hungary, Poland and Slovenia), plus Norway, Switzerland and Israel. In all, some 50 000 one-on-one interviews were held. Each interview, lasting on average one hour, was based on a three-part questionnaire consisting of a basic module (to be repeated in every two-yearly survey) and two revolving modules covering subjects that can be re-examined at longer intervals. The questions in the basic module relate to various major subjects such as trust in institutions, interest in politics, participation in public life, fundamental moral and social values, feelings towards social integration and exclusion, and national, ethnic and religious identities. The revolving modules in this first survey questioned attitudes towards "others" (immigration, asylum rights) and citizenship (participation in political and voluntary associations).

What was the most striking result? In not a single country did more than one inhabitant in four express "high" trust (a rating of at least 7 out of 10) in politicians. The responses varied by place, age and the institutions in question. For example, the Europeans who most "trust"

their national representatives, such as the Swedes, are also those least willing to put their money on the European Parliament (EP)⁽¹⁾. Conversely, those with the highest opinion of the EP, such as the Greeks, Hungarians, Irish, Slovenians, Portuguese, Czechs and Poles, also express the greatest reservations about their own politicians. The Britons appear sceptical towards the entire political class.

One would expect this distrust to be expressed in voting figures, but no, the Greeks turned out in force (91%) in their most recent national elections, as did the Swedes, Norwegians, Finns, Dutch and Slovenes with participation rates of over 80% in theirs. Yet under 70% of the Czechs, Poles and Swiss ventured to the polling stations. Why? This participation in the democratic process seems to depend more on cultural tradition than on interest in politics.

Generation gap?

One relationship that is largely common to the entire survey is that between age and participation. Men and women under 30 are almost everywhere considerably less enthusiastic voters than their elders. This difference can be striking – just 46% of Irish under-30s voted in the latest national elections, compared with 85% of older citizens. Yet there are exceptions – in Sweden, 81% of under-30s turned out to vote, close on the heels of their elders at 88%.

The survey also reveals a general lack of political commitment among the young, only 3% of our youngest citizens are members of a political party, compared to 8% of their older compatriots. In terms of political conviction, 41% of under-30s feel close to a particular political group – as against two-thirds of older citizens. Is this relative indifference simply a question of age and will today's under-30s act like their parents in a few years? Or does this apparent disengagement from political life point to a real process of social change and herald a new culture, which only future surveys will enable us to understand?

At a recent Council of Europe symposium on "Young People and Democratic Institutions", American researcher Pippa Morris from Harvard University used fresh information from the ESS survey in an attempt to answer these questions. She observes that under-30s appear much more motivated by some specific political and social issues, such as the environment

Building a European survey

Setting up the ESS called for an intense preparatory effort, much of it devoted to solving methodological and cultural problems. Participating research centres had to agree on very precise sample selection and interview methodologies, questionnaire structuring, and reporting and data recording procedures. They also had to ensure meticulous translation of the questionnaires into the different languages.

There are many pitfalls in making 'scientific' comparisons. How does one account for external factors that can vary from one country to the next and which can influence respondents' answers? (such as local, national or international events amplified by the media). How can one use or adapt traditional, but not necessarily comparable, socio-economic indicators in a survey on such a scale? Which new indicators should be added and how should these be formulated? How does one translate into 29 languages a sophisticated questionnaire, originally written and checked in English, in a way that takes account of the possible connotations and shifts of meaning and interpretation? All these questions and more had to be meticulously examined when designing the survey.

and humanitarian activities, than their elders. Among under-30s, 8% say they have signed a petition, 7% report they have purchased a product for political reasons, and 6% have taken part in a demonstration. In other words, European youth does not necessarily embrace indifference and disengagement. 'The political energy of the younger generation in post-industrial societies has diversified towards fighting for specific causes, rather than turning to apathy,' she stresses. 'New types of commitment and mobilisation have emerged. The question is how far this reflects a broader cultural change that seriously challenges the future of representative democracy in Europe.'

Social capital

This last observation opens the door to another issue, widely analysed in the United States and in particular by sociologist Robert Putman, also from Harvard University. This is the question of "social capital". This concept assesses the vibrancy of the relatively informal

networks (political or sports clubs, professional, religious or humanitarian associations) that make up the social fabric. The membership of these networks, the donations they receive, the level of trust they engender and their participation in citizens' bodies enable us to measure the dynamism of these groupings. For these American researchers, a major correlation exists between the dynamism of this social capital and social factors such as school performance, health, tax fraud, democratic participation and the value attached to citizenship. While for Putman, America's social capital appears to have significantly eroded since the mid-60s, both his colleague Pippa Norris and James Davis from the University of Chicago suggest that more young people in Europe are being drawn towards such informal structures than is the case on the other side of the Atlantic.

By collecting systematic data covering much of the 'Old Continent', the ESS is supporting comparative analyses, not only within Europe, but also with other regions of the world. Social

and political scientists have been eagerly awaiting such comparative data for a long time. But importantly, this data is open to the public and is of interest, not only to scientists, but to everyone interested in good governance, the democratic debate or, more simply, the society in which we live. ■

(1) See also the article on page 40.



Immigration: a sensitive subject

Europeans' perception of immigration was one subject that ESS researchers analysed closely. As a general rule, the degree to which "others" are accepted depends on what they offer to their host societies, with professional competence a frequent criterion for the opening of frontiers. Greeks are particularly sensitive to this competence (85%), northern Europeans (Sweden, Switzerland, Norway, the Netherlands – 40, 49, 50 and 53% respectively) much less so.

At the same time, even if we prefer them to be competent, we also prefer migrants to know their place, namely not too high up the social ladder. Having to work under a foreigner or – worse – someone of a different race, is hard for most Europeans to accept. The Swedes and Swiss are less diffident here, while the Israelis and Greeks find this a particularly hard pill to swallow.

Just a few months before the end of its mandate, the current Commission has set out its vision of the financial resources needed to support European Union action for the 2007-13 period. In particular, it is a vision which includes a doubling of the research budget. RTD info talks to Research Commissioner Philippe Busquin, the architect of this radical strategy for growth for an enlarged Europe.



Doubling European research investment

■ *You were the one who first came up with the concept of the European Research Area (ERA). You then went on to win the support of Member States to set the ambitious target of allocating at least 3% of the Union's gross domestic product (GDP) to the objective. The next stage is supposed to bring a doubling of the Community budget in this field.*

Philippe Busquin: This follow-up – which is the fruit of a drive desired by all members of the Prodi Commission – is the logical and coherent consequence of the Lisbon strategy. Following enlargement, Europe is now the world's biggest economic and commercial bloc. If it is to respond effectively to its major challenge – namely maintaining the prosperity of its citizens – it is essential for it to improve its performances in terms of growth, competitiveness and employment.

At present, its results in these fields are rather mediocre. Prosperity, growth and employment are today dependent on an inescapable priority: the development of the knowledge-based society. This objective must be central to the Union's policies. How? By fulfilling its essential function of creating a multiplier effect at European level. Now more than ever, research and innovation, as well as education and training, are the key elements for this necessary boost.

■ *A doubling of the research budget is nevertheless a huge leap...*

This increase is not in any way disproportionate in the context of the '3% objective' requested of all the Member States by 2010. To achieve this, the Lisbon strategy, first of all, stresses the necessity of increasing research investment by private companies to the equivalent of 2% of GDP and national public research budgets must increase to 1% of GDP. However, in the light of the limitations on the public expenditure of Member States imposed by the stability pact, this figure is unlikely to be achieved. We expect to arrive at no more than 90% of the objective set for public research in the Union countries. The doubling of the Community research budget could help to make up for this shortfall, although not entirely.

■ *Specifically, does this mean that annual Union research expenditure will increase from around €5 billion a year at present to around €10 billion a year?*

That is correct. But that is the quantitative approach. To appreciate its real significance, you must set it against the main lines of research and growth policy proposed by the Commission. First of all, the Community research effort must focus on fundamental research. Europe is lagging behind in this field and this is a subject of concern for the scientific community as a whole. The past 20 years have seen a fall in the number of European Nobel prizewinners. We are feeling the painful effects of the United States' ability to

Research Commissioner Philippe Busquin

“ We expect to arrive at no more than 90% of the objective set for public research in the Union countries. The doubling of the Community research budget could help to make up for this shortfall, although not entirely. ”

attract the best brains. There is certainly a capacity for scientific excellence of a very high level in the Union, but fundamental research is traditionally a national affair. This compartmentalisation is now proving a handicap.

Under the Sixth Framework Programme, we have introduced support for the creation of networks of excellence, but this is insufficient. There is a need to create new types of aid with which to genuinely finance basic research: on cutting-edge subjects, chosen by the scientific community itself, carried out by top-level research teams, and selected on the basis of an evaluation at European level. Present discussions on creating a European Research Council, modelled on the National Science Foundation in the United States, are a step in this direction.

Then there is investment in essential research infrastructure and the development of human potential. To date, it has been

principally intergovernmental agreements which have given rise to major European infrastructure. Except in certain cases – the equipment for the Joint Research Centre, the Joint European Torus for fusion research, and the financial support currently granted by the Union to the new GRID computer network – the EU has not been charged with financing nuts and bolts projects. Under the present Framework Programme, however, it does have certain limited means with which to favour the creation and/or functioning of such programmes. There is no reason why decisions to invest in installations to meet new needs – such as in the field of hyper lasers, neutron sources for the study of matter, biomedicine or major genomic databases – should not have a European dimension.

As for human resources for research and technology, European initiatives, such as the Marie Curie actions, have certainly demonstrated their usefulness. It is perfectly desirable to increase study programmes and cross-border training for researchers, whether young or experienced, and also from outside the Union. Europe has just under six researchers per 1 000 inhabitants, compared with eight in the United States and nine in Japan. Our first projections were to train 400 000 new researchers by 2010 to achieve the 3% objective. This is a low estimate; the number must be increased to 700 000.

■ *The 3% objective is banking on a considerable increase in research investment by the private sector. How can an increased Union budget stimulate companies to achieve this?*

The Sixth Framework Programme has already introduced the new instrument of 'integrated projects'. These are aimed at achieving the critical mass of research on concrete objectives on a sufficiently ambitious scale, in which the industrial players – large companies as well as innovative SMEs – are very much involved. Unfortunately, we are also facing the situation of a lack of funds with which to finance many proposals of great value, which have to be rejected.

With increased resources, we could give a big boost to the mobilisation of the private sector. This is why we are already developing the concept of the 'technological platform'. In well-defined sectors – aeronautics and space, electronics, steel, etc. – industrialists, private and public research centres, universities and leaders of national research programmes are coming

together to draw up a Europe-wide scientific and technological agenda for the next 15 years. This very concrete exercise, which will be regularly updated, will indicate which avenues must be pursued for Union research policy to become a genuine motor for growth and competitiveness in Europe.

A new and very important field for European research is also linked to the development of a common security policy.

■ *The Commission's financial ambitions were published in February 2004. How have they been received so far by the Member States?*

These perspectives cover all the Union's activities, not just for research, education and growth, but also in the fields of agriculture, social and regional policy, etc. Once you put this against the backdrop of the integration of new Member States, some difficult choices will have to be made.

Can we, as the Commission wants, increase the Union's total budget to 1.15% of the Union's collective GDP or will we remain below the 1% ceiling which some Member States want to retain? In any event, there is quite a broad consensus, in principle, for supporting the priority structure adopted in favour of the knowledge society, one already confirmed in the Lisbon strategy. At some meetings of European government leaders, the Union comes under pressure to do more in the research field.

Commission President Romano Prodi's reply to this, with a touch of humour, is that charity begins at home.

In this respect, it is important to stress a final avenue of research which is essential to creating the European Research Area: the coordination of national research programmes. This is already becoming a reality and the 'ERA-Net' pilot programme, implemented since 2003, is experiencing an interesting success. This type of direct co-operation between Member States, in which the Union is both a stimulating and a binding force, is something which must certainly be developed further in the future. ■

“ There is certainly capacity for scientific excellence of a very high level in the Union, but fundamental research is traditionally a national affair. This compartmentalisation is now proving a handicap. ”





Showcasing science

During the *Make a Face* exhibition at the Nemo Science Centre in Amsterdam, the children take on the role of the parents and are able to use various genes to create a virtual baby.

©Nemo Science Centre/Brunns

People no longer wish to go to a natural science exhibition which consists solely of display cabinets with explanatory texts saying what is inside them. In today's highly competitive cultural environment, exhibition organisers who want to keep their public must satisfy the new demands and find the corresponding financial resources. The other constraint is the need for constant renewal, again in response to public demand. We put on one or two temporary exhibitions a year, with at least two years' work going into each one,' explains Michele Antoine, Director of exhibitions at the *Musée des Sciences Naturelles* in Brussels (BE).

The Sixties revolution

What is the best way of reaching out to various target audiences, arousing their curiosity and enriching their knowledge? This is not a new problem. Even the very first science and technology museums back in the early years of the last century – such venerable scientific institutions as the Chicago Museum of Science and Industry (USA), the Deutsches Museum, Munich (DE), the Science Museum in London's South Kensington (UK), and the Paris Palais de la Découverte (FR) – provided demonstrations and opportunities for visitors to touch and activate certain devices.

'Interaction was present, but in a very different way to that of today,' explains Melanie Quin, Director of the British section of Ecsite (European Collaborative for Science Industry & Technology Exhibitions) network. 'But the real

revolution in the whole approach to and presentation of science and technology came in the 1960s. This was when the Russians were the first to venture into space with their Sputnik mission, which represented spectacular progress, and the Americans began to ask questions about the way science was being taught. The idea which emerged during that decade was that one should try and put the visitor in the position of the inventor so that he or she can also learn by exploring different possibilities, asking questions and actually operating certain devices.'

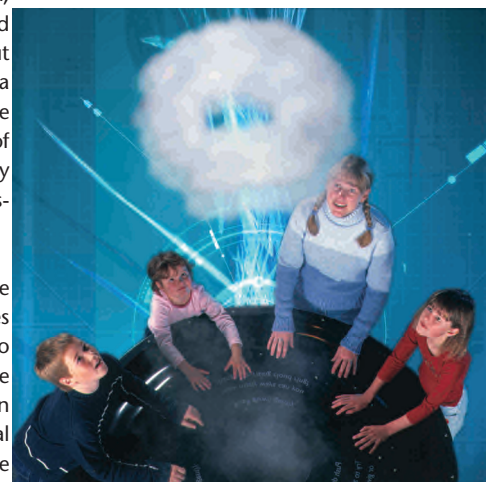
In the late sixties, this new approach gave rise to a new generation of educational centres in North America – such as the San Francisco Exploratorium and the Ontario Science Centre – which were seeking to innovate and offer an alternative to the traditional museographical centres. The concept later took root in the United Kingdom and then in continental Europe, but took about 20 years to become really established. One of the engines for this growth was the use of new information technologies and audio-visual communication. These tools can now be found wherever the communication of knowledge is at stake.

Form in the service of content

'But there is a dividing line which must be clearly established. The point is not to entertain and become some kind of amusement park, but to educate. This does not of course prevent an experience-based approach. The aim is not just

The issues facing science museums are plentiful: sparking public interest, balancing between science and fun and finding funding. These were just some of the questions raised at a meeting organised last November at Deutsches Museum, Munich.

In a series of thematic workshops, more than 600 specialists took a close look at the present and the future of these institutions.



Cloud ring – W5 (Who/What/Where/When/Why) in Belfast (IE)

to disseminate knowledge but to generate interest. To do this, we have no hesitation in using well-known psychological levers. We want to fascinate, awaken curiosity, appeal to the senses and the imagination of our visitors,' explains Diana Issidorides, Director of exhibitions at the Nemo Science Centre in Amsterdam (NL).

'Form is in the service of content,' she continues, stressing how much science museums and centres contribute to educating the general public in the reality and implications



Two aspects of the *Why the World Works* exhibition at the Nemo Science Centre in Amsterdam (NL)
©Nemo Science Centre



Visible Soundwaves – Universum Science Center in Bremen (DE)
©Universum Management Gesellschaft

Travelling exhibition to increase awareness of traffic and children, produced by the Technopolis science centre (BE)
www.technopolis.be



Pattern Pod – Welcome Wing – Science Museum, London (UK)

of science and technology. 'In a context in which everyone is worried at the declining interest in these subjects, this role must be emphasised and recognised.'

Although people like to be surprised and to have fun, they also – and perhaps above all – want to learn something and find some answers to their questions. 'We are immediately criticised if the content is too light. We are taken to task very specifically. We see this in the spontaneous reactions or during the satisfaction surveys we carry out,' points out Dominique Botbol, Head of the Department of Museological Projects at the *Cité des Sciences et de l'Industrie* in Paris (FR). The Cité's policy is to meet the expectations of a public who want exhibitions on subjects of relevance to society – diet, GMOs, the environment. The current *Climax* exhibition, for example, presents some of the possible scenarios which could result from climate change. 'The museum is becoming a forum for discussions on science and technology and their consequences, which was not at all the case when the Cité was founded 20 years ago. Our approach at that time was to explain phenomena.'



Public-private partnerships

But such a development also requires substantial resources. 'Money is our oxygen,' observes Goéry Delacôte, Executive Director of the San Francisco Exploratorium and chairman of the Paris Exploradome's Board of Directors. The only way to generate the budgets needed to manage and realise the ambitions of today's science centres and museums is through co-operation. This can take a variety of forms: sponsoring, partnerships with

other science centres and museums, the use of external designers, hosting travelling exhibitions, etc. 'Co-operation with the private sector is guided by financial considerations, but is not limited to this dimension,' continues Delacôte. 'It is up to the partners to express what they want and what objectives they share clearly.'



This is what happened in the case of an exhibition on climate change at the Deutsches Museum, Munich. 'We wanted to target the right partner,' explains Walter Hauser, Director of the museum's Centre for New Technologies. 'The first criterion was [for them] to have the scientific competences. We were looking for a partner able to contribute its own data and analyses. We also wanted a company with a local presence and a good image as our visitors are mainly from the surrounding area.' The insurance company Munich-RE, a global group based in Munich, was the final choice. It is concerned by the subject (storms and earthquakes triggered by climate change can be costly) and presenting such



Behind the scenes at the *Muséum des Sciences Naturelles* in Brussels. 'Real' museums are also scientific institutions where scientists work and which have a heritage.
©IRSNB-KBIN

a subject can boost its image. 'The group's experts contributed their know-how in terms of analysing the risks and data in this field. But the museum retained final control over content and scenography. Discussions with Munich-RE soon identified shared values which we were seeking to promote, namely a commitment to sustainable development and a





The Wheel of Invention – from the idea to the patent. This travelling exhibition was produced for the European Patents Office by the German company ArchiMeDes. The focus is the potential fascination of science and technology for young people, with a combination of carefully selected objects, interactive elements and multimedia presentations. The first stage, held at the Munich headquarters, was a success.

© Jean-Marie Bottequin
www.wheelofinvention.org

Maths games

An experience unlike anything else in the world... In November 2002, the Mathematikum opened at Giessen, a small university town north of Frankfurt am Main in Germany. It is devoted to a single and, one may be tempted to think, rather unattractive subject: mathematics. Its 1 000 m² floor space is the site of about 100 interactive exhibits plus regular conferences, especially for children, debates and science weekends. 'During the first year, we had 135 000 visitors, which is more than the number of people living in the town,' notes Albrecht Beutelspacher, the centre's director. 'The success has grown since then and we should soon be self-financing.' Schools, students, families and groups of adults all come to the centre.



'Mathematikum is seen as very much part of the town and the inhabitants are proud of it. They no longer need persuading that mathematics can be enthralling.'

www.mathematikum.de
(mainly in German,
but also in English)



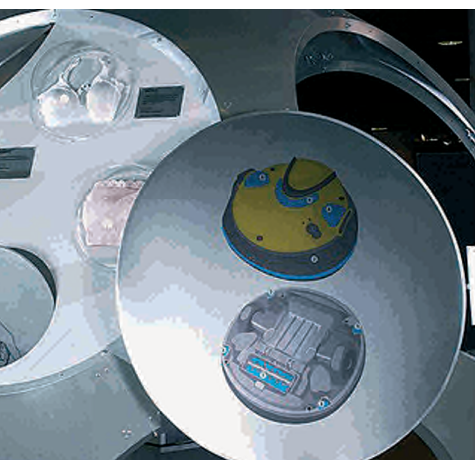
desire to make the general public more aware of the risks linked to climate change, while remaining close to the facts and figures and avoiding any over-dramatising.'

'The local situation, the partnerships with scientists or local companies must help give each museum its own identity,' stresses Olivier Gies, exhibition Designer and Director of the Kunstraum GfK in Germany. 'Science centres and museums must do more to cultivate their individuality, through original presentations and subjects. Why visit a place which is the same as another you have already visited?'

The science-society interface

In addition to organising (costly) exhibitions, another activity pursued by some museums is the holding of debates and Q&A sessions, which are both inexpensive and very interesting. Jerusalem's Bloomfield Science Museum – where many activities are aimed at both a Palestinian and Israeli public – sees itself very much as a centre for continuous learning. 'We call them dialogue groups and they are in keeping with a very old Jewish tradition. Adults, some scientists by training and some not, come together to discuss scientific subjects with researchers,' explains Maya Halévy, the museum's Director.

Another example is Madrid's Museo Nacional de Ciencia y Tecnología (ES) which organises 'conversations with researchers' for children aged between eight and 14. But the most surprising initiative, which has proved a great success, is the six-hour 'science marathon' held eight times a year. 'Spanish scientists, the best in their field, each speak for about 20 minutes on their chosen subject, followed by time for questions from the audience. The 120 seats in the hall are always taken right away so we have had to start putting up a screen in the lobby. Our initial idea was for members



of the public to wander in and out of the various presentations, but we have found that people generally stay from start to finish. We cover everything from nanotechnologies to life in extreme conditions. They have all been very successful.'

This move towards a combination of rigour and conviviality seems to be evident just about everywhere. 'We are moving away from mere popularisation,' concludes Ecsite's Quin. 'The museum is becoming a place of dialogue, an interface between science and society. People already have some scientific knowledge and a certain scientific culture. They contribute their ideas and their questions. The museum's role is perhaps gradually becoming that of a forum.'



Exhibition on the Earth's magnetism at the Universum Science Center in Bremen (DE)

©Universum Management Gesellschaft



In addition to temporary and traveling exhibitions, a number of other projects are made possible thanks to partnerships between museums. *Fatal Attraction – when animals speak the language of love* is the result of a co-production between natural history museums in Leiden (NL), Brussels (BE) and Paris (FR). The co-operation began right from the conceptualisation stage, making it possible to pool the necessary human resources and to share the financial

and technical risks. Each museum agreed to contribute the same capital and presented the exhibition in the knowledge that it had been designed for the three sites. 'We had to know each other well to work together in a spirit of trust,' explains Michele Antoine, Director of exhibitions, Musée des Sciences Naturelles. 'The initial wider theme of animal communication was subsequently reduced to that of the communication of affection.'

The peacock, a symbol of seduction, presented in *Fatal Attraction*.

©IRSNB-KBIN/Th.Hubin

Scientific co-operation

Preliminary discussions lasted a year and resulted in a contract between the three institutions. The chemistry between the individuals on the three teams was particularly good. We shared common values in terms of content and organisation. We wanted to show specimens from our collections and we agreed on the level of scientific discourse and type of presentation. Everybody contributed on an equal footing and every museum had to take ownership of the exhibition. The revenue was shared equally until the break-even point, after which the profit was shared out in line with the number of visitors. The whole process was totally transparent and I believe that is why it was so successful.'

To find out more

- *Ecsite network and Ecsite-UK*
www.ecsite.net
www.ecsite-uk.net

Some of the science museums and centres mentioned

- **Nemo Science Centre, Amsterdam**
www.e-nemo.nl
- **W5, Belfast**
www.w5online.co.uk/
- **Museum des Sciences naturelles, Brussels**
www.sciencesnaturelles.be
(mainly in Dutch and French, but also in English)
- **The Science Museum, London**
www.sciencemuseum.org.uk/
- **Deutsches Museum, Munich**
www.deutsches-museum.de
(mainly in German, but also in English and Italian)
- **Cité des Sciences, Paris**
www.cite-sciences.fr
(mainly in French, but also in English and Spanish)
- **Bloomfield Science Museum, Jerusalem**
www.mada.org.il
(mainly in Hebrew, but also in English and Russian)

MEET... COMPETE... COMPLETE

In the crosshairs

Cafés scientifiques

They are springing up everywhere in the United Kingdom and France, and are beginning to appear elsewhere in Europe. Generally, you will find them in bars and pubs, but also in libraries, theatres and fast-food restaurants. Although *cafés scientifiques* are intended to take scientific discussion out of the academic domain, you will frequently run into top scientists at them. Many of those attending these informal meetings have no scientific background. What they share is an interest in culture and science.

A topic is announced in advance of these evening get-togethers. A couple of invited guests then kick off the discussion, in simple, jargon-free language, before answering the audience's questions. The organisers start from the principle that no question is too stupid to be disregarded. A Chair is on hand to summarise

Lively discussion at Copenhagen's *Videnskabscafe* captured by participant Sasha Brucker.

interventions, decide whose turn it is to speak, and generally mediate the discussion. Subjects discussed can be the time which passes, DNA, Darwinism, cloning, euthanasia, nuclear technology or nanotechnologies.

Some researchers come armed with visuals and illustrations, such as pictures of fractal structures within cauliflowers, bracken or snowflakes to explain the concepts of order and chaos. "For the price of a cup of coffee or a glass of wine, anyone can explore the latest developments in science and technology," say the British organisers of these 'free exchange zones.'



In France, similar discussions are taking place in certain grammar school cafeterias, where *cafés scientifiques*' informal discussions and meetings with scientists become school activities. Some *cafés scientifiques* like to have a common thread. Copenhagen's *Videnskabscafe*, with its diversified and strongly motivated audiences, focuses

on the relationship between science and society, and on how technology affects our daily lives. Its organisers are particularly keen on the relationship between science and culture, and round tables regularly discuss questions concerning science and art, science and science fiction, or computers and creativity.

To find out more

- United Kingdom: www.cafe-sci.org.uk/
- France: www.bardessciences.net/une.html
- Denmark: www.videnskabscafeen.dk

Internet-connected schools**To find out more**

www.scienceacross.org/



A videoconference brings together pupils from Sant Quirze secondary school in Spain with pupils from Cleveland in the United States.

Exploring science locally, sharing insights globally, is the objective of the vast Science Across the World (SAW) network developed and run by the ASE (Association for Science Education) in partnership with *GlaxoSmithKline*. ASE is proposing a mixture of internet-based teaching methods and approaches to enable teachers and pupils to examine in greater detail the relationship between society and science and technology. Most data is in English, but certain documents are accessible only in French, German, Spanish, Portuguese and Italian.

More than 2 500 teachers from 95 countries have signed up to SAW, which also offers them an opportunity to develop their own projects. 'When Norm Schmidt proposed that I undertake a videoconferencing experiment with pupils from Cleveland, USA,' explains Xavier

Juan, a science teacher from Sant Quirze secondary school near Barcelona (ES), 'my first thought was "This is impossible. I have no experience with this communication technology." But a colleague, Jaume Pinto, who is an expert in this area, told me, "Yes, we can do it." Language teacher Marta Pardell also provided valuable help. It was marvellous watching pupils prepare what they had to say in English, using the language like they have never done before... In fact, SAW has dynamised intra-school relationships as much as it has understanding between continents.'

Layered information

Teachers, journalists, economic decision-makers, politicians... Who today has time to plunge into a thousand-page scientific report on a subject that interests them? The GreenFacts Foundation which specialises in environment and health, proposes a special stepped communication method to get readers rapidly to the information they really need. On its internet site, you start at a summary level, and then click to "go deeper". Within three levels surfers can move from a brief resumé of the subject to a more in-depth summary (written by specialists and reviewed by scientists) to the complete underlying document. Files can be accessed on climate change, endocrine disruptors, power lines, non-sugar sweeteners (aspartame), dioxins and water disinfectants.

To find out more

www.GreenFactsFoundation.org
info@greenfacts.org



The GreenFacts Foundation was set up by the Solvay group in 2001. But the Foundation seeks to be independent of its sponsor's influence and upholds its own rules of objectivity. The foundation's managers believe that scientific information is often difficult to understand for non-specialists and, when "popularised", easily becomes tendentious.

SUPPORT... CONSORT... REPORT...

Sun-powered marathon car

To find out more

www.alpha-centauri.nl/adiante

Nuna II is not your common-or-garden family car. Last year, it took part in Australia's 3 000 km-long World Solar Challenge race – following its elder brother Nuna I, which participated in the same race in 2001. Both cars were fitted with clean solar-powered engines designed by the Nuon Solar Team of students from the Technological University of Delft (NL). The team's coach is none other than Wubbo Ockels, the Netherlands' first astronaut. 'After seeing the Earth from space, it is a truly satisfying experience for me to work with young people on a sustainable development-related project,' he told us.

With Australia behind it, Nuna is about to start out on the new 8 000 km-long Adiante marathon, leaving Athens (EL) on 29 May and arriving in Porto (PT) on 11 June. En route, the Nuon Solar Team will be stopping off at Skopje, Belgrade, Budapest, Bratislava, Vienna, Prague, Bonn, The Hague, Brussels, Paris, Geneva, Genoa, Toulouse and Madrid. Nuna II will also be making frequent stops at schools, which will take part in a huge drawing contest – yes, hand-drawn with crayons or markers on good



Nuna II, the ambassador of renewable energy throughout Europe, surrounded by the Dutch student team that designed it.

old-fashioned paper – on the topic of a sustainable future. All these works (around 50 000 in all) will accompany the team to Portugal before being presented to the United Nations.

With 13 countries and 16 stops in different cities in just 14 days, the solar race is also a battle against fatigue. 'After it, there will be no excuse for being unaware of aero-

space technology's potential contribution to the transport industry in the form of solar cells, light-weight structures and advanced aerodynamics, or of the enthusiasm that students are capable of,' Ockels concludes. 'With Adiante, we are going to demonstrate to Europe that solar-powered transport is not science fiction. Through schools, and in particular primary schools, we will be showing our youngest citizens what sustainable technology is capable of.'

Long-term exhibition

The meaning of pain

Pain: passion, compassion, sensibility
Science Museum, London, until 20 June

Suffering, passion, compassion... pain can be approached through experiences as varied as child-birth, illness, torture, sadism and masochism. Humanity's relationship to suffering is also influenced by culture and religion. This unusual exhibition at London's Science Museum, organised by the Wellcome Trust under the guidance of Spanish philosopher Javier Moscoso, presents the complex physical and mental experience of pain through scientific concepts (both the exact sciences and the human sciences) and works of art.



Chinese torture chair, 18th or 19th century.
© The Science Museum

How do neurons detect pain and transmit it to the central nervous system? How can medical progress open the way for the pharmaceutical industry to develop new painkillers? Why can certain types of medicine, such as acupuncture, have anaesthetic effects? What is the placebo effect?

Aside from the medical aspects, history, sociology and psychology also shed light on suffering. The exhibition presents, for example, the Christian justifications for pain (this "gift of God" which humanity was required to accept) and the connections between pain and eroticism. The Marquis de Sade (1740-1814) – from whose name we derive the term 'sadism' – and Leopold von Sacher-

ERRATUM

In issue No. 40, we announced that the **CreepyCrawly** exhibition was being held at the Finnish Science Centre at Vantaa (better known as Heureka) close to Helsinki. In fact, this travelling exhibition is taking place at the Experimentarium in Copenhagen until 12 September.

www.experimentarium.dk

Masoch (1836-1895) – after whom 'masochism' is named – are both analysed as is the famous psychologist Sigmund Freud.

'The meaning of pain is not unchanging,' Moscoso explains. 'Despite its universality, it has not always been put at the centre of the human condition. It has multiple histories – of those who suffer, those who contemplate it and those who inflict or alleviate it. Pain has variously been seen as a means of salvation, as the sign of injury or illness, or as a route to self-enhancement.'

The exhibition includes an extensive programme of documentary films.

To find out more

www.wellcome.ac.uk/en/pain/exhibition.html

Overview of calls for proposals

Below is the latest news on the calls for proposals that have already been launched or are scheduled for the coming months. For additional specific information on each of these calls, go to the following web address:

europa.eu.int/comm/research/fp6/calls_en.html

Abbreviations used – IP: Integrated Projects – NoE: Networks of Excellence – STREP: Specific Targeted Research Projects – CA: Coordination Actions – SSA: Specific Support Actions – Nd: not determined

CALL IDENTIFIER	RESEARCH FIELDS OR ACTIONS TARGETED	CLOSING DATE	INDICATIVE BUDGET (in MILLIONS €)
INTEGRATING AND STRENGTHENING THE EUROPEAN RESEARCH AREA			
Preparatory action for security research rtd-pasr@cec.eu.int			
PASR 2004	Main priority missions: situation awareness; optimisation and protection of networked systems; protection against terrorism; crisis management; interoperability of ICTs	23/06/2004	13
Information society technologies ist@cec.eu.int			
FP6-2002-IST-C	Future and emerging technologies (FET) – Continuous submission of proposals ⁽¹⁾ (1) see: www.cordis.lu/ist/fet/int-o.htm	31/12/2004	60
Nanotechnologies and nanosciences, knowledge-based multifunctional materials and new production processes and devices rtd-nmp@cec.eu.int			
FP6-2003-NMP TI-3-main ⁽²⁾	Thematic call (particularly: fundamental research; auto-organisation and assembly; molecular motors; characterisation and handling methods; bio-inspired and hybrid materials; nanobiotechnological interfaces; intelligent biomaterials for tissue repair; integration in industrial technologies; measurements and testing; life cycle; effect on health and the environment; ethical aspects and consumer awareness) (1) For STREP, CA, SSA: about 50 proposals can be selected (2) A specific FP6-2003-NMP-TI-3-ncp identifier is set for the CA targeted at an enlarged Europe	12/05/2004	105 ⁽¹⁾
Aeronautics and space rtd-aerospace@cec.eu.int			
FP6-2002-Aero-2	'Aeronautics' periodic call for SSA (participation of SMEs – international co-operation – candidate countries – exploitation of results – objectives of the ERA, EU strategy and support for aerospace policy): final closure in March 2006	28/09/2004	7
Food quality and safety rtd-food@cec.eu.int			
FP6-2003-Food-2-B	Periodic call for SSA (participation of SMEs, international co-operation, participation of candidate countries, exploitation of results, scientific and organisational management of projects)	29/09/2004	5
Sustainable development, global change and ecosystems rtd-sustainable@cec.eu.int			
FP6-2004-Global-3	Thematic call in the field of 'Global change and ecosystems'	26/10/2004	205
FP6-2002-Transport-2	Periodic call for SSA (participation of SMEs – international co-operation – candidate countries – exploitation of results – objectives of the ERA, EU strategy and support for policy) in the field of 'Sustainable surface transport': Final closure in March 2006	22/09/2004	5
Horizontal actions for the participation of SMEs research-sme@cec.eu.int			
FP6-2003-SME-1	Periodic call: co-operative research projects	21/10/2004	75
Specific support measures for international co-operation inco@cec.eu.int			
Abbreviations: DEV: developing countries – MPC: Mediterranean partner countries – Russia + NIS: Russia and the Newly Independent States – WBC: Western Balkan Countries			
FP6-2003-INCO-DEV-2	DEV thematic call ⁽¹⁾ (particularly: combatting neglected transmissible diseases; health systems; health care policy and management; food safety)	14/09/2004	36,2
FP6-2002-INCO-MPC-2	MPC thematic call ⁽¹⁾ (particularly: integrated management of water resources; improvements to the use, reuse and advanced treatment of water; development and use of renewable energies; protection and conservation of cultural heritage; health problems linked to economic and population growth; transmissible diseases; health systems; genetic diseases)	14/09/2004	27,1
FP6-2002-INCO-DEV/SSA-1	Periodic call for DEV SSA (health, natural resources, and food safety)	08/09/2004 ⁽²⁾	0,95

CALL IDENTIFIER	RESEARCH FIELDS OR ACTIONS TARGETED	CLOSING DATE	INDICATIVE BUDGET (in MILLIONS €)
FP6-2002-INCO MPC/SSA-2	Periodic call for MPC SSA (environment, cultural heritage, health)	08/09/2004 ⁽²⁾	0,45
FP6-2002-INCO WBC/SSA-3	Periodic call for WBC SSA (environment, health)	08/09/2004 ⁽²⁾	0,45
FP6-2002-INCO Russia+NIS/SSA-4	Periodic call for Russia + NIS SSA (adaptation of industrial production and communication systems, environment, health)	08/09/2004 ⁽²⁾	0,45
FP6-2002-INCO CoMultilaRTD/SSA-5	Periodic call for SSA in the framework of the multilateral coordination of national RTD policies and activities	08/09/2004 ⁽²⁾	0,75
<i>(1) For STREP and CA –</i>			
<i>(2) Forthcoming pooled intermediary assessment dates: 07/03/2005, 07/09/2005, 06/03/2006</i>			
Scientific support for EU policies and anticipation of scientific and technological needs		rtd-policies@cec.eu.int	
FP6-2003-NEST-B	Open call: new or emerging fields in science and technology (NEST): Adventure, Insight projects and Support Actions (STREP, CA, SSA)	15/09/2003	30 ⁽¹⁾
<i>(1) Including budget for call closed in April 2004</i>			
Support for coordination activities		rtd-coordination@cec.eu.int	
FP6-2002-ERA-NET/ 1/CA-SSA	Periodic call: support for co-operation and co-ordination of research activities at national and regional level (ERA-NET system)	05/10/2004 ⁽¹⁾	24 ⁽²⁾
<i>(1) Forthcoming acceptance dates for assessment: 02/03/2005, 04/10/2005</i>			
<i>(2) The budget for the call as a whole is €148 million</i>			

STRUCTURING THE EUROPEAN RESEARCH AREA

Research and innovation		rtd-innovation@cec.eu.int	
FP6-2004-INNOV-3	SSA: 'Industrial and intellectual property rights' assistance service (IPR helpdesk)	16/06/2004	4
FP6-2004-INNOV-4	SSA: regional innovation strategies (including new instruments and approaches)	16/06/2004	17,3
Human resources and mobility (Marie Curie Actions)		rtd-mariecurie-actions@cec.eu.int	
FP6-2002-Mobility-3	Periodic call: Marie Curie host fellowships for the transfer of knowledge	19/05/2004	45 ⁽¹⁾
FP6-2002-Mobility-8	Periodic call: Marie Curie excellence awards (research teams)	18/05/2004	30 ⁽¹⁾
FP6-2002-Mobility-9	Periodic call: Marie Curie excellence awards (individual awards)	18/05/2004	0,25 ⁽¹⁾
FP6-2002-Mobility-11	Marie Curie European integration grants	15/07/2004 ⁽²⁾	19 ⁽¹⁾
FP6-2002-Mobility-12	Marie Curie international integration grants	15/07/2004 ⁽²⁾	10 ⁽¹⁾
<i>(1) Indicative budget for 2004</i>			
<i>(2) Next deadline for assessment: 04/10/2005</i>			
Science and society		rtd-sciencesociety@cec.eu.int	
FP6-2003-Science- and-Society-7	Governance, scientific advice; uncertainty, risk and principle of precaution (€3M) – European science week (€2.6M) – Other (€1.5M: Science shops; science communication; exchange of information products, integration of science in FP6)	11/05/2004	7,1
FP6-2003-Science- and-Society-8	Descartes Prize 2004 (Research and Communication)	11/05/2004	1,25 ⁽¹⁾
<i>(1) Including €1 million for the 'research' prizes (minimum amount: €0.2 million) and €0.2 million for the 'communication' prizes (minimum amount: €50 000)</i>			

RESEARCH AND TRAINING IN THE FIELD OF NUCLEAR ENERGY

		rtd- Euratom@cec.eu.int	
Euratom Call Open	Open call: SSA, international access to major infrastructures, promotion and development of mobility	12/10/2004 ⁽¹⁾	3 ⁽²⁾
<i>(1) Forthcoming closing dates: 12/04/2005, 11/10/2005, 11/04/2006</i>			
<i>(2) For 2004</i>			

CO-OPERATION WITH SCIENTISTS IN THE NEWLY INDEPENDENT STATES (INTAS) ⁽¹⁾

		www.intas.be	
Intas Calls 2004 ⁽²⁾	Thematic and collaborative calls: particularly information technologies, aeronautics, environment, social changes (East & West programme) – Grants for young researchers from the NIS – Dissemination of innovation	03/09/2004	9,8
<i>(1) Support granted by the International Association INTAS is independent of actions under the Sixth Framework Programme</i>			
<i>(2) See also the INTAS open call for accompanying measures: forthcoming closing dates: 30/09/2004 – 30/04/2005</i>			

REFERENCE POINTS... REFERENCE POINTS... R

Biology and Humanity

In this town of Genoa, birthplace of Christopher Columbus, I want this meeting to be the occasion to set off in search of new continents of knowledge." It was with these words that European Commissioner Philippe Busquin welcomed the 200 or so representatives of civil society to the 'Modern biology and visions of humanity' conference. Held on 22 and 23 March, this Commission-backed event aimed to promote dialogue between biologists, philosophers, sociologists and artists on the contemporary implications of biology. To encourage this interdisciplinary dialogue, each session consisted of two 30-minute presentations, followed by comments from the assembled experts. Seated in a semicircle as if in a television studio, they also answered questions from the public. The subjects discussed at this meeting, organised by the 13 members of the European Life Sciences Group, were progress, reductionism in biology, democracy in sciences and, finally, science fiction as a symbol of the contribution art can make to science.



A book by the same title carries 14 of the diverse papers presented at the conference. They include articles by the Italian philosopher Evandro Agazzi on the notion of progress, by the English neurobiologist Steven Rose on the limits of the reductionist approach to biology, and by the American chemist Carl Djerassi on the scope for scientific communication using literary vehicles, such as theatre, the novel and song. Djerassi amazed the audience when he played a piece of rap music dedicated to NO, or nitrogen monoxide, which acts as a neurotransmitter in the brain.

This event in Genoa, European cultural capital in 2004, was a forceful reminder of the importance of including science and technology in any conception of culture.

To find out more

Modern biology and visions of humanity

- In French: Editions de Boeck-Université, Brussels, 2004
universite.deboeck.com/
- In English: Multi-Science Publishing Co
www.multi-science.co.uk/
- In Italian: Centro Stampa d'Ateneo
www.uniroma1.it/centrostampa/

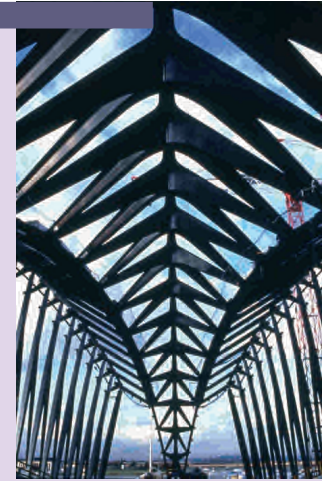
Steeling for success

European steel is huge: annual production of 160 million tonnes, a turnover of almost €100 billion, 250 000 direct jobs, 1.3 million jobs upstream in the metal construction and automobile sectors alone. Today, the industry ranks number one worldwide in terms of production, technological performance and environmental friendliness. Following decades of crisis and restructuring, 'innovation has saved European steel', as Commissioner Busquin declared on launching the new Steel technology platform in March. 'But we must continue to intensify research and increase investments in the face of the challenges of globalisation and sustainable development,' he continued.

Set up in response to this need, the platform represents the entire European industry – producers and users – as well as the sector's considerable research capacities. Its aim is to identify the remaining challenges⁽¹⁾ and to develop – with Union support – innovation strategies for the next two decades.

(1) These include the need to restructure the steel sector in the new Member States. Their annual production – currently 26 million tonnes – represents 16.5% of the EU-15 level.

See: europa.eu.int/comm/enterprise/steel/accession_and_memberstates.htm
www.cordis.lu/coal-steel-rtd/



EUROFER, the group of European iron and steel industries, has published a document entitled *Vision 2030* which provides a strategic basis for the Steel technology platform.

The document can be downloaded at: [ftp://ftp.cordis.lu/pub/coal-steel-rtd/docs/steel_stp_def_en.pdf](http://ftp.cordis.lu/pub/coal-steel-rtd/docs/steel_stp_def_en.pdf)

To find out more

- www.cordis.lu/coal-steel-rtd/

Spotlight on green technologies

They exist, they are clean and economically feasible, and they are easy to use and available in sufficient quantities. At the end of January 2004, the Commission presented its Environmental Technologies

Action Plan (ETAP). This initiative aims to remove the many obstacles to these technologies finding their way into the market. They can play a crucial role in Europe's competitiveness in the context of 'sustainable globalisation'. At the industrial level, ETAP proposes implementation of a technological certification system to guarantee the performance of innovations and reduce access time to the market.

The research sector, too, must serve as a springboard for this promotion of green technologies. Under the Sixth Framework Programme, the ETAP aims to reinforce calls for projects to this end. The plan also recommends quickly setting up a technology platform centred on water supply and sanitation – a particularly crucial field for the global market.

To find out more

europa.eu.int/comm/environment/etap/

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Security: the growing challenge

With terrorism, weapons of mass destruction, rogue states, regional conflicts and organised crime, the list of security threats is as long as it is real – as the newspaper headlines

regularly remind us. The issue of strengthening Europe's common security has also become a recurrent and major subject of discussion at gatherings of European leaders.

To date, the European common security strategy has lacked one essential element: co-operation in terms of the technological resources which are vital to any real European security policy. Although sometimes the subject of intergovernmental agreements, defence R&D has traditionally been deemed a politically sensitive area of national sovereignty. Faced with the globalisation of threats, this excessive fragmentation of structures and programmes is coming to be seen as a handicap. In addition to the high level of duplication, there are also major problems in terms of mobilising resources (both military and civil, as the technologies employed are often 'dual use'), the profitability of applications, and the interoperability of systems.

With a mandate from the Council of Ministers and the European Parliament, the Commission has decided to implement a 'preparatory action', with a budget of €65 million over three years to lay the foundations for a European security research programme, scheduled for launch in 2006. The programme will follow a cautious approach, first testing and demonstrating the potential benefits of increased Union investment in this field. Five priority missions have been identified for the calls for proposals: 'situation awareness' (surveillance of borders and localisation devices); network security; protection against terrorism (especially chemical or biological attacks); operational crisis management; the interoperability of information and communications systems. Support actions (forward studies, normalisation, dissemination of knowledge, etc.) are also planned.

'The cross-fertilisation of the ideas and results of civil and military research has exciting research potential for an enlarged Europe,' stresses Commissioner Philippe Busquin. 'Increased European R&D in the security field is also part of a dynamic making it possible to increase research investment to 3% of GDP.'

To find out more

- **EU security research**
europa.eu.int/comm/research/security/index_en.htm
- **Commission proposal COM(2004) 72 final**
"Towards a programme to advance European research through Research and Technology"
europa.eu.int/eur-lex/fr/com/cnc/2004/com2004_0072fr01.pdf
- **Research for a secure Europe: Report of the Group of Personalities charged with advising the EC**
europa.eu.int/comm/research/security/pdf/gop_en.pdf

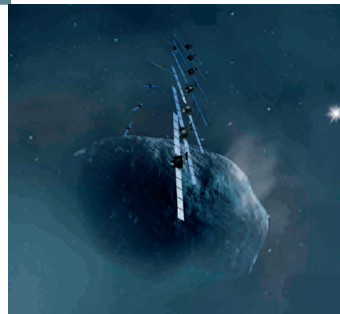
Contact

- rtd-pasr@cec.eu.int

2014, a Rosetta odyssey

'Rosetta is one of the most ambitious space missions ever undertaken, in terms of the expected scientific benefits and the scale and complexity of the interplanetary manoeuvres involved,' believes David Southwood, Director of the ESA's scientific programme. Following years of preparations (and the delay of earlier projects due to problems with Ariane 5), the Rosetta probe (3 tonnes in weight and 3 metres high) took off from Kourou in French Guiana on 2 March 2004. Its decade-long voyage will culminate when it meets up with the Churyumov-Gerasimenko comet in November 2014. Under the auspices of the European Space Agency, the device was built by an industrial team of more than 50 contractors from 14 European countries. Technical assistance was also provided by the United States.

Like the previous attempt to chase Halley's comet, this rendez-vous will be a great moment of suspense in the history of space. Rosetta's high-tech cameras will photograph this heavenly body from every angle and deposit a lander on the comet surface to carry out exper-



Scientific passports

A new European initiative is giving further momentum to the mobility of researchers: the 'scientific visa'. The Commission has just adopted a proposal for a directive and two recommendations for the launch of the document which, issued within 30 days of submitting an application, will enable nationals of all non-EU countries to reside in a Member State for limited periods for specific research purposes (temporary contract, grant, etc.). These researchers will be free to travel anywhere in the Union.

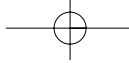
For the purposes of the visa, the concept of 'researcher' is understood in the widest sense of the term and covers any person qualified in the fields of knowledge and innovation. Raffaele Liberali, Head of the Human Factor, Mobility and Marie Curie Actions Directorate at the Research DG, stresses that 'the Union has taken a step to facilitate visits by researchers at a time when other parts of the world, the United States for example, are moving in the opposite direction. This represents a real opportunity for Europe.'

iments. The on-board instruments (cameras, spectrometers and sensors) will gather a unique body of data on the comet's core, shape, density and chemical composition. They will also make it possible to analyse the gas and dust particles present in the nebulous cloud that surrounds it, as well as the interactions with solar wind.

Rosetta's mission should go some way to lifting the cloak of mystery that still surrounds the solar system. The composition of comets is, in fact, the same as that of the solar system during its embryonic initial stages, about 4 600 million years ago. Rosetta should also shed light on the role of comets in the appearance of life on Earth.

To find out more

- www.esa.int/rosetta



REFERENCE POINTS... REFERENCE POINTS... R



Hydrogen generation

Convertible to mechanical or electrical energy and heat – in particular by using electrochemical converters known as ‘fuel cells’ – hydrogen is a clean energy source set to play a major role as a substitute for fossil fuels. The Union has included this alternative technology among the priorities for its energy policy of the future. Under the Sixth Framework Programme, financial support of almost €100 million, coupled with private investment of the same amount, has already been granted to new R&D projects in this field. Other calls for proposals to be issued under the priority research themes (energy, aeronautics, land transport, industrial technologies) later this year will result in the mobilisation of public and private financial resources of around €300 million, one half in the form of Community research.

To find out more

- Hydrogen technology platform
europa.eu.int/comm/research/energy/nn/nn_rt_http1_en.html

As part of the wide-ranging European initiative for research, launched by Commission President Romano Prodi in 2003, this multidisciplinary research effort is the point of departure for the Quick Start programme designed to encourage the development of the infrastructures, networks and knowledge needed to get a genuine ‘hydrogen economy’ up and running. Based on the creation of a European technology platform of private and public sector researchers, industry and the financial world, it aims to demonstrate that this energy source is both technologically and economically viable.

The Dead Sea Scrolls: the eye of the synchrotron

A team of researchers from the Hebrew University (IL), the University of Kiel (DE) and Daresbury Laboratory (UK) have been working at the European Synchrotron Radiation Facility in Grenoble (FR) to study, using the Microfocus beam line, the fibres and pigments of the material in which the Dead Sea Scrolls were wrapped. Using ESRF technology, it is possible to determine the scrolls’ composition on the basis of a sample just one hundredth of a millimetre

To find out more

- www.esrf.fr



in diameter. ‘We discovered that they consist of several materials, such as linen and wool. Some fragments contained only cotton, a textile which did not arrive in Europe and the Middle East until several centuries after the period when the Dead Sea Scrolls were believed to have been written. This tells us that the fabric is more recent than the Scrolls themselves,’ explains Jan

Gunneweg, the project manager.

These 800 or so Hebrew, Greek and Armenian documents were discovered by Bedouins, in 1947, in caves in the region of Qumrân, on the West Bank of the River Jordan. They are believed to have been written between the second century BC and the first century AD and must have been the library of a Jewish community, probably the Essenes. The texts tell us of the life of this community and the beliefs and practices of the early Christians.

Humour

Hitting where it hurts

Nurses, postal workers, train drivers, tax inspectors, farmers, newsagent tobacconists, smokers, restaurant owners, intermittent artists, Corsican prisoners, Swiss footballers, eradicators of transgenic maize, lawyers employed by dictators, columnists for *RTD info*, chief weapons inspectors...

In our developed democracies, many professions threaten to go on strike to obtain from the authorities an improvement to or protection of their situation. French researchers, outraged at the restrictions on research posts and funding in their country’s public sector, have recently swelled the numbers of these protestors.

Let there be no mistake. When a profession as private as that of the researcher decides to enter the arena of collective interest groups, then something is amiss. But what should be done to attract attention and win public support when one has so little direct influence on people’s day-to-day lives?

Simply stop work?

No. Whether it was because, with noble ideas of their social utility, they feared downing their research tools would damage the results of public research, or, more realistically, they suspected such a threat

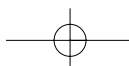
could prove totally ineffective, or, finally, because they could not bring themselves to sacrifice what is often a passion as much as a profession, they decided simply to stop carrying out the administrative tasks linked to their research.

That is what struck to the core of the system. Getting off the bureaucratic merry-go-round, stopping circulating from ministries to secretariats and from offices to departments the many forms bearing their stamps and signatures. That is what jeopardised the central model and was of a nature to affect millions of civil servants, tens of millions of citizens, users, recipients and other administered parties.

That is the stroke of genius that warrants the label of ‘brains revolt’ applied to this movement, despite the vexing nature of such a description in regard to the other categories (see list above).

And if this action does not yield the expected result, then the researchers will have to attempt a strike of zeal that would consist, for example, of trying to exasperate the public by swamping them with a flood of discoveries, innovations, publications and patents!

Candide



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Letters

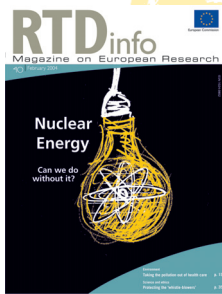
Nuclear reactions

The dossier on nuclear energy in edition 40 of RTD info (February 2004), prompted a number of reactions. Here are two letters from readers who express reservations on the subject.

Krypton-85

It is stated in your dossier that nuclear power stations do not produce any carbon dioxide molecules and can help meet Europe's obligations under the Kyoto Protocol. In this respect, I should like to point out that half-truths invariably conceal full-blown lies.

It is true that nuclear power plants do not emit any CO₂. On the other hand, they all emit krypton-85, a rare radioactive gas with a sufficient life and energy to damage the ozone layer and affect the health of people who inhale it due to a prevailing wind. At the time of the 'Iron Curtain', the Americans were able to assess the nuclear output of eastern Europe solely by taking measurements of the krypton-85 concentration levels in the atmosphere.



Peter Tschaunin
peter.tschaunin@fh-gelsenkirchen.de

It is correct that nuclear fission applications – and in particular the reprocessing of fuel – emit krypton-85 into the atmosphere and that this rare radioactive gas, with a half-life of approximately 10 years, is perfectly detectable. While used as a 'spy' in the Cold War, it is also used by the World Meteorological Organisation (WMO) – which analyses precise concentrations – as an excellent 'tracer' for the study of transport and the global circulation of atmospheric pollutants.

Despite an undeniable increase in concentrations recorded (a doubling in 30 years, between 1970 and 2000), radioprotection studies consider that the levels attained – in particular when compared with concentrations of radioactive elements (such as radon-222) due to natural sources – to date give no cause for concern as regards human health and the environment. See: Krypton-85 in the Atmosphere: Accumulation, Biological Significance, and Control Technology (NCRP Reports See: 44, USA).

Don't forget wind power...

I read with interest your dossier on nuclear energy, in which a conclusive statement caused me some concern. Nuclear energy is a controversial subject and should be the subject of much reflection. It is incorrect, however, to present it as a necessary evil to achieve the goals of climate preservation, as your article suggests.

It is already verging on ignorance to state, in passing and as if self-evident, that renewable energy sources have insufficient potential. Such a statement is quite simply wrong and you will quickly realise this in the course of your own research. This is a prejudice which appears convincing and which serves a political argument, but it remains a prejudice and nothing more.

Write an article on wind power, for example. Industry and research have progressed enormously in this field over recent decades. Aerodynamics, mechanical construction, control technology, materials knowledge, electro-technology – researchers have explored unknown scientific terrain in recent years. This could also be an interesting subject for your magazine! One of your many researchers in climatology, none of whom managed to place a single word in your article on nuclear energy, could certainly evaluate the potential of wind power in Europe.

Ralf Mehr
R.Mehr@recht.uni-jena.de

RTD Info has published many articles on the key importance of renewable energy and it is a subject to which it will return, especially the convincing progress made in the field of wind power. But is it a mistake to state that, faced with a growing demand for electricity, these energy sources will not be sufficient to permit a sufficient decrease in the use of fossil fuels? The Union has set itself the ambitious goal of producing, by 2010, 22% of its electricity from renewable sources, while present trends suggest that it will achieve just 15% by then. Germany is one of the countries that has made a notable effort in this respect, and particularly in developing wind power. However, at the end of 2003, the production potential of the German wind power park was 5.6% of the country's electricity consumption in 2001 (Source: Deutsches Windenergie-Institut).

For recent information on Union research efforts in favour of renewable energy, we refer our readers to the presentation on the subject, in March 2004, which can be found on the prestigious website of the Almeria solar platform (ES).
europa.eu.int/comm/research/press/2004/pr1603en.cfm

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On the Web

Info on European R&D at a click

europa.eu.int/comm/research/infocentre/index_en.cfm

The Research DG's Europa site now has a Research Information Centre page. By entering key words or subjects, visitors can consult hundreds of documents from several of the DG's editorial sources (news weeklies, project presentations from the DG's scientific services, articles published in *RTD info*).

Sites dedicated to European research

The Research DG's Europa site is constantly acquiring new autonomous sub-portals devoted to specific themes and continuously updated. Here are some examples:

- Biosociety
europa.eu.int/comm/research/agriculture/index_en.html
- Industrial research
europa.eu.int/comm/research/industrial_technologies/index_en.html
- Space research
europa.eu.int/comm/space/index_en.html
- Aeronautics research
europa.eu.int/comm/research/aeronautics/index_en.html
- Security research
europa.eu.int/comm/research/security/index_en.html
- Energy
europa.eu.int/comm/research/energy/index_en.html
- Surface transport
europa.eu.int/comm/research/transport/index_en.html
- Marie Curie actions (Human resources and mobility)
europa.eu.int/comm/research/fp6/mariecurie-actions/indexhtm_en.html
- Science and society
europa.eu.int/comm/research/science-society/index_en.html
- International co-operation
europa.eu.int/comm/research/iscp/index_en.cfm

The Marie Curie market of opportunities

mc-opportunities.cordis.lu/

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This page enables you to subscribe on-line to various newsletters on European research which will then be sent to you by e-mail, and/or to receive a message of notification whenever publications in this field – such as *RTD info* – become available on the Web.

Research DG publications

European Research Area

- **Towards a European Research Area – Key Figures 2003-2004** – Brochure – Publication: 2003/12 – 95 pp. – ISBN: KI NA 20735 C – fotini.chiou@cec.eu.int
- **ERA-NET - Networking the European Research Area** – Publication: 2004/01
ISBN: 92-894-6380-5 – rtd-coordination@cec.eu.int
- **European Diversity and the Knowledge-Based Economy - Feasibility Study** – Project report – Publication: 2004/02 – 65 pp.
ISBN: KI NA 20816 C – fotini.chiou@cec.eu.int
- **Governance of the European Research Area Giving Society a Key to the Lab** – Brochure – Publication: 2004/03 – 22 pp.
ISBN: 92-894-4971-3 – rtd-citizens@cec.eu.int
- **International Scientific Co-operation 2002-2006 - Conditions to participate in the projects and receive funding as member of a third country** – Brochure – Also available in ES – Publication: 2003/12
16 pp. – ISBN: 92-894-6279-5 – inco@cec.eu.int
- **Report of activities 2001-2003 - European Research Advisory Board** – Report – Publication: 2003/10 – 20 pp.
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- **Dossier: Nuclear energy – Can we do without it?**
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Agenda

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- **Consultation Conference on Innovation and SMEs**
3-6/06/2004 – Clontarf Castle
- **Forum of National Bioethics Committees**
11/06/2004 – Royal Irish Academy
- **Foresight for Competitiveness** – (in association with the Research DG) – 14-15/06/2004 – University College Dublin
- **ICMSS 2004 – International conference on Molluscan Shellfish Safety**
Organised by the *Marine Institute* – 14-16/06/2004 – Galway
- **Thinking Beyond Tomorrow: A Safe and Nutritious Food Chain for the Consumer** – 17-18/06/2004 – University College Dublin

European notebook

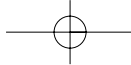
- **Eighth Congress of the International Society for Musculoskeletal Shockwave Therapy** – 29/05/-1/06/2004 – Vienna (AU) – www.ismst.com/
- **World Bioenergy 2004 – Taking you from Know-How to Show-How** 2/06/2004 – Jonkoping (SE) - www.elmia.se/worldbioenergy/
- **Questioning Internationalisation – Cultures, Players, Organisations, Machines** – Organised by the *Société Française des Sciences de l'Information et de la Communication* – 3-5/06/04 – Istanbul (TU) – congres.sfsic.org/
- **Object-Excavation-Intervention: Dialogues between Sculpture and Archaeology** – Organised by the Henry Moore Foundation 4-5/06/2004 – Leeds (UK) – www.henry-moore-fdn.co.uk/site/thesite/institutep/index.html
- **ALLC/ACH 2004 – Computing and Multilingual, Multicultural Heritage** – Organised by the Association for Literary and Linguistic Computing and the Association for Computers and the Humanities – 16/06/2004 Gothenburg (SE) – www.hum.gu.se/allcach2004/
- **Promoting Workplace Health** – 14-15/06/2004 – Dublin (IE) www.whpudublin2004.org/
- **Sensors for Security – Workshop and Exhibition** – Organised by the Joint Research Centre – 14-15/06/2004 – Ispra (IT)
- **International Conference on Groundwater Vulnerability Assessment and Mapping** – 16/06/2004 – Ustro (PL) – khgi.wnoz.us.edu.pl/vulnerability.htm
- **Food and Feed Safety in the Context of Prion Diseases** 16-18/06/2004 – Namur (BE)
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- **Bio Ireland 2004 – All-Island Biotech – 20-22/06/2004**
Coleraine, Northern Ireland (UK) – www.bioireland2004.com/
- **EC workshop on Geographic Information and Information Systems** – 23-25/06/2004 – Warsaw (PL)
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- **Eighth ESC Congress – A Holistic Approach to Sexual Health: Is it Needed, Appropriate and Possible?** – Organised by the European Society of Contraception – 24-26/06/2004 – Edinburgh (UK)
- **Fourth Ministerial Conference Environment & Health – The Future for our Children**
Organised by the WHO, Europe regional office 24-28/06/2004 – Budapest (HU)
www.who.dk/eprise/main/WHO/Progs/BUD/Home



- **IST Mobile & Wireless Communication** – 27-30/06/2004 – Lyon (FR)
www.mobilesummit2004.org/

- **INPC 2004 – International Nuclear Physics Conference** 27/06/-2/07/2004 – Gothenburg (SE) – www.fy.chalmers.se/conferences/inpc2004/
- **EACR 18 – 18th Meeting of the European Association for Cancer Research** – 3-6/07/2004 – Innsbruck (AU) – www.fecs.be/conferences/eacr18/index.shtml
- **ECMLG 2004 – IS Management, Leadership and Governance** 1-2/07/2004 – Reading (UK) – www.academic-conferences.org/ecmlg2004/2-ecmlg2004-home.htm
- **ICME 10 – 10th International Congress on Mathematical Education** 4-11/07/2004 – Copenhagen (DK) – www.icme-10.dk/





The allergy enigma

One in four European children under the age of 10 suffers from an allergy. Why is this a growing problem? Are the causes environmental or hereditary? Why is it that, despite relatively homogenous lifestyles in apparently comparable countries, the percentages of allergy sufferers show such marked contrasts?

The 'allergy sufferer's wave', an identifying gesture of people suffering from hay fever.



All in all, the scientists have certainly not finished grappling with the allergy headache. As part of their efforts, 25 leading research teams have come together within the GA²LEN European network of excellence.

'The sound of my wheezing drowns out that of my pen, I am in a cloud of smoke which, I swear to you, you would refuse to enter, and in which you would be nothing but tears and coughing.' The suffering and the anguish of the asthma sufferer has rarely been described with such poignancy as in this letter of 31 August, 1901, written by the French novelist Marcel Proust to his mother. Today, this suffering and anguish is becoming increasingly common, affecting almost a quarter of children in Europe.

At its present rate of growth, it is an epidemic which threatens to impair the quality of life of future generations. Of Europe's 80 million allergy sufferers, two-thirds say it presents a serious handicap in their day-to-day life.

Hypersensitive immunity

Over the past 20 years, a lot of progress has been made in our understanding of the biology of allergies. We now know that they are linked to the immune system producing a particular kind of antibody known as class E immunoglobulins (IgE). IgE is the human body's natural response to parasitic infections. For reasons we have yet to grasp fully, allergy sufferers produce an excess of IgE in response to exposure to a substance which usually produces no effect in non-sufferers.

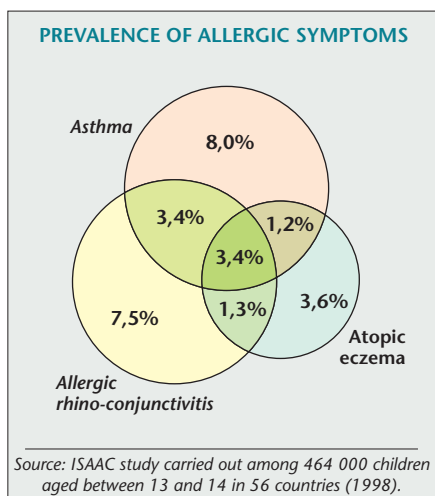
Although identifying this hypersensitive immune reaction has paved the way to the development of new treatments, these have not solved the problem as a whole. The fact is a third of people who produce excess IgE do not develop any allergic symptoms. Immunologists still have questions to answer, although the

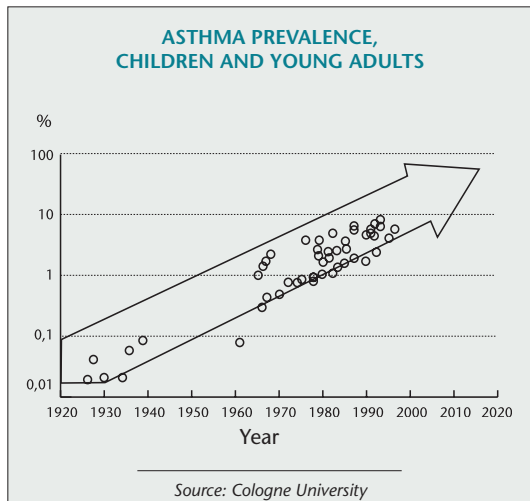
principal challenge no doubt lies elsewhere: in an understanding of the reasons why the prevalence of allergies, while increasing rapidly, also varies greatly from one country to another.

Epidemiological conundrum

The epidemiology of allergies is very much an enigma. How do we explain, given the relatively homogenous lifestyles throughout Europe, allergy rates of 3.7% among 13-14-year-olds in Greece and of 32.2% for the same age group in the United Kingdom? It cannot be climate, because countries as different as Finland and Malta both show a 16% prevalence. Atmospheric pollution? Not that either. In Eastern Europe, where the air quality can be particularly poor, children suffer less from allergies than they do in Western Europe: 8% in Poland and Lithuania, but 29% in Ireland.

Coupled with these surprising geographical differences, there is the rapid increase in the frequency of allergies over the past 20 years. Is this down to genetics or an environmental influence? As always, it is probably a bit of both. The same environmental factors are





increased frequency of allergies offers a useful way forward in defining research priorities. The genetic make-up of Europeans cannot have changed much over the past 20 years. This implies that it is the environmental changes which must be studied.

Recognising the scale of the problem

'To date, there has been insufficient integration of environmental policy and health policy. It has proved difficult to study the relationships of cause and effect between these two fields,' admitted Health and Consumer Protection Commissioner

allergenic for subject X and harmless for subject Y, due to differences in their genetic make-up. However, unlike for other diseases where the debate between the champions of the hereditary hypothesis and supporters of the environmental explanation leads to an impasse, the

David Byrne on presenting the European SCALE strategy to combat children's diseases linked to the environment. Asthma and other allergies top the list of these diseases, followed by neurological development disorders, cancers and disturbances of the endocrinal system.

The acronym SCALE is an entire programme in itself. The 'S' for 'Science' evokes the need for scientific research on pollutants and allergens. How do they interact and travel? How do we come into contact with them – through the air, water or diet? The 'C' for 'Children' indicates the priority given to studies on childhood, the period when the body is most sensitive to the action of pollutants and when exposure can have effects that last a lifetime. The 'A' for 'Awareness' highlights the importance of ensuring that the general public, economic players, politicians and other stakeholders are all well informed. The 'L' for 'Legislation' and the 'E' for 'Evaluation' stress the need to adapt European legislation to take full account of this public health priority and to assess regularly the effectiveness of all action taken.

In the food

The SCALE strategy's action programme will be presented at the Interministerial Conference on the Environment and Health, to be held in Budapest in June. Research directly

Data on plant proteins



Dwarf ragweed



Sweetgum



Mulberry



Orchard grass

One of the difficulties posed by the study of food allergens is the lack of a centralised source of useful information. When a patient shows significant symptoms of an allergy, it is rare to know the precise ingredient of the food which is responsible. Even the clinical diagnosis can sometimes be imprecise. Is it a genuine allergy? If so, is it an anaphylaxis – an extreme and sometimes lethal form which begins a few minutes after eating even very small quantities of a particular food? Or is it a food intolerance – a phenomenon which is very different to an allergy – manifested in the form of cramp in the stomach and headaches, as in the case of coeliac disease (cereal gluten intolerance) or diarrhoea, which can indicate an intolerance to the lactose contained in milk?

The Protall database – accessible online free of charge – helps shed light on these questions. It was developed by a network of 30 researchers from 12 Union countries, specialists in plant biology, food science and clinical allergology. It presents virtually all the available information on a total of 77 allergens found in 48

Source: American Academy of Allergy, Asthma & Immunology

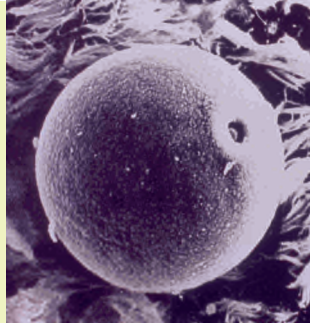
plant species (clinical description of allergies, chemical nature of the allergen, biochemical properties). A comparison of these molecules has made it possible to define a number of common properties. This improved knowledge of the biochemistry of allergenic molecules has important applications. It may, one day, enable us to predict the possible allergenic properties of new plant proteins and develop simple precautions for avoiding food allergies, such as peeling peaches, as it is the skin which contains the principal allergens.

Protall: Food allergens of plant origin – the relationship between allergenic potential and biological activity

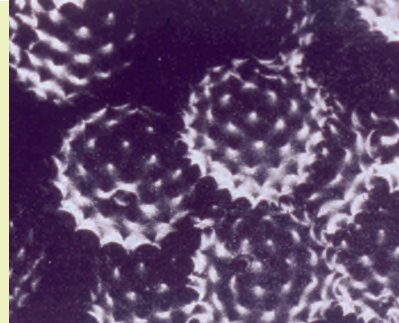
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Pollen alert

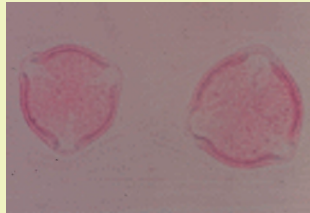
The Internet site of the European network of aerobiological monitoring presents data collected at monitoring centres for allergic risks located throughout Europe. In addition to the newsletter on pollen content, visitors can also check seasonal maps per pollen type and country. Explanations are also provided on each variety of allergenic plant. Check it out this spring...
www.polleninfo.org/



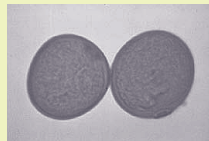
Grass pollen



Ragweed pollen



Oak pollen



Orchard grass pollen

Source: American Academy of Allergy, Asthma and Immunology

Many people believe, rightly or wrongly, that they suffer from an allergy and change their lifestyles accordingly. This self-medication can be harmful if an unbalanced diet is adopted. Above all, it closes the door on any treatment targeting the root of the problem, the antigens responsible.

A breath of fresh air

Research on food allergens relates to just one aspect of the questions raised by multiple allergies. A real understanding of these pathologies and the development of strategies to treat them entails drawing on several disciplines: nutrition, genetics, immunology and epidemiology, pneumology, dermatology, paediatrics and ear, nose and throat specialisations.

This is precisely the aim of the new Global Asthma and Allergy European Network (GA²LEN) Network of Excellence, launched last February. Its acronym is a reference to the famous Greek physician from the second century AD who was the first to understand that the lungs fill with air inhaled through the nasal passages. GA²LEN is distinctive not only for bringing together researchers from 14 Union countries, plus Switzerland and Norway, but also the principal groups affected by the problem, that is the patients and health professionals who treat them. The project partners are the European Academy of Allergology and Clinical Immunology (3 000 physicians from learned societies from all over Europe) and the European Federation of Allergy and Airways Diseases Associations (250 000 members in 19 countries). The project received immediate initial funding from the Commission of €14.4 million out of a total €29 million budget.

A question of hygiene

This support will result in a wide-ranging programme covering nine main avenues of research investigating most of the enigmas posed by the increase in allergies. Why, for example, are allergies less frequent

among children who grow up in a rural environment? Some researchers believe that urban life, by reducing exposure to pollen, insects and other natural immunogens during childhood, makes the immune system lazy to the point where it fails to recognise these antigens. This hygiene hypothesis implies that the increase in allergies is the unexpected consequence of more sanitary living conditions. This possibility is being tested by GA²LEN, in particular by researchers at the Ludwig Maximilians Universität in Munich (DE).

Dust mite

Source: American Academy of Allergy, Asthma and Immunology

relating to this strategy has already been carried out in the field of food allergies. This is partly in response to strong public concern over the matter.

Fears of allergies relating to the consumption of products containing genetically modified (GM) maize or soya has a lot to do with the suspicions harboured by many Europeans on the subject of genetic modification in general. Moreover, the debate extends beyond this issue. Globalisation brings more opportunities to consume new products. Peanuts, virtually unknown in Europe 50 years ago, are now served with drinks everywhere, not to mention kiwis and Brazil nuts which appeared on European tables even more recently. Finally, the modern processing practices of the agrifoodstuffs sector, in particular the use of preservatives, are also elements to be watched.

There is now a general consensus that European consumers are entitled to close monitoring of the potential allergic risks posed by new foods and to information on them. In addition, the technical tools are needed to permit the implementation of regulations in an area which has given rise to a number of projects supported by the Union (see boxes).

'We are often unaware of what quantity of an allergen in food triggers an allergic reaction. Experience shows that it can vary from 1 to 100 000 from one patient to another,' explains Lars Poulen of the Laboratory for Medical Allergy at the Copenhagen University National Hospital (DK). Poulen is coordinator of the FAREDAT (Food Allergy Risk Evaluation Based on Improved Diagnosis, Allergens and Test Methods) project.



Another typical question is: why are office workers more subject to allergies than others? In this case, the cause may be linked to modern wall coverings or paper solvents. This is the aspect being studied by the team from Barcelona's Instituto Municipal Investigacio Medica (ES). Meanwhile, GA²LEN teams and the University of Utrecht are looking into indoor pollution (poor air circulation, dust mites, passive smoking, etc.).

Gender divisions

Another mystery is being studied at the Institut de la Science des Etudes et de la Recherche Médicale (INSERM) in France: small boys are more prone to allergies than girls, but the gender gap balances out during adolescence. What is at work here? Is this difference due to biological, sociological or simply statistical factors?

The list of GA²LEN research projects is long. They include: the modelling of the effects of asthma on lung tissue by Palermo University (IT); the role of traditional food allergens – such as seafood and peanuts – a research project headed by Southampton University (UK); the compiling of a DNA databank of allergic diseases, coordinated by the INSERM; and exchanges between European physicians on medical treatment, organised by the Institut Karolinska in Stockholm (SE).

The importance of diagnosis

This blossoming of projects also shows how important it is to place improvements in diagnostic methods at the heart of research. Existing tests are based on detecting IgE synthesis in response to exposure to antigens. These are of imperfect predictive value as some people produce IgE without developing allergic symptoms.

Researchers with the GA²LEN network aim to overcome these obstacles. 'I have every confidence that we will succeed, within the next five years, in obtaining a simple test, perhaps requiring no more than a teardrop or saliva sample. This would tell us to what substances and to what degree a child is allergic,' believes network coordinator Paul van Cauwenberge of Ghent University (Belgium). ■

More information

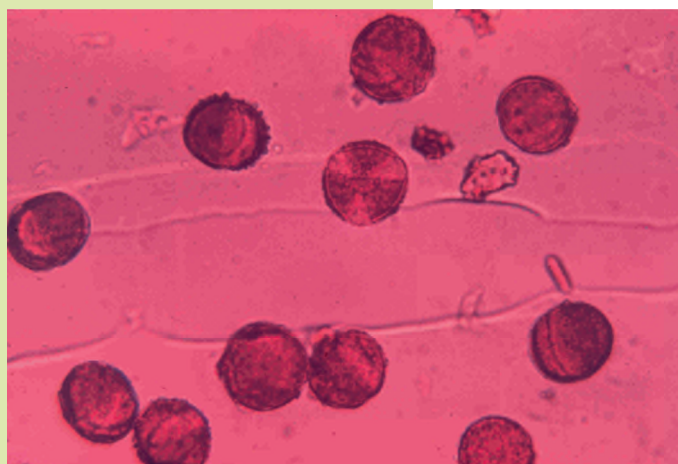
- **WP5: Clustering of European food allergy research**
www.informall.eu.com/WP5.htm
- **FAREDAT (Food Allergy Risk Evaluation based on improved Diagnosis, Allergens and Test methods) project**
www.lkpallgy.suite.dk/FAREDAT/
- **Lars Poulsen**
lkpallgy@inet.uni2.dk
- **GA²LEN (Global Asthma and Allergy European Network) project**
www.ga2len.net
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- **European Academy of Allergology and Clinical Immunology**
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- **European Federation of Allergy and Airways Diseases Patients' Associations**
www.efanet.org
- **The SCALE strategy**
http://europa.eu.int/comm/environment/health/index_en.htm#1

Apples, false friends

'An apple a day keeps the doctor away'. This popular and scientifically sound saying overlooks the fact that apples, Europe's most widely grown fruit, can also provoke allergies. The Safe project recently identified chemically five allergens: four in the fruit, known as Mal D1 to 4, and a fifth in the pollen. 'Approximately 10% of the population is allergic to pollen. More than half of these people will also develop an allergy to plant foods,' explains Safe's Karin Hoffman of the Department of Pathophysiology at Vienna University (AT). 'Our study made it possible to better understand the relationship between these two types of pathology triggers.'

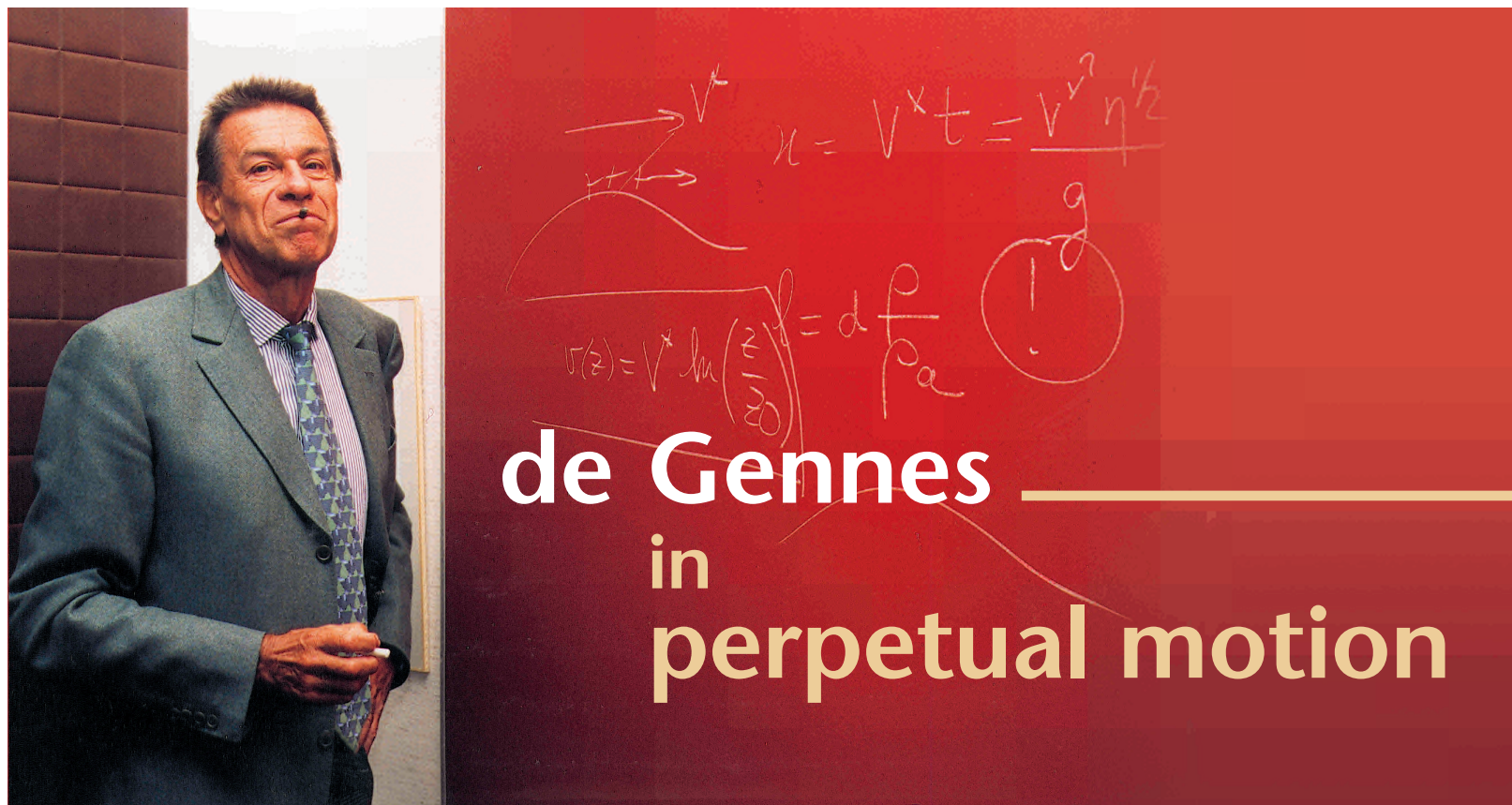
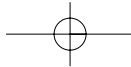
The epidemiological aspect of the Safe research – to which Austrian, Spanish, Italian, Finnish, Dutch and Swiss laboratories contributed – showed two dominant forms of geographically distinct allergies: reactions to the pollen are typical in Northern and Central Europe while, in Southern Europe, the main problem is posed by allergies to the fruit itself. Present research is trying to identify the levels of expression of the various Mal D variants among the principal varieties of apple trees and to develop tests with which to identify these antigens in the fruit as well as in the juices and purees made from it.

Safe: Plant Food allergies. Field to table strategies for reducing their incidence in Europe



Four allergens are found in the apple, a fifth (above) in the pollen.

Source: American Academy of Allergy, Asthma and Immunology



A constant difficulty in scientific research is selecting areas that are ripe but not overripe for investigation. Pierre-Gilles de Gennes (72), a Nobel prizewinner in physics and Professor at the Collège de France, now works on memory neurons and certain aspects of cancer. Earlier voyages of scientific discovery took him into the fields of superconductivity, liquid crystals, polymers, and interfacial science. We met this untypical researcher.

Fascinated by how things work, gifted with a rare spirit of synthesis and exhibiting a deep aversion to routine, Pierre-Gilles de Gennes has, from his earliest youth, struck out from the beaten track. "Poor health prevented me from attending primary school. My teacher

was my mother. She had a marvellous knowledge of history and literature and taught me English by reading Jerome K. Jerome's *Three men in a boat* to me. This was probably not a bad initiation, but I lost a lot in terms of social life..."

Since then, de Gennes, far from being an introvert following his several years of solo education, has made up for the lost human contact. Teams are a vital part of research for him. These should preferably be multi-disciplinary teams, involved in a collective effort under the baton, not of a "boss" but someone who guides them in what to look for. De Gennes's own priority is to bring together experimental and theoretical scientists. In Latin countries, there is a tendency to believe that theory governs the universe. I totally disagree. Contact with reality is vital. It is only then, after careful reflection, that one tries to explain.

De Gennes's office at the Collège de France is a short walk away from the laboratories where physicists, chemists and biologists are hard at work. PGdG appreciates this house where he began work in 1971 on being offered the chair in condensed matter physics. 'It is a place where I can put together my courses in complete

freedom. It is still very demanding work, though. Every year I have to present a genuinely new subject, not just describing the current state of knowledge, but adding my own contribution.'

And who comes to hear him speak at this prestigious Collège? Henri Bergson, the philosopher and André Chastel, the Curator of the Louvre, used to address elegant ladies in our auditorium. Other personalities lectured to audiences who shared their enthusiasm for a particular field of research or their political commitment. Everything depends on the subject. You are never sure whether what you intend to talk about will interest novice or confirmed researchers, or specialists in one field or another. For example, I once gave a course on nucleation phenomena to an audience, half of which was passionately interested in the upper atmosphere and the other half in metallurgy... This contact with a mixed and changing public is particularly stimulating.

From neutrons to superconductivity

Let us turn the clock back half a century. Pierre-Gilles de Gennes, aged 23, has just



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