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Transmissible diseases From animals to human beings

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Editorial

Information is not manipulation

Just for once, we invite our readers to turn straight to the interview on page 35 of this issue. At worst, it will leave you indifferent; at best, annoyed.

In it one reads that our acceptance or rejection of technological and scientific innovation is determined largely by our preconceived ideas. Does this mean that, deep in our souls, we are all inevitably deeply irrational? And that we must therefore dispense with the widely held belief that high-quality scientific information can influence people's judgement? One must admit that this would certainly deal quite a blow to the sciences! Many researchers continue to claim, for example, that opposition to genetically modified organisms is due to the fact that

most of the population fail to understand the underlying scientific notions. In short, all you need do is inform the general public about the secrets of transgenesis and everybody will rally to the GMO cause! It would all be so simple... if it were not for the fact that recent Eurobarometer surveys show that opposition to GMOs among Europeans is as likely to increase as it is to fall with their level of education.

Why then bother to inform at all if the information serves no purpose? Why the magazine you now have in your hands? Perhaps, in all modesty, those who engage in the difficult art of communicating and popularising science should simply hope to contribute to an evolution rather than a revolution in

thinking, fuelling the democratic debate and developing the general culture in the process. In the present context, achieving such a goal would in itself be a considerable success. The important thing is to stop seeing information as a machine designed to convince or, worse still, to manipulate.

Our interviewee makes another interesting point: that the quality and accessibility of information reflects positively on the organisation that publishes it. Thus, *RTD info* also contributes – we hope! – to the promotion of research and the activities of research institutions.

DOSSIER

Health - Zoonoses

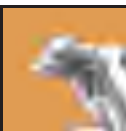
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Zoonoses (old or new diseases human beings may acquire from animals) are intensifying to form a growing threat. Mad cow disease was followed by SARS. The new threats are a result of increasingly versatile viruses, the global trading system and the worldwide ecological crisis.

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Tribology? The study of the resistance of materials to friction and the resulting wear. This multidisciplinary field of research and development is at the forefront of nanotechnologies' industrial penetration.



Fighting insecurity

15 The scientist and the inspector

'Traditional' criminality, health and food fraud, sports doping... The forensic police now have the high-tech tools (biotechnology, data processing, robotics, etc.) to provide proof of guilt – or of innocence.



In brief

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Energy and Climate

30 A dead end in 30 years

Undertaken by a team of European researchers, the Commission-sponsored WETO survey 'scripted' the outlook (if nothing changes) for world and European energy production and consumption by 2030. The prospects should give policy-makers some food for thought.



Science communication

35 Moulding public opinion – truth and myth

How is information about science and technologies perceived? Are citizens open to persuasion and can their reactions be predicted? What arguments are likely to appeal to



them? An interview with Hans Peter Peters, from the Jülich Research Centre (Germany), who queries preconceived ideas about the complicated opinion-forming mechanisms.

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38 Biocultural fervour

Cesareo Saiz-Jimenez has two strings to his bow: biology and cultural heritage. He painstakingly investigates the biological processes at work in historical monuments.



European Research Area

40 A new ERA of research

Union support for research which breaks with tradition. This is not a question of funding projects or teams, but of helping national and regional research projects to coordinate their approaches and to co-operate.



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europa.eu.int/comm/research

Viruses without barriers

With global trade and the worldwide ecological crisis, the danger from zoonoses – animal diseases which can spread to human beings – is set to increase in the decades to come. The recent global SARS epidemic has provided a foretaste of the new challenges facing public health systems that are mobilising doctors, veterinarians and biologists.



the species barrier provide protection against these animal infections? The answer is, unfortunately, no. 'Most emerging human diseases come from zoonoses, that is the natural spread of animal pathogens from animals to human beings,' a trio of specialists (Daszak, Cunningham and Hyatt) wrote in the prestigious *Science Review* (21 January 2000) ⁽¹⁾.

These species-hopping diseases include influenza, all the more dangerous because the virus can be transmitted from farm animals to human beings, AIDS, where proof is accumulating that the HIV virus passed from monkeys to people through the hunting and consumption of bushmeat. The terrible Marburg virus, which is closely related Ebola, was discovered in 1967 when green monkeys captured in Uganda were brought to a laboratory in the German city of the same name. In short, viruses, but also bacteria and parasites, often penetrate the species barrier.

Worse still, the opportunities for pathogens to jump across this 'frontier' have multiplied in recent decades. 'Rapid urbanisation, population movements, the clearing of new agricultural land, the growing trade in meat, milk and other animal prod-

ucts, the increasing speed and numbers of vehicles and even tourism have contributed to making zoonoses a problem that is no longer limited to certain rural areas, but is in some cases becoming global,' is how Aristarchos Seimenis, of the World Health Organisation's (WHO) Mediterranean Zoonoses Control Centre (GR) analyses the situation.

Hidden dangers of the global village

Zoonoses represent a little known aspect of globalisation. Global warming is allowing certain species, in particular insects, to colonise new regions where they propagate new pathogens. Tropical deforestation is bringing humans into contact with animals they have not encountered before. The Hendra and Nipah viruses, discovered in 1994 and 1999, and deadly in some 50% of cases, appear to originate in fruit-eating bats from south-east Asian forests.

Certain diseases – such as influenza, so named because Italian Renaissance physicians believed it to be *influenced* by the stars – return at regular intervals. Others strike like bolts out of the blue. Marburg fever, rocketed a peaceful German university town of the same name to unwanted fame almost 40 years ago when seven people died, within a few hours of each other, from violent haemorrhagic fever. Other diseases never disappear. These include brucellosis or leishmaniosis, a disease with which many Mediterranean populations have had to learn to live.

All the preceding examples are diseases known as zoonoses. Whilst this term is little known to the general public, many specialists believe that zoonoses will represent a major threat to public health in the coming century.

Breaking down barriers

Scientists are overdramatising the situation, some would say. Have humans not always lived in contact with animals? Has our immune system not learned, over millions of years, to combat these pathogens? Does

(1) P. Daszak, A. A. Cunningham and A. Hyatt, 'Emerging infectious diseases of wildlife – Threats to biodiversity and human health', *Science* (2000) 287: 443-449



With the acceleration of international travel and trade, all inhabitants of the 'global village' are concerned – a fact that is reinforcing the importance of North-South co-operation. Two centuries ago, a giraffe caused a sensation in Europe. Today, importers of reptiles, birds and other small tropical pets are flourishing. These newcomers too represent new potential diseases... Over 200 zoonoses have been counted today and there are certainly many more.

Our ignorance does not stop at their number. What do we know about the biochemical mechanisms of the species barrier? 'Very little,' says Alistair MacMillan of the New Haw Central Veterinary Laboratory (UK). 'Pathogen-host interactions are right now the subject of intense research. A better understanding of the pathogenesis mechanisms, facilitated by growing knowledge of genomes, should help us see more clearly.'

The EU-USA Biotechnology Research Task Force concluded at its meeting on 25-26 June in Washington that there was an urgent need to organise a discussion meeting on this topic. 'This workshop, scheduled for 2004, will focus more particularly on experimental hypotheses and models that can potentially verify the molecular and ambient mechanism governing the transmission of infectious agents from one species to another. Human beings are, of course, always the backdrop, but the questions are posed in terms of mechanisms, as our knowledge is rudimentary and exclusively empirical,' explains Etienne Magnien, director for biotechnologies, food and agriculture at the European Commission's Research DG.

Viral circulation

If we do not yet understand how the species barrier works, do we at least know why certain pathogens, in particular viruses, are able to suddenly cross it? 'The most traditional vision says that emerging viruses appear suddenly because they evolve *de novo*. But this emphasis on the variety of emerging viruses leads us to forget what many of them have in common. The vast majority of "new viruses" are, in fact, not new at all. They are derivatives of what I would call viral circulation: the transference to human beings of diseases already existing in animal populations,' states Stephen Morse, an American virologist at the University of Columbia.

This 'viral circulation' phenomenon is particularly clear in the case of type A influenza viruses. Different strains exist, each adapted to infecting one particular species: horses, poultry, pigs, sea mammals and, of course, human beings. In ducks, both domestic and migrant, the virus is, on the other hand, not very dangerous. This turns these birds into a natural reservoir in which the virus can multiply and mutate.

Its genome is made up of eight independent segments of ribonucleic acid (RNA). This has two major consequences. On the one hand, since the RNA-reproducing enzyme (RNA polymerase) is a lot less faithful than its counterpart for DNA, multiplication errors are more frequent, producing mutations that confer new properties to the virus.

Antigenic breaking

On the other hand, its structure of independent segments permits the rare phenomenon of antigenic breaking, leading to the replacement of one segment by another. When it is the genes that code for surface proteins – those recognised by our immune system – that are affected, the

First success in the fight against Ebola

Since 1994, the Ebola virus has been responsible for a series of epidemics, some with a mortality rate in excess of 80%, in tropical Africa. One of these, recorded at the end of 2001 in the Mekambo region of Gabon, combined a human catastrophe with an epizooty striking gorillas and chimpanzees. Knowledge gained from this tragedy allowed a simple diagnostic test to be developed for the first time. This success was the fruit of co-operation between researchers from the Mérieux-Pasteur Research Centre (France) and the International Medical Research Centre in Franceville, Gabon. This effort was supported by the European Commission's International Co-operation (INCO) programme.

This new test uses magnetic colloids to pick up the virus in blood serum, and then detects certain of its genetic sequences. This test has the sensitivity of laboratory tests, but with the advantage that it can be used in the rough conditions of the field. It permits the identification of people incubating the virus, enabling health workers to quarantine them. European Research Commissioner Philippe Busquin praised this remarkable advance, saying: 'this success highlights the importance of international and multidisciplinary co-operation between African and European teams.'



The Ebola virus (*filoviridae* family). This longest known filamentous virus, responsible for high fevers and internal haemorrhaging, is frequently fatal in humans and monkeys.

© Institut Pasteur

virus acquires totally new properties. This mutation is particularly fearsome when it occurs in pigs, which can be infected both by duck and human viruses. All that is needed, during co-infection, is for one of the segments coding for a surface protein of the human virus to be replaced by its duck counterpart for the new strain to be no longer recognised by our human immune system.

The terrible Spanish flu pandemic which, immediately after World War I, resulted in the death of between 20 and 40 million people across the world, was very likely caused by such an antigenic break. Two other pandemics (in 1957 and 1968) followed, both originating in China. 'The reason is to be found in farming practices which combine pigs, ducks and chickens on the same farm, making China a veritable incubator of new viruses,' explains Christop Scholtissek of the Veterinary Virology Institute in Gleissen (DE). For this specialist, the appearance of Severe Acute Respiratory Syndrome (SARS) cannot be explained by a comparable mechanism. The fact is that – unlike influenza – the coronavirus behind the disease does not possess a segmented genome.



A watchful eye

What can be done to counter these long misunderstood or neglected zoonoses? One key activity is the monitoring of both animal and human health. Since we cannot foresee when and where they will appear, we need to be able to detect these diseases as soon as they emerge, and before they take on epidemic proportions. Vigilance is organised around three principles. First of all, training practitioners to identify speedily atypical symptoms which could presage a new disease. This was recently demonstrated by Carlo Urbani, a WHO worker in Vietnam. Although he paid for it with his life, Dr Urbani was the first to identify the SARS virus. Secondly, doctors should develop on-site epidemiological work, in which they become detectives cracking the mystery of where an infection comes from and how it is transmitted. Thirdly, laboratory diagnosis methods for analysing the nature of the pathogen need to be developed.

Since 1991, this surveillance – carried out by an EU-wide network – has encompassed all communicable diseases. However, the new threats from

zoonoses are requiring an intensification of these synergies (see box 'Learning from SARS').

Alongside this public health policy, major research efforts are being undertaken to gain a better knowledge of the state of health of both wild and domestic animal populations. A research consortium of German, Finnish, Lithuanian and Swedish laboratories has just described the various forms of hantaviruses – which cause respiratory diseases – infecting small rodents in eastern Europe.

For further information

● On the Internet

Zoonoses page on the World Health Organisation website: www.who.int/health-topics/zoonoses.htm

'Health topics fact sheets' prepared by the Centers for Disease Control and Prevention (USA): www.cdc.gov

Office International de Lutte contre les Epizooties: www.oie.int

Mediterranean Zoonoses Control Programme: www.mzcp-zoonoses.gr/

'2001 Zoonoses Report of the Department for Environment, Food and Rural Affairs (DEFRAUK): www.defra.gov.uk/animalh/diseases/zoonoses/zoonoses_reports/zoonoses2001.pdf

Learning from SARS

'SARS awakened Europe to the need for better preparation and to considerably boost co-operation at Union level. The EU and Member States already had a system for monitoring the propagation of the SARS virus, but they lacked a system for recommending – and even more for decreeing – measures to be taken at EU level to gain control of it,' European Health Commissioner David Byrne said recently. The Commissioner proposed that a European Disease Prevention and Control Centre be set up to meet this need. Its primary missions will be epidemiological surveillance, including a network of pathologists, who can be called upon 24 hours a day to formulate scientific opinions on policies for implementation and to provide technical assistance. This independent agency, based on national institutes, should come into being in 2005.

The Directorate-General for Research has launched a specific call for proposals dedicated to the understanding and prevention of SARS. With a budget of €9 million, the call closed on 30 September 2003.

For further information

● European Centre for Disease Prevention and Control
europa.eu.int/comm/health/ph_overview/strategy/ecdc/ecdc_en.htm

European research into zoonoses

'Food Quality and Safety' priority work programme: www.cordis.lu/food/workprogramme.htm
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Hantaviruses

'Hantaviruses can pass to human beings, in particular forestry workers and farmers whose professions bring them into contact with these rodents. A particularly virulent form, found in the Balkans, is deadly in 12% of cases,' explains virologist Detlev Krüger of Berlin's Humboldt University (DE). The European project he coordinates has helped develop a diagnostic which can recognise all the forms of hantavirus and may become the basis for a vaccine⁽²⁾. A new programme coordinated by Antti Vaheri of the University of Helsinki (FI) will follow up this work, combining the skills of virologists, veterinarians, molecular biologists and zoologists. Their task: to gain a better understanding of the dynamics of hantaviruses in rodent populations⁽³⁾.



Clethrionomys glareolus, a common rodent that can pass hantaviruses to humans.



Plasmodium falciparum. Malaria haematozoan transmitted by anopheles (enlargement x 75,000).
© Institut Pasteur



The AIDS-causing VIH-1 virus (surface burgeoning of a lymphocyte). Isolated in 1983 by Professor Montagnier at the Institute Pasteur (FR).
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- (2) 'Bivalent hantavirus vaccine for Europe: different approaches and evaluation in animal models' – Project ended on 01/08/2003 – EU funding: €1.25 million – Contact: Detlev Krüger – detlev.kruger@charite.de
(3) 'Diagnostics and control of rodent-borne viral zoonoses in Europe' – 36-month project began on 01/09/2002 – EU funding: €1.5 million – Contact: Antti Vaheri – antti.vaheri@helsinki.fi



The veterinary challenge

As well as posing public health and ecological problems, zoonoses present serious challenges to European farming. 'The most recent avian influenza epidemics, caused by the flu virus, beat all records. Several tens of millions of head of poultry were lost in Italy, the Netherlands, Germany, Belgium and other European countries, either from the sickness itself or by preventive slaughter measures,' Isabel Minguez-Tudela, in charge of this dossier at DG Research, recalls. The Eurosurveillance epidemiological watch network indicates that dozens of types of human conjunctivitis and several cases of influenza, one of them deadly, are attributable to this sudden flare-up of zoonoses. This underlines the importance of the European AVIFLU project, coordinated by Jill Banks of the Veterinary Laboratories Agency (UK), which has set itself the objective of developing 'rapid diagnostic tests permitting the containment of the propagation of the virus by contact between infected animals at the sub-clinical stage'⁽⁴⁾.

Swine influenza poses different problems owing to the widespread use of a certain vaccine in European farms. 'In recent years, we have observed a growing genetic and immunological variability of this virus. These changes appear to coincide with a growing virulence, and the lower effectiveness of vaccines,' Guus Koch of the Lelystad Veterinary Sciences and Health Institute (NL) points out. This researcher coordinates a group of 14 laboratories from ten EU countries which have set out to construct a database to monitor the evolution of this virus⁽⁵⁾ closely. Bearing in mind the role of pigs in spreading viruses highlights the importance of this work when managing the risk of zoonoses.

Halting avian and swine influenzas

The extent and insidious form of the SARS epidemic, which took scientists by surprise, has demonstrated the ever-growing need for anticipatory research into viral transmission from animals to humans. One such example is the FLUPAN project which, since the end of 2001, has been developing diagnostic tools and vaccines against the potential threats posed by the reservoir of influenza-type viral infections originating in birds and pigs. One of the main objectives of this research is the production of vaccines based on mammal cell structures.

Preparing for an influenza pandemic: new vaccinations strategies (FLUPAN) – Project runs until 30/11/2004 – EU funding: €2.1 million – Contact: J.M. Wood – jwood@nibsc.ac.uk



(4) 'Pathogenesis and improved diagnosis and control of avian influenza infections' – 36-month project began on 01/10/2002 – EU funding: €1.84 million – Contact: Jill Banks – j.banks@vla.defra.gsi.gov.uk

(5) 'European surveillance network for influenza in pigs' – 36-month project began on 01/01/2001 – EU financing: €104 365 – Contact: Guus Koch – G.Koch@id.dlo.nl

The scourge of ticks

Several species responsible for zoonoses live in the forests covering almost one-third of the Union's territory. Ticks can communicate a number of diseases. With no requirement among Member States to declare cases, we know very little about the health impact of these parasites. It is to remedy this shortage of information that a European project is developing a database containing epidemiological information and information on clinics treating these pathologies.

In certain regions, foxes carry around a fearful parasite, the echinococcus. In human beings, this worm that attacks the liver can be deadly.

Identifying risk factors, developing preventive strategies, and communicating these to the general public are the main objectives of the European Echinorisk project.

Tick-borne diseases – From 01/09/02 to 31/08/06 – European contribution: €171708 – Contact : Philippe Brouqui – philippe.brouqui@medicine.univ-mrs.fr

Risk assessment and prevention of alveolar echinococcosis – From 01/09/01 to 30/11/04 – European contribution: €499 959 – Contact: Peter Kern – peter.kern@medizin.uni-ulm.de



Prions, seven years on



The 'mad cow' crisis is today little more than a bad memory. But the fundamental scientific questions raised by the prion⁽¹⁾ remain. What

mechanisms, for example, allow it to cross the species barrier? Research into sheep and fish is suggesting possible answers.

20 March 1996. The British authorities announce that a number of cases of a new variant of Creutzfeldt-Jakob disease are possibly due to the spread to human beings of bovine spongiform encephalopathy (BSE). The responsible infectious agent, the prion, was fairly quickly identified. But the mechanism by which this mysterious cellular component – neither virus nor bacteria – attacks the central nervous system remained an enigma. How did it manage to spread to humans? Could it infect other species? The Commission swiftly assembled a European BSE Research Group, chaired by Swiss biologist Charles Weissman, currently a member of Imperial College London (UK). A broad action plan was launched in 1996. Since then, four successive calls for proposals, in addition to the general programmes, have enabled over €100 million to be pumped into this research.

Following the drastic measures taken in recent years on farms and in health services, the situation has improved considerably. The BSE epidemic is under control, and the much-feared outbreak of a new variant of Creutzfeldt-Jakob disease has not materialised.

Crossing the species barrier

At the scientific level, the Commission's campaign revolves around five key areas: clinical and epidemiological research into the various transmissible spongiform encephalopathies (TSEs) or prion-induced diseases; research into the infection agent and its transmission; detection and diagnostic methods (supported, in particular, by the validation work undertaken by the Joint Research Centre – see box); risk evaluation; and finally the treatment and prevention of these diseases. Certain of the 95 or so research projects (from the most advanced molecular biology to applied clinical research) address an old biology question: why do some conditions cross the species barrier?

(1) A prion is an infectious protein particle similar to a virus but lacking nucleic acid.

The JRC in the hunt for the prion

The fight against the BSE pandemic would not have been possible without the work of scientists at the European Commission's Joint Research Centre (JRC). Researchers at two of its laboratories, the Materials and Measurements Reference Institute (BE) and the Consumer Health and Protection Institute (IT) have validated a highly effective test for detecting infected cattle, based on post-mortem analysis of the brain or the spinal cord, which paved the way for mandatory testing in slaughterhouses since 1 January 2001. Such tests are vital for implementing controls, without which the bans on animal meal in cattle feed are in danger of being violated by dishonest operators.

Contact

Heinz Schimmel, IRMM-JRC: heinz.schimmel@irmm.jrc.be
irmm.jrc.cec.eu.int/



For further information

● All research into TSE

europa.eu.int/comm/research/quality-of-life/tse/index_en.html

● Projects

Monitoring the effect of SCRAPIE control policies that use genetics in different countries – 48-month project started on 01/01/2003 – EU funding: €1.11 million – Contact: Francis Barillet – barillet@toulouse.inra.fr

● European project to study BSE strain in sheep

60-month project started on 01/01/2003 – EU funding: €2.66 million – Contact: Olivier Andreoletti – o.andreoletti@envt.fr

● Evaluation of the possible transmission of prions (scrapie and BSE) to different fish species

48-month project started on 01/12/2002 – EU funding: €1.3 million – Contact: Theodoros Sklaviadis - sklaviadis@auth.gr

That prions continue to defy biologists is due to their extraordinary capacity to pass from one species to another. Prion proteins (PrP) exist in all healthy mammals, in sequences that vary slightly from one species to the next. For reasons that are poorly understood, the PrP can change its configuration and develop a resistance to the enzymes which degrade it, hence its name of PrPres.

According to the most widely accepted theory, PrPres is the pathogen behind ESTs. Injected in the animal's brain, it unleashes the disease, presumably converting the PrP into PrPres. Charles Weissman's work has shown that laboratory mice become resistant to the injection of PrPres, if they are genetically modified

to remove the PrP coding gene. Replace the gene, and the PrPres is once again infectious.

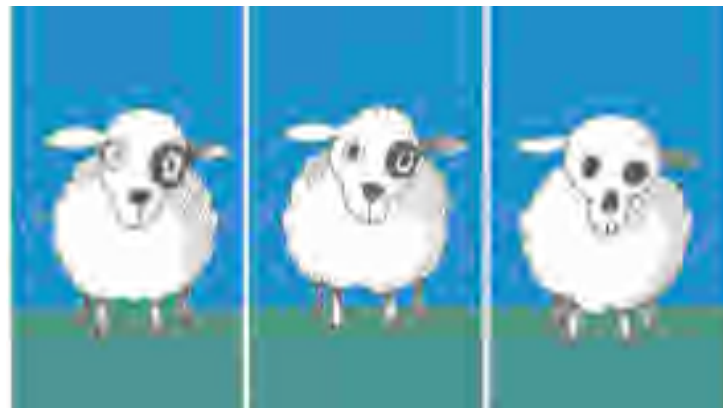
The scrapie model

What happens in nature when a pathogenic prion protein comes into contact with a new host expressing a different form of the protein? Scrapie, the first TSE to have been identified back in 1938, offers a good model for answering this question.



In fact, there are several strains of the prion responsible for this disease. Contrary to what happens in BSE-infected cattle, a sheep's natural degree of resistance is hereditary, with certain genotypes being sensitive and others not. This property is being exploited by the 'Scrapie-free sheep' project to select scrapie-resistant flocks. This double variability (prion strains and resistance) makes scrapie an ideal model for studying causal relationships.

What happens, for example, if sheep are infected by the prion responsible for BSE? Would the symptoms be distinguishable from those of traditional scrapie? Could the infected animals in turn pass on the disease to their fellow creatures? Would sheep which are genetically resistant to scrapie also be resistant to BSE? It is these questions (with major economic repercussions) that the 'BSE in Sheep' project, coordinated by Olivier Andreoletti of the Toulouse National Veterinary College, is seeking to answer.



'It is a matter of being ready to react if one day we happened to detect the BSE pathogen crossing into sheep. Our research will serve as an input for a European scientific policy to manage these risks,' he explains.

Fish farming under threat?

The possibility of a disease crossing the species barrier hangs like a Damocles sword over a number of farming sectors, including fish farming. 'All farmed fish are fed with a 40% to 55% protein content. This can include animal protein and, hence, potentially pathogenic prion proteins,' explains Theodoros Sklaviadis of the University of Thessaloniki (GR).

In 1997, Carla Bolis, a researcher at the University of Milan (IT), discovered a normal prion protein, previously believed to exist only in mammals, in the brain of salmon. This means it is important to determine the risk of TSE in fish, as the programme coordinated

Does feeding animal protein to farmed fish produce a risk of TSE? Research into this prion is being undertaken at the University of Thessaloniki (GR).

by Sklaviadis is seeking to do. This work focuses on two areas. The first is a systematic search in the genomes of trout, sea bass and bream for the coding sequences of the prion protein in order to analyse homologies with mammal genes. The second involves feeding these fish food containing BSE and scrapie prions, to see whether it is possible to start an infection. 'Given the incubation period of the disease, the results will not be available for several years,' Sklaviadis warns. Patience is called for if we want to ensure that Europe's fish farmers never experience a 'mad fish' crisis. ●

Brucellosis: old threat, new responses

Brucellosis or undulant fever, a disease affecting various farm animals, and in particular sheep, is an old acquaintance of Mediterranean shepherds. As well as the ravages it causes to flocks, this bacterial infection can be communicated from animals to humans⁽¹⁾. A large European network, run under COST, is seeking to boost the effectiveness of defence systems set up against this menace. It is also exploring new avenues for designing a safer and more effective vaccine.

Most farmers in southern Europe know someone who has contracted undulant fever. Although the advent of antibiotics has meant that brucellosis is no longer fatal, contracting the disease remains serious and unpleasant. Brought on by bacteria from the *Brucella* genus, it causes splitting headaches, extreme fatigue, fever, and can have irreversible consequences. Humans who consume dairy products or come into contact with infected animals – particularly cattle with the *Brucella Melitensis* strain – can contract the condition. On farms, brucellosis leads to serious losses, particularly by causing pregnant female cattle to miscarry – at times rendering them sterile – reducing both meat and milk production.

Although it is an ancient scourge, brucellosis is not unavoidable. Several northern European countries eradicated it years ago through lengthy campaigns combining vaccination, monitoring and the slaughtering of infected animals. But the disease continues its ravages further south. For example, infection levels range from 0.15% of flocks in France to 15% in Greece and 23% in Spain.

The vaccination-infection imbroglio

Human pathology shows a parallel progression: from 0.1 case per 100 000 inhabitants in France to a rate of almost 8 cases per 100 000 in Portugal, and even higher in non-Community Mediterranean rim countries. Why is southern Europe so vulnerable? One major reason lies in the practice of extensive farming, including summer transhumance, during which veterinarians monitor less closely animals who mix freely with other flocks as they move from lowland pasture to alpine meadows, thereby increasing the risk of developing these infections.

⁽¹⁾ In addition to brucellosis, one should also mention the enterohaemorrhagic intoxications due to *Escherichia Coli* (EHEC and VTEC) communicated to humans by cattle, and salmonellosis caused by bacterial infections from a wide range of animals. A large number of European research programmes target these conditions.



Diagnosing brucellosis using ELISA technology.
©INRA/Jacques Dufrenoy

However, brucellosis has, for many years, been the subject of a concerted European policy aimed at eliminating this transnational epizootic – causing an epidemic among animals of the same kind – disease. This joint effort is based on a classical vaccination campaign consisting of injecting young animals with live bacteria of reduced virulence. The vaccine, which is marketed widely and used on farms, is the *Brucella Melitensis* Rev 1 strain, which provides successful protection in over 85% of cases.

Despite this good performance, this form of vaccination carries two major disadvantages. On the one hand, the Rev 1 strain retains a certain virulence, making it unsuitable for vaccinating pregnant animals and representing a potential risk to humans. At the same time, the acquired protection involves the generation of antibodies which are precisely those detected by diagnostic tests. In other words, a vaccinated animal is indistinguishable from an infected animal. 'In this way, brucellosis remains a real headache for international livestock trading,' explains Alastair MacMillan of the Weybridge Brucellosis Reference Laboratory (UK), which is coordinating a COST action on this topic (see 'Finding strength in networks' p.10).

Intensive research efforts

Devising a vaccine that is easy to use, is harmless to human beings and does not produce any confusion between infected and vaccinated animals are the three directions of research being pursued by several EU-backed



projects. One such project, coordinated by a team from France's National Agronomic Research Institute (INRA), was completed in January 2002. 'Our aim was to design a test and vaccine which could both protect vaccinated animals and distinguish between infected and vaccinated animals. For this, we produced a Rev 1 strain, which retains the vaccine properties but no longer expresses the protein BP26, the presence of which was recently identified for diagnosing the infection,' explains INRA's Laurence Guilloteau⁽²⁾. This novel detection system is currently undergoing assessment trials for commercial use.

This French laboratory is also involved in a new contract, coordinated by Ignacio Moriyon of the University of Navarra (ES)⁽³⁾. This time it involves using the Rev 1 vaccine strain as a basis on which to build, using molecular biology, new *Brucella Melitensis* strains which no longer express a surface molecule used in the current diagnostic tests. 'It is a question of developing a vaccine which does not require us to design new diagnostic tests in order to distinguish infected from vaccinated animals, thereby avoiding additional production costs,' Moriyon stresses. A parallel project, coordinated by Jean-Pierre Liautard of the Montpellier National Health and Medical Research Institute (FR) is seeking to attenuate the virulence of *Brucella Melitensis* in order to combat the unwanted side effects of today's vaccines⁽⁴⁾.



Flock of vaccinated sheep in experimental sheep barn (inset: conjunctival vaccination).

©INRA/Christian Slagmudler/Alain Beguey

(2) 'Development of a genetically modified *Brucella Melitensis* Rev 1 live vaccine and associated diagnostic assay allowing discrimination between vaccinated and infected sheep' – Project completed on 31/01/2002 – EU funding: €1.1 million – Contact: Laurence Guilloteau – guillote@tours.inra.fr

(3) 'Animal brucellosis: genetically engineered live vaccines against *B. Melitensis*' – 48-month project began on 01/09/02 – EU funding: €1.16 million – Contact: Ignacio Moriyon – imoriyon@unav.es

(4) 'Development of an efficacious vaccine against animal brucellosis that is harmless for humans' – 60-month project began on 01/01/2000 – EU funding: €1.47 million – Contact: Jean-Pierre Liautard – liautard@univ-montp2.fr

Finding strength in networks

In what way is a European research network valuable for research into brucellosis?

Alastair MacMillan(*): Whether it is diagnostic tests or vaccines we are developing, the questions posed by brucellosis are so complex that they can be resolved only by an international effort involving scientists from several disciplines. The institutes with the necessary research equipment are frequently located in brucellosis-free countries. The idea of the European network is to facilitate co-operation between these specialists and their colleagues working in the field.

Can progress in molecular biology, and in particular genome sequencing, help them combat the disease?

Without any doubt. The genomes of three species of *Brucella* have recently been sequenced. This data will be very useful for *in silico* bio-informatic research, aimed at comparing these different genomes and identifying the specific genes responsible for their virulence, which could then be the subject of experimental studies. The *Brucella* genus exhibits a high degree of genetic homogeneity. This will facilitate localisation of the genes responsible for the phenotypic differences observed between the species. We can look forward to major advances in this field in years to come.

One aspect of your project is looking at European regulation in the fight against brucellosis.

Given the health and economic problems it poses, the fight against brucellosis is the subject of Community regulations aimed at first controlling, and then eradicating the disease in cattle. This means that scientific advances in both testing and vaccines can be translated into practice only by amending the corresponding regulations. A key function of the COST project is to link precisely the evolution of the regulatory environment with scientific progress. This allows us to incorporate new and more effective diagnostic tests in a new directive once they have undergone assessment testing in several laboratories.

COST Action 845 'Brucellosis in animals and man' – 60-month project involving 400 researchers in 42 countries – began on 07/06/2000 – www.brucella.org

(*) Researcher at the Weybridge Brucellosis Reference Laboratory (UK) and coordinator of this COST action.

Sentinel proteins of the infection



Identifying animals incubating a disease is a constant concern in slaughterhouses. Further upstream, monitoring herd and flock health, in a way that combines safety with a respect for animal welfare, is a vital issue for livestock breeding in Europe. For over 20 years, David Eckersall's laboratory at the University of Glasgow Veterinary School (UK) has been working on this problem using an original approach for detecting 'acute phase proteins' which give away an infection even before the first symptoms appear.

Acute phase proteins (APPs) can signal the presence of infections on farms that fail to maintain the highest standards of hygiene. Research by Professor Gruys of the University of Utrecht.

It is the immunological process that explains the importance of acute phase proteins (APPs). As soon as an animal is infected by a pathogenic agent, its body unleashes a series of protective measures to combat it. This initial immune response, identical whatever the infectious agent, is present in the animal from birth.

Typical expressions of this response are fever, the secretion of hormones, metabolic upheavals and, finally, the production by the liver, under the influence of hormones, of acute phase proteins (APPs), which proceed to organise the inflammatory reaction to combat the infection. This reaction serves, in particular, to pave the way for the second immune response: white blood cells attack the infectious agent to destroy it.

Specific bio-marking for ruminants

The first human APP, known as C-reactive protein, was identified back in the 1930s and has since been extensively investigated. But until David Eckersall and his team began their research in the late 1980s, very little was known about these proteins in farm animals. The Scottish researchers then proceeded to demonstrate that C-reactive protein was an important APP in dogs and pigs, but not in ruminants. For the latter, this role is played by two other proteins, haptoglobin and serum amyloid A.

The concentration of these proteins in the blood, which is negligible in a healthy cow or sheep, increases 1 000-fold within 24 hours of the start of the infection, to as much as one gram per litre of serum. This makes these proteins excellent infection bio-markers, informing the farmer, veterinarian or slaughterhouse manager of the animals' state of health. Compared with other current technologies, such as counting the neutrophil blood cells which proliferate from the first immune response, the dosage of APP is at once greater and more specific. In this way, infections can be identified very early on, thereby considerably reducing the risk of 'false positive' test results.

New high-performance test

Detecting APPs requires the appropriate diagnostic tools adapted for general use. It is for the task of making this technique more user-friendly that David Eckersall's team has, since the mid-1990s, enjoyed support from the European Union. This long-term endeavour has now borne fruit. Several international patents have been filed for haptoglobin detection methods which exploit this molecule's property of bonding biochemically with haemoglobin.



Contact

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www.gla.ac.uk/R-
E/leading_edge/6/10.html

John Claxton – Research DG
john.claxton@cec.eu.int

The outcome is a biochemical test produced by Tridelta Development Ltd (IE) which is both rapid (taking just one to two minutes) and automatable. It can also be used on all ruminant species. The new test beats the immunological detection methods currently in use – they take two to three hours, are difficult to automate and have limited application, as they recognise antibodies whose structures vary according to species. 'True, the objective of real-time monitoring of APP concentrations on farms is still out of the reach of current tools. On the other hand, systematised APP analyses of the blood of carcasses in slaughterhouses are very useful in helping health managers to detect diseased animals,' Eckersall explains⁽¹⁾.

Nor is the application of these tests limited to slaughterhouses. APPs are also present in the milk of cows suffering from mastitis, udder infections caused by bacteria or microscopic fungi which render milk unfit for consumption. The APP detection tests will enable dairy managers to identify contaminated milk deliveries rapidly. 'A recent project has provided the starting point for the standardisation of APP detection methods in Europe⁽²⁾,' he notes.

Promoting sustainable animal farming

The researchers at the University of Glasgow's Veterinary School are seeking to apply their knowledge of APPs to assessing animals' overall state of health. Poor farm hygiene or excessive stress can produce an inflammatory response which is not directly caused by a pathogen. Here again, haptoglobin detection serves to identify these sub-clinical infections, which are often the harbingers of future disease. In Germany, for example, trial tests have already been carried out during health inspections of pork imports from Russia and Poland.

A new European project, 'APP in pigs', partnering the Scottish institute with Dutch, Danish, German and Spanish laboratories, as well as a biotechnology company in Segovia (ES), sets out to expand the systematic use of APP detection tests in pork farming⁽³⁾. 'The project includes an economic research dimension, aimed at quantifying farmers' interest in using these tests in the context of sustainable farming.'

The rise in APP detection tests is an integral part of European efforts to move towards animal production which is more respectful both of the environment and health. For example, the preventive use of antibiotics in animal feed will be banned in Europe from 2006 onwards⁽⁴⁾. Until now, this practice has been widely used because low doses of antibiotics protect animals against infections and speed up growth. However, it is feared that this may contribute to increasing human resistance to these drugs. It is this potential threat⁽⁵⁾ that has motivated the scheduled European ban. Farmers will be required to adopt new practices for monitoring the health of their animals. This will probably result in new applications for APP testing. ○

Saving Europe's goose

A European project bringing together French, Belgian, German, Italian and British researchers has identified the genes involved in the development of poultry immune systems. Research into the role of these specific genes in the appearance of infections which cause major losses in poultry farms – such as coccidiosis, Marek's disease and viral immunodeficiency attacks – can lead to new prospects for species selection and vaccination, as well as a reduction in expensive prophylactic treatments.

Chicken IMAGE: Improvement of chicken immunity and resistance to disease based upon analysis of gene expression' – Project ended on 31/07/2003 – EU funding: € 2.13 million – Contact at the Research DG: John Claxton – john.claxton@cec.eu.int



(1) All quotes by David Eckersall.

(2) 'Coordination, harmonisation and standardisation of measurement of bovine and porcine APP in blood. Reference preparation for animal protein assays' – Project ended on 31/07/2002 – EU funding: €138 442 – www.gla.ac.uk/faculties/vet/research/protein/index.html

(3) 'New markers of immunological stress and welfare in animals: porcine acute phase proteins in the production of healthy pigs' – Duration: 36 months from 01/09/2001 – EU funding: €1.22 million – www.gla.ac.uk/appinpigs/index.htm

(4) Excluding the use of antibiotics for treating animal diseases.

(5) In this context, the 'Antibiotic resistance in bacteria of animal origin' (ARBAO-II) project has set up a European network of national reference veterinary laboratories for the harmonised surveillance and control of the appearance of cases of resistance to antibiotics of bacterial origin attributable to animal feed – Duration 36 months – EU funding: € 0.4 million – Contact: Frank Aarestrup – faa@vetinst.dk

Tribology in the 'nano' age

Little known to the uninitiated, the scientific and technological discipline which studies the resistance of materials to the friction and wear inherent in mechanical systems is at the forefront of the industrial penetration of nanotechnologies.



TRIBO project: research on improving tribological performances in the aerospace industry where they are particularly important for safety and energy savings.

In the physical world around us, nothing happens without friction. It is both a constraint and a necessary condition for the transfer of power in mechanical systems. The contact between two materials, and the friction that one exercises on the other, causes an inevitable process of wear which is sometimes slow – for instance, the footsteps of walkers eroding city pavements – and sometimes instantaneous – such as a space shuttle without its ceramic shield breaking up as it enters the dense layers of the earth's atmosphere. At the same time, a car cannot move without the series of surface interactions – and thus friction – between the metal components which convert the rectilinear movements of the pistons into a rotary movement. It is also unable to stop without the brake pads pressing against the wheel discs.

The study of how to strengthen the resistance of materials to friction and the resulting wear, as well as optimising the power transmitted by mechanical systems and the complex lubrication they require, has become a specialised science and technology discipline which has seen major growth in recent decades. Bearing the rather colourful name of 'tribology' (from the Greek *tribos*, meaning scraping), this field of research and application requires physicists, chemists, hydrodynamic specialists and engineers to work closely together as part of an interdisciplinary approach.

Technological sophistication

Tribology has developed out of the growing complexity and sophistication of the systems engineering used in many sectors – transport, space, robotics, medical technologies – and the associated safety and reliability requirements. Progress in tribology is also linked to the emergence of increasingly advanced technological tools used in the analysis and manipulation of matter. These are found especially in the field of thin coating application and lubricant formulation, involving, for example, electronic microscopy, tunnel effect optics, radiology, spectrography, high-energy plasmas, as well as laser, ionic or neutron beams.

But the discipline today is assuming a radically new dimension as it enters the age of nanotechnology. 'Nanopowder depositing and nanostructured coating technologies are now a key field for the future of intelligent and multifunctional materials,' stresses José-Lorenzo Vallés, head of the European Commission's Materials Research unit.

Cluster research

In light of its growing industrial importance, in 2002 the Nanotrib 'cluster' (see box) was set up, bringing together a number of research projects in this field. 'Policy to strengthen synergy between these projects permits the sharing of experience and good practices, avoids duplication, and encourages the development of norms and the dissemination of results amongst a wider base of potential users,' explains Vallés.

Around 60 research teams, 16 of them employed by small- and medium-sized enterprises, are working on the six EU-funded Nanotrib projects. Financing for this cluster has reached the 'critical mass' of €16 million, of which the Union provides half.

'The specific goals of each of the projects have complementary multidisciplinary bases,' stresses Karen Vercaemmen, coordinator of the Nanotrib *LubriCoat* project, and researcher at the Materials Technologies Department at Belgium's VITO (Vlaamse Instituut voor Technologische Onderzoek).

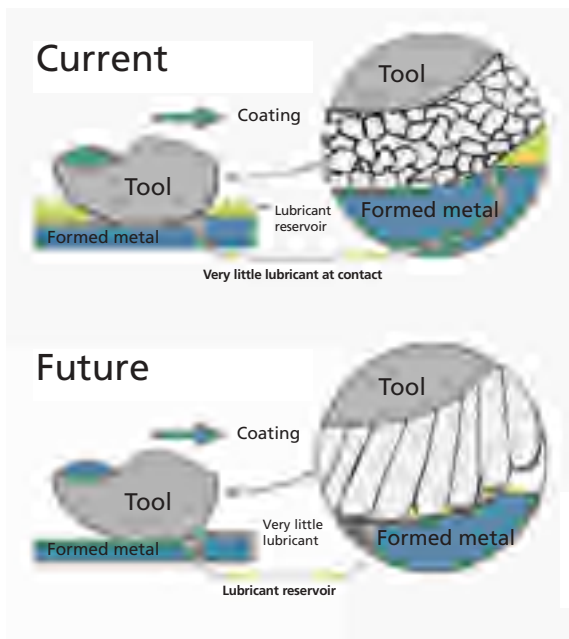
To find out more

- **Nanotrib Cluster**
www.vito.be/nanotrib/
- **European research under the Fifth Framework Programme**
europa.eu.int/comm/research/growth/
- **Research DG**
José-Lorenzo Vallés
jose-lorenzo.valles@cec.eu.int
- **Nanotrib**
Dr Michael Stueber - Forschungszentrum Karlsruhe – (General coordination)
michael.stueber@imf.fzk.de
Karen Vercaemmen, LubriCoat coordinator
karen.vercamme@vito.be



'In addition to the concrete and, where applicable, directly marketable results, each research team – in sectors such as aerospace, machine tools, metal forming, automobile engines or wind turbines – wants the methodologies developed to also have a medium- or long-term impact. In particular, Nanotrib aims to contribute to sustainable development. Improved

performance must lead to longer life cycles for mechanical systems and thus reduced consumption of materials. At the environmental level, one should expect reduced energy consumption and the replacement of toxic lubricants by biodegradable and renewable organic substitutes.'



Benefits of the new microlubrication process, developed by the MICLUB project, using PVD (physical vapour deposition) to deposit a coating on the surface of tools used in metal forming.

A priority for Europe's future

With a research budget of €1 300 million, the Sixth Framework Programme is granting pride of place to the nanotechnologies and nanosciences, knowledge-based materials and their industrial applications. In this respect, the federation of projects within the Nanotrib cluster was a forerunner of the new 'integrated projects' instrument.

Nanotechnologies under the Sixth Framework Programme

www.cordis.lu/nanotechnology/

www.cordis.lu/nmp/home.html

http://europa.eu.int/comm/research/industrial_technologies/index_en.html

Nanotrib: six coordinated research projects

- **Tribo** (*Nanostructured coating for engineering tribological applications*) – This research is seeking to improve tribological performances in the aerospace industry where they are particularly important for safety and energy savings. The Tribo approach involves developing new processes for depositing thin coatings of solid lubricants in the form of 'nanostructured' powders.

- **Hidur** (*Improving competitiveness and conserving the environment through high-durability nanocomposite coatings*) – The research concerns the depositing of nanocomposite coatings combining metal (chromium, aluminium, titanium) and ceramic materials for various low- or high-intensity friction applications, in particular for the mechanical components of wind power turbines and automotive construction.

- **Miclub** (*In-process structured hard coatings for microlubrication*) – This project is aiming to achieve a drastic reduction in lubricant consumption during metal forming. The process consists of depositing a finely microstructured high-friction coating on the surface of the forming tool so as to optimise the action of the lubricating fluid which is captured in the micropores it generates.

- **Lubri-Coat** (*Environmentally friendly lubricants and low friction coatings*) – Many instances of ground and water pollution result from 'routine accidents' involving the leakage of lubricant fluids from site equipment. This research project is looking at a new generation of lubricants prepared from vegetable and biodegradable synthetic ester oils. The obstacle in using such oils is their susceptibility to thermal deterioration when subject to intense friction. The solution is therefore to reduce this friction by obtaining low-friction coatings such as DLC (diamond-like carbon) for the mechanical parts involved.

- **Nano-Comp** (*New nanocomposite wear resistant and self-lubricant PVD-coatings*) – This research essentially concerns the benefits of PVD (physical vapour deposition) – a process of depositing composite elements in the plasma state using a magnetron. This permits a multilayer outer layer which can include solid coatings providing dry self-lubrication which eliminates the often toxic effects of conventional lubricants.

- **Smart Quasicrystals** (*Tailored quasicrystalline surface layers for reduced friction and wear*) – This project is looking at the problems posed by friction and wear in sliding devices where there can be no lubrication between the contact materials. Such systems are commonly found in aerospace devices as well as in various industrial mechanical applications using agglomerated metal powders. The aim is to explore the possibilities presented by depositing quasicrystalline coatings with very low-friction characteristics.

The scientist and the inspector

A scientist and a detective have one thing in common: their work depends on providing material evidence to support their hypotheses. Traditionally, it is the latter who draws on the knowledge and methods of the former. This convergence of science and police work is strengthened when scientific advances – especially in the life and material sciences, as well as information technology – change the tools used by forensic investigator to fight crime.



The study of photographic images, processed by computer modelling, is an important tool for forensic investigators. Above, a montage of photographs of the hands to be used in 3D reconstructions, as part of the research carried out by the INRIA (FR) under the European Improofs project.

Photos: Quentin Delamarre, INRIA (FR)

There is no escaping the fact that scientific progress not only benefits the cause of justice but also the practice of crime.

Technology makes it possible to prevent and crack down on crime, but also to invent increasingly original and sophisticated methods of breaking the law. The growth in organised crime – which benefits from the opening up of borders and technical innovations – is a particularly serious global problem.

The third pillar

In recent years – and especially since the resolutions adopted at the Tampere (FI) Summit in 1999 – the European Union has increased considerably the co-operation between the police forces and the judicial authorities in Member States. In EU jargon, this has come to be known as the 'third pillar' and it has resulted in a number of initiatives, such as the creation, in 2001, of the *European Crime Prevention Network* (EUCPN). This vast network federates and supports a wide range of policies – local, national and European – with the emphasis on juvenile, urban and drugs-related crimes.

Various strategies have also been adopted in the fight against financial crime, money laundering and computer crime.

Identifying and detecting

Similar coordination is found in the research field. 'Advances in metrology are helping to better detect crimes and identify those who commit them,' stressed Kimmo Himberg of the Finnish Laboratory of Criminal Research at a conference entitled 'Towards an integrated infrastructure for measurements', held in Warsaw (PL), in June 2002. 'In many disciplines, the

scientific basis remains uncertain and the reproducibility of results unsatisfactory. As crime becomes more international, the need to exchange information grows. We also need more methods for rapid verification at the immediate scene of the crime.'

As the examples below illustrate, the Commission has been supporting scientific and technological co-operation centred on this problem for a number of years. 'During the Fifth Framework Programme, the Union invested almost €35 million in projects relating to combating food fraud, industrial counterfeiting, anti-doping measures, as well as forensics – in particular techniques for identifying criminals and detecting forged currency,' explains Luisa Prista, head of unit at the Commission's Research Directorate-General. The Sixth Framework Programme will cover all these aspects – metrology, biology, and the analysis of food safety and its traceability – in its research priorities.⁽¹⁾

To find out more

- **The European crime prevention network (EUCPN)**
europa.eu.int/comm/justice_home/doc_centre/policy/network/wai/doc_police_crime_prevention_en.htm
- **Institut de police scientifique et de criminologie de Lausanne**
www.unil.ch/ipsc/docs/navv1.html
- **Interpol**
www.interpol.int/Public/Forensic/Default.asp
- **The FBI**
www.fbi.gov/hq/lab/org/labchart.htm
- **Scotland Yard**
www.met.police.uk/so/so3.htm

Contact

- **Research DG**
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(1) This article does not cover European actions to combat computer crime and trafficking in radioactive substances. The latter aspect will be dealt with in a future issue of RTD info devoted to the nuclear sector.

SOS forensics

DNA detective work

The EU-backed **Stadnap** project, which brought together some 20 forensic medicine laboratories and crime-fighting organisations, helped to harmonise the methods used to analyse DNA clues. This harmonisation was all the more necessary as the 150 or so European laboratories in the field tend to carry out genetic tests in their own way, preventing any reliable exchange of data. The number of genetic markers is considerable and a DNA imprint can be obtained from different parts of the human genome.

To find out more

● **Stadnap - Standardisation of DNA Profiling Techniques in the European Union**
www.stadnap.uni-mainz.de/

Contact

● **Angel Carracedo**
apimlang@usc.es

The researchers did not just study the markers present on the DNA of chromosomes, but also

on the DNA of mitochondrions (the 'energy centres' of cells) which are very interesting because they can be found in samples of poorer quality, such as fragments of hair or bone.

The Stadnap members were divided into four groups to study the reference materials used for these tests and to identify the most effective. They spent time at the various laboratories to study the different methods, train and develop common standards.



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Earmarking the villains

There is more to detection than fingerprints and DNA. Burglars, murderers and rapists may place their ears up against a window, door or wall to listen for sounds, leaving an ear-print that is unique to each individual and which can, therefore, be detected and 'read'. Coordinated by the ICR (Instituut voor Ciminaliteits beheersing en Recherchekunde), in the Netherlands, the **FearID** project aims to collect, by 2005, as much knowledge as possible to establish methods of identification on the basis of these signatures, which can then be used to corroborate other evidence. 'It is mainly a question of standardising and harmonising detection methods by using electronic image processing procedures and validating them against the vast number of imprints collected,' explains project coordinator Cornelis van der Lugt.

To find out more

● **FearID: Forensic ear identification**
www.fearid.com/

Contact

● **cor.van.der.lugt@lsop.nl**



Using electronic image processing to identify an ear-print. (FearID project).

Pictures: Cornelis van der Lugt, ISOP, NL

Fragmentary evidence

Nitecrime is a thematic network of research and forensic bodies from five European countries (Austria, Germany, the United Kingdom, the Netherlands, and Switzerland) as well as Australian and American partners (including the FBI laboratories). It aims to carry out precise analyses of the often minute fragments of inorganic materials (glass, bullets, fabric, paint, tyres, etc.) found at the scene of a crime. The project is comparing the dependability, practicality and cost of the various processes currently used and it is also seeking to develop new methods based on non-destructive technologies for the ablation of the ions contained in the traces found and their analysis by ICP-MS (Inductively Coupled Plasma-Mass Spectrography).

To find out more

● **Nitecrime - Natural isotopes and trace elements in criminalistics and environmental forensics**
www.nitecrime.eu.com/

Contact

● **Jurian.Hoogewerff@bbsrc.ac.uk**

Getting the full picture

Surveillance cameras are an increasingly common feature of the urban landscape, strategically positioned at potential troublespots such as car parks, banks and shopping centres. London transport alone has installed 14 000 of them. Although they may keep their eye on the job, the documents they produce often leave much to be desired. Due to the large recording capacity required, surveillance cameras operate at the speed of only one image per second which means that the picture resolution is usually mediocre. They sometimes fail to capture essential details of fast-moving events. Finally, their necessarily limited settings (focal length, position) means they provide only part of the picture. By drawing on the expertise of robotics laboratories and police identification experts, the **Improofs** project has helped to improve the decoding of electronic images (sharpness, contrast, evaluation of distances) and to develop three-dimensional techniques for identifying suspects.

To find out more

● **Improofs (Image Processing Operations for Forensic Support)**
www.esat.kuleuven.ac.be/~konijn/improofs.html

Contact

● **lucvangool@esat.kuleuven.ac.be**

Animal feed: separating the wheat from the chaff

War on antibiotics

The **Simbag-Feed** project (launched in March 2001 by eight partners in ten countries) concentrates on detecting illegal substances introduced into animal feed which pose health risks to humans. These include 'growth promoters' (carbadox and olaquinox) and five antibiotics (avoparcin, bacitracin-zinc, spiramycin, tylosin and virginiamycin) which are banned by the Union because their indirect ingestion, by eating 'treated' meat or fish, can increase our own bacterial resistance.

Scientists working on this project, which is now approaching completion, studied a multimodal screening procedure for banned products. This is based on microbiological inhibition, high-voltage electrophoresence

and chromatography (TLC, HPLC) combined with mass spectrometry. The research is being carried out with the aid of some 30 European control laboratories and should culminate in the validation of new tests to be ratified by Community legislation. Towards this end, Simbag-Feed has compiled a databank of reference standards for banned substances.

To find out more

● Simbag-Feed (Screening and identification methods for official control of banned use of antibiotics and growth promoters in feedingstuffs)

www.stadnap.uni-mainz.de/

Contact

● Institute for quality control of agricultural products (RIKILT) – NL
J.dejong@rikilt.wag-ur.nl

Taking the animal out of animal meal

Among the drastic measures taken since the BSE crisis, the **Stratfeed** project (which completed its work in the spring of this year) targeted the presence of mammalian tissue in cattle and sheep meal. The Centre de Recherches Agronomique de Gembloux (CRA) in Belgium coordinated the work of the ten public and private sector partners. The initiative aimed to detect any banned substances using three alternative methods: polymerase chain reaction (PCR), based on DNA analysis, spectrometry, near infrared microscopy (NIRM) and near infrared spectrometry (NIRS). The latter two methods consist of evaluating the particles of a given type in a sample. 'Our results show that the PCR and NIRM approaches permit

a detection of up to 0.1% for the presence of animal meal and an identification of the species in question,' said Pierre Dardenne, a researcher at the CRA (see diagram). 'A new protocol and decision-making support mechanism is currently being validated. As to the NIRS method, that remains a test for rapid screening which is unreliable below 1% of prohibited constituents.'⁽¹⁾ The Stratfeed project also compiled a bank of the more than 2 000 reference samples used in the research.

(1) The Stratfeed results will be presented at a symposium scheduled for the 16-18/06/2004 in Namur (BE).

Discrimination between plant-based meals (flours), bonemeal and fishmeal



To find out more

● Stratfeed (Strategies and methods to detect and quantify mammalian tissues in feeding stuffs)
stratfeed.cra.wallonie.be/

Contact

● dardenne@cragx.fgov.be

The processing of spectral data obtained by near infrared microscopy (NIRM) makes it possible to identify the particles analysed on the basis of origin.
Diagram: Pierre Dardenne, CRA, BE



Salmon: wild or farmed?

How to distinguish the true origins of a salmon? Can we be sure that the Scottish, Norwegian or Irish labels – and the price that goes with them – are real guarantees of origin? New European regulations introduced in 2002 make more complete information on this fish compulsory, especially as regards labelling. This is because fraudulent practices regarding the nature of the product (farmed or wild salmon) and place of origin have been found to exist. Such incidents

To find out more

● **Cofaws (Confirmation of the origin of farmed and wild salmon and other fish)**
www.nafc.ac.uk/Research/Conforigin.pdf

Contact

● karinewietzerbin@eurofins.com

are most common where local over-production causes prices to fall. However, only the connoisseurs are likely to taste the difference.

Using RMN spectography, chromatography and mass isotopic spectrometry to make statistical analyses of the elements present in the fatty acids, the five-partner Cofaws project (FR, IT, NO, and the UK), which completes its work in 2004, plans to develop a rigorous scientific tool for authenticating labels of origin.

Uncontrolled designations

Contrary to the adage *in vino veritas*, wine is not always what it seems. The trickery concerns in particular the glycerol content. This is a natural ingredient produced by the fermenting process and – within legal limits – quantities of it can be added to improve the taste. The question is how to check that these limits are not exceeded?

The **Glycerol** project is studying the chromatographic and spectrometry (GC – MS) tests currently used to distinguish and quantify, on the basis of carbon isotope ratios, the proportions of natural and added glycerol contained in wine.

To find out more

● **Glycerol (Determination of glycerol in wine – comparison and validation of existing methods)**

Contact

● MicheleLees@eurofins.com



Sports doping: chasing the cheats

The information weapon



In co-operation with the International Olympic Committee, the Union is fighting against the use of illegal drugs in sport. To combat this scourge with criminal ramifications – and one that poses a particular threat to young people attracted to sport – the **Cafdis** research network sought to strengthen the information weapon. The result is an Internet site able to answer a wide range of questions on this problem of serious concern to society. Researchers can find scientific articles, lawyers, pertinent legal texts, doctors and pharmaceutical industries, details of the latest developments in substances and detection methods, and teachers handy tips on how to approach the subject in the classroom. There are also many links to other resources.

To keep pace in a field where new illegal practices are developing all the time, the Cafdis site is updated continuously with the latest info on doping and on science's response to the problem.

To find out more

● **Cafdis (Concerted Action in the Fight against Doping)**

● www.cafdis-antidoping.net/fr/

To find out more

● **Isotracc** (Detection of illegal drugs by isotope ratio mass spectrometry: improvement of sensitivity, widening of applicability and development of tests and reference data)

● europa.eu.int/comm/research/growth/gcc/projects/antidoping-isotracc.html

Advances in detection

Another weapon in the fight against doping is testing. The nine teams from six countries participating in the EU-backed **Isotracc** project are developing a particularly sensitive IRMS (*Isotope Ratio Mass Spectroscopy*) detection method. This test should make it possible to detect the ratio of carbon isotopes present in a urine sample at concentrations which are much lower than is at present the case. This would make it possible to distinguish between natural hormones (produced by the body after consuming a given food) and synthetic hormones resulting

from the ingestion of a banned substance. 'Such a technique could later be extended to isotopes other than carbon, especially hydrogen, which could be very useful detectors in the field of doping substances,' stresses Rainer Stephany of the Laboratory for Residue Analysis (NL).

The Isotracc partners would like their process to be used at the 2004 Olympic Games in Athens.



Discovering... Competing... Investi

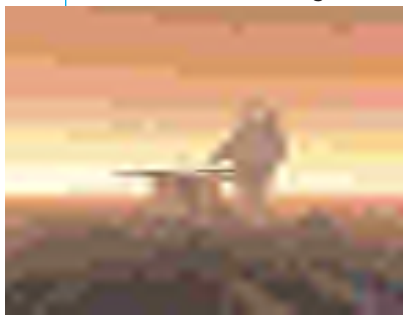
SPECIAL FOCUS

Kitted out for space

The European Space Agency (ESA) loves to stimulate ideas, as well as to provoke them in unexpected directions. This includes organising international competitions for young scientists. The very young are not forgotten in the teaching projects that its researchers develop in conjunction with teachers.

Aurora: new frontiers in design

The Aurora programme examines how Europe can participate in the future exploration of the Moon, Mars or certain asteroids and, in particular, those exhibiting traces of organic matter. This involves developing technologies and concepts now, and one of Aurora's principles is to make use of academic know-how in this field. In a recent student design competition, 17 finalists from Finnish, Italian, Spanish, British, French, Swiss, German and Canadian institutions presented their ideas in Barcelona in early September. Prizes include



a visit to the European Space Research and Technology Centre in the Netherlands, and a trip to the European spaceport in French Guiana.

www.esa.int/export/esaCP/SEMFKRYO4HD_index_0.html

Success – experiments in Space

A hundred competitors from 21 countries have just taken part in the Success experiment, dreaming up experiments that could benefit from the special conditions – weightlessness, vacuums and confined spaces – found on the International Space Station. First prize went to Adalberto Costessi of the University of Trieste who would like to study the phenomenon of osteoporosis in space. Loss of bone mass is one of the main health risks with which astronauts living for long periods in space have to contend. His experiment would examine, in a weightless environment, the molecular mechanisms that reduce the functionality of osteoblasts, possibly pointing the way to new treatments for osteoporosis, which affects 20% of people. Costessi will spend a year at the ESA's European Space Technology Centre (NL) working more intensely on his project. Fingers crossed that it will 'take off'.

The next Success competition is scheduled for 2004.

spaceflight.esa.int/users/success

Ulf.Merbold@esa.int

Sci-Fi or Sci-Fact

Tintin walked on the moon long before Neil Armstrong did. The European Space Agency's (ESA) David Raitt believes that fiction could prove a good technology development consultant. To refresh our memories, ESA has just published an attractive brochure entitled '*Innovative Technologies from Science Fiction for Space Applications*', which highlights a series of concepts which began as fiction (jet propulsion, living in space, robots and launchers) and ended up as fact. It has also launched the Clarke-Bradbury International Science Fiction competition which was won by Lavie Tidhar, a 26-year-old Israeli student. His story is about Spider, an intelligent rock drifting through space looking for a place to lay its 'children'.

www.esa.int/export/esaCP/SEME6BZO4HD_Expanding_0.html

Space Station in the classroom

What is the International Space Station (ISS) designed to do? How was it built? How do people live on it? To answer these questions, European Space Agency researchers have teamed up with teachers to produce an ISS teaching kit aimed at 12-15-year-old pupils. Available in 11 languages, the kit includes interdisciplinary exercises, a glossary of terms, transparencies, and much more. ESA staff will be visiting schools with real astronauts to launch the first kits.



www.esa.int/export/esaCP/SEMPR8YO4HD_France_0.html
educationkit@esa.int

gating...Reflecting...Learning...Discover

The pick of on-line science

Disseminating scientific knowledge, promoting debate between scientists and the public, as well as helping citizens to gain a better understanding of the scientific issues facing society and to dialogue with researchers. This is the mission of the Futura-Sciences website, which has just walked off with the French Press Guide's 'Best on-line scientific information Internet site' award. Visitors can polish up on their science, embark on virtual scientific voyages of discovery, keep abreast of the latest developments, discuss hot issues, or simply relax with fun activities.

www.futura-sciences.com/

Understanding nanotechnology

To build a canoe, you can chop down a tree. But to produce a toothpick, should you start with an oak? Nanotechnology is the manipulation of atoms or molecules to produce materials, appliances and machines with unprecedented precision using clean production methods that minimise waste and reduce energy consumption. A recent Commission document, available in 11 languages, explains the ABCs of this science in a way that encourages readers to find out more.

www.cordis.lu/nanotechnology/src/young-public.htm

Science in the public arena

The Commission holds regular expert consultations on sensitive scientific issues, mostly involving the life sciences which are developing at an extraordinary pace and have a major potential impact on our daily lives. To make these gatherings accessible to the widest possible audience, summaries of these meetings have been placed on the Internet.

In 2000, the Directorate-General for Research organised a meeting on 'Genetics and Europe's future'. In 2001, it held a consultation on stem cells and a round table on genetically modified organisms (GMOs). In 2003, it arranged a conference on the contribution of biotechnology to agriculture in developing countries.

GMOs appear to arouse the greatest public interest. The conclusions of the multi-disciplinary Pabe project (DE, ES, FR, IT and the UK) which examined this issue across Europe, challenge many commonly held notions. Researchers found that citizens are not *a priori* hostile to change, and are ready to accept a reasonable measure of risk. But they do question whether certain technological developments are really necessary.

Parallel with this, the UK's Food Standards Agency has launched a survey to assess the British public's views on genetically modified food.

Various documents can be downloaded at:

europa.eu.int/comm/research/biosociety/publicunderstanding/communicating_sciences_en.htm

- Pabe Report: www.pabe.net
- The British survey: www.foodstandards.gov.uk/gmdebate/gmpress/gm_pr.

Virtual university

Six British and five US universities have just teamed up in a Worldwide Universities Network to produce a programme of distance training courses. The programme combines teleworking and e-learning to offer courses in public policy and management for public service managers confronted with social security problems. The courses, based on an existing training programme offered by York University (which will award an e-diploma) and directed at British civil servants, will now be widened for an international audience.

Contact: Professor John Ditch, University of York

jsd1@york.ac.uk

Bio-survey

Do you feel sufficiently informed about biotech research which can have a potential impact on your life?

Questions such as this, catching the mood of the time and posed anew every month, enable the Directorate-General for Research to gauge the connection between science and society, and to work to improve this relationship in the life sciences. To take part in this quick opinion poll, go to:

europa.eu.int/comm/research/biosociety/public_understanding/polls_en.cfm

News in brief... News in brief...



Philippe Busquin meets members of an NGO taking part in the EDCTP programme at Kihumbe (Tanzania).

AIDS, malaria, TB

During a recent African tour covering Tanzania, Mozambique and South Africa, European Commissioner Philippe Busquin presented the Commission's health initiatives for developing countries. Speaking at the WHO conference (Johannesburg, 4 September) attended by health ministers from 46 African countries, he presented the EDCTP (Europe-Developing Countries Clinical Trials Partnership), progress on which he was able to assess for himself during this trip. The EDCTP is receiving €600 million from the Union to help fund its battle against AIDS, malaria and tuberculosis. This programme, gathering together both private and public sector researchers, seeks to bring clinical research to the doorstep of populations affected by these endemic diseases, in order to develop new therapies and new and appropriate vaccines.

To find out more

europa.eu.int/comm/research/info/conferences/edctp/edctp_en.html

45 Nobel Prize winners back ERC

European co-operation is the watchword today in fundamental research, a field in which individual countries have very much gone their own way until now. Political independence and specific funding are the main requisites of a new European Research Council, according to a group of experts (ERCEG) given a mandate by the Union in late 2002 to define the contours of such a body.

Prestigious support arrived recently in an open letter sent to Commissioner Philippe Busquin and signed by 45 European Nobel Prize winners, arguing that the Union's research programmes are currently poorly adapted to the advance of fundamental knowledge. By managing these programmes to exacting standards of excellence and European value added, the ERC would, in their view, stimulate competition between the continent's top laboratories and make an essential contribution to strengthening the European Research Space.

At a press conference in early November with a delegation of Nobel Prize winners, Philippe Busquin clearly supported their move. The final report from the ERCEG is due on 15 December 2003. One question in particular addressed by this report is how to evaluate research proposals involving totally new subjects or fields still at the planning stage. Also awaited with baited breath is the size of a specific funding line (on top of existing European research efforts). We will keep you posted.

To find out more

www.ercexpertgroup.org/

The Commission and stem cells

Member States have tasked the Commission with setting rules for Community financing of research into human embryo stem cells. Last July it put forward a series of stringent ethical guidelines in this field, in which the Union undertakes not to finance any project from European funds in any country which has imposed a moratorium on this research.

This proposal is in accordance with the Union's desire to put in place a series of ethical guidelines for the funding of 'sensitive' research under the Sixth Framework Programme. The Commission has until the end of 2003 to define and adopt new ethical guidelines in this field.

In parallel with this, the Commission has published a call for proposals to develop a European register of stem cells and for participation in the setting up of public stem cell banks.

To find out more

See document COM/2003/0390 final

Downloadable from the following site (by entering the above references):

europa.eu.int/prelex/rech_simple.cfm?CL=fr



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News in brief

Public research centres: a neglected sector

Alongside their colleagues in universities and private laboratories, over 100 000 scientists are working day in, day out, in 769 public research centres across Europe, managing a total budget in excess of €25 billion a year. A recent study by the PREST Centre (University of Manchester) takes an in-depth look at 50 PRCs, highlighting their strengths and weaknesses. It also overturns a certain number of common perceptions about how they work.

Its first finding is that most PRCs have redirected many of their efforts towards the private sector. Whilst 50% undertake fundamental research, 92% of their laboratories are also involved in applied research. Many of the services they deliver relate to the development of certification, standardisation and validation systems. Their main fields of activity are engineering and technology, followed by natural sciences, agriculture, medicine and life sciences.

The study also reveals that many of the services they offer are 'inter-redundant'. This and the heavy ensuing cost to the taxpayer makes them targets for rationalisation at the European level. For European Research Commissioner Philippe Busquin, 'these data form an important starting point for ensuring that our funding policies for public research centres maximise their contribution to the European Research Area'.

To find out more

ftp://ftp.cordis.lu/pub/indicators/docs/ind_report_prest1.pdf

European steel: maintaining the impetus

Several decades of root and branch restructuring under the ECSC treaty have succeeded in adapting Europe's steel industry to evolving markets. Constant research and innovation have given it quality, competitive products, and produced major advances in environmentally friendly technology.

But acquiring a position is one thing, maintaining and extending it are a very different matter. The ongoing battle between competitiveness and the environment will be fought increasingly in the context of the ever-tighter limits

on CO₂ emissions to which Europe has committed under the Kyoto Protocol. 'The sector must continue its efforts to improve its performance and meet the challenges of sustainable development. Only European-scale research, with the entire sector pulling together in the same direction, can enable us to meet the challenge,' Commissioner Busquin told members of Eurofer, the association of Europe's major steelmakers. Creating a steel technology platform and encouraging public-private partnerships should allow us to work in a long-term perspective and set in train a strategic agenda for the future of European steel. In response to this challenge, the European Union is devoting over €43 million to steel research over a two-year period (2003-2004).

To find out more

www.cordis.lu/coal-steel-rdt/home.html

Different regions, different benefits

With many of Europe's regions developing their own research and development policies, the unevenness of R&D between the different parts of Europe comes as no surprise. The dynamism of innovation varies significantly from one region to another. Baden-Württemberg (DE), the Île-de-France (FR), the regions of Uusimaa (FI) and Vaestverige (SE), and Eastern England (UK) each devote over 3% of their GDP to R&D. In other regions, this figure is under 0.5%. Fuelling this dynamism are vigorous higher education and continuous training provision in the South-West UK, technology employment promotion measures in the provinces of Navarra and Madrid (ES), and public R&D expenditure in the Mid-Pyrénées region (FR).

To promote such 'intangible' catalysts (know-how, human resources, research quality, etc.) the Commission has launched its 'Regions of Knowledge' pilot action, with an initial call for proposals published on 1 August. Projects, which must include partners from different European regions, can address various aspects, such as initiating technological audits, developing new economic and technological models, launching initiatives to encourage university-enterprise links, etc.

This action, with a first-year budget of €2.5 million, symbolises the importance of the regional dimension in achieving a European Research Area.

To find out more

www.cordis.lu/era/regions.htm

News in brief... News in brief...



Visit the permanent 'Microcosm' exhibition at Cern (Geneva).

©CERN

A week of science

Is science indigestible? Is the European Research Area too abstract? Everything depends on how they are explained. This, alongside proving that science is for young people, is what the various events in European Science Week (3 to 9 November) set out to do. Among them are an exhibition and Internet site showing students' 'high-tech' projects (**Stead**), extensive presentation and discussion of life sciences (AIDS, stem cells, etc.) (**Pulse, Scifi**), internet society (**E-Aware**) issues, and a series of events focusing on the ocean world (**Oceanics**) – not forgetting fashion (**I-Wear**). The Kids & Science project (see the *Science at our Fingertips* section) returns, bringing together young people and researchers. A third **Physics on Stage** programme, aimed at revitalising physics teaching, will take place at Cern.

As well as these projects, which are being supported financially by the Commission, a host of other initiatives will be taking place simultaneously across Europe as part of national science weeks.

To find out more

europa.eu.int/comm/research/science-society/scientific-awareness/science-week_en.html

New ESF bursaries for young postdoctorates

The European Science Foundation has just launched a call for proposals aimed at an 'élite' of young postdoctoral students wanting to compete for one of the 25 bursaries on offer under the new EURYI (*European Young Investigators*) initiative. The grants – to finance research budgets in high-level European institutions – can amount to as much as €250 000 a year and, in certain cases, may be renewed for five years. EURYI has been placed under the control of two highly renowned British institutions, the *Particle Physics and Astronomy Research Council* (PPARC) and the *Engineering Physical Science Research Council* (EPSRC).

To find out more

www.esf.org

Prizewinners

- The prize-giving ceremony for the 15th 'European Contest for Young Scientists' was held at the end of September in Budapest. Competing this year were 75 remarkably high-quality and diverse projects, presented by 114 young people aged between 15 and 20, coming not only from greater Europe, but also China, Japan, South Korea and the Americas. All in all, 37 countries were represented.

To find out more

europa.eu.int/comm/research/press/2003/pr2509en.html
europa.eu.int/comm/research/youngscientists/img/photoalbum/2003/awards/germany-f1030002.jpg

- Another European science competition, this time for established research teams, will end shortly with the award ceremony for the fourth European Descartes Prize, to be held in Rome on 20 November 2003. Almost 900 scientists have competed for this year's prize, and eight teams have been shortlisted. The panel of judges now has the difficult task of selecting the 'best' team, which will receive a €1 million prize.



To find out more

www.cordis.lu/descartes/

News in brief . . . News in brief . . .

Letters

Effects of the 'War on terrorism' on foreign postdocs in the United States

Research in the United States, with its glamorous names of world-famous institutions and Nobel Prize winners, depends heavily on postdoctoral scholars. The largest single postdoc employer in the US, the University of California, employs about 9 000, over 60% of whom are foreign nationals. This figure is typical in top-level institutions – a third of the foreign postdocs at America's Stanford University are EU citizens.

About half the foreign postdocs are expected to continue their careers in the US. This number might change with the burst of the 'dotcom bubble' still sending economic aftershocks through California, although not only for economic reasons – 'friendly fire' arising from the crusade against terrorism is also taking its toll.

Foreign postdocs issued with J-1 visas are being tracked by SEVIS (Student and Exchange Visitor Information System), a nationwide database linking the institution, the state department and homeland security in an effort to counter terrorist activity. Some bottlenecks are already starting to emerge. Biometric registration will soon be required from most visa holders, which is already being experienced by those coming from certain, mainly Islamic, countries. Patriot Act I gave the US government sweeping powers over foreigners, essentially removing basic rights such as protection against arbitrary detention.

Enhanced homeland security is also having a significant effect on research areas related to defence and energy. Access has become increasingly difficult for non-American citizens. This has resulted in strange experiences when, for example, a computer with software essential for a certain experiment cannot be switched on because the owner is non-American. Visits to national laboratories require applications filed several weeks in advance, even for the basic science sections.

The situation is much worse for researchers from Islamic countries. One postdoc from Bangladesh who originally went after a faculty position in the US, recently remarked: 'Canada and Europe look so much more attractive now'. This presents Europe with a unique strategic opportunity to compete with the US for some of the brightest brains – if 'reasonable' opportunities can be made available in Europe.

Florian Ausfelder

Postdoctoral Scholar and Co-Chair of the Stanford University Postdoctoral Association (SUPD) at Stanford University (USA)

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Humour

The name game

Schengen, or not; the eurozone, or not; respecting the 'convergence criteria' and the 'growth pact', or not; supporting the US in its war with Iraq, or not; Member States, accession countries, candidate countries... the list never stops growing of European regions where there is one rule for one and one for another. So much so that Valéry Giscard d'Estaing's question to the Convention on the Future of Europe he was chairing – 'should it be called European Union or United Europe?' – seems very misplaced today. Just call it Europe, and hope that this still means something, we might well be thinking.

All of this demonstrates the force and symbolism of words, and their considerable power to excite and enthuse – with, of course, certain variations from one language to the next. The choice of name we use to designate what is ineluctably becoming our 'common home' affects our chances of achieving a true union or merely a marriage of convenience.

If there is one field where words are weighed with precision, it is research. I am not thinking of the rigour of scientific language, but more prosaically of the names chosen for projects submitted for financing under the various Union programmes. I am constantly amused when I come across the title for an otherwise very serious project, and where one would

expect a straightforward or symbolic message, one of those hypothetical semantic alignments, manifestly intended to render homage to the goddess *Acronymy* and to win favour with her Brussels' worshippers.

The authors' intention is clear: to inform the reader of the project's content, using a name that is easy to identify and remember. Where ambition goes too far, often with counter-productive results, is to want the symbolic name and the summary of the project to be the same as the acronym of its full title. Faced with the at times hilarious results of these attempts, one can only wish that European researchers would not use up the greater part of their creative energy in twisting the vocabulary and syntax of an often foreign language in the hope of seducing the recipients of their proposals.

Now that we have successfully deciphered the genome, perhaps it is time to attack the next major field: deciphering the names of European projects?

Candidate⁽¹⁾

(1) Pseudonym borrowed from the famous philosophical story 'Candide ou l'optimisme' by 18th century writer Voltaire.



Agenda

Last meetings under the Italian Presidency

- **Governance and the Lisbon Process in an Enlarged EU** – Joint Research Centre and the European University Institute – 20-21/11/03 – Firenze
www.buongiornoeuropa.istruzione.it/index_en.shtml
- **European Platform for Biodiversity Research Strategies meeting on Genetic Variability** – 20-24 November – Firenze
www.bioplatform.info/index.htm
- **Research infrastructures: exchange, training and excellence centres** – 21-22/11/03 – Organised by the Ministero dell'Istruzione, dell'Università e della Ricerca (MIUR) – Trieste
www.buongiornoeuropa.istruzione.it/eventi/et_21_22_novembre_triESTE_en.shtml
- **ICSC 2003 – 2nd International Conference on Spatial Cognition, Scientific Research and Application –Space and Disability** – Organised by University La Sapienza – 24-27/11/03 – Roma
www.icsc2003.org/
- **Infomobility Forum 2003** – Organised by the Centro Sviluppo Spa, Wireless Srl, Camera di Commercio di Torino – 25/11/03 – Torino
www.buongiornoeuropa.istruzione.it/index_en.shtml
- **Antibiotic resistance conference⁽¹⁾** – Organised by the European society of clinical microbiology and infectious diseases (ESCMID) – 28-30/11/03 – Roma
www.escmid.org/sites/index_f.asp?par=2.1
- **4th GMEs (Global Monitoring for Environment and Security) Forum** – November 2003 – Ispra
www.gmesforum.com/
- **High-level Workshop: Scientific and technical support to the new EU Chemical Policy** – Organised by the JRC and the Enterprise and Environment DGs – 1/12/03 – Ispra
www.buongiornoeuropa.istruzione.it/index_en.shtml
- **Women in Science: strengthening equal opportunities in the European Research Area** – 3-5/12/03 – Brussels (BE)
www.buongiornoeuropa.istruzione.it/eventi/et_3_5_dicembre_roma_en.shtml
- **European Manufacturing of the Future: role of research and education for European world leadership** – Organised by Politecnico Milano – 1-2/12/03 – Milano
www.buongiornoeuropa.istruzione.it/index_en.shtml
- **Technology for successful ageing** – Organised by the Italian Embassy – 4-6/12/03 – Washington (USA)
www.buongiornoeuropa.istruzione.it/index_en.shtml
- **Education, Research, Migration: the European Polices in the context of globalisation** – Organised by Università La Sapienza – 5/12/03 – Roma
www.buongiornoeuropa.istruzione.it/index_en.shtml
- **EuroNanoForum 2003⁽¹⁾** – 9-12/12/03 – Trieste
www.euronanoforum2003.org/index_en.php
- **e-Europe+: the role of the information technology in the creation and sharing of knowledge through university and enterprise** – December 2003 – Genoa (IT)
www.buongiornoeuropa.istruzione.it/index_en.shtml

(1) Conference with full media programme supported by Research DG

Contact: Patrick Vittet-Philippe

Patrick.Vittet-Philippe@cec.eu.int

European Notebook

- **The Meanings of Genomics** – Organised by EGENIS (ESRC Centre for Genomics in Society) – 20-22/11/03 – Exeter (UK)
www.ex.ac.uk/egenis/events/meanings.htm
- **The Environmental Performance of EU Industry** – Organised by the Environment DG – 24-25/11/03 – Brussels (BE)
europa.eu.int/comm/enterprise/environment/events/env_performance/index.htm
- **Control with Remote Sensing Conference** – Organised by the German Bundesministerium in charge of Agriculture – 27-28/11/03 – Köln (DE)
marsunit.jrc.it/CwRS/Koln/
- **Interfaces between Science and Society** – Organised by the Joint Research Centre (JRC) – 27-28/11/03 – Milano (IT)
alba.jrc.it/interfaces/
- **Forum on Sustainable Development** – Under the patronage of the French President Jacques Chirac – 27-29/11/03 – Paris (FR)
www.equitable-forum.org/
- **Alternative energy: energy efficiency, ocean tide and solar energy** – Media Briefing organised by the Research DG – 26/11/03 – Almeria (ES)
Contact: Julia Acevedo-Bueno, Julia.Acevedo-Bueno@cec.eu.int
- **The Molecular Basis of Life: Is life possible without water?** – Organised by the Royal Society – 3-4/12/03 – London (UK)
www.royalsoc.ac.uk/events/
- **World Congress of Science TV Producers** – 3-6/12/03 – Paris (FR)
www.banffmedia.com/science/media/030318.science2003.html
- **Online Educa Berlin – 9th International Conference on Technology Supported Learning and Training** – Organised by ICWE GmbH – 5-7/12/03 – Berlin (DE)
www.online-educa.com/fr/index.html
- **The World Summit on Information Society** – 8-12/12/03 – Geneva (CH)
www.geneva2003.org/wsis/indexa02.htm
- **Second epoline® Annual Conference** – Organised by the European Patent Office – 09-11/12/2003 – Barcelona (ES)
www.epoline.org/
- **EURO V International Conference - Future Worldwide Emissions Requirements for Passenger Cars and Light Duty Vehicles** – Organised by the JRC – 10-11/12/03 – Ispra (IT)
ies.jrc.cec.eu.int/Units/eh/events/EURO5/
- **3rd International Conference System Identification and Control Problems –SICPRO '04** – Organised by the Institute of Russian Control Sciences – 28-30/11/04 – Moscow (RU)
sicpro.org/
- **Global Conference on Animal Welfare** – Organised by the Office International des Epizooties (OIE) – 23-25/02/04 – Paris (FR)
www.oie.int/fr/welfare_2004/home.htm
- **World Congress on Public Health – Sustaining Public Health in a Changing World** – 19-22/04/04 – Brighton (UK)
www.phaworldcongress.com/
- **The Europe of Knowledge 2020 – A Vision for University based Research and Innovation** – 26-28/04/04 – Liège (BE)
europa.eu.int/comm/research/conferences/2004/univ/index_en.html
- **Urban Transport 2004 – 10th International Conference on Urban Transport and the Environment in the 21st Century** – 19-21/05/04 – Dresden (DE)
www.wessex.ac.uk/conferences/2004/urbantransport04/index.html
- **About Internationalisation – Cultures, Actors, 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/



Research DG publications

European research area

- **Investing in research: an action plan for Europe** – 76 p. (Hard copy versions also available in French and German) Versions in the 11 EU languages may also be downloaded from the following address: europa.eu.int/comm/research/era/3pct/index_en.html lynda.morrish@cec.eu.int
- **Science & technology policies in Europe: new challenges and new responses – Workshop** – 508 p. marie-christine.brichard@cec.eu.int
- **The Observatory of European SMEs: 2002 Report** – 18 p. – Available in the 11 EU languages rtd-sme@cec.eu.int
- **The potential of regional foresight⁽¹⁾** – 39 p. – Also available in French and German guenter.clar@cec.eu.int

Human resources

- **A rough guide to the Marie Curie actions** – January 2003 – 15 p. – Leaflet rtd-mariecurie-actions@cec.eu.int
- **Women in Industrial Research – A wake up call for European Industry** – 76 p. – Hard copy versions also available in French and German rtd-sciencesociety@cec.eu.int
- **Women in industrial research – Analysis of statistical data and good practices of companies** – 172 p. rtd-sciencesociety@cec.eu.int
- **Enseignement supérieur et recherche pour l'Espace européen de la recherche: tendances actuelles et défis pour le proche avenir** – 80 p. elie.faroult@cec.eu.int
- **13th workshop of Marie Curie Fellows: research training in progress** – 124 p. theodore.papazoglou@cec.eu.int

Life sciences – Health

- **Biomed 2 – Biomedical and health research programme (1994-1998) – Impact assessment** – 328 p. shahid.baig@cec.eu.int
- **Biomed 2 – Biomedical and health research programme 1994-98 – Volume 1 – Surveys** – 707 p. rtd-genomics-biotech@cec.eu.int
- **Generic RTD activities and research infrastructures – FP5 1998-2002 (Biomed 2)** – 586 p. shahid.baig@cec.eu.int
- **Generic RTD activities and research infrastructures – Community-funded projects 1998-2002 (Biomed 2)** – 406 p. manuel.hallen@cec.eu.int
- **Towards sustainable agriculture for developing countries: options from life sciences and biotechnologies** – 32 p. – Also available in French and German elisabetta.balzi@cec.eu.int
- **Quality control and efficacy assessment of microbial inoculants: need for standard evaluation protocols** – COST – 105 p. emil.fulajtar@cec.eu.int

Energy – Environment – Transport

- **European Bio-Energy Projects, 1999-2002** – 212 p. rtd-energy@cec.eu.int
- **Renewable energy technologies and Kyoto Protocol mechanisms** – 60 p. domenico.rossetti-di-valdalbero@cec.eu.int
- **External Costs – Research results on socio-environmental damages due to electricity and transport** – 22 p. domenico.rossetti-di-valdalbero@cec.eu.int
- **Measurement and use of directional spectra of ocean waves – COST** – 155 p. pavol.nejedlik@cec.eu.int
- **Development of VHF/UHF wind profilers and vertical sounders for use in European observing systems - COST** – 433 p. pavol.nejedlik@cec.eu.int
- **FISA-2003 – EU Research in reactor safety – Symposium – Leaflet** liette.eisen@cec.eu.int
- **EU co-sponsored research on reactor safety/severe accidents** – 334 p. research@cec.eu.int
- **Clipex - Clay instrumentation programme for the extension of an underground research laboratory (nuclear research)** – 141 p. research@cec.eu.int
- **Environmental deterioration of ancient and modern hydraulic mortars** – 194 p. johanna.leissner@cec.eu.int
- **Oils and water repellents in wood preservation – COST** – 65 p. guenter.siegel@cec.eu.int
- **Quality and assimilation of radar data for NWP – COST** – 38 p. pavol.nejedlik@cec.eu.int
- **UV-B forecasting – COST** – 84 p. pavol.nejedlik@cec.eu.int
- **Corrosion of steel in reinforced concrete structures** – 238 p. eberhard.seitz@cec.eu.int
- **Habitat fragmentation due to transportation infrastructure – COST** – 251 p. magnus.carle@cec.eu.int

European research in action

Themes recently published and available in the 11 EU languages as part of the series of leaflets intended for the 'general public' (format: 6 pages) edited by the Research DG.

research@cec.eu.int

- Antibiotics resistance
- Socio-economic research
- Biodiversity
- Nanotechnologies
- Aeronautics
- Global monitoring for environment and security

These leaflets (particularly those published earlier on) may also be downloaded at the following site:

europa.eu.int/comm/research/leaflets/index_en.html

(1) A comprehensive 187 p. guide on this subject is also available in French and German.

Sixth Framework Programme

Overview of calls for proposals

Review of the types, closing dates and indicative budgets for calls for proposals launched or planned for the coming months. For further specific details about each of these calls, see the following page on the Europa site. This provides direct links to all the online documents and procedures available on the CORDIS server. (europa.eu.int/comm/research/fp6/calls_en.cfm)

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 OF ACTIONS TARGETED	CLOSING DATE	INDICATIVE BUDGET (MILLIONS €)
INTEGRATING AND STRENGTHENING THE EUROPEAN RESEARCH AREA			
	Life sciences, genomics and biotechnologies for health	rtd-genomics@cec.eu.int	
FP6-2003-LIFESCIHEALTH-II	Periodic call for SSA in the various priority fields	15/04/2004	4
	Information society technologies	rtd-ist@cec.eu.int	
FP6-2002-IST-C	Future and emerging technologies (FET) – Continuous submission of proposals: call open until 31 December 2004	2004 (date nd)	60
	Aeronautics and Space ⁽¹⁾	rtd-aerospace@cec.eu.int	
FP6-2002-Aero-2	Periodic call for SSA in the area of 'Sustainable surface transport'. Final closing date /03/2006	2004 (date nd)	7
FP6-2002-Transport-2	Periodic call for SSA (participation of SMEs, international cooperation, participation of the candidate countries, exploitation of the results, scientific and organisational management of projects). Final closing date in March 2006	2004 (date nd)	5
<i>(1) See also joint aeronautics-energy-transport call below (identifier FP6-2003-TREN-2)</i>			
	Food quality and food safety	rtd-food@cec.eu.int	
FP6-2003-Food-2-A	Thematic call in the various priority areas	05/02/2004	192
FP6-2003-Food-2-B	Periodic call for SSA (participation of SMEs, international cooperation, participation of the candidate countries, exploitation of the results, scientific and organisational management of projects).	29/09/2004	5
	Sustainable development, global change and ecosystems	rtd-sustainable@cec.eu.int	
FP6-2003-Global-2	Global change and ecosystems: closing date (optional) of the 2nd stage for proposals for the thematic call for IP and NoE, admitted to the 1st stage (closing date 09/10/2003).	17/02/2004	nd ⁽²⁾
FP6-2003-Global-2	SSA linked to the Global change and ecosystems theme (particularly the Enrich Network, cooperation with the candidate countries, polar research, 'Citizens' conferences' on sustainability)	17/02/2004	nd ⁽³⁾
FP6-2003-Energy-2	Energy: SSA and CA with a short and medium-term impact (creating European technological platforms and lending support to international cooperation in the field of sustainable energy)	17/12/2003	3
FP6-2003-TREN-2	Joint Periodic call in the fields of 'Aeronautics and Energy and Sustainable Transport' (particularly: air traffic management – flight and ground control; renewable energies (CONCERTO); clean urban transport (CIVITAS II); rail system; electronic toll collection, etc.)	17/12/2003	175 ⁽⁴⁾⁽⁵⁾
<i>(2) As part of a € 150 M budget already partly allocated – (3) As part of a € 30 M budget already partly allocated – (4) Including aeronautics: € 20 M; energy : €107 M; transport : € 48 M – (5) Including € 155 M earmarked for IP</i>			
	Citizens and governance in a knowledge-based society	rtd-citizens@cec.eu.int	
FP6-2002-Citizens-3	Thematic call for IP and NoE in various fields (particularly: dynamics of the knowledge-based society and its economic and social impact, social cohesion, changes in working methods, implications of enlargement for governance and citizens, European identity, cultural dialogue, historical factors)	10/12/2003	48
	Horizontal research activities involving SMEs	rtd-sme@cec.eu.int	
FP6-2002-SME-1	Periodic call: cooperative research projects	27/11/2003	60
	Specific measures in support of international cooperation	rtd-inco@cec.eu.int	
FP6-2003-INCO-DEV-2	Thematic call ⁽⁶⁾ for developing countries (DEV) (particularly: combating transmissible diseases; healthcare policies and management; food security)	14/09/2004	36,2
FP6-2002-INCO-MPC-2	Thematic call ⁽⁶⁾ for the Mediterranean partner countries (MPC) (particularly: integrated water resources management; developing and use of renewable energies; protection and conservation of cultural heritage; health problems related to demographic and economic developments)	14/09/2004	27,1

CALL IDENTIFIER	RESEARCH FIELDS OF ACTIONS TARGETED	CLOSING DATE	INDICATIVE BUDGET (MILLIONS €)
FP6-2003-INCO-Russia+NIS-1	Thematic call ⁽⁶⁾ for Russia and the other New Independent States (Russia +NIS) (particularly: stabilisation of the R&D potential; modernisation of the industrial system; environment and health)	27/04/2004	13,4
Voir note ⁽⁷⁾	Periodic calls for SSA in all the relevant groups of countries	08/03/2004 ⁽⁸⁾	see note ⁽⁷⁾
	<i>(6) For STREP and CA – (7) {Call identifiers} / [Budgets]: {FP6-2002-INCO-DEV/SSA-1} [€1 M] / {FP6-2002-INCO-MPC/SSA-2} [€0.6 M] / {FP6-2002-INCO-WBC/SSA-3 (Western Balkan countries)} [€0.6 M] / {FP6-2002-INCO-Russia+NIS/SSA-4} [€0.6 M] / {FP6-2002-INCO-COMultiRTD/SSA-5 (multilateral coordination of national RTD policies and activities)} [€0.6 M] – (8) Forthcoming pooled intermediary assessment dates: 08/09/2004; 07/03/2005; 07/09/2005; 06/03/2006.</i>		
	Scientific support to EU policies	rtd-policies@cec.eu.int	
FP6-2003-SSP-3	Call for STREP, CA and SSA for various policies: Sustainable management of natural resources, health, biosafety & crisis management, economic potential & social cohesion	13/01/2004	83,1
	Support for coordination activities	rtd-coordination@cec.eu.int	
ERA-NET/1/CA-SSA	Periodic call: Supporting the cooperation and coordination of research activities carried out at national and regional level (ERA-NET system)	02/03/2004 ⁽⁹⁾	24 ⁽¹⁰⁾
	<i>(9) Forthcoming assessment receipt dates : 05/10/2004; 02/03/2005; 04/10/2005 – (10) The overall budget for the call package is €148 M</i>		

STRUCTURING THE EUROPEAN RESEARCH AREA

	Human resources and mobility (Marie Curie actions)	rtd-mariecurie-actions@cec.eu.int	
FP6-2002-Mobility-2	Periodic call: Marie Curie host fellowships for early stage researchers training		
FP6-2002-Mobility-3	Periodic call: Marie Curie host fellowships for the transfer of knowledge	19/05/2004	45 ⁽¹⁰⁾
FP6-2002-Mobility-4	Periodic call: Marie Curie training conferences and programmes	20/04/2004	10 ⁽¹⁰⁾
FP6-2002-Mobility-5	Periodic call: Marie Curie intra-European fellowships	18/02/2004	55 ⁽¹⁰⁾
FP6-2002-Mobility-6	Periodic call: Marie Curie 'outgoing' international fellowships	12/02/2004	18 ⁽¹⁰⁾
FP6-2002-Mobility-7	Periodic call: Marie Curie 'incoming' international fellowships	12/02/2004	11 ⁽¹⁰⁾
FP6-2002-Mobility-8	Periodic call: Marie Curie excellence awards (research teams)	18/05/2004	30 ⁽¹⁰⁾
FP6-2002-Mobility-9	Periodic call: Marie Curie excellence awards (individual awards)	18/05/2004	0,25 ⁽¹⁰⁾
FP6-2002-Mobility-10	Periodic call: Marie Curie chairs	21/01/2004	5 ⁽¹⁰⁾
FP6-2002-Mobility-11	Marie Curie European integration grants	Voir note ⁽¹¹⁾	19 ⁽¹⁰⁾
FP6-2002-Mobility-12	Marie Curie international integration grants	Voir note ⁽¹¹⁾	10 ⁽¹⁰⁾
	<i>(10) Indicative budget for 2004 – (11) Assessment dates: 15/01/2004; 15/04/2004; 15/07/2004; 14/10/2004</i>		

	Research infrastructures	rtd-infrastructures@cec.eu.int	
FP6-2003-Infrastructure-4	Preparatory studies, building new infrastructures and flanking measures	04/03/2004	70
	Science and society	rtd-sciencesociety@cec.eu.int	
FP6-2002-Science& society-1	Periodic call: support and development of networks for the Science and society approach	09/12/2003	4
FP6-2003-Science& Society-6	Periodic call: SSA for the European platform of women scientists	09/12/2003	2

RESEARCH AND TRAINING IN THE NUCLEAR FIELD

		rtd-euratom@cec.eu.int	
Euratom Call 2004 – Fixed deadline	Thematic call (IP, STREP and CA): management of radioactive waste, radio protection, nuclear technologies and safety	14/04/2004	61
Euratom Call Open	Periodic call for SSA: transnational access to infrastructures and actions to develop mobility	13/04/2004 ⁽¹²⁾	3 ⁽¹³⁾

(12) Forthcoming assessment dates: 12/10/2004, 12/04/2005, 11/10/2005, 11/04/2006 – (13) For 2004



A dead end in 30 years

If current trends continue and in the absence of determined political action, in 30 years' time we will be faced with increasingly uncontrollable energy and climate problems. This is the conclusion of the recent WETO study published by European researchers. The ball is now in the politicians' court.

The study *World Energy, Technology and Climate Policy*, financed by the Commission as part of its socio-economic research into the energy sector⁽¹⁾, offers one of the first clear pictures of what awaits us if nothing changes. For Domenico Rossetti di Valdalbero, who supervised this study at the Research DG, 'The approach taken by this research has three strengths: It is scientific. It is rigorous. And it is objective. Based on the most reliable assessment possible of available resources and on a realistic and well-documented observation of the current and future evolution of worldwide energy demand, the study proposes a reference scenario and describes the issues at stake in terms of global climate change and, in parallel, energy supply security in Europe, whilst highlighting the role of technology. The study points to the limits that we are inexorably tending towards, and which are in danger of proving unbearable if nothing is not done to induce a trend change, in particular concrete implementation of the Kyoto Protocol. This report has been discussed at the highest level in the Commission and distributed to European energy and environment ministers. From now on, its conclusions should serve as a backcloth for implementing alternative policies.'

(1) This project, coordinated by Enerdata (FR), was undertaken by researchers from the Federal Plan Office (BE), the Institute of Energy Economics and Policy (FR), and the Institute for Prospective Technological Studies of the Joint Research Centre (Seville – EU).

Population and growth

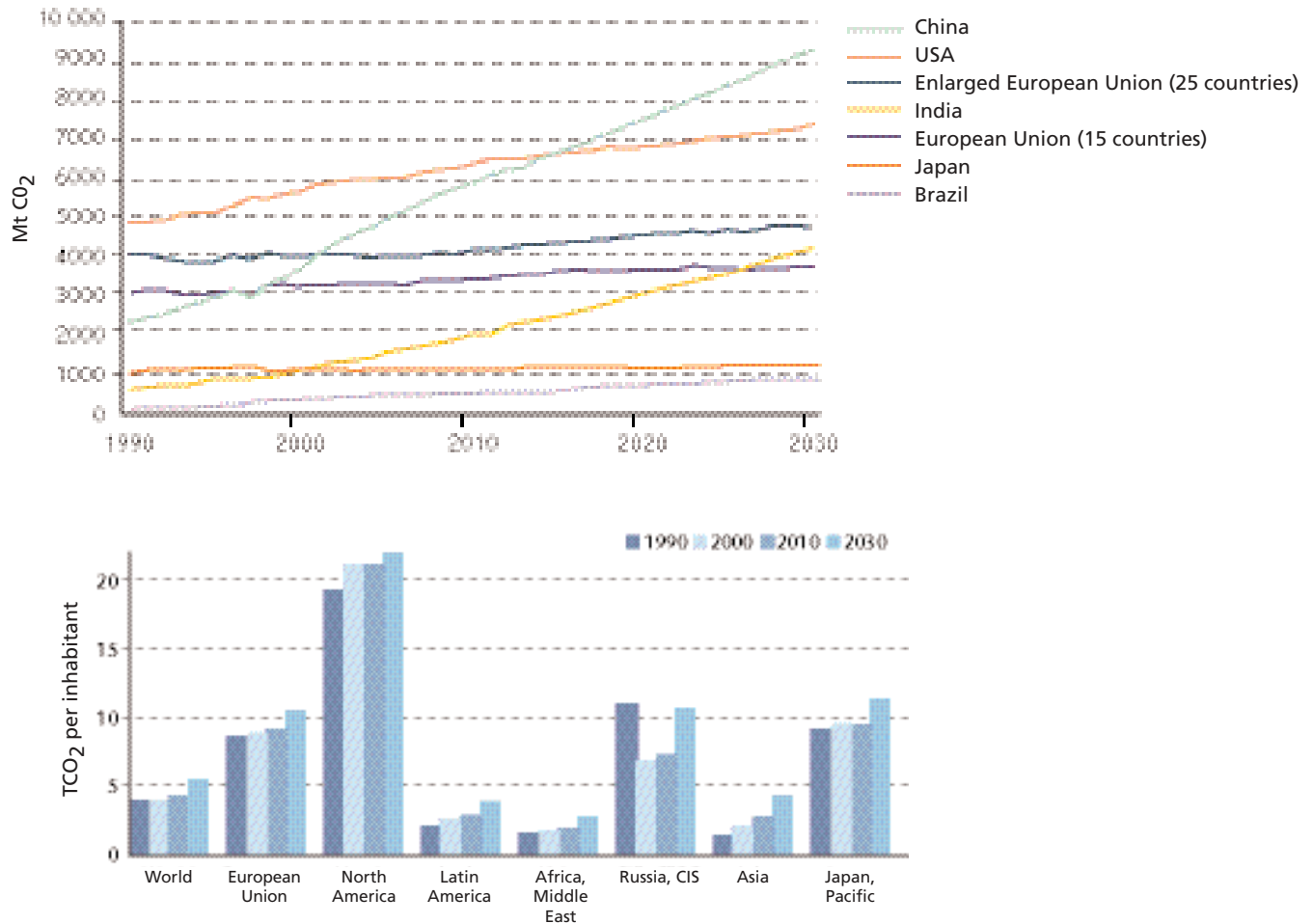
The path of world energy growth is signposted by demographic and economic reference points. By 2030, our planet's population will have grown to 8.2 billion (from 6.1 billion in 2000). Latin America, Africa and the Middle East will together make up 22% of this number, as against 16% today.

What level of economic development should we expect? The world economy can be expected to continue to grow at its average 'cruising speed' (3% a year since 1970). But this speed will vary greatly, rising by just 0.4% a year in EU countries, but increasing by leaps and bounds in Asia, and in particular in China. Industrial countries, which accounted for 70% of GDP in 1990 and 62% in 2000, will 'fall' to around 45% in 2030.

Energy demand is projected to mirror these developments, increasing at a global 1.8% a year between now and 2030, with over half the demand coming from developing countries (as against 40% today). Energy will be shared between the various sectors in similar proportions as today: 35% for industry, 25% for transport, and 40% for a more vaguely defined area including residential, services and agriculture. Demand from service industries will grow fastest in developed countries.

The grip of fossil fuels

Fossil fuel resources, which are dominant today (81% of global consumption in 2001), should remain adequate until 2030. Whilst certain supply-side tensions could begin to be felt by then, oil remains the king of fuels. Used variously by industry, transport and the service sector – and still representing a large portion of electricity generation (see box) – consumption seems set to rise by the 1.6% annual rate which it has known since 1990. In this way, global production would grow by around 65% to some 120 million barrels a day by 2030. Three-quarters of this

CO₂ emissions over time

Source: Rapport WETO



Oil consumption is growing inexorably. Worldwide production of 'black gold' should reach around 120 million barrels a day by 2030.

increase would come from OPEC countries, which will then supply 60% of demand (as against 40% in 2000). By then, oil can be expected to cost €35 a barrel – a figure comparable to the current price.

The world's very abundant exploitable reserves of gas and coal should not cause any problem. Sustained growth in use of these two primary sources will continue over the next three decades. Having risen by 0.9% a year between 1990 and 2000, coal consumption is set to grow by 2.1% between now and 2010, and by 2.5% a year from then to 2030. Encouraged by its competitive price – in energy equivalent terms coal will cost €10 per barrel in 2030 – production will have doubled by then, with over 50% coming from Asia and Africa. This traditional fuel will play a major and grow-

ing role in supplying these two continents, as it will in North America (much less in other industrialised countries).

In turn, a 'dash to natural gas' will be a key feature of the next three decades. Gas production will grow by 3% a year between 2000 and 2010, slackening off to 2.1% thereafter. In 2030, it will cover 25% of total consumption compared with 21% today.

Three factors explain the interest in this fuel, which is playing an increasingly important role in electricity generation: the very generous reserves existing well beyond 2030 (in particular in the CIS and Middle East), a competitive price compared with oil (around €30 a barrel depending on where it is produced and consumed), and its less harmful impact on the environment. 'Natural gas gives off 30% less CO₂ than coal,' according to Bruno Lapillonne from French energy data specialists Enerdata. 'Furthermore, combined cycle gas turbines are offering yields of up to 60% compared with 40% for coal-fired power stations. In all, the carbon content of electricity from gas is half that of electricity from coal.'



Clean energies relegated

In the absence of any countervailing action, the 'natural' trend of the laws of supply and demand is for fossil fuels to dominate increasingly and to satisfy 88% of world needs in 2030⁽²⁾. This increase of almost 9% signifies a fall-back in 'climatically clean' non-CO₂ producing energies.

Highly contested and lacking new technological impetus, **nuclear** fuel will represent just 5% of world consumption as against 7% today. But the greatest losers will be **renewable energies**. In the absence of any genuinely proactive policy to surmount the barriers to their penetration in an economy regulated solely by market interests, in 2030 they will cover just 8% of global demand as against 13% in 2000. Whilst solar, wind and small hydro will have risen (7% a year between now and 2010, and by 5% thereafter), their market share will not exceed 1% in 2030. At the same time, by giving precedence to other energy vectors, urbanisation in developing countries will result in a decline of the renewable resources sector and a significant fall in biomass consumption (meeting just 5% of world needs as against 9% today).

Climate verdict – no appeal

When it comes to the climatic consequences of the energy projections contained in this scenario, the verdict is harsh and with no room for appeal. The planet will find itself in an 'unsustainable' situation in terms of climate change, with annual CO₂ emissions more than doubling between 1990 and 2030, from 21 to 45 Gt. The forecast also highlights the new regional distribution of the burden of pollution, given changes in the nature of the fuels (and hence the 'carbon emission intensity'). Industrialised countries, representing just 70% of carbon emissions in 1990, will share only 42% in 2030. Europe will increase its discharges by 'just' 18% and North America by 50%.

Their place will be taken by the sustained growth in fuel consumption in developing countries, with China way out ahead in absolute terms. Even if it succeeds in reducing its relative energy intensity by 66% from 1990 levels, its CO₂ emissions will rise by 290% from then, due essentially to the substantially reduced use of biomass energy⁽³⁾.



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Potential trend changes

What factors could potentially change the WETO projections, defined by its authors as the scenario of 'harsh reality if nothing is done'. The study examines the sensitivity to two hypotheses, linked to two major uncertainties. The first is a downward revision of estimated world oil and gas resources, the second is greater energy efficiency from accelerated technological developments in the electricity sector.

Natural gas: Europe's dependency gives cause for concern

Over the past decade the use of natural gas in Europe – mainly from the continent's own resources – has grown by a record 5% a year. With the gradual saturation of needs – in particular in manufacturing and the service industries – this trend is likely to weaken. The WETO study projects average growth of 0.8% a year over the next three decades, most of it for electricity generation, with power stations 27% gas-fuelled by 2010 as against 12% in 1990 and 20% in 2000.

Two factors are causing concern, even if Europe's future gas needs remain moderate. First, the manna of its own resources is nearing exhaustion. Second, with a global 'dash for gas', Europe will find itself acutely dependent on the two closest gas-producing regions, the CIS and the Gulf zone, which hold over 70% of world reserves. For these essential sources of supply, it will be competing with the entire Asian continent, where demand will be much higher in a similar context of absence of own resources.

'Can we remain insensitive to the fact that our dependence on external natural gas will rise from 53% today to 80% in 2030?', Domenico Rossetti di Valdalbero asks. 'As the Green Paper⁽¹⁾ has shown, it is vital that Europe take steps now to secure its sources of supply, by diversifying potential "gas roads" to African and Middle East resources, and establishing permanent dialogue with producer countries.'

(2) In Europe, oil will remain the primary source of fuel (39%), followed increasingly by gas (27%), and then coal and lignite (16%).

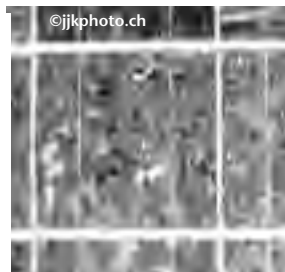
(3) CO₂ emissions from biomass fuels are regarded as 'neutral', involving the release of carbon stored in them, and not additional carbon, as in the case of fossil energies.

(1) 'Towards a European Strategy for the Security of Energy Supply' (Green Paper adopted in 2000) – Downloadable from europa.eu.int/comm/off/green/index_fr.htm

Falling oil and gas resources (further aggravating Europe's dependency) would mean higher prices. The resulting reduction in demand would be offset by a greater role for coal (a negative development in pollution terms) and other cleaner renewable energies. But the main effect would be to encourage energy savings, producing a small drop in global consumption. In brief, if oil and gas prices hit €40 a barrel in 2030, world energy demand would fall by 3%. Consumers would turn more resolutely to non-fossil energy sources, and CO₂ emissions would fall by 2% compared with the reference scenario⁽⁴⁾.

Whilst economically attractive, technological innovations paving the way for greater use of gas and coal would lack any significant environmental impact. On the other hand, technological progress promoting the role of renewable or nuclear energies could reduce the power sector's CO₂ emissions by 10%.

Electricity production from the so-called soft energies (sun, wind, water) will increase by 7% a year from now until 2010 and by 5% a year from then on. Even so, they will represent no more than 1% of the world market in 2030, according to the reference scenario given in the WETO report.



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between the different regions of the world, of the Kyoto provisions aimed at a 'forced' reduction of CO₂ emissions.

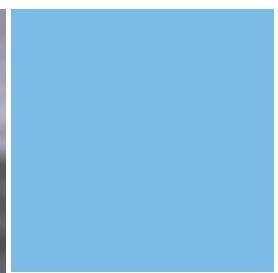
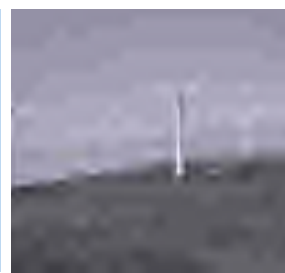
The target taken by the authors is based on one of the 'reasonable' scientific modelling exercises undertaken by the IPCC (International Panel on Climate Change), based on limiting the increase in the global atmospheric temperature to 2°C by the end of the 21st century. Achieving this means reducing the worldwide CO₂ emissions of the 'as usual' scenario from 45 to 36 Gt, or 21%. The WETO report goes on to assess the energy and regional consequences of this ambitious but

For further information

● The complete WETO study can be downloaded from http://europa.eu.int/comm/research/energy/gp/gp_pubs_en.html

Contact

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(4) On the contrary, an increase in gas resources would lower the price. This would produce a 21% increase in gas production and a 1.5% global increase in global energy demand.

Electricity - vital progress

The main change in the coming decades lies in the growth of the electricity sector, in response to the ever-growing demand in developing countries and to further calls for energy from the industrialised world. With average global growth of 3% a year, electrical power will represent almost one-quarter of final demand (22% in 2030 as against 15% in 2000).

We are set to see a significant redistribution in the supply of raw fuels to this sector. Over half of the production will be generated by units incorporating technological innovations, such as combined cycle gas turbines, clean coal burning and, to a lesser extent, renewable energies, that have come to maturity after a decade of research. This trend is shown in figures on the development of market share between 2000 and 2030: gas – 16% to 25%; conventional power stations – 36% to 12%; nuclear – 18% to 10%; major hydro – 19% to 13%; and other renewable energy sources – 2% and 4%. Nor should we forget the growth of solar and wind energy sources which will multiply by a factor of 11. With 8% of its electricity market sourced by renewable energies in 2003, Europe should become the leading user of such energies⁽¹⁾.

(1) This figure does not reflect the specific proactive measures the Union intends to take to promote these energies, but only their potential market penetration based on economic performance criteria.

certainly not excessive objective, which can be estimated by applying the constraints resulting from a strict implementation of the Kyoto Protocol's 'carbon tax'.

In this simulation, for the European Union to fulfil its Kyoto commitments, this progressive taxation would produce a levy equivalent to €13.5 per tonne of CO₂ emission between now and 2010, rising to €60 a tonne in 2030 if Europe remained determined to set a good environmental example. Carbon emissions would then be 26% lower than under the 'as usual' scenario, with the brunt of the reduction being borne by the industrial sector.

According to this hypothesis, the world's energy landscape would change considerably. Global energy demand would decrease by 11%, with a drastic cut-back in coal consumption (-42%), a smaller fall in the use of oil (-8%), while natural gas consumption would remain stable. Consumption of nuclear and renewable fuels would increase by 36% and 35% respectively. The share of large hydro and biomass would rise further, whilst that of wind, solar energy, and small hydro would jump by a factor of 20.

Stocking up on wood for winter fuel in Russia. Use of this biomass resource is likely to decrease with urbanisation and advanced electricity-generation technology.



For Domenico Rossetti, 'the WETO report sends a strong signal, in particular to European leaders, regarding the efforts to which they have committed, under the Kyoto Protocol, between now and 2010. It is essential that we demonstrate our determination to respect the objectives we have set if we want to get the remainder of the international community – including developing countries – to commit to reducing their own emissions in the future. It is vital that by 2010 the United States and China, the world's two largest polluters, come to an agreement and sign and implement a Kyoto II aimed at the year 2030.'

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Moulding public opinion – truth and myth



Sociologist, physicist and journalist Hans Peter Peters is concentrating his research on scientific and environmental communication.

Can citizens' opinions be influenced by feeding them with information on science and technology? The answer is not so simple, says Hans Peter Peters, member of the Programme Group 'Humans, Environment, Technology' at the Juelich Research Centre (DE). A reader or listener's reaction to a particular message is the outcome of a personal and largely unpredictable cognitive process, the mechanisms of which we are only just beginning to discover.

Your research consists of analysing how people react to a press article or a TV report. What happens during the reception of the message?

What we observe, first of all, is that one and the same attitude can, in fact, be the outcome of very different mental processes. Take, for example, a scene showing cows being injected with hormones. Many people will express their rejection of such practices, but the logical processes behind their arguments can differ greatly. One person will find this unacceptable for the animals. Another will say that it presents too great a risk to consumer health. A third will place the message in a context which has nothing to do with the document itself, like agricultural policy, and proceed to criticise the mad rush towards productivity. In other words, everyone reacts by referring to different elements, reflecting their own memories and sensitivities. Such tests reveal hidden mechanisms. This is what is known as the cognitive response process⁽¹⁾.

Why do such mechanisms exist?

The key lies in existing attitudes. People look to new information to support the opinions they have already formed. They hear those facts that confirm them, and ignore or reject those that contradict them.

Which poses the question of where these pre-existent ways of thinking come from. In areas like biology, which have been the subject of public debate for many years, everyone has had time to develop their own opinions. But how does this work in the case of more recent information? To understand the mechanisms involved, we presented a number of people with some scientific research that is almost unknown to the general public. What we saw was that 'fresh' information influences attitudes much more strongly, even if existing attitudes continue to manifest themselves

as a function of, at times, quite indirect criteria. For example, a new project by a respected institution will benefit from the trust placed in it.

In other words, we are confronted with a number of pre-existing sources of attitudes. In a large majority of people, however, basic attitudes are built up on receiving fresh information of any kind. And once these attitudes exist, new information is handled so as to reinforce them.

Does the level of knowledge of the subjects play a role in these attitudes?

A popular conception is that the better educated and well informed people are, the more favourable they will be to new scientific applications. In fact, our analyses point to an absence of any direct link between knowledge and attitudes. We find all sorts of combinations, with correlations in both directions. Highly knowledgeable people can be strongly for or against a particular innovation, as the case may be, whereas poorly informed people have no particular opinion.

That being said, it is often the best informed people who are the most reticent in coming out clearly 'for' or 'against' something. This may be because better educated people with more information at their disposal tend to take more viewpoints into account, which makes it more difficult to arrive at a final decision. In any event, this result puts pay to the idea – shared by groups with radically opposing interests, such as industrialists and ecologists – that information can 'tip' opinion. Ultimately, levels of information are not a decisive factor in the creation of people's attitudes.

(1) See box p.37.



In which case, public information campaigns are all a waste of time and energy...

Of course not. They serve to improve reflection and debate, and to train and inform citizens, all of which are laudable ends in themselves. But the temptation to 'manipulate' one's readers or listeners is based on an illusion, as the link between information and opinion is fundamentally unpredictable. Opinions are the product of complex processes depending on people's individual mental models. These models include factual elements, but also ethical, emotional and other considerations, which cannot be modified by simply providing additional information. But better an opinion based on masses of information than the same opinion based on almost none.

Other than pre-existing attitudes and knowledge, have you studied other factors?

We have examined recipients' motivation. That is their interest, curiosity and desire to know more. And this time our study shows a positive correlation. For example, people who are most interested in biotechnologies also express the most positive attitudes. In other words, it is motivation, not information, which provides the link to positive attitudes. Even so, we need to be careful when talking cause and effect. Are people motivated because they are favourably inclined towards the subject, or are they favourably inclined because they are interested in it? We simply do not know.

Have you also tested the cultural factor?

We are currently doing so with a homogenous study in Germany and the United States, countries with clear cultural differences and where media coverage is not comparable. How then do reactions differ to one and the same item of information? We took two populations of primary schoolteachers of both sexes, and gave them each the same articles to read on food biotechnologies. The cultural contrasts came out very clearly, with the Germans much more inclined than the Americans to question the credibility of the information.

You have made one astonishing observation: when receiving a scientific item of information, people are four times more likely to react negatively than positively. This would mean that almost every commentary is a criticism?

This is a very general constant that takes many people by surprise. People are quite simply irrational, one might conclude. But this cannot be so, otherwise we would never have had the long adventure of human development. But it may be that we all have inside us an unconscious, primitive rationality, which is the result of the natural process of evolution. This tells us that it is better to be alarmed about something than to fail to notice a danger. In this way, negative information receives priority attention. Also, in our society of plenty, in which most of us are certain of our jobs, housing and food from one day to the next, it may be that positive expectations are 'normal', and we, therefore, seize only on information that could announce a threat to these standards. Another possible explanation is that citizens believe that the positive outcomes

of science are handled by different institutions, whilst the management of its risks is neglected. This makes them feel obliged to remain on their guard.

But are these negative reactions not always linked to people's negative attitudes?

No, they can be expressed by people who are favourably inclined to the subject but are, nonetheless, capable of perceiving the dangers or negative side effects. And however much this may irritate decision-makers, it does show that people apply their critical faculties to the information they receive. They are aware that what they are confronted with is a particular portrayal of reality and not reality itself. Moreover, a portion of the comments are addressed not at the information proper, but at how it is presented – how clear, how credible, etc. The general public comes down like a ton of bricks on scientists who speak a complicated language, whereas experts are often under the impression that they need to appear hermetic in order to be deemed credible. It is exactly the opposite that is true. Aloofness is perceived as a sign of disdain, and totally wrecks any communication.

In other words, people look as much at how the content is communicated as at the content itself.

Precisely. And it is here that the intention to manipulate can prove disastrous. When people sense it, they feel degraded. Institutions which start to communicate with citizens in 'advertising mode' run a severe risk. In the fields of health and safety, this form of communication blots out all credibility. Some people are talking of launching 'brand policies' in the scientific field, with each institution or organisation having its own image, a bit like Coca-Cola. What they fail to see is that this will reduce them to being no more than an image, an unimportant product.

Such an approach is contrary to everything science has achieved until now. Many surveys tell us that science is always ahead in terms of credibility. A policy of instrumentalising this authority will inevitably be its death knell. The correct path leads in the other direction: information to inform, not to manipulate. Putting forward the arguments as best one can, backed up with honest, clear, complete and up-to-date information. In short, positioning oneself as a credible communicator. And even if we fail to convince our readers or listeners, at least they will feel that they have been respected. And this too can play a role in shaping their opinion, given that information is not the sole factor at play. At times, perceiving the informing party to be honest can achieve more than the information itself. ○

To find out more

www.fz-juelich.de/mut
www.hpp-online.de

The black box of cognitive intelligence



But how do we study this response? Professor Peter's approach is based on very precisely controllable experiments. Volunteers are subjected to messages on one particular issue. In the case of biotechnologies, each person is presented with different films or press articles and is asked to 'think out loud' – that is, express without any hindrance everything that goes through their minds whilst receiving the information. Attitude assessments are undertaken before and after the message sessions. Every session is recorded and subjected to qualitative analysis, and then categorised. It is time-consuming work, but vital for opening up the 'black box' of cognitive response.

GMOs, cloning, the nuclear industry, environmental side effects... Today Science and technology are at the centre of controversies that decision-makers and experts would rather be without. In this situation, communication is welcome because good information – positive information, of course – is supposed to put reactionary and even obscurantist responses to flight.

Annoyingly, public opinion is frequently distrustful and refuses to 'bite'. More and more surveys commissioned to analyse this situation all point to the low productivity of positive messages – confronted, it is true, with often vigorous campaigns in the opposing direction. But surveys have their limits. They are, at best, rudimentary tools, approximate snapshots of public inclinations, revealing little of the complex mechanisms of opinion-forming.

Fascinated by how science is perceived in contemporary society, Hans Peter Peters has for several years been examining these questions methodically at the Juelich Research Centre (DE). His aim is to explore the individual cognitive processes that come into play whenever people receive messages carrying scientific or technological content. 'We need, first of all, to understand what is going on in these people's minds when they watch a programme or read an article. We then try to pin down regularly recurrent features and to link the qualitative and quantitative aspects,' he explains.

The central theory behind this work is that everyone reacts first of all according to what their 'mental apparatus' dictates to them. 'Everyone has experienced this. When you take notes in a lecture, you write down not just certain things the lecturer says, but also the ideas these awaken in you, the thoughts activated by listening to him. What moves you is your own cognitive response, not the speaker, who is simply the stimulus. This same stimulus can provoke very different responses from one individual to the next. Which leads us to posit the existence of an intermediate variable modulating the link between stimulus and attitude: this is the cognitive response.'

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Biocultural

With doctorates in biology and chemical engineering, Cesareo Saiz-Jimenez has carved out a cross-disciplinary research field for himself, studying the biological processes at work at historical sites and monuments. The implications of this fascinating work extend much further than simply protecting our cultural heritage.

During his medical studies, Cesareo Saiz-Jimenez dreamt about the cinema. Bergman, Antonioni, De Sica, Fellini ... A few of life's twists and turns later, we find him with a penknife scraping the walls of a Roman tomb close to Seville. He has since become a biologist, with a passionate interest in protecting historical monuments.

The adventure began timidly when he was studying soil fertility. A chemist colleague told him of a monastery where the wall paintings were deteriorating, for which no chemical explanation could be found. Cesareo Saiz-Jimenez left his microscope to attend to the sick frescos. Closer examination showed the walls to be colonised by green mould, representing just one element in a complex food chain stretching from bacteria to dust mites. The primary cause proved to be atmospheric pollution. Emissions from neighbouring industrial plants had caused the proliferation of sulphur-metabolising bacteria. For the first time, Cesareo Saiz-Jimenez was studying a micro-organic ecosystem in an architectural context.

La Giralda, Altamira and others

Hearing of the degradation of Seville cathedral's bell tower – the famous Giralda – Cesareo Saiz-Jimenez immediately climbed on to the scaffolding. Later, when Spain joined the European Union, he was able, with European project funding, to devote himself entirely to protecting our cultural heritage. He discovered that the diversity of historical environments (cities, churches, palaces, caves, underground burial sites) is matched only by the diversity of biological activity (bacteria, mould, lichen, algae, moss, plants). With a team of young researchers recruited for these projects, Cesareo Saiz-Jimenez threw himself into comparative studies in Spain, Italy, Belgium, the Netherlands and Austria.

His most significant intervention was definitely the Altamira cave, with its 16 000 year-old rock paintings. The site, visited by 3 000 tourists a day in the 1970s, was invaded by bacteria. Our researcher was able to demonstrate that these were natural colonists, also found in large quantities

even in recently discovered or rarely visited caves. All such bacteria feed on the same organic material present in the seepage water, the limited presence of which inhibits their development. But when the caves are opened up, ventilated, lit and frequented, this self-regulating balance is lost. The walls become covered with green, yellow or white colonies, some of which can degrade the pigment of the paintings. The choice is then one

“**Cesareo Saiz-Jimenez:**
My laboratory contains
all the beauty of past
cultures.”

of either closing the caves and re-establishing a low-bacteria ecosystem, or undertaking targeted interventions to destroy the bacteria. 'We should avoid changing the ecological balance without fully knowing the consequences,' Cesareo Saiz-Jimenez advises. 'For example, the bacteria at Altamira produce antibiotics which prevent any competition from actually "setting up shop". Remove these bacteria and it is quite possible that other micro-organisms will take over, as happened at Lascaux, where mould appeared following the original treatment. For me, the only safe method is to close the cave. You can always satisfy tourists with reproductions.'

A second lesson: many of the bacteria found in the caves are still unknown to scientists and can represent hugely valuable resources. Those at Altamira, for example, have enabled the development of a new wide-spectrum antibiotic (*altamiramycin*) which is currently undergoing testing in a German laboratory. 'At the same time as preserving and protecting our cultural heritage, we are making a fundamental contribution to the knowledge of ecosystems and species. We can also find ourselves confronted with conflicting objectives. Sometimes, historical sites represent very special biotopes, with species not found elsewhere, forcing us to choose between conserving the monument and maintaining biodiversity.'

Cultural heritage vs. traffic

Cathedrals too are full of surprises. Cesareo Saiz-Jimenez has a series of boxes containing large blocks of a black, porous matter. 'This is the crust of vehicle exhaust deposits that used to cover Seville cathedral. In it we have found bacteria that are capable of breaking down the organic components in the oil. Studying monuments is a real Pandora's box.'

fervour



An astounding 'transfer': bacteria discovered in the prehistoric Altamira cave have been used to develop the new *altramiramycin* antibiotic.

Sadly, the pollution accumulates faster than these bacteria can break it down, so right now there is no other solution than a very expensive cleaning operation every ten or 20 years – or to limit the traffic, diesel buses in particular. 'We have measured the level of suspension particles in the air. In the road which passes by the cathedral this can reach 330 000 particles per cm³, as against 80 000 in the proximity of Saint Eustache in Paris, or 20 000 in traffic-free roads'⁽¹⁾. These results made headlines in Seville's local press in March 2002. In a report to the city authorities, the researchers recommend rerouting the traffic. But this measure appears to be unpopular and electric buses are too expensive. Even so, Cesareo Saiz-Jimenez is not ready to give up yet ⁽²⁾.

Impossible task

Research, scientific communications, consulting and making recommendations to the political authorities, managing a team and running various projects leave our scientist little or no time for holidays. 'I am doing what I most like doing in the world – looking at the Altamira bisons, the Roman mosaics, the necropolises – I am in paradise. My laboratory contains all the beauty of past cultures. And on top of that, society pays me a salary for exercising my passion. The least that I can do is to attempt to be useful to it.' Saturdays and Sundays are spent on administration work and, in the summer, our indefatigable researcher is either abroad on scientific missions or hosting students in Seville. 'I am very strong on exchanges between disciplines and nationalities. We need specialists from every discipline – biologists, chemists, architects and archaeologists. You simply cannot do this sort of work in isolation.'

Whilst he is perhaps the most European of Sevillians, Cesareo Saiz-Jimenez is undoubtedly the most Sevillian of Europeans ('it is here that life is at its most beautiful'). He loves the city's lively and colourful traditions – 'In April, Seville is one big festival, and I always try to avoid travelling then' – and its outstanding restaurants. On top of this, he has several archaeological sites in the immediate proximity. At the Roman necropolis at Carmona, he is tracking the biological situation, gathering samples, taking photos and measuring black and brown stains to the nearest millimetre. This is usually followed by a visit to the neighbouring monastery to collect some cookies prepared by the nuns. 'I just love combining my professional trips with other discoveries – art, gastronomy, music.... The extraordinary attraction of this region – and of Europe in general – lies in its fabulous cultural wealth. We have to do everything possible to preserve it.'

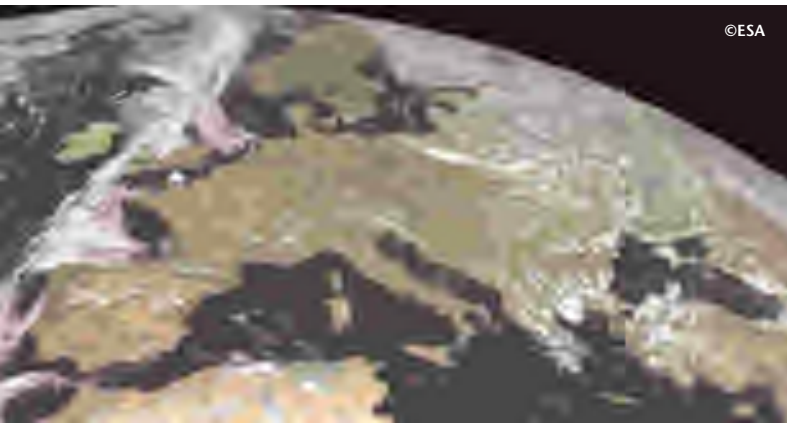
For further information

- **IRNASE, Seville (ES) site**
www.irnase.csic.es
- **Caramel (Remedying damage to Europe's architectural heritage from carbon composites)**
www.caramel.cnrs-gif.fr/
- **Coalition Project (Application of molecular biology to cultural heritage)**
www.genomic.uni-oldenburg.de/projekte/coalition/
- **Cats project (Application of molecular biology to Roman remains)**
www2.bio.uniroma2.it/lab/algae/CATS.htm
- **Water-repellent/biocide surface treatment for mortars project**
www.sci.port.ac.uk/ec/

(1) See RTD info no 36, A monumental task.

(2) A workshop on Air Pollution and Cultural Heritage will be held in Seville Cathedral from 1 to 3 December 2003 for scientists, traffic experts, politicians and members of cultural associations.

A new ERA of research



ERA-Net articulates the underlying ambition of the European Research Area (ERA) – that is, to overcome the barriers splitting Europe's scientific and technological potential into a 'patchwork' of national and regional policies.

ERA-Net tackles this 'compartmentalisation' of research by encouraging the networking of research activities, on the one hand, and the mutual opening up of national and regional research programmes on the other. ERA-Net strives to support – using a bottom-up approach – all kinds of initiative aimed at achieving this twofold aim. It is not for the Commission to indicate the avenues to be pursued, that is the role of the decision-makers within the institutions, as well as Member States and Associated States.

Networking

The networking can take many forms and does not, in principle, imply the pooling of financial resources. One key aspect is the systematic exchange of information.

The approach can be comparative (benchmarking, dissemination of good practices, analysis of administrative and legal obstacles to mobility) or strategic (identification of potential partners, analysis of synergies for future programmes, identification of interdisciplinary opportunities).

In some instances, the networking will result in concrete mechanisms for co-operation, such as the formation of international or trans-regional clusters of research projects charged with forming joint working groups, the drawing up and application of common evaluation procedures, or joint training initiatives.

As the 'last born' under the Sixth Framework Programme, the ERA-Net initiative is something of an exception as regards traditional EU support for research. It is targeted at public or quasi-public institutions responsible for managing research policy and activities at national or regional level in the Member and Associated States. It aims to help them co-operate and coordinate their approaches.

Mutual opening up

More complex – insofar as it involves 'extraterritorial' financial intervention and shared funding – the mutual opening up of research programmes between countries and/or regions is a fundamental innovation for strengthening the ERA. The desire is for this to take a number of forms.

By virtue of 'crossed' support, scientists or teams from a national research system may be an integral part of programmes launched in another country or have 'equal' access to their infrastructures. A still more ambitious stage would be for various national entities to pool their resources to launch calls for proposals for joint projects.

The ERA-Net contribution

Transnational co-operation is only possible within networks which adopt a long-term perspective. ERA-Net support seeks to ensure – in association with the Commission – the scientific and administrative management of this continuity. A particularly important criterion when selecting proposals is for the coordination and co-operation activities to be relevant and of high scientific quality. Union policy also takes into account other considerations, such as equal opportunity.

ERA-Net projects must include at least three independent research entities located in three different countries (Member States or Associated States). The financial support can be as much as €2 million, to be allocated solely to coordination and co-operation. This new programme has a total budget of €140 million for the period 2002-2006. ●

Initial response

An initial call for proposals was published by the Commission in December 2002. This met with 72 responses involving 422 partners by the 3 June 2003 closing date. Many of the proposals covered actions linked to research on health and the environment or in the field of the social sciences. Nineteen of them were selected.

Two other evaluation proposals will take place in 2004 (on 2 February and 5 October) as well as in 2005 (on 2 March and 4 October).

To find out more

europa.eu.int/comm/research/fp6/era-net.html
www.cordis.lu/coordination/era-net.htm
fp6.cordis.lu/coordination/calls.cfm

Contact

rt-d-coordination@cec.eu.int

Stocking up on wood for winter fuel in Russia. Use of this biomass resource is likely to decrease with urbanisation and advanced electricity-generation technology.



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News in brief . . . News in brief .

Letters

Research in the United States, with its glamorous names of world-famous institutions and Nobel Prize winners, depends heavily on postdoctoral scholars. The largest single postdoc employer in the US, the University of California, employs about 9 000, over 60% of whom are foreign nationals. This figure is typical in top-level institutions – a third of the foreign postdocs at America's Stanford University are EU citizens.

About half the foreign postdocs are expected to continue their careers in the US. This number might change with the burst of the 'dotcom bubble' still sending economic aftershocks through California, although not only for economic reasons – 'friendly fire' arising from the crusade against terrorism is also taking its toll.

Foreign postdocs issued with J-1 visas are being tracked by SEVIS (Student and Exchange Visitor Information System), a nationwide database linking the institution, the state department and homeland security in an effort to counter terrorist activity. Some bottlenecks are already starting to emerge. Biometric registration will soon be required from most visa holders, which is already being experienced by those coming from certain, mainly Islamic, countries. Patriot Act I gave the US government sweeping powers over foreigners, essentially removing basic rights such as protection against arbitrary detention.

Enhanced homeland security is also having a significant effect on research areas related to defence and energy. Access has become increasingly difficult for non-American citizens. This has resulted in strange experiences when, for example, a computer with software essential for a certain experiment cannot be switched on because the owner is non-American. Visits to national laboratories require applications filed several weeks in advance, even for the basic science sections.

The situation is much worse for researchers from Islamic countries. One postdoc from Bangladesh who originally went after a faculty position in the US, recently remarked: 'Canada and Europe look so much more attractive now'. This presents Europe with a unique strategic opportunity to compete with the US for some of the brightest brains – if 'reasonable' opportunities can be made available in Europe.

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Humour

The name game

Schengen, or not; the eurozone, or not; respecting the 'convergence criteria' and the 'growth pact', or not; supporting the US in its war with Iraq, or not; Member States, accession countries, candidate countries... the list never stops growing of European regions where there is one rule for one and one for another. So much so that Valéry Giscard d'Estaing's question to the Convention on the Future of Europe he was chairing – 'should it be called European Union or United Europe?' – seems very misplaced today. Just call it Europe, and hope that this still means something, we might well be thinking.

All of this demonstrates the force and symbolism of words, and their considerable power to excite and enthuse – with, of course, certain variations from one language to the next. The choice of name we use to designate what is ineluctably becoming our 'common home' affects our chances of achieving a true union or merely a marriage of convenience.

If there is one field where words are weighed with precision, it is research. I am not thinking of the rigour of scientific language, but more prosaically of the names chosen for projects submitted for financing under the various Union programmes. I am constantly amused when I come across the title for an otherwise very serious project, and where one would

expect a straightforward or symbolic message, one of those hypothetical semantic alignments, manifestly intended to render homage to the goddess *Acronymy* and to win favour with her Brussels' worshippers.

The authors' intention is clear: to inform the reader of the project's content, using a name that is easy to identify and remember. Where ambition goes too far, often with counter-productive results, is to want the symbolic name and the summary of the project to be the same as the acronym of its full title. Faced with the at times hilarious results of these attempts, one can only wish that European researchers would not use up the greater part of their creative energy in twisting the vocabulary and syntax of an often foreign language in the hope of seducing the recipients of their proposals.

Now that we have successfully deciphered the genome, perhaps it is time to attack the next major field: deciphering the names of European projects?

Candide⁽¹⁾

(1) Pseudonym borrowed from the famous philosophical story 'Candide ou l'optimisme' by 18th century writer Voltaire.