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The politics of climate change

Last month, the world's Heads of State or Government congregated at the UN headquarters in New York for the Summit on Climate Change. The gathering was, in the UN Secretary-General's words, aimed at 'mobilising the political will and vision needed to reach an ambitious agreed outcome based on science at the UN climate talks in Copenhagen'.



Despite calls for consensus on a crucial issue that is bound to affect all of us, wherever we may live, nearly every country on this planet is finding it difficult to address climate change comprehensively. The social consequences, it is argued, would be far too damaging. The EU, through its numerous research-funding programmes, continues to support researchers working on projects aimed at reducing CO₂ emissions. Some of these projects are highlighted in this supplement.

The opening article of the section on biology and medicine presents the outcome of a revolutionary project that has seen major progress in the field of skin substitutes. Transplanting skin remains a very difficult medical procedure and the Intelliscaf project has aimed at reducing its complexity by developing skin substitutes that include dermal and epidermal components.

The lead article in the energy section describes a system developed by the CRISP project that allows the electricity produced by wind turbines to be fed into the power distribution grid. Indeed, as the notoriously unpredictable wind power is pushed forward as a clean source of energy it has become crucial to balance it with consumers' demand.

Another topic indirectly linked with cleaner energy supply is the production of organic food. In the environment section, experts from 18 different European countries working on the Omiard project carried out a comprehensive study on the development of the market for organic produce. The expected results were aimed at boosting the economy in some of the EU's most underprivileged regions.

The IT and telecommunications section opens up with an article on the Envisnow project. Researchers working on this project have studied ways to better measure snow cover conditions. This would in turn ensure a better forecast of potential snowmelt in the spring that often leads to catastrophic floods. In order to achieve this, researchers have designed advanced algorithms that exploit the complementary characteristics of optical and radar sensors.

Microelectronics are increasingly part of everyday life. Whether in medical equipment or white goods, they can be found almost anywhere. The opening contribution of the industrial technologies section highlights the research carried out in the Machmini project. New advanced micro-forming tools were developed to improve the quality of the manufacture of these microelectronic components.

The events section for its part offers readers a selection of upcoming event announcements in the field of research, including relevant website references.

As we are always striving to offer our readers the best possible information, we appreciate receiving your feedback on this issue, and on the *research*eu* publications in general. Questions or suggestions can be sent to: research-eu-supplements@publications.europa.eu

The editorial team

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EVENTS

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Bioengineered skin substitutes

Within the field of tissue engineering, there is a need to develop new approaches to achieve effective wound closure in patients with extensive skin burns or chronic ulcers. The growth of living skin cells on bioresorbable polymeric films was investigated by the Intelliscaf project as an intermediate stage for making implantable skin substitutes.

Autologous and allogeneic skin grafts, which involve transplanting skin from one area to another on the same or a genetically non-identical person, are methods currently used to treat skin defects. In regard to skin defects caused by burns and chronic ulcers, alternative techniques are sought due to the limited availability of donor tissue and the risks of transmitting infection.

The Intelliscaf project has endeavoured to improve skin reconstructive surgery by means of skin substitutes that include dermal and epidermal components. In the quest for the creation of full-thickness skin equivalents, the use of bioresorbable synthetic polymers was investigated. Among polymers having the reputation of being degradable, polylactic acid (PLA) and polyethylene

oxide (PEO) proved to have great potential as temporary therapeutic devices.

Films made of PLA/PEO copolymers degraded rapidly in the human body and allowed for the foreign support material to be eliminated during regeneration of the skin tissue. The use of synthetic polymers also allowed adjustments of their mechanical properties to match clinician's and treatment requirements, in addition to limiting the risk of infectious disease transmission.

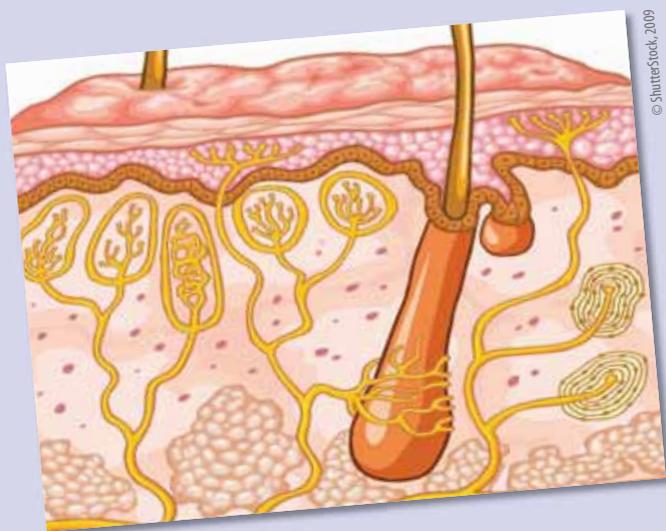
Proliferation and adhesion of human skin cells on the newly developed polymeric films was evaluated by using MTT-based assays and a scanning electron microscope. Polyethylene oxide appeared to be suitable material to culture fibroblasts that synthesise collagen, the major structural component of the dermis. Moreover, the enhanced adhesion demonstrated by the fibroblasts showed promise for increased possibilities in handling cultured keratinocytes that form the epidermis.

The Centre national de la recherche scientifique (CNRS), France, has protected the technology to synthesise films of PLA/PEO copolymers with a patent. Their hope for the future is to phase out current autologous and allogeneic skin grafts in favour of polymeric implants that guide cell attachment into skin tissue for regeneration.

Funded under the FP5 programme Growth (Competitive and sustainable growth).

Collaboration sought: further research or development support; licence agreement; marketing agreement; manufacturing agreement; financial support; available for consultancy.

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Regenerating injured tissue by converging technologies

Plasma treatment of polymeric materials has been a topic of extensive investigation pertaining to a wide range of applications. By sterilising and modifying the surface of biodegradable polymers in a controlled way, it can optimise interactions with proteins and cell adhesion for improved biocompatibility.

As a promising alternative to traditional implants, biodegradable polymers have been used to fabricate porous scaffolds which should assist in the regeneration of bone, cartilage and skin tissue. The three-dimensional polymeric structures are placed in the injured tissue region where they induce and guide the growth of cells. While degrading over time, they are replaced by the growing tissue.

Following fabrication, polymeric scaffolds would have to undergo treatment to ensure their sterility. The Intelliscaf project partners sought to adapt existing sterilisation procedures to promote an efficient inactivation of micro-organisms. Because of their low melting points, complex geometries and hydrolytic degradation mechanism, plasma

sterilisation was identified as the most appropriate treatment for microbes.

Sterilisation of medical materials can be implemented by autoclave, gamma or other radiation and ethylene oxide gas. However, the use of chemically reactive gas, such as ethylene oxide, leads to changes in the polymer structure. Moreover, the complete removal of residual traces of this toxic gas is difficult to achieve. The application of low-pressure plasma induced little or no change in the three-dimensional morphology, molecular weight or mechanical properties of polylactic acid (PLA) homopolymers.

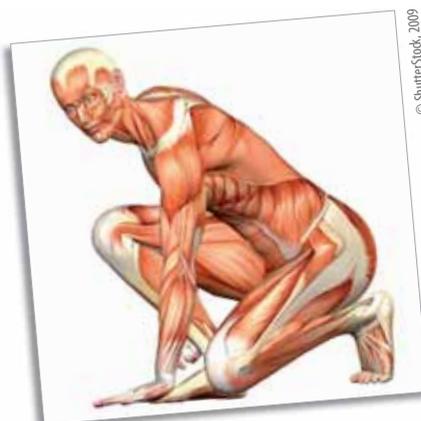
PLAs are among the most widely used biodegradable polymers since they display excellent biocompatibility and mechanical

properties, but more importantly their degradation rate can easily be controlled. Gas plasma acted on surfaces in a conformal fashion, not only for PLA scaffolds of complex geometries, but also on their textured surfaces. Plasma treatment has also been found to increase the surface bioactivity on these tissue scaffolds.

Funded under the FP5 programme Growth (Competitive and sustainable growth).

Collaboration sought: manufacturing agreement.

<http://cordis.europa.eu/marketplace> > search > offers > 4831



Change of expression for oncogenes

Research centred on the malfunction of important developmental and regulatory genes can elucidate details of their function. Mutations in an important proto-oncogene have shed light on the development of human cancer.

In the battle against cancer, the identification of oncogenes and their mutations has potentially uncovered the biochemical mechanics of the transformation from a normal to a tumour cell. Mutations in proto-oncogenes can yield an oncogene. A particularly interesting proto-oncogene is RET, abbreviated from 'rearranged during transfection', a description of the gene when it was first discovered. The EU-funded project 'The RET proto-oncogene' undertook the enormous task of unravelling the role of RET in human and animal models.

As a cell-signalling gene involved in development of several kinds of nerve cells, RET mutations cause a range of phenotypes. Loss of function mutations cause Hirschsprung's disease where the colon lacks a normal nerve supply. Gain of expression changes cause various human cancers. Interestingly, one particular gene, C602R, is associated with both types of disease. Project partners at

the University of Bologna, Italy, therefore studied a mouse model that incorporates the RETC602R mutation.

The effects of RETC602R on thyroid C-cells and adrenal gland chromaffin cells were observed in mice. Almost half the mice heterozygous for the mutation showed C-cell hyperplasia as opposed to only a quarter of the wild-type mice with hyperplasia. The increase in cells may induce pre-cancerous tumours. The low penetrance of the mutation suggests that other factors are required for mutation expression, perhaps of genetic or environmental origin.

As regards mice homozygous for the mutation, there was a total loss of function effect resulting in no ganglion cells in the intestine and lack of development of kidneys. The scientists planned further research into the role of extraneous factors that were responsible for the expression of the C602R mutation. The implications of the study in the search for cancer pathways are undeni-



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ably important in the identification of molecular blocks for drug therapy.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

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The genetic web of Hirschsprung's disease

Hirschsprung's disease (HSCR) is the cause of chronic constipation and poses a significant health threat, particularly in newborn babies. Researchers are well on the way to unravelling the complex genetic pathways of this disease.

HSCR is an enteric nerve disorder which is the cause of life-threatening obstruction in the intestine in newborn children. The condition is characterised by a lack of parasympathetic ganglion cells in the submucosal and myenteric nerve networks in varying

lengths of the bowel. It is a complex genetic disorder controlled by the input of many genes. Hence, the degree of severity varies from patient to patient.

Members of EU-funded project 'The RET proto-oncogene', as the name suggests, studied the RET gene and its multiple role in biological systems. Encoded, the gene produces a signalling protein and, as such, is involved in organ development including the enteric nervous system and the associated disease HSCR.

Through a study of 1 000 patients, project partners at the Istituto Giannina Gaslini in Italy studied transmission of the RET gene, the low penetrance of mutations and enhancer mutations. All the findings supported the postulation that HSCR is indeed a multifactorial disease. The data also confirmed that the set of genes predisposing individuals to HSCR was associated with low RET gene expression.

Another research path explored was the gene network in the overall development of the autonomic nervous system. This way,

the scientists hoped to identify new candidate genes in the development of the enteric nervous system and possible modifier genes in HSCR pathology. Implicated in particular were various homeobox genes.

Transient transfections, electrophoretic mobility shift and chromatin immunoprecipitation assays were used to target two T-cell leukaemia (TLX) genes. These particular homeobox genes are involved in autonomic nervous system morphogenesis. Another homeobox gene, paired-like homeobox2b (PHOX2B), was found to be able to bind sequences within the human TLX2 gene. Interestingly, this interaction acts as a promoter in a molecular cascade giving rise to neuronal lineages during human development.

The absence of advanced diagnostic tools means that children with this debilitating and sometimes fatal disease may not receive appropriate medical care. The elaboration of the complex genetics of HSCR stands to improve means of diagnosis as well as risk assessment tools.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

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Birth cohort effects on serum testosterone

Serum samples from Scandinavian men were analysed to determine possible changes in hormone levels over time. The work was undertaken as part of an EU initiative into reproductive health.

Scientists from the EDEN project collected serum samples from 5 350 Danish and 3 270 Finnish men. The samples were then analysed for testosterone, luteinising hormone (LH) and sex hormone-binding globulin (SHBG). This was done to discover if the hypothesis was correct in predicting a long-term trend in male reproductive hormones.

Researchers studied the effects of age, period of sampling and date of birth on hormone levels through the use of a general linear model. The sample involved men who had taken part in a major population study conducted in Denmark in the period 1983–99 and in Finland in the period 1972–2002.

Examination of the cross-sectional data revealed an age-dependent population-level decline in testosterone levels, with the highest levels of testosterone found in the oldest cohort. This is in addition to the widely

known age effect, where levels of testosterone decline with increasing age. A further significant cohort effect was seen in men born more recently, who were observed to have lower levels of LH and SHBG.

The results found in both Danish and Finnish men were similar. However, the findings could not be directly compared because there was no overlap in the timing of the collection of samples. This was in contrast to the fact that no cohort effect was observed for free testosterone and testosterone/LH levels. Researchers concluded that there was an interrelationship between cohort-related changes in hormone levels. The most significant cohort effect identified was for SHBG.

The cause behind the observed effect resulting from age of the cohort remains to be found. The effect was most significant in the oldest cohorts. However, the results indicated that SHBG levels in the men sampled have levelled off in more recent years.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

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Endocrine disruptors and disorder in the KISS-1 gene

Evidence is increasing as regards the havoc that endocrine disruptors (EDCs) can cause during sexual development. Researchers have assessed the effects of EDCs on the hypothalamic-pituitary unit using gene expression studies to identify potential biomarkers.

EDCs are all too commonplace in our environment. Sources include a variety of chemical classes including hormones, pesticides, compounds used in the plastics industry and in consumer products, and many other industrial by-products and pollutants.

The effects of these insidious chemicals are far-reaching and complex. This leads to difficulties in determining their impact and hampers attempts to set levels of tolerance and toxicity. Consequently, the EU-funded project EDEN sought to assess hazards for humans and wildlife and to develop biomarkers for the early detection of EDC effects.

The hypothalamic-pituitary (HP) unit produces or controls many hormones that are

responsible for sexual development and reproductive cycles. The importance of the HP unit in endocrine terms prompted scientists to investigate the effects of EDCs on this vital endocrine gland in rats.

Expression of key molecular biomarkers was monitored. Genes KISS-1 and PR in the hypothalamus and those encoding for globins in the pituitary were targeted in particular. Neonatal exposure to various EDCs including the oestrogenic oestradiol benzoate and the anti-androgen flutamide was examined. In some cases, concentrations as low as 1–10 µg of the chemical per rat were able to induce significant changes in messenger RNA expression of the genes.

Elucidation of the effects of disruptors on the KISS-1 system has particular significance. The KISS-1 gene codes for kisspeptin, a protein thought to initiate the production of gonadotropin-releasing hormone at the start of puberty. As such, the KISS-1 system has major importance, not only in regulation of cycles, but at crucial times of sexual development.

Moreover, the observed changes were strongly correlated to decreases in basal serum levels of luteinising hormone. This hormone is regarded as a conventional marker for disruption in the gonadotrophic axis. In turn, this means that KISS and PR expression products can also potentially serve as reliable markers for any changes of function at the HP unit.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

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Frequent acronyms

ERA	European research area	ICT	information and communication technologies
FP5/6/7	Fifth/Sixth/Seventh Framework Programme of the European Community for research, technological development and demonstration activities	IST	information society technologies
		R & D	research and development
		SMEs	small and medium-sized enterprises

Creation of metagenomic insert libraries

Researchers investigated techniques for the creation of small insert libraries. The work combined micro-organism biodiversity with cutting-edge microbiology and screening technology.

The EU-funded Gemini project constructed metagenomic libraries from a range of environmental samples. Researchers employed *in situ* extraction methods based on the mechanical disruption of cells using silica and glass beads. The average amount of DNA per 500 mg of soil sample was found to be approximately 10-20µg. This material was used directly in partial digestion, size fractionation and construction of metagenomic libraries.

The phage library was changed into a plasmid library using two strains of *Escherichia*

Coli (E. coli) and the M13 helper phage. The concentration of the metagenomic libraries were found to be between 50 000 and 1 000 000 colony forming units (cfus). Functional and polymerase chain reaction (PCR) based assays were then used to screen the libraries. Researchers implemented a number of different assay techniques which proved to be unsuitable. A carbohydrate screening assay was then carried out using microtitre plates and bicinchoninic acid (BCA) with a detection limit of between 0.2-50 µg.

Unexpected domains in novel proteases

Gene mining of metagenomic libraries is uncovering a wealth of genetic sequences of commercial value. Partners in the Gemini project have concentrated on proteases and discovered an enzyme with a unique unexpected structure.

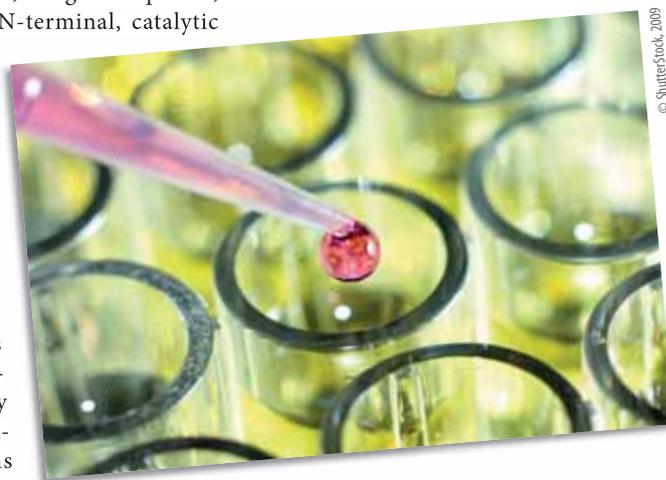
In the diverse microbial world, proteases are many and varied. Growth and differentiation at the heart of cellular regulation at all levels of organisation involve hydrolysing enzymes, hydrolases.

Project researchers in Gemini cast their net in metagenomic libraries for novel enzymes with industrial applications. Partners based at the University of Göttingen in Germany narrowed the search down to hydrolysing proteases.

The screening procedure used was based on the enzymes' ability to hydrolyse skimmed milk. Two genes were found that expressed proteases and were designated proA and proB. The structural domains of the proteins were investigated and related to enzyme function as well as compared with other microbial proteins.

Both proA and proB showed very unusual domain structures in that a regulatory P-domain present is normally only found in proteins secreted from eukaryotes. For active protease production, a signal sequence, together with the N-terminal, catalytic and alpha-helical domains found within the structure of the protein were all found to be necessary.

Both expressed proteases showed high activity and stability at alkaline pH values and at high temperatures. As such, they show excellent potential in applications



Metagenomic libraries for the glacial habitat

During the EU-funded Gemini project, a German university took up the challenge of trying to extract valuable genetic material from the harsh climate of mountain glaciers.

Metagenomics is a rapidly developing field in which DNA fragments are isolated from environmental samples rather than in cultures. Since only a limited number of micro-organisms have been successfully cultivated in the laboratory, metagenomics offers the ability to study a much wider range of biodiversity.

In the course of Gemini, samples were collected from a variety of sources. Participants

from the University of Göttingen, Germany, focused their attention on the Schneeferner glacier in the Bavarian Alps.

The German scientists had to develop new techniques for handling of the glacial ice and snow samples. Both were melted at a constant temperature and the residual material was collected on a filter. Gene extraction from the filter was performed with the help of a commercially available kit, though sev-

The Gemini team needed to take into consideration the high absorbance background in which the clones were grown, which often contain substances that can cause interference. This was avoided by diluting the samples tenfold before measuring them, which also ensured that the substrate background was not too high.

The screening assay was tested on positive controls. Two were wild amylase bacillae and one was an alpha-amylase recombinant clone in *E. coli*. The screening assay was also tested on a bacillus species genomic library.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: information exchange/training.

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where conditions are inclement for most enzymes. Their industrial application could be extended to various sectors including the cleaning and detergent industry.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

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eral modifications to the procedure had to be incorporated.

Since the amount of recovered biomass was relatively small, it was necessary to apply multiple displacement amplification to the isolated DNA. The resulting metagenomic libraries contain over 3 million base pairs and represent an excellent starting point for the investigation of potentially valuable microbes in the glacial habitat.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

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Detection of ryegrass single nucleotide polymorphism

Studies were undertaken to identify genes for the forage quality of perennial ryegrass (Lolium perenne), an important component of agricultural systems and the natural landscape. An improved genetic knowledge base helps scientists and plant breeders develop crops for new applications, which can also adapt better to a changing climate.



Different methods were evaluated for the detection of single nucleotide polymorphisms (SNPs) as part of an SNP marker-based breeding strategy for grasses. The criteria assessed included throughput capacity, robustness/reproducibility, information content and cost efficiency.

Overall, scientists from the EU-funded GRASP project evaluated nine different techniques for detecting and identifying trait-specific SNPs. Furthermore, three of the partners from the consortium considered the Sequenom MassARRAY system the most suitable.

The system used matrix-assisted laser desorption ionisation — time of flight

(MALDI-TOF) mass spectrometry, which provided completely automated genotyping. The technique was a powerful, flexible, high-throughput technology capable of accurately identifying genetic variations. It was also simple to use and cost-effective. The genotypes were separated according to mass and all assays were computer-designed. This enabled several independent SNP sites to be analysed in a single typing assay and made the use of fluorescent labelling unnecessary.

Researchers used two different methods to carry out allele sequencing and detection of haplotypes and SNPs in 20 genotypes of perennial ryegrass. The first method

involved the cloning and sequencing of at least five polymerase chain reaction (PCR) fragments for each genotype and candidate-gene combination. The second method employed direct haplotype-specific sequencing, which obtained DNA sequences from both alleles.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support; private-public partnership.

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Selective breeding of ryegrass within GRASP

Knowledge acquired during the GRASP project has been transformed into practical tools that will enable breeding of better forage grass.

Molecular genetics has assisted in the achievement of a number of significant advances in agriculture in recent years. Looking to improve the quality of forage grass, a group of plant researchers and grass producers gathered in the context of the GRASP project. The effort was funded in part by the Fifth Framework Programme (FP5).

During the GRASP project, DLF-Trifolium — a company specialising in grass seed — focused its attention on ryegrass, *Lolium perenne*. Genetic analysis of ryegrass samples led

to the discovery of several DNA sequences where single nucleotide polymorphisms (SNPs) occur. Attempts were then made to link this genetic differentiation to plant traits such as quality, hardiness and yield.

According to DLF-Trifolium, the SNPs can initially be exploited as simple markers during breeding trials. Even when the function of the gene is not known, the SNP can help identify the allele associated with the desired plant characteristic, known as the phenotype.

The greatest value, however, can be obtained when the gene's function has been established, whereupon the SNP evolves into a functional marker. Considerable ground was covered during the project to reach this milestone for a number of traits. Furthermore, DLF-Trifolium plans to use the GRASP genotypes directly in ensuing breeding experiments.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support; private-public partnership; other.

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Optimal floors alleviate dairy cow lameness

A study was conducted in search of the best possible material used in flooring for commercial herds, in order to help lessen causes of lameness in dairy cows.

Lameness in dairy cows is a significant problem, not only in terms of animal health and welfare, but also as regards to productivity and competitiveness in the dairy sector. Moreover, what causes lameness and just how it develops has not been fully understood.

Hence the aim of the Lamecow project was to help lessen cases of lameness through the detection and implementation of best practices in addition to learning core biological aspects. As part of a multidisciplinary

approach, highlighting causes of lameness and forming a better understanding for its prevention, an experiment was conducted in Sweden to examine flooring used for commercial herds.

One of the achievements was the development of a method to assess footprint patterns of a walking cow in order to determine the degree of walking comfort on various types of surfaces. The results showed that sand ground provided the best comfort, followed by rubber flooring. In contrast, the

least amount of comfort was shown on slippery concrete surfaces.

As regards to standing, rubber flooring was again preferable to concrete by as much as 70 %. Furthermore it was found that rubber combined with mastic asphalt helped to lessen the wear rate and level of injury to claws. This provides the optimal solution with the most benefits including healthy claw growth.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

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Impact of endocrine disruptors on cell systems

Concern about the widespread occurrence of endocrine disruptors (EDCs) at all levels of the food chain and their effects on hormonal systems has triggered many research initiatives. Partners in the EU-funded project Mendos have developed a novel protocol based on cell exposure to validate sensors that detect and identify these synthetic chemicals.

EDCs are present in an array of chemicals including insecticides, herbicides, detergents and plasticisers. They are also present in both air and water and can be very persistent in environmental systems, many being stored in fat.

Researchers in the Mendos project aimed to combat this serious threat by developing advanced monitoring schemes based on artificial receptor-based optical systems. Specifically, the objective of scientists based at the Austrian Research Centre Seibersdorf GmbH was to design and test a cell exposure protocol for testing endocrine disrupting activity.

Two separate but related lines of research were conducted. The first was to use a breast carcinoma cell line to assess gene expression and to validate a sensing system based on a DNA chip. The chip had been developed with other project partners from the National Institute of Oncology (NIO) in Hungary. The T-47D breast cancer line selected expresses receptors to 17-alpha oestradiol and a range of other steroids as well as calcitonin.

The second research route aimed to identify the most appropriate cell line to validate other MIP (molecularly imprinted polymer)

sensors. MIPs are robust, stable, and resistant to a wide range of pH, humidity and temperature. MIPs are also relatively inexpensive to produce. Furthermore, using the samples generated, candidate genes were identified by the real-time polymerase chain reaction. Another cell line was employed to test those genes best able to identify the EDCs.

This research constitutes the basis of tools for EDC research and risk assessment, both for laboratory-based research as well as actual environmental profiling. Moreover, it can be employed in the fields of food safety, environmental monitoring and medical diagnostics.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 5030

Putting together the Okazaki fragments

EU-funded research is digging deeper into the biochemistry behind DNA replication. To achieve this, researchers are enrolling our distant microbial relatives for the assembly of model systems.

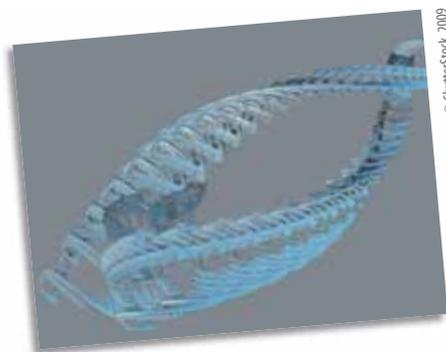
The biochemical mechanisms involved in making that perfect copy of DNA, particularly in higher organisms, are very complex. Although many of the pieces of the DNA replication puzzle are in place, some remain elusive. Partners in the Repbiotech project aimed to investigate, step by step, the process in the microbial group Archaea. As micro-organisms that followed their own unique evolutionary path, some of their biochemistry shows more similarity to that of eukaryotes than prokaryotes.

The general idea was that as Archaeal pathways are overall simpler, elucidation of cascades in these organisms can lead to parallels in humans. Furthermore, research before Repbiotech revealed the presence of short-developing DNA strands with 5' RNA segments in the hyperthermophilic Archaeal

Pyrococcus abyssi (*P. Abyssi*). Their size and structure turned out to be very similar to eukaryotic Okazaki fragments.

The project team at the University of Paris Sud, France, sought to find out exactly how RNA primers that help to join the Okazaki fragments are produced and then removed. In order to develop a model, the scientists cloned and overexpressed *P. abyssi* proteins implicated in this process. To check for expected interactions, surface plasmon resonance was used. High-affinity binding was indeed evident involving four of the candidate molecules. The pull-down technique and the monitoring of associated enzyme activity were then used to further confirm the protein-protein interactions.

An intricate functional model of Okazaki fragment maturation in the Archaea was



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therefore pieced together. Albeit a very small portion of the overall process, complete models of each section represent major progress in the understanding of DNA copying. As cell replication and its malfunction lie at the heart of many diseases including cancer, knowledge of the molecular mechanics would be a highly potent tool.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: marketing agreement.

<http://cordis.europa.eu/marketplace> > search > offers > 5080

Incidence of mutation in renal development genes

A genetic basis for renal hypodysplasia (RHD) has been characterised by researchers in the EU-funded project Escape_trial. The incidence of mutations in seven genes involved in early kidney organogenesis was tracked in a trial group of patients with the disease.

Histologically, patients with RHD have reduced size kidneys, a lower number of nephrons and disorganised renal tissue. Previous research has recognised a group of developmental genes involved

in early kidney organogenesis. Dominant mutations within these genes that result in RHD and developmental problems in the urinary tract have been identified.

To assess the prevalence of these mutations, scientists at the University Hospital for Paediatric and Adolescent Medicine in Heidelberg, Germany, performed genomic and proteomic research. Around 100 unrelated patients with RHD formed the study group.

Techniques used to identify the effects of the expression of proteins from the mutated genes included overexpression studies in zebra fish. To achieve the opposite effect,

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Effect of the prion gene on traits in sheep breeds

The genetic relationship between the prion protein (PrP) locus and production or functional traits was studied in meat, hardy and dairy sheep breeds.

Scientists from the EU-funded Scrapie-freesheep project combated scrapie through the use of genetics based on the selection of the ARR allele of the PrP gene. The work also addressed possible bovine spongiform encephalopathy (BSE) risk. The team observed two genetic sources of risk for the negative effect of ARR/ARR sheep on production or functional traits called PF traits, including resistance to disease.

It was possible that the PrP gene could have a pleiotropic effect on other PF traits, involving a negative direct effect on the ARR allele. If such a pleiotropic effect existed, it would be expected to be stable across different breeds and populations of sheep. This risk was assessed through the use of association analysis, which was undertaken at the breed or population level. This involved making direct comparisons between different PrP genotypes for PF traits.

The PrP gene could be linked to another polymorphic gene which controlled the genetic variability of a PF trait. Most commonly the PrP and PF loci were not in linkage disequilibrium. This meant that from one family of sheep to another, the ARR allele could be on the same chromosome as a beneficial or non-beneficial allele of the PF gene in question.

Researchers studied the pleiotropic or direct effect of the PrP gene on the PF traits of different sheep breeds or populations, as well as for synthetic lines. The traits analysed included reproduction and growth as well as traits for muscle and fat depth, milk yield and content, wool and resistance



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to disease. The team concluded that there was no direct or pleiotropic effect by the PrP gene on the other PF traits. Therefore no linkage effect was expected between the PrP gene and other genes controlling these important traits.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

<http://cordis.europa.eu/marketplace> > search > offers > 4824

Selective sheep breeding for scrapie eradication

A monitored genotype programme was used as an experimental study on a Sardinian flock, in an effort to help eliminate scrapie in sheep through selective breeding.

Scrapie is a fatal disease in sheep which is characterised by chronic itching and loss of muscu-

lar control, followed by a progressive degeneration of the central nervous system. In order to assist in the development of the best breeding strategy for scrapie control, the EU-funded Scrapie-freesheep project examined the effect of introducing a genotype programme to lessen the occurrence of transmissible spongiform encephalopathy (TSE). This effort spanned the progression of genotype frequencies, occurrence of clinical disease, frequency of infection through to significant production traits such as fertility parameters.



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Part of this effort included setting up a monitoring programme as an experimental study on a Sardinian flock for four years. The study involved naturally scrapie-affected sheep. Two lines known as 'resistant' and 'susceptible' groups (RG and SG) were reproduced from the initial affected flock during five generations using, respectively, only ARR/ARR or ARQ/ARQ rams. Conclusions indicated that selective ARR breeding may be an effective method for eliminating scrapie in an affected flock. This may even be possible in situations where the scrapie agent was present in the flock during the lambing period as a result of the susceptible groups.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

<http://cordis.europa.eu/marketplace> > search > offers > 4823

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morpholino oligonucleotides designed to modify and reduce selected gene expression were also applied, resulting in the so-called knockdown effect.

Data collected from the expression studies suggested that the sine oculis-related homeobox 2 (SIX2) and bone morphogenetic protein 4 (BMP4) sequences played an important role in development of the renal system. Reduction expression of the corresponding proteins affected kidney development at varying stages and

this led to the defects observed in RHD patients.

Patterns of inheritance were deduced and included an example of oligogenic inheritance. To summarise, genes showing mutations most frequently were transcription factor 2 (TCF2) and the paired box gene mutation, PAX2. Mutations in these genes were observed by 15 % of patients with RHD.

Investigation into the genetic variation underlying kidney development has pro-

vided important insights into the range and mechanisms of genetic abnormalities. Collaboration with other projects dealing with genetic evaluation in children with congenital abnormalities in renal development has been established.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support; information exchange/training.

<http://cordis.europa.eu/marketplace> > search > offers > 5074

Detection of gluten by optical biosensors

The autoimmune disorder coeliac disease (CD) causes genetically predisposed individuals to develop inflammation of the small intestine through exposure to gluten, which is found in wheat products. Scientists from the EU-funded project CD-CHEF developed a microsystem module which detected gluten through the use of optical biosensors.

The CD-CHEF project developed a microsystem module for the optical detection of fluorescence. The optical detection chip designed by the team was capable of obtaining measurements from five parallel cuvettes used as the dilution series for the metering chip. This was operated using a sledge on a stage with a single source of light for excitation. Two photodiodes were used for detection, one for measuring ultraviolet and visible light (UV/Vis), and the other as a fluorescence detector.

The UV/Vis detector can be used for both absorption measurements for detecting the dye concentration, and for the correct positioning of the sledge. Researchers tested the optical chip's performance by measuring transmission in the UV/Vis range and through the measurement of fluorescence.

The sensitivity of the micromodule as regards transmission measurements was determined using methylumbelliferone at 370 nanometres (nm). The sensitivity of the microsystem was as good as or even better than those found in standard laboratory photometers. Experiments were undertaken to test sensitivity for fluorescence measurements with the fluorescent dye 5,6 FAM (5,6-carboxyfluorescein), which is used to label biomolecules.

During these experiments, samples of different concentrations of fluorescent dye were deposited into the cuvette channel. This can be compared with the way in which an enzyme links with a secondary antibody within an assay. The enzyme produced a fluorescing dye, which was released into the

channel. The CD-CHEF microsystem module successfully achieved a good correlation with a sensitivity of around 20 nm, making it suitable for the detection of gluten.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: licence agreement; marketing agreement; manufacturing agreement; available for consultancy.

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Microsystem for electrochemical detection of gluten

Researchers have developed and validated a microsystem module for the electrochemical detection of gluten.

Gluten is a protein found in wheat. It causes inflammation of the small intestine in sufferers of coeliac disease (CD), an autoimmune disorder which affects genetically predisposed individuals. Screening studies have shown that CD has been underdiagnosed in the past. It is now believed that there are around 8 million European citizens suffering from the disease.

The use of an electrochemical sensor for the measurement of concentrations of gluten required pairs of electrodes to be placed onto the detection chip. The project team used a sandwich of five gold working elec-

trodes with immobilised antibodies and used silver/silver chloride counter and reference electrodes. Together, their surface area is significantly greater than that of the working electrode.

The five gold working electrodes were applied to a glass slide with an intermediate titanium layer. The advantage of glass is that it can be easily cleaned. Small gold strips leading from the electrode provided an electrical interface. The slide was placed into a commercially available foil connector which ensured a close contact between the electrodes and the microsystem's connectors.

Double-sided adhesive tape was bonded to the top of the gold array. Slits were cut in the tape with a laser to form channels for the fluid interface between the sandwich of gold electrodes and the detection chip. A second slide was attached on top and completely covered by the silver/silver chloride layer, which acted as counter and reference electrode.

The work by the multidisciplinary CD-CHEF team successfully integrated biomolecules with solid-state micromechanical devices. The technique was applied to biotechnology and food control activities, allowing greater numbers of samples to be analysed resulting in lower costs.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: licence agreement; marketing agreement; manufacturing agreement; available for consultancy.

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Better use of sulphur for amino acid biofortification

Increasing pressure on world food supplies means that maximisation of amino acid content in food and fodder crops is becoming increasingly important. European researchers are using a combination of genomics, proteomics and traditional breeding strategies to achieve this goal.

Of the essential amino acids, methionine and lysine rank as the most limiting in fodder and vegetable crops. The EU-funded project OPTI-2 chose the high-yielding traditionally grown potato and maize crops

as models for breeding programmes to increase amino acid content.

The project team based at the University of Berne, Switzerland, focused on the bio-

chemical pathways involving sulphur metabolism. Methionine and cysteine contain sulphur, and the team of scientists therefore manipulated pathways involved in the assimilation of the element to increase content of these amino acids.

Previous research had shown that overexpression of methionine S-methyltransferase and 5-adenylylsulphate (APS) reductase in Arabidopsis caused a correlated increase in methionine content. Disappointingly, data

continued on page 13

Radiation sensitivity in human mammary tissue

Researchers have investigated the roots of genetic instability at chromosomal level in human mammary epithelial cells (HMECs) on exposure to radiation.

The telomere, as a region of repetitive DNA at the ends of chromosomes, has no transcriptional function. Ironically then, it has been found to have an equal, if not more crucial role as a protective region during cell division. Scientists have unlocked one of the secrets of the telomere as a protective agent because it can prevent the fusion of bare uncapped ends of chromosomes. This becomes particularly important when cells are exposed to radiation, which can induce chromosome breaks.

The EU-funded project Telosens aimed to further determine how cellular radiosensitivity and genetic instability were linked to telomere integrity. Project partners based at the Universitat Autònoma de Barcelona, Spain, specifically studied chromosome complements to determine the type and extent of chromosomal

rearrangements due to radiation damage in HMECs.

An extensive cytogenetic analysis was performed on HMECs from three women that had been exposed to radiation. This revealed that there were an increased number of chromosome aberrations per cell in the culture. Furthermore, the number of double strand breaks (DSBs) in the telomeres themselves increased, explaining the increased radiosensitivity of cells with decreased telomere length.

The Spanish laboratory was the first to verify directly that chromosome ends involved in fusion with those resulting from DSBs were those with dysfunctional telomeres. Another observation was that the fusion of identical replicated arms of the chromosomes, sister chromatids, was the first event to initiate genetic instability.

Shortened telomeres then can create chromosomal chaos. In a cell environment where there are normal telomeres, a broken end can only fuse with another broken end and this may involve the fusion of the original sections. In cells with shortened telomeres, there may be several uncapped ends where fusion can occur. This makes the restoration of the original much more unlikely.

Another important implication of these findings is linked to radiation use for diagnostic purposes. Telomeres tend to shorten with every cell division, a phenomenon linked with age and an individual predisposition. Moreover, as radiation can inactivate the p16 tumour suppressor gene, a reappraisal of the risks of radiation as a diagnostic tool could be useful.

Funded under the FP5 programme EAECTP C (Euratom research and training programme in the field of nuclear energy).

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 4816

Telomere maintenance curbs DNA damage

Scientists working on the EU-funded project Telosens have furthered research on the link between telomere integrity and DNA damage response mechanisms.

Telomeres are regions of repetitive DNA located at the ends of the chromosomes. When intact, the telomere protects the ends of chromosomes from sticking to other DNA and therefore plays an important role in DNA response mechanisms on damage from agents such as radiotherapy.

The consortium of partners in the EU-funded project Telosens researched with the overall goal of identifying the actual link between telomere heterogeneity and radiosensitivity. A number of mammalian genes are involved in DNA damage control as well as telomere integrity, and research has suggested that more genes may be discovered that play this dual role.

The project team based at Brunel University in the United Kingdom focused on extending their previous research into the link

between the telomere and damage limitation mechanisms. Furthermore, they specifically investigated the BRCA1 gene, the notorious tumour suppressor gene.

The BRCA1 gene helps in maintaining the genetic stability of the cell by coding for proteins that mend DNA breaks. The scientists found additional evidence to suggest that the sequence BRCA1 has a telomere capping function.

Observations were also made using primary cell lines from 11 patients that had over-responded to radiotherapy. These further supported the telomere integrity connection with mechanisms for DNA damage protection.

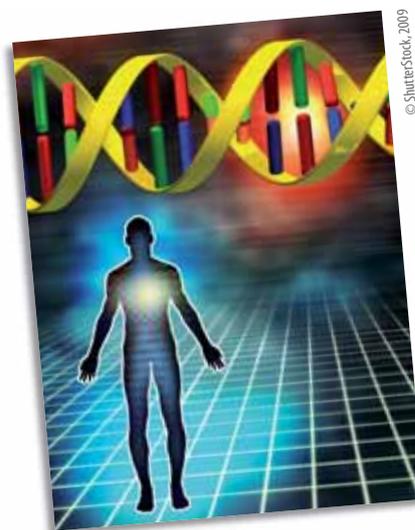
The data suggests that telomere integrity may be used as an indicator for the extent of radio-

sensitivity of an individual. The fields of radiation protection and the safe use of ionising radiation as a therapy would stand to benefit.

Funded under the FP5 programme EAECTP C (Euratom research and training programme in the field of nuclear energy).

Collaboration sought: information exchange/training.

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continued from page 12 **'Better use of sulphur for amino acid biofortification'**

from OPTI-2 showed that this was not the case overall in maize and potatoes.

However, use of transgenic lines by the Swiss team yielded more promising results. Over-expression of methionine S-methyltransferase increased the content of a derivative of methionine. The incorporation of further desirable traits in these interesting transgenic

lines was then pursued. An obvious candidate characteristic to shore up the increased methionine content was a boost in the sink strength for sulphur containing amino acids.

Animal fodder crops and production systems are not the only beneficiaries of this research. There is mounting pressure on world food supply. The rising cost of meat production,

both economically and ecologically, means that vegetarianism is an increasingly efficient way of providing dietary protein.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 5104

Seaweed potential brought to the surface

Advancements have been made towards a comprehensive seaweed database, devoted to providing a broad array of knowledge on the utilisation of seaweed from Africa's coastline.

Seaweed is a valuable renewable resource with high utilisation potential largely unknown to the general public. The possible uses of seaweed are vast, spanning the areas of aesthetics, food and pharmaceuticals, to name a few. In fact, seaweed is inconspicuously used by consumers on a regular basis in the form of convenience foods and domestic commodities, such as toothpaste. In spite of this, there had previously been no efficient means of keeping abreast with the seaweed industry's latest evolutions.

Under the auspices of the SeaweedAfrica project, a seaweed database which expanded on AlgaeBase was developed. AlgaeBase is a database of information on algae that includes terrestrial, marine and freshwater organisms. The SeaweedAfrica database

collated the numerous records which were previously published in specialised journals, thus making them more readily available. It provided a realm in which knowledge regarding the high biodiversity of seaweed in African coasts could be expanded.

This development is of paramount importance since Africa had not witnessed key developments in the seaweed industry, apart from the countries of Mozambique, Tanzania and South Africa, despite the continent's vast coastline. In effect, local knowledge about seaweed had been quite scarce regardless of the enormous potential which exists.

The seaweed database includes a broad scope of information spanning ecological, commercial and technological data. Furthermore,



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checklists were created for seaweed found in the coasts of Kenya, Namibia and South Africa. These checklists offer background information on each country and its coastal environment. This should prove useful for the advancement of the seaweed industry.

Funded under the FP5 programme 'INCO 2' (Confirming the international role of Community research).

Collaboration sought: information exchange/training.

<http://cordis.europa.eu/marketplace> > search > offers > 5017

Reversible male sterility in crops

Genetic modification of crops can produce vastly improved yield in increasingly disease-free crops. Researchers have developed breeding protocols which avoid the possible release of transgenic pollen into the environment, as a result of deliberate genetic manipulation.

The overall aim of the plant breeder is to produce uniform crossbred crops with high-throughput hybrid seed production, without having to resort to emasculation of the plant. Parental homozygosity ensures the homogeneity of the variety and this can be achieved by doubled haploid technology to avoid repeated self-pollination.

The aim of the EU-funded project Hybtech was basically two-fold. First, to induce reversible male sterility and second, to develop a system of doubled haploid plants. The consortium had to devise a protocol that encompassed the two goals which are normally incompatible in most plants.

Male sterility was induced by depleting one of the enzymes necessary for complete development of the mature microspore.

One of the critical enzymes turned out to be glutamine synthase, which could then be replaced by spraying crops when male fertility was required.

As part of the research to induce male sterility, it was essential to study multiple metabolites, as up- or down-regulation of any enzyme can cause modifications in the production of other metabolites in the pathways. The team based at the Max-Planck-Institut für Molekulare Pflanzenphysiologie in Germany modified the technique of metabolic profiling for each sample matrix. Consequently, the scientists could take a broad look at the effects of metabolic manipulation.

To speed up the breeding procedure and to produce total homozygosity, the project

scientists necessarily took each crop in turn. Tobacco responded well in trials and all lines of male sterile plants and doubled homozygous progeny were obtained. Rice, chicory and tomato presented various problems. Although male sterile plants were obtained through metabolic starvation, problems with the phenotype in later generations or in the vegetative phase were encountered.

The technology developed has delivered several important benefits to the plant breeding industry. The protocols are rapid and high-throughput. Hybrids possess the necessary high yield and quality. Moreover, the methods are protective of the environment by preventing the release of transgenic pollen, where its effects may be detrimental to ecosystem balance.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: information exchange/training.

<http://cordis.europa.eu/marketplace> > search > offers > 5100

Controlling late blight with resistant potatoes

Farmers of organic potatoes have traditionally used copper-based fungicides to combat the late blight potato pathogen (Phytophthora infestans). The limitation or elimination of these fungicides, in order to improve environmental and food safety, means that new strategies are required to combat the disease.

Potatoes are an important cash crop for organic farmers throughout the EU, and the disease potato late blight can result in serious economic losses. Therefore, a ban

on copper-based fungicides would result in greater losses for farmers, unless alternative ways of combating blight can be developed. The Blight-mop project developed

improved, commercially viable organic production systems which can manage potato blight without resorting to copper fungicides. The aim of the project was to maintain the same quality and crop yield as obtained with the use of these fungicides.

Researchers noted that resistant varieties of potatoes consistently achieved the most

continued on page 15

Keeping deadly bacteria off the dinner plate

Mad cow disease and other similar epidemics have made the public increasingly conscious of the threat of disease transmission through the food chain. In response, research was aimed at reducing the risk of other unwanted bacteria finding their way to the dinner table.



Mycobacterium avium subspecies *paratuberculosis* (Map) is responsible for significant livestock losses across Europe. More recently, it has come to light that Map has spread to non-ruminant species. The EU-funded 'PARA-TB transmission' project, which investigated Map in nearly 15 different types of animals, could not have come at a more opportune time.

Infectious disease experts with the Moredun Research Institute (MRI), United Kingdom, took part in the research. They performed a genetic analysis of Map samples obtained from the different species in a variety of locations. Methods including amplified fragment length polymorphism (AFLP),

restriction fragment length polymorphism followed by hybridisation to IS900 (IS900-RFLP) and pulsed-field gel electrophoresis (PFGE) were employed. The result was a collection of well over 200 isolates.

MRI subsequently analysed the isolates in relation to the geographic origin and type of species from which the Map was taken. While some isolates were in fact associated with one particular animal, the MRI scientists were unable to establish the existence of any species-specific strains of Map.

On the other hand, the discovery of similar types of Map in different species suggested the

potential for transmission between species. Furthermore, common genetic material was also detected in the Map of up to four different types of animals hailing from the same region. However, MRI advocates further research before any definitive conclusions can be drawn.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 5035

Intercropping peas and barley to reduce weed growth

Intercropping, where two or more crops are grown at the same time on the same land, is an environmentally friendly way of improving crop production in organic farming systems. The ability of this technique to control weeds and prevent nitrogen loss was investigated through experiments carried out in four European countries.

European farmers have expressed a growing interest in sustainable agriculture and



organic farming. However, the production of organic cereals and protein crops, such as peas and beans, need to be increased in order to keep up with growing consumer demand. Therefore, researchers investigated farming techniques which increased production without compromising the principles of organic agriculture. They found that larger harvests could be achieved by intercropping legumes with cereals, which provided an efficient means of reducing weeds based on simple ecological principles.

The Intercrop project carried out experiments to investigate the use of intercropping and its associated benefits. Researchers grew

barley and pea crops both together and separately, and studied their impact on the species of weeds found and their biomass. The results showed that intercrops and barley grown alone were better at reducing weeds than peas grown alone. Furthermore, barley and peas grown together and barley grown separately were more efficient at accumulating biomass and taking up soil nitrogen than peas grown separately. This greater efficiency was responsible for the crops' increased competitiveness against weeds.

Therefore, it appears that intercropping pea and barley crops is a highly effective method for reducing weed infestation, which can be successfully applied to organic farming. This technique also removes the need for mechanical weeding and further weeding operations.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 5040

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effective control of blight on foliage and tubers, in contrast to diversification and agronomic strategies. Resistant varieties also gave better results than alternative treatments to copper-based fungicides. Although resistant varieties did not always provide higher yields than susceptible ones, they did reduce the level of disease and the risk of infection within and between crops.

Application of copper oxychloride to both susceptible and resistant potatoes resulted in

a slight improvement in blight control and crop yield in the most resistant varieties. It appeared, therefore, that cultivation of resistant varieties was the most effective way to reduce or eliminate altogether the need for copper based-fungicides in organic agriculture.

The Blight-mop team concluded that applications of copper-based fungicides could be reduced by around 16.5 to 50 % of current levels. This can be achieved by growing

the maximum amount of resistant varieties that the market can bear. However, this can only be realised if the resistant varieties are acceptable to the organic market and more popular susceptible varieties replaced without incurring economic losses.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 5029

Genetics combats rust in *Vicia faba* bean

The precise histology and biochemistry of faba bean rust has been characterised by the EU-funded project Eufaba, to identify sources of resistance.

There is a gap in European agriculture for a candidate to fill the niche for high-protein fodder crop. Currently, the faba bean fills that role but to a limited extent. Unfortunately, the bean is lacking yield characteristics, nutritional value and is susceptible to a host of diseases and insect predators.

Top plant breeders throughout Europe, with the help of trials in northern Africa, formed a consortium to improve the genotype of the faba bean. Traits such as yield, digestibility, nutrition and resistance to abiotic pressures and disease could then be increased. In particular, resistance to rust was investigated.

Resistance to pathogens can be broadly characterised according to physical and biochemical parameters. To help classify resistance mechanisms, partners from

the Consejo Superior de Investigaciones Científicas (CSIC) in Córdoba, Spain outlined the infection process of the airborne rust fungus in a series of distinct steps. These range from spore deposition and germination, right through to their formation and release.

Types of resistance with a physical basis that were found to give genotypic variation large enough to warrant incorporation into breeding programmes were rare. Failed stomatal penetration showed sufficient variation for possible inclusion as a trait for selection.

Biochemical profiles were compiled using thin-layer and high-performance liquid chromatography. Interestingly, the analyses unearthed three previously unidentified fluorescent phenolic compounds in resistant lines. These show promise for use as

markers for the isolation of resistant lines in large groups.

On another level, two forms of incomplete resistance were both characterised by an increased period of latency, small colony size and decreased infection rate. On a molecular level, concentrations of phenols and peroxidases were monitored when resistance was encountered. The data suggests that these two groups of compounds may be an active component of pathways involved in resistance.

Successful breeding programmes for the faba bean to improve the yield and resistance to biotic and abiotic factors stand to benefit the agricultural sector globally. Not only is it a plant protein source, but *Vicia faba* is a leguminous crop with obvious advantages for nitrogen application.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: information exchange/training.

<http://cordis.europa.eu/marketplace> > search > offers > 4851

Screening faba bean for *Ascochyta fabae* resistance

*Scientists studied different methods for screening faba bean (*Vicia faba*) for resistance to the plant pathogen *Ascochyta fabae* (*A. fabae*). The aim was to provide tools for developing genotypic resistance in faba beans, in order to turn it into the ideal candidate for sustainable agriculture.*

Researchers from the Eufaba project carried out field evaluations which involved screening faba bean germplasm against the plant pathogen *A. fabae*. The field trials were inoculated either by spraying the plants with a conidial suspension of *A. fabae*, or through spreading infected barley seeds or debris during sowing. A suitable susceptible control was employed throughout the trial. Young plants were initially assessed when the fourth and fifth leaves were completely expanded. The plants were assessed a second time during flowering, and once more as mature pod-bearing plants.

The Eufaba team used a number of scales, including a disease severity scale (DS) based on the percentage of the whole plant which displayed signs of the disease. The qualitative infection type (IT) scale was based on the size of lesions and the presence or absence of pycnidia, the fruiting bodies of mitosporic fungi. However, although the IT scale was quick to use, it was considered unsuitable for use in the field when few lesions were present that could not be found easily. Possible underestimation of rate-reducing resistance types could result in a low DS score, where the few lesions visible were well developed. Although unsuitable

for field trials, the IT scale was considered suitable for growth chamber studies when supported with DS ratings.

Researchers also used the disease scoring system recommended by the International Center for Agricultural Research in the Dry Areas (Icarda), which is on a scale of 0–9. It combines lesion type, lesion frequency and extent of damage and was more complete than using the IT scale on its own. The Icarda system was also quick to use, which was a major consideration when examining large-scale breeding programmes. The end-users of this research are faba bean breeders and producers, and the animal feed industry.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support; joint venture agreement; information exchange/training; available for consultancy.

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Measuring otoliths for behaviour patterns

In order to understand whether the policies governing fisheries and their management principles are working, it has become imperative to understand the factors causing changes in fish behaviour. To do so, the EU-funded project Codssey has investigated the horizontal and vertical dynamics of the cod and related the data to the management and impact of fishing activities.

The otolith is a small particle comprised mostly of calcium carbonate that is found in the inner ear of vertebrates. Its function is primarily related to that of balance. However,

Codssey scientists studied the otolith of cod to determine whether structural changes to it can be used to identify and understand behavioural changes indicated in data collected by

data storage tags (DSTs). DSTs are used to collect specific information such as water temperature, depth, salinity and even angle.

To determine whether or not microstructure changes in the otolith are responsible or are involved in behaviour changes, data was extrapolated from DSTs. The data was qualified and quantified to determine the frequency and timing of behavioural phases.

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Identifying population structures in herring stocks

Fishery experts studied the composition of shoals of Atlantic herring (Clupea harengus). The aim of the investigation was to develop the scientific basis for sustainable fisheries and preserve local herring populations.

The misidentification of population structures within herring stocks can result in overexploitation through depletion of spawning fish. A reduction in the breeding population also has a negative effect on the genetic diversity within the population. This problem has been addressed by the EU-funded Hergen project. Researchers have been able to draw up guidelines for the sustainable management of herring fisheries by identifying different populations of the fish. The team also quantified relative stock contributions to the fishery.

Catches of herring are often made up of individuals originating from different populations. Scientists from the Hergen project obtained microsatellite DNA from samples collected at spawning sites and from mixed stocks. This was then used to estimate relative populations in mixed aggregations of herring in the northern part of the North

Sea, and from the Skagerrak. Researchers developed a tool for determining the composition of mixed herring stocks through the application of a Bayesian mixed-stock analysis algorithm.

Analytical methods developed by the Hergen project enabled scientists to clearly identify previously unknown patterns of migration for mixed aggregation of herring in the Skagerrak. Herring sampled in the northern North Sea were found to originate in the western North Sea and the English Channel. Sampling in the Skagerrak showed considerable mixing of herring originating from the North Sea, Skagerrak, inner Danish waters and the western Baltic.



The statistical power of the analysis used by the research team was high. Therefore, this method represented a powerful new tool for assessing fisheries. Techniques developed by the Hergen group for the analysis of mixed stocks can also be applied to the management of other exploited species.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support; information exchange/training; available for consultancy.

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Individual-based modelling of stocks of Atlantic cod

Research during the EU-funded Codyssey project demonstrated the usefulness of behavioural models for studying the migration of fish stocks.

Decline in stocks of Atlantic cod (*Gadus morhua*) in recent years has highlighted the need for sustainable management of this important marine resource. The Codyssey project aimed to improve knowledge concerning the impact of environmental factors on the movement of cod stocks.

Modelling work was carried out by the Centre for the Environment, Fisheries and Aquaculture Science (CEFAS) in the United Kingdom, a member of the Codyssey consortium. CEFAS employed individual-based models (IBMs), which simulate the effect of individual behaviour on the greater population.

During Codyssey, two distinct IBMs were developed. The North Sea IBM, which included comprehensive data for seabed temperature, was used to investigate the influence of temperature on cod migration throughout an entire season. Conversely, the Baltic Sea IBM helped CEFAS better understand the role of oxygen availability in determining spawning location.

CEFAS concluded that while IBMs may not yet produce highly accurate forecasts of the distribution of cod stocks in space and time, they can provide important insight into cod behaviour. For instance, CEFAS learned which of the simple behavioural rules had the most impact on the behaviour of the population as a whole. This development will help reshape and validate behavioural theory.

It was also remarkable that relatively simple behavioural rules could lead to such complex distributions. Future research by CEFAS will focus on improving the IBMs to the point where the impact of climate change and other external environmental factors can be properly modelled.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 4950



continued from page 16 **'Measuring otoliths for behaviour patterns'**

Experiments with adult cod to parameterise the effects of temperature, age and size were conducted, using comparisons also taken from the long-term natural otolith signals.

A predictive model was developed to determine how signature behaviour might influence otolith growth at the macrostructural

level. This model was applied to DST-tagged individuals in both the Baltic and North Seas. It was found, however, that no correlations between otolith structure on the microstructural scale with cod behaviour could be made to identify consistent patterns within ecosystems. However, major biological forces were identified to

have a strong influence on otolith macrostructure between ecosystems.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

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Electronic medicine, without borders?

Disease knows no borders and now researchers in Europe and the Mediterranean shoreline are using electronic infrastructures (e-infrastructures) to coordinate and cooperate internationally.

Disease knows no borders. With migration, mixing populations and globalisation, genetic disorders, too, spread and blend easily. In each country where particular diseases emerge, national authorities deploy resources to track, treat and research common diseases.

This is helpful, and often very successful, but tends to duplicate efforts internationally many times over. Moreover, researchers working in one country may not be in touch with those in another, where their knowledge could be invaluable.

European and Mediterranean specialists working on the Ithanel project have increased coordination of their efforts and pooled their knowledge using e-infrastructures such as different communication tools, databases, grids and web portals. This type of knowledge sharing is fertile ground for enriching the internet, but still remains one of the least explored and developed functions.

Of course, knowledge networks of one type or another proliferate on the web, but specialised networks, gathered around one specific problem, are still comparatively rare.

Ithanel hopes to change that. By focusing their efforts on one group of blood disorders, the thalassaemias, the EU-funded project gathered experts from many countries where the disorder is common — in particular among populations surrounding the Mediterranean.

As such, Ithanel provides the basis for future collaboration on inherited anaemia, more generally, and could serve as a model for international coordination and cooperation on other diseases.

‘Haemoglobin disorders are common, potentially lethal, diseases posing a global health challenge,’ explains Carsten Lederer, a researcher with the Ithanel project. ‘With global migration and intermixing of carriers, demanding flexible health planning and patient care, haemoglobinopathies may serve as a paradigm for the use of electronic infrastructure tools in the collection of data, dissemination of knowledge, harmonisation of treatment and coordination of research,’ he notes.

Like sickle-cell disease, thalassaemia’s most common symptom is anaemia, but there is also a list of devastating secondary complications. In its most severe form, untreated thalassaemia leads to death in the first decade of life. When managed, thalassaemia still interferes enormously with a person’s quality of life, limiting the person’s activities and requiring frequent blood transfusions and other expensive, life-long treatment. ‘Even with the best of care, it still leads to a shorter life-span,’ says Lederer.

Ithanel involved specialists from 26 organisations spread across 16 countries, including Egypt, Israel, Lebanon, Tunisia and Turkey, making it a truly Mediterranean effort. ‘The problem is, many of these experts are still very unfamiliar with computer tech-

nology. Some researchers had no e-mail of their own. In other cases, there is little or no electronic infrastructure, and most patient records are still on paper,’ declares Mr Lederer.

But the project found that there were enormous potential benefits to be had from linking these experts up. Each had invaluable knowledge and experience, which is vital.

Thalassaemia is a complex disease which requires two out of a set of multiple genes to be defective. If only one of the genes is broken, you are a carrier, if two are broken, then you have the disease. ‘If parents each carry the disease, then there is a one-in-four chance that the child suffers from [the disease]. And there are degrees, too, depending on the type of broken gene each carrier has,’ notes Mr Lederer.

As a result, there is a multitude of possible phenotypes, of widely varying degrees of severity. ‘Chances are, one of the experts in one of the countries where this disease is common has experience with a particular combination of defects,’ argues Mr Lederer. ‘The problem is, it is probably just written down in some notebook somewhere.’

Ithanel sought to bring all that ‘hidden’ knowledge to light, to educate researchers about e-infrastructures and encourage the development and deployment of appropriate tools and technology.

The potential for the internet and allied technologies to unlock undreamed-of knowledge and experience that already exists is enormous, but the challenges are considerable, too. ‘Initially, we wanted to use an excellent, open source platform for our primary network, and for videoconferencing, but it required some technical knowledge and setting up at each site [but without the right IT support] it was not practicable,’ recalls Mr Lederer.

So they moved to a proprietary, more expensive videoconferencing solution, which partially tackled the bandwidth issues. Bandwidth on the server side (at source) was fine, but bandwidth at the destination needed to be improved.

The team also set up courses and seminars using live webcasts and streaming video, where participants could pose questions in real time, during the live sessions, or via a blog after the streaming sessions. These were more successful.

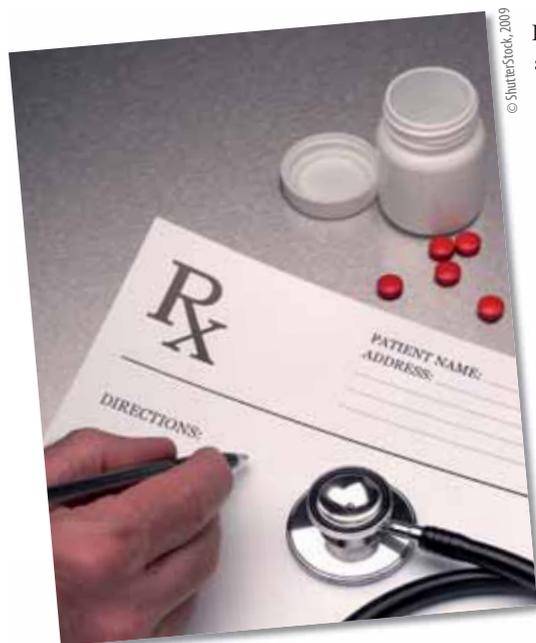
The team also set up the Ithanel portal for the central collection of data and easier commu-



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Analysing chronic disease health care cost

A vast study was conducted in order to assess health care costs of chronic diseases such as inflammatory bowel disease (IBD).



IBD is a chronic non-fatal disease significant in the field of gastroenterology. The EU-funded IBDT2K project conducted a study aimed at health care in this field, with a complete analysis of crucial aspects involved in long-term disease outcome.

The work canvassed a broad European patient group able to account for therapeutic, social and environmental changes which occur and are a continual influence on outcomes. This effort exemplifies that regular updating is necessary for all chronic non-fatal conditions, which is an important message for the medical community as well as society at large.

A significant portion of this study was devoted to an economic analysis of chronic diseases on an international level, in order to properly plan and distribute health care resources. The scope extended to the cost of treatment of IBD, as it is a lifetime illness having significant morbidity.

Data were obtained from studying over 1 000 patients in 8 European countries and Israel over the course of 10 years. Various important results were obtained from the study. Overall, it was found that medical and surgical hospitalisations combined accounted for the most expensive resources. Furthermore, age at diagnosis and sex did not impinge on costs; rather it was country, diagnosis and follow-up year which increased costs.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

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nication of breaking news and events about the disease, and that remains live today. The forums, in particular, were very popular and led to many fruitful exchanges about particular, or very rare, cases of the disease.

Finally, in a continuation of the Ithanel project, a wiki and database have been set up which, over time, will integrate all the data, terminology, protocols and guidelines to identify and treat particular instances of thalassaemias.

'We really learned a lot during the project,' Mr Lederer relates. '[One time] we got all the experts together to discuss the way forward, and talk quickly went from e-infrastructure to all sorts of different research projects they could set up.'

That sort of face-to-face exchange and networking is important, suggests Mr Lederer, but it would not have been possible without the virtual interaction made possible by Ithanel, stimulating the use of available and emerging e-infrastructure technologies.

The enthusiasm of the participants demonstrated that there is a need and a real value in providing exactly the kinds of infrastructure that Ithanel developed. It underlined the value of a 'networked expertise' paradigm, where the most learned in a particular topic hold a global conversation from wherever they are located in the world.

The Ithanel project was a pioneering and ambitious attempt to put that paradigm into

practical use for a relatively obscure disease in very challenging circumstances, where often the fundamental infrastructure and familiarity with technology is missing.

But its success demonstrated that these types of networks have enormous potential. Ithanel's work could be applied not only to any haemoglobinopathy, but to any disease. It is even a potential early start towards cheaper, very large-scale epidemiological studies.

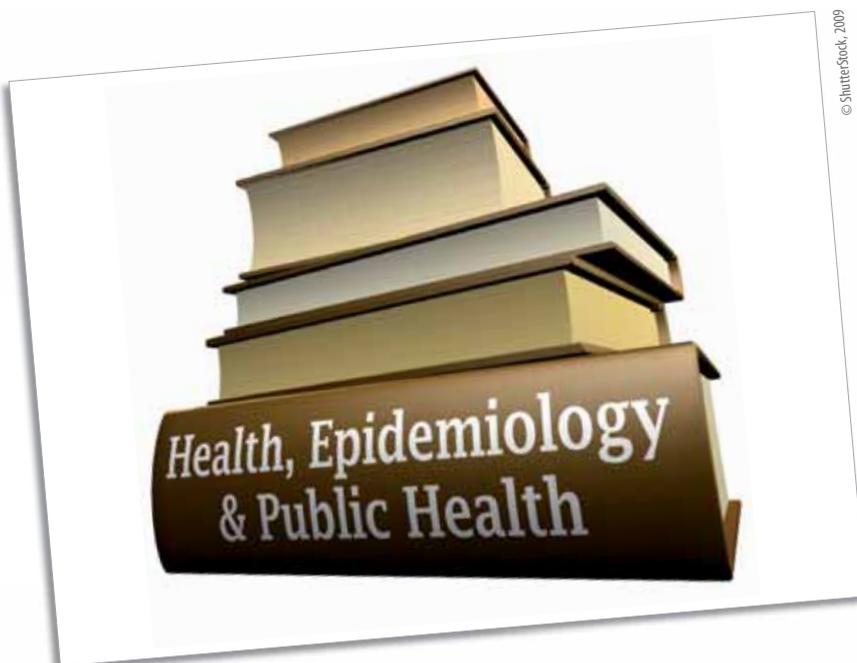
Epidemiological studies are invaluable, but they are enormously expensive to run and require huge cohorts to reveal real trends.

Ultimately, projects like Ithanel could be the precursor to population-wide epidemiological studies using digital patient records, case notes and research.

Ithanel developed and executed a very ambitious programme and learned many of the fundamental lessons. In the process, it offered a tantalising glimpse of a very compelling future.

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<http://cordis.europa.eu/ictresults/index.cfm?section=news&tpl=article&ID=90819>



Dry chemistry concept for speedy automated toxin assay

Intensive rearing methods in the agricultural sector can lead to the build-up of toxic residues in food. In response to this, researchers have devised a simple, high-throughput, fully automated assay to detect the presence of coccidiostats in poultry products.

Coccidiostat residues that can occur in poultry products are cause for concern. Almost all commercially reared chickens have been dosed for protozoal infection with coccidiostats throughout their lives. Consequently, there may be toxic residues in meat and eggs that the consumer may be totally unaware of. European regulations governing safety within the food chain from the 'field to the fork' incorporate monitoring of food residues by the National Reference Laboratories (NRLs).

However, previous to this research spearheaded by the EU-funded project Poultry-check, lack of appropriate methods hampered the enforcement of residue control directives. As part of the research to correct

this situation, the consortium team at the University of Turku in Finland developed a screening assay based on immunochemistry and time-resolved fluorometry.

The test was aimed originally at screening for three of the main coccidiostats in use in the industry. A superior level of accuracy is possible due to the use of highly specific polyclonal antibodies. Assay time is very rapid at 18 minutes per sample, due to the use of an all-in-one dry chemistry immunoassay.

All reagents in dry form are contained in microtitration wells. The immuno-assay is one-step and is extremely simple for the end-user as all that is required is addition of the

sample. Furthermore, the dry chemistry concept also allows automation of the protocol with the addition of an immunoanalyser.

The new time-resolved fluorescence label technology employs intrinsically fluorescent lanthanide chelates that provide a highly sensitive assay with chemical stability, also suitable for automation. Furthermore, lack of background fluorescence means the signal can be measured directly from the solid phase surface, without the need for any signal enhancement.

The assays have been validated according to a related European Commission decision and promise the accuracy, speed and simplicity demanded for detection of toxic agents throughout the food chain. An added advantage is that the basic assay design can be adapted for use with other toxic residues.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 5103

Keeping toxins out of Europe's wines

Research in vineyards across Europe has provided important insight into how to protect grapes against possible contamination by a well-known toxin.

Europe's wine industry is world renowned. However, the grapes upon which it relies can be compromised by ochratoxin A (OTA), a toxin produced by fungi. Significant funding was allocated to perform an OTA risk assessment in European vineyards.

The EU-funded project, entitled 'Wine-ochra risk', was coordinated by the Catholic University of the Sacred Heart in Italy. Further to extensive experimentation during the course of the project, important discoveries were made with respect to optimal sampling methodologies.

For instance, it was determined that a sampling design in the shape of the letter X was most appropriate for fields of vines. This technique was applied to gather grape samples from two different vineyards suffering from known levels of OTA contamination. The subsequent analysis revealed significant variability not only between plants, but also between bunches of grapes on the same plant. Interestingly, no relationship could be established between OTA content and the position of the grape on the plant.

In the case of grape must, the scientists with the Catholic University of the Sacred Heart recommend sampling one bunch from a

specific location on each plant. Furthermore, it was demonstrated that variability can be decreased by increasing the number of bunches and plants sampled.

Finally, it was concluded that the 'Wine-ochra risk' sampling protocol was capable of providing an accurate estimate of the true OTA content of grapes on the vine and grape must. Importantly, this applies to OTA concentrations in the range of European limit values. When necessary, corrective actions have been suggested in cases of possible overestimation.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 5049

'Waste not, want not' in the olive industry

Olive production can be made even more sustainable by detoxifying the mill waste. Researchers have investigated both biotic and abiotic methods to achieve this worthy economic and environmental goal.

Food processing usually presents an environmental cost and the Mediterranean olive industry is no exception. Olive mill wastewater (OMW) is a significant pollutant in both waterways and on land due to the presence of phenolic compounds. Ironically, phenols are produced by plants as their defence against pathogens, but they can therefore affect the delicate balance of microbiota of soils and water.

Composed of partner countries that produce the olive crop, the EU-funded project NewtechOMW aimed to develop new technologies to minimise the phenol content of OMW. The team of scientists based at the University of Naples Federico II in Italy have been particularly active in their research endeavours on olive waste. One of their research packages involved the investigation of the

action of different biological and abiotic catalysts on OMW.

A commercial enzyme laccase and the strong oxidative catalyst birnessite were compared for their remedial action. Germination tests on tomato and garden pepperwort seeds showed that laccase was more effective at reducing phenol content in whole OMW than in concentrated extract of the waste. Further exploration showed this differential effect was dependent on the type of laccase and the phenol present.

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Enzyme production success in *Streptomyces lividans*

The economic importance of commercially valuable proteins by microbes cannot be overstated. Researchers have developed and tested a new cloning vector for, and successfully extracted, a xyloglucanase in Streptomyces lividans (S. lividans).

The overall aim of the EU-funded Gemini project was to develop gene vectors and screen for suitable host organisms for production of proteins for the pharmaceutical and biotechnology industries.

Xyloglucans are members of a group of polysaccharides known as hemicelluloses. The breakdown of xyloglucans by the appropriate enzyme xyloglucanase lends itself to key industrial processes, such as the production of alcohol from plant sources and cleaning processes in laundry.

Project partners at the Katholieke Universiteit Leuven in Belgium therefore focused

their research expertise on finding a suitable cloning vector for xyloglucanase. The team investigated a cloning vector pSSV05 developed previously by project partners.

To achieve a measure of the vector's ability, they inserted into *S. lividans* a cassette comprising appropriate signal and promoter sequences fused in complementary DNA encoding a tumour necrosis factor (TNF). The production of TNF compared favourably with another plasmid commonly used in biosynthesis.

Failure of production expectations in hosts is a common phenomenon. Trials using

bacteria *Escherichia coli* and *Bacillus* were abandoned for this reason and xyloglucanase production in *S. lividans* was assessed. Two constructs containing the gene for xyloglucanase and promoter sequences in different positions were tested. Assays using enzymatic activity tests proved the presence of xyloglucanase in the extracellular environment.

The effectiveness of the novel cloning vector and *S. lividans* as a host to produce the enzyme xyloglucanase has important implications. Production of ethanol as a biofuel has obvious advantages over petrochemical fuels. An energy-saving cleaning enzyme stands to reduce the carbon debt even further.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support; information exchange/training.

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New biomarkers for endocrine disruptor chemicals

New, fast testing techniques for determining levels of endocrine disrupting chemicals (EDCs) in the aquatic environment were developed. Biologists used a model organism to study the effects of environmental exposure to four hormonally active agents and to develop new biomarkers for them.

The African clawed frog (*Xenopus laevis*, *X. laevis*) is often used as a model organism for achieving a greater understanding of a range of biological phenomena. Insights gained from working with *X. laevis* can then be applied to other organisms.

Scientists from the EU-funded Easyring project used the frog to study the effect of EDCs in aquatic organisms and to develop suitable biomarkers. The endocrine systems of different animals, including humans, can be affected by EDCs, reducing their ability to successfully develop and reproduce.

The Easyring consortium investigated potential biomarkers for EDCs, which can be used to determine the threat posed by these chemicals in the environment. Researchers

from the Institute of Freshwater Ecology and Inland Fisheries in Berlin, Germany, studied messenger ribonucleic acid (mRNA) expression for three carrier molecules in the liver of *X. laevis*. The compounds were retinol binding protein (RBP), transthyretin (TTR) and transferrin (TF).

The researchers exposed the frogs to oestrogenic and androgenic compounds, as well as two substances that inhibit the action of oestrogens and androgens, respectively. They were left for four days in water containing the different

compounds, all at an extremely low concentration and in water taken from the river Lambro in Lombardy, northern Italy.

The results showed that RBP and TTR were suitable to act as biomarkers for oestrogenic compounds, whereas TF could be used as a biomarker for antioestrogens.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: information exchange/training.

<http://cordis.europa.eu/marketplace> > search > offers > 5058



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Overall, however, the inorganic catalyst was better at transforming phenols and removing antibacterial activity. Phytotoxicity was reduced but not removed completely by either type of catalyst.

As with any complex waste processing treatment, the remedies are usually far from straightforward. The level of phytotoxicity recorded depended on the seed type used.

The data also suggested that compounds other than phenols in the mixture may be responsible for the phytotoxicity.

Nevertheless, the data collected by the team has shown that toxicity of OMW can be reduced using catalytic agents. Olive products are gaining in popularity and the industry is valuable in southern Europe. The successful detoxification of olive waste and

subsequent use of the residue for fertigation stands to enhance conditions in rural communities.

Funded under the FP5 programme 'INCO 2' (Confirming the international role of Community research).

Collaboration sought: further research or development support.

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Human biomonitoring report focused on Europe

Developing coherent research methods for human biomonitoring (HBM) in Europe is an integral part of the 'European environment and health action plan 2004-2010'. In line with this plan, a report has been produced which focuses on the utility and sensitivity of biomarkers.

In the framework of action 3 of the EU environment and health action plan, the European Commission committed itself to encouraging closer cooperation with EU Member States in order to develop a coherent approach to HBM in Europe.



Within this context, HBM refers to 'monitoring activities in human beings, using biomarkers that focus on environmental exposures, diseases and/or disorders and genetic susceptibility, and their potential relationships'.

The EU-funded ESBIO project, in line with action 3, aimed at developing a coordinated approach in HBM with the particular focus of children in Europe. The research set out to achieve a variety of aims which would target specific deficiencies in HBM research. These targets included creating an updated and extended inventory of HBM activities and databases, preparing guidelines for ethical practices and communication, and conducting an assessment of

socioeconomic consequences and costs of various alternatives.

One part of the research culminated in the production of a report focusing on the utility and sensitivity of biomarkers. The report is divided into two parts. The first part contains data on existing HBM systems and reference values, information on inter-laboratory quality assurance systems and reference materials. The second part of the report includes background information on the biomarkers of exposure to substances considered priority for HBM in Europe. For all the substances which were discussed in the report, validated analytical methods, external quality assurance systems and reference materials were made available.

Funded under the FP6 cross-cutting activity 'Research for policy support'.

Collaboration sought: information exchange/training.

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Improving therapies for stroke patients

Enabling people to cope better with disability can dramatically increase the quality of life of those affected. This is especially the case with stroke patients, for whom physiotherapy and occupational therapy are consistently used in the rehabilitative process.

The EU-funded Cerise project was a longitudinal study which examined the pattern of recovery after stroke in four rehabilitation centres across Europe and over a time frame spanning 12 months after the stroke. The services offering optimal therapy were analysed and ways of improving rehabilitation services for stroke patients were identified.

As part of the study, the content of physiotherapy and occupational therapy services across the four stroke rehabilitation centres was assessed for consistency. Fifteen physiotherapy and occupational therapy sessions were videotaped. The purpose of this was to use the material to measure the frequency with which certain therapeutic meth-

ods were used in the sessions. There were 12 predefined categories. A modelling strategy was used to aggregate the results and odds ratios were produced.

The results showed that there was a clear demarcation of roles between the two professions, and that the content of each of the therapeutic disciplines was consistent across the four centres.

Comparisons showed that in physiotherapy sessions, there was more frequent use of ambulatory training, exercises for balance, and standing and lying down as part of the patients' therapy. In the occupational therapy

sessions however, there was more frequent incidence of activities relating to domestic and leisure activities as well as sensory, perception and cognitive training.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support; joint venture agreement; information exchange/training; private-public partnership.

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Early B12 deficiency diagnosis for healthy minds later

Psychiatric morbidity is a distressing and debilitating condition for sufferers and can be caused by deficiency of vitamin B12, particularly in the elderly but also in vegetarians. A research team has analysed the use of a test capable of predicting with accuracy the need for therapy for B12 deficiency.

Nutrient deficiency and its influence on mental health is an issue which is under-researched. This gap in the research market prompted the EU-funded project 'HoloTC early B12 MA' to examine the relationship

between B12 deficiency and the onset of dementia and depression in the elderly.

The project as a whole surmised that psychiatric morbidity, which can be associated

with vitamin B12 deficiency, costs the EU millions a year in care. Yet early treatment has been found to be both effective and inexpensive. The problem arises because identifying those needing therapy is difficult due to the lack of tests which provide diagnostic accuracy.

The research team therefore assessed a test capable of measuring holotranscobalamin (holoTC, transcobalamin bound to vitamin B12). HoloTC has been found to be a sensi-

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New ways to assess early prediction of psychosis

A novel measure for assessing the predictability for the transition to psychosis has been developed.

In situations where early psychosis is left as an untreated illness for an extended period of time, a long-term individual, social and economic burden often presents itself. An intensive effort for early recognition accompanied by intervention is therefore the best measure to take in breaking this cycle.

Being the first five-country collaborative multicentre study concerned with the aim of intervention and recognition in psychotic disorders, the EU-funded EPOS project has done just that. More specifically, it was designed to predict the transition to psychosis and the course of psychopathology and disability in persons with an increased risk of schizophrenia.

The study was comprised of a multilevel assessment which involved psychopathology, neurocognition and brain imaging. The outcome was recorded at the stages of 9 and 18 months in order to determine risk level.

Furthermore, EPOS examined pathways as well as obstructions in order to account for delays in proper treatment.

The Bonn Scale for the Assessment of Basic Symptoms — Prediction List (BSABS-P) developed at the University of Cologne, Germany, was employed. It is capable of assessing the self-experienced cognitive, perceptual and motor disturbances that are predictive in terms of transition to psychosis. Possible end-users include psychiatric, psychological or public health investigators involved with early psychosis. The most beneficial aspect of the BSABS-P is that it offers a means for early recognition of a prodromal phase of psychoses.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support; information exchange/training; available for consultancy.

<http://cordis.europa.eu/marketplace> > search > offers > 5032



Good measures for coercive psychiatric treatment

A European case study gathered data on coercive means of psychiatric treatment, in order to comprise a best-practice approach for patient care.

Coercive means of psychiatric treatment involve involuntary admission, detention after voluntary admission, mechanical restraint, seclusion and forced medication. Such measures vary vastly across different European countries in terms of rate of occurrence, type and legal conditions. The gaps in such differences bring to light the possibility of infringing on patient rights as well as not following the best practices.

In light of this, the EU-funded Eunomia project conducted a case study using a naturalistic approach which spanned 12 European regions in 12 countries. Data was gathered on coercive practices, their influences and results. A qualitative methodology consisting of two feedback loops with all the

centres was put into effect. In this way, common clinical standards for the coercive treatment measures could be recommended.

A range of important issues aiming to improve the quality of procedures for the benefit of the patient were addressed by the recommendations. For example, the recommendations for involuntary hospital admission included preconditions, the professionals/persons addressed, ethical issues and practical issues referring to procedures as well as to other persons. The hope was to

gather up best clinical practices of coercive psychiatric treatment, in order to widely distribute the information.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 5090



continued from page 22 'Early B12 deficiency diagnosis for healthy minds later'

tive marker of early B12 deficiency. Therefore, a low cost test to detect this protein, the holoTC assay, could act as an early warning detection system.

In order to achieve this result, one part of the consortium focused solely on utility of

the holoTC test. Scientists tested individuals for B12 deficiency and identified the superiority of holoTC in comparison to plasma vitamin B12 measurement. The holoTC test can potentially be used as a basis for determination of the patient's ability to absorb vitamin B12.

Further research was planned to investigate the further potential of the test.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: information exchange/training.

<http://cordis.europa.eu/marketplace> > search > offers > 5083

Emerging technologies in bone tissue engineering

A unique weaving technology has been developed by researchers at the Danish Technological Institute, to produce continuous porous scaffolds that could improve the ability of physicians to regenerate injured bone tissues.

Bone defects may occur with age or due to disease, and their reconstruction to provide mechanical integrity to the skeleton is a necessary step in the patient's rehabilitation. Current therapies to repair injured bone tissues involve combining cells, derived from a patient biopsy and 'grown' in the laboratory, with a porous matrix functioning as a scaffold.

More specifically, scaffolds are impregnated with cells along with chemicals stimulating further growth and implanted in the patient's body. Scaffolds are required to have a design that will promote the complete infiltration of bone tissue, bone marrow and blood vessels, just as when autografts or allografts are used.

Research within the EU-funded Intelliscaf project focused on composites of ceramics and polymers. These can be used to obtain bone constructs that display not only the mechanical robustness of ceramics, but also the flexibility of polymers mimicking bone tissue properties.

A way to minimise the risk of disintegration of the implanted bone substitute after surgery is to produce a porous material that holds together. The method proposed by project partners at the Danish Technological Institute allows the production of three-dimensional (3D) continuous scaffolds from composites of calcium phosphate (CaP) ceramics and bioresorbable polymers.

Calcium phosphate scaffolds for bone regeneration

Researchers have developed a porous calcium phosphate (CaP) scaffold with controlled porosity for the regeneration of bone tissue.

Europe's ageing population has created a growing demand for materials capable of replacing, repairing or even regenerating damaged bone, cartilage and skin tissues. Current surgical techniques use the patient's own bone for small bone reconstructions. This requires a second operation to harvest the bone, increasing the costs of the treatment and reducing the patient's quality of life. Therefore, use of a standardised tissue for generating scaffolds marks a major step forward in improving patient care and reducing costs.

The EU-funded Intelliscaf project has developed functional biomaterials, employing nanostructured particles, to help regenerate bone, cartilage and skin tissues. These intel-

ligent scaffolds support natural tissue regeneration by attracting and concentrating cell adhesion, molecular triggers and progenitor cells. The use of bioactivated material scaffolds can be widely applied to the treatment of bone, cartilage and skin lesions.

Conventional processes required the use of large quantities of coral to produce the porous component for bone tissue substitution and regeneration, causing a major environmental impact. The Intelliscaf project developed a foaming technique for creating porous CaP ceramic scaffolds for bone regeneration.

The technique utilised CaP ceramic powders as feedstock. These included the mineral

Carbonated hydroxyapatite (CHA), depending on its physiochemical and microstructural properties, provided a suitable osteoconductive and osteoinductive substrate. On the other hand, bioresorbable polymers could be used to fabricate a non-woven and flexible matrix with nanoscale fibres.

This novel concept to design hybrid scaffolds, where biomaterials are not chemically or physically bonded, has been optimised to provide for the treatment of larger areas of bone damage. It provides for ceramics and polymers to be assembled into a single structure, which maintains the bone formation capabilities of each single material, as well as interconnected pores and cell migration.

Funded under the FP5 programme Growth (Competitive and sustainable growth).

Collaboration sought: information exchange/training.

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hydroxyapatite (HA), bi-phasic hydroxyapatite (HA/bTCP) and carbonated hydroxyapatite (CHA). HA is found in human teeth and bones, and is commonly used as a filler to replace amputated bone or as a coating on prosthetic implants.

The scaffolds were produced either as granules or in the size required. The same technique used for producing the scaffold was employed to create porous structures possessing a porosity gradient. The technique can be applied to a number of materials like aluminium oxide, zirconium oxide ceramics and metals.

Funded under the FP5 programme Growth (Competitive and sustainable growth).

Collaboration sought: further research or development support; joint venture agreement; licence agreement; manufacturing agreement; financial support; venture capital/spin-off funding; available for consultancy.

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Helium and oxygen mix for easy breathing

Chronic airflow limitation can cause a serious loss of quality of life for sufferers. Therapeutic exercise regimes involving the manipulation of inhaled gas ratios have been devised by research scientists as part of the drive to alleviate this situation.

Chronic obstructive pulmonary disease (COPD) is a major public health concern in both Europe and the United States. At the time of this research, the World Health Organization (WHO) estimated it to be the sixth most common cause of death worldwide. From the point of view of quality of life, it has a devastating effect on employment prospects for the patient. This is mainly due to the inability to exercise.

To address this problem, the EU-funded CARED project partners at the University Hospital in Aintree, Liverpool in the United Kingdom aimed to evaluate how management of the gas ratios in inspired air may improve

the ability to exercise. The rationale behind the trials involving 82 patients with stable COPD was that increasing oxygen (O₂) levels can reduce breathlessness. Furthermore, replacing nitrogen (N₂) with helium (He) was known to reduce expiratory flow resistance and therefore may improve lung emptying.

In a randomised crossover trial, patients were given different gas mixtures of He, O₂ and N₂ using a face mask. Medical air with the usual ratio of 79 % N₂ and 21 % O₂ was applied as a control. Performance was measured by endurance shuttle walking distance and difficulty of breathing at the end of exercise (dyspnoea).

The team found that Heliox28 (with 72 % He and 28 % O₂) gave the best results. Walking distance was at an optimum and dyspnoea reduced as compared with medical air. Overall, the use of a much reduced density He gas as compared with N₂ improved exercise as much as increasing the O₂ levels. These independent effects can be realised with the use of Heliox28 for maximised benefits in patients with severe airflow obstruction.

Specially designed exercise regimes could mean return to employment for those previously disabled by COPD. The implementation of optimised exercise means economic treatment with better outcomes, shorter intensive care stay periods and a much improved quality of life for the patient.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: information exchange/training.

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Balancing wind power fluctuations

For embedding the less predictable wind power generators more smoothly into electricity distribution grids, an advanced system for balancing electricity supply with customers' demand was designed by the CRISP project.

In countries like the Netherlands, the United Kingdom and the Scandinavian countries renewable energy resources have already been integrated into the existing electricity infrastructure. The major electricity producers and traders are, however, obliged to make predictions of their production and consumption on a daily basis and communicate them to the transmission system operator.

Wind power, like many other sources of electric power, is a technology of variable output. Although it is subject to the risk of under- and overproduction, this variability can become a problem only if it results in unreliable predictions. To minimise deviations of the predicted from the actually produced electric power for a portfolio of wind parks, the 'Imbalance reduction system' was developed at the Energy Research Centre of the Netherlands.

The 'Imbalance reduction system' makes use of distributed, intelligent sensing systems to collect all the information needed to coordinate demand and supply in electricity distribution grids. At the heart of the system is the Power-Matcher™, which provides guidance to an aggregated set of electricity producing and consuming devices towards a common objective.



In this simulation environment, each electricity-producing device is represented by a producer agent that can bid on an electricity exchange market. A software agent acting on behalf of the local grid's substation is offering prices for electric power produced and consumed, while client agents represent the demands for electricity. As the demands of combined heat and power systems (CHPs) and house occupants are strongly dependent on the time of year, climate scenarios have also been incorporated for representative periods.

PowerMatcher™ has been validated in real-life experiments, where the load variations in the electricity distribution network with residential micro-CHPs were sought to be minimised. For this purpose, the operation of both electricity producing and consuming devices was modified to increase the overall match between production and consumption. As the application of PowerMatcher™ has yielded very encouraging results, further large-scale field experiments have already been programmed.

Funded under the FP5 programme EESD
(Energy, environment and sustainable development).

Collaboration sought: further research or development support.

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Modern standards for wind turbine technology

A new version of fatigue load sequence used for variable amplitude testing on materials used in wind energy industries has been developed.

Unlike wind turbines some 20 years ago, modern wind turbines possess significantly larger blade mass. In turn, blade energy and output capacity must follow suit. Therefore more knowledge needed to be obtained regarding load measurements and new standards for wind turbine blade manufacturing needed to be set.

In light of this, the 'Optimat blades' project set forth to create a load sequence known as 'New wisper' for variable amplitude testing of materials in wind energy applications. 'Wisper', the previous load sequence became widely used for variable amplitude testing of wind turbine rotor blade materials. Since then, however a standard load sequence representative of current trends in wind energy conversion technology is called for.

The new test sequence not only reflects today's turbine technology but provides a better understanding of material characteristics such as fatigue life limits. Reports were formulated in order to compare the new sequence with the older one, based on damage calculations and accumulation models.

Funded under the FP5 programme EESD
(Energy, environment and sustainable development).

Collaboration sought: further research or development support.

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Energy wood as a renewable alternative

The potential of energy wood for heat and power production in Europe has been examined taking into account long-term perspectives with respect to environmental impacts.

Energy demands in Europe and in many parts of the world are being met through the utilisation of woody biomass and energy crops. Biomass serves as a substitute for fossil fuels to supply heat and generate electricity. However, the use of such materials has been considerably low as compared to their estimated potential. This is due to various barriers, particularly those associated with environmental impacts and public acceptability.

In light of this, the Echaine project set out to identify and assess socio-economic and environmentally friendly means of using energy wood for heat and power production in Europe. This was brought forth through gathering data and reviewing national and international documentation and policy relating to energy wood supply systems.

Part of this effort involved estimating the available quantities of energy wood

within a time horizon of approximately 10 years in order to evaluate possibilities for a long-range perspective. This involves good forestry practice which takes measures for the proper management of resources and for the reduction of negative impacts. Results were made available via the project website, through presentations in workshops and seminars as well as scientific publications.

Funded under the FP5 programme EESD
(Energy, environment and sustainable development).

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 5075

Studying methane seeps in northern waters

A European initiative was established to study the presence of methane in selected ocean margin sediments. Methane is an important greenhouse gas and its production and sources in the environment need to be clearly understood.

The aim of the Metrol project was to identify sites of methane fluxes in northern waters. Project partner Statoil ASA from Norway used their expertise in oil exploration to record methane seeps. Researchers employed a hull-mounted single beam echo sounder to detect methane emanating from the seafloor in the areas of Tommeliten and Gullfaks in the North Sea. A remotely operated vehicle (ROV) was then used to visually record methane bubbling up from macroseeps identified within these areas.

Methane emitted by microseeps could not be visually recorded. However, its presence was indicated by bacterial mats which were docu-

mented by the ROV. Microseeps were located at Tommeliten and Gullfaks as well as at Nyegga in the Norwegian Sea. The Metrol study showed that both micro- and macroseeps were self-sealing. This process was facilitated by the formation of bacterial mats and carbonate.

At Nyegga the ROV revealed for the first time the existence of hydrate pingoes within the tundra-like landscape of the seafloor. This environment was believed to be created by the formation and breakdown of gas hydrates originating from below the seafloor.

Hydrate pingoes are mounds up to one metre high and are covered with sediment

and a carpet of tubeworms. These mounds also feature corrosion pits and are partly covered with bacterial mats. The mats are used as a source of nutrients by larger organisms such as hermit crabs.

The results from the Metrol project can help the oil industry and other users of the seafloor improve field development strategy and design. It can also facilitate the construction of pipelines and reduce the environmental impact of drilling. New insights into natural chemical environments and their impact on biology were also achieved through the study.

Funded under the FP5 programme EESD (Energy, environment and sustainable development).

Collaboration sought: further research or development support.

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On the road to more efficient solar cells

The production of silicon-based solar cells is a major step towards reducing carbon dioxide (CO₂) emissions from fossil fuels and securing European energy independence. As part of this initiative, the Topsicle project developed a low-cost industrial process for the manufacture of highly efficient multicrystalline silicon (mc-Si) cells and modules.

Members of the Topsicle research team drew up a road map to facilitate the industrial scale production of 20 % efficient mc-Si photovoltaic (PV) modules. The road map outlined two different cell concepts, the screen-printed cell and the buried contact cell.

Project partners from the University of Konstanz in Germany carried out a detailed loss analysis and comparison of 17.6 % and 18.1 % mc-Si efficiency cells. The cells' efficiency potential was evaluated through the use of PC1D modelling with the aim of achieving large areas of mc-Si 20 % solar cells in the future. Loss analysis for the 18.1 % solar cell indicated that significant improvements could be realised by replacing the full area aluminium back surface field with a local rear contacting scheme.

This change ensured a low back surface recombination velocity and high optical reflectivity for the rear surface. An additional thin thermal silicon oxide layer was placed beneath the silicon nitride antireflection coating in order to reduce the front surface recombination velocity. A key parameter in determining the performance of a solar cell is the fill factor. The addition of the silicon oxide layer resulted in a fill factor of 77 % for the 18.1 % cell. A fill factor of 78 % had previously been achieved using a similar plating process and a factor of 79 % may be considered realistic in the near future.

A further improvement towards high efficiency can be made through the use of zero-shading loss cell design. This technique is

based on the angled buried contact concept. The successful application of all the improvements prescribed by the roadmap could result in a current density of 39.6 mA/cm² and an open circuit voltage of 642.9 mV. This would enable a 20.1 % efficient mc-Si solar cell to be developed.

Funded under the FP5 programme EESD (Energy, environment and sustainable development).

Collaboration sought: further research or development support.

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Ensuring prolonged life for car catalytic converters

Pressure on the automotive industry to lower exhaust emissions spurred on Nanostrap project partners to promote exhaust gas after-treatment technologies that rely on the introduction of fuels with reduced sulphur content.

The performance and lifetime of nitrogen oxides (NO_x) storage catalytic converters as well as engine fuel economy could be significantly improved using sulphur-free fuels. Over the last few years a clear trend has been witnessed towards a lower sulphur content of diesel fuels. However, it would be both technologically and economically difficult to achieve a sulphur content below 10 ppm.

On the other hand, this extremely low sulphur content provided the Nanostrap project partners the option of using disposable or ex situ regenerable sulphur oxides (SO_x) traps. Even if these SO_x traps are not efficient enough to remove all sulphur compounds from diesel engine emissions, significant benefits can still be derived from the combination of SO_x/NO_x traps.

By trapping the SO_x of the exhaust gas before passing through the NO_x trap the permanent deactivation of NO_x storage catalyst due to sulphur poisoning could be overcome. For this purpose, different sulphur trap materials were prepared at the laboratories of Venezia Technologie SpA. One of the main objectives was to develop the sulphur traps without the use of noble metals.

Due to the low sulphur content of the exhaust gases in combination with their

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Modelling combustion processes in a diesel engine

An alternative way to achieve the drastic cuts in exhaust emissions from diesel engines prescribed in the short and medium term by the legislators has been proposed by the Minnox project. Based on detailed numerical studies of the thermal imprint of turbulence on fuel combustion, advanced models have been developed to account for the important physical effects occurring in the combustion chamber.

Diesel engines provide important fuel economy and durability for large heavy-duty trucks, buses, and non-road equipment. The reduction of nitrogen oxides (NO_x) and fine particulate matter emitted with the lean diesel exhaust remains, however, a technological challenge. Engineers are faced with a multi-parameter optimisation problem, where fuel injected at high pressure into the combustion chamber helps reduce the emission of soot, but results in higher levels of NO_x .

Numerical tools with predictive capabilities have been developed during the Minnox project to provide the means essential for balancing fuel consumption and emission formation. Researchers at laboratories of Volvo Technology Corporation worked towards a more realistic modelling of wall-

bounded turbulent flows. This is a necessary prerequisite for the accurate prediction of wall friction and heat transfer, as well as for providing reliable boundary conditions for components' thermal analysis.

Sub-models for each flow and combustion process within the engine's combustion chamber were first validated with the use of the in-house computational fluid dynamics (CFD) flow solver, Mermaid. Covering the effects of heat transfer to the engine's pistons as well as exhaust gas recirculation, these were proven to be accurate over a wide range of engine operating conditions. They have also lent themselves to improvements that could ultimately lead to predictions on the build-up of sludge and carbon deposits around pistons as the engine's service life is prolonged.

Moreover, the possibility of a CFD solver working independently was explored. Well-defined interfaces to commercially available CFD flow solvers, such as the widely used STAR-CD code, were also developed. At the same time, the efficiency and robustness demanded by engineers when performing CFD calculations of flow and combustion processes were kept in mind.

Funded under the FP5 programme EESD (Energy, environment and sustainable development).

Collaboration sought: further research or development support.

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Baseline for economic model of low carbon technology

An economic model was developed by European researchers to give a better insight into how changes involving non-carbon emitting technologies will affect production and growth.

The Nemesis/ETC economic model, developed by the project with the same name, was used as a basis for depicting national and sectoral trends in 15 EU Member States, and Norway, between 2005 and 2030. The model highlighted major challenges that will face European decision-makers over the next 25 years. The baseline scenario indicated that the greatest source of growth will be through foreign trade as growth within the EU area is not expected to exceed 2 % for the whole period. However, weak internal demand in Europe will be compensated by

high growth in the fast-growing economies of Brazil, China, India, and Russia.

The key to attracting foreign trade will be the ability of European countries to create niche markets for their products. This can be achieved through increasing scientific and technological research and development, particularly in the area of environmentally friendly energy production. The baseline scenario developed by the Nemesis/ETC project also showed a decline in population and the labour supply. A shortage of skilled

workers could prove critical to the European economy. The EU must also face the challenge of an aging population, whereby in 2030 there will only be two working people for every person over 65 years of age.

The purpose of the Nemesis/ETC economic model was to develop scenarios and strategies for the supply and demand of energy technologies for combating global warming. The model's baseline scenario allowed a clearer understanding of the relationship between economic, energy and environmental policy, thereby helping to draft future European policy.

Funded under the FP5 programme EESD (Energy, environment and sustainable development).

Collaboration sought: further research or development support.

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high velocities, very active surface sites able to absorb and oxidise SO_x were necessary. The sulphur trap materials prepared contained cerium (Ce) as an oxygen storage component together with copper (Cu) and manganese (Mn) as oxidation components. These materials absorb SO_x under lean conditions and desorb the accumulated SO_x under rich conditions.

To evaluate the SO_x trapping efficiency of these materials, their dynamic behaviour was investigated under non-isothermal loading conditions. The Nanostrap project partners aimed to approach the conditions in a car, where the exhaust temperature is unstable. While analysing in detail the dependence of the SO_x trapping efficiency on temperature, strong variations between materials prepared by different methods became obvious.

Venezia Technologie SpA therefore advocates further research before the high performance offered by materials containing noble metals used to promote the oxidation of SO_x can be attained.

Funded under the FP5 programme Growth (Competitive and sustainable growth).

Collaboration sought: further research or development support.

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Developing the European market for organic food

Organic food experts from 18 European countries examined different factors, including the role of government, which could influence the development of the market for organic produce. This work could help to boost the economy and increase employment prospects in some of the most disadvantaged regions of the EU.

Researchers from the Omiard project employed the Delphi method to study future growth in the European organic food market. This forecasting technique used a carefully selected panel of experts to answer questionnaires over three rounds. This repetition allowed the members of the panel to refine their responses on complex or uncertain issues.

The Delphi process enabled countries to be categorised according to the level of development of their markets. The state of the different European markets varied according to the country



involved. Not all markets for organic produce were equally developed within each country. For example those in urban settings were more established than those in rural areas. Furthermore, the market for cereals, dairy produce and fruit and vegetables was greater than those for meat and convenience products.

The wider acceptance of organic produce has meant that the role of direct marketing and specialist retail outlets might decline. Only in Denmark and Austria was catering and public procurement expected to surpass any other outlets in the near future. Lack of promotional skills and the fragmented nature of the market were considered to be the two greatest constraints upon supply and demand for organic produce. Other barriers included high prices, poor availability and lack of information for consumers. A key issue arising from the Delphi process was the amount of support received from national and regional governments, which was found to vary across the EU.

The Omiard project could be used to increase the ability of organic farming to deliver social and environmental benefits to the more disadvantaged peripheral regions of Europe. The greatest obstacles to the success of organic marketing initiatives (OMIs) were the poor quality of management and a shortage of capital. This was reflected in recommended government measures to support rural development by providing training for OMI managers and initiatives to encourage consumer demand. Consistent government support was considered to be of great importance to the development of organic food markets.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

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Intercrop: mixing crops for better results

The University of Reading discovered that farmers can reap economic benefits from intercropping and is promoting its adoption as a paradigm of sustainable agricultural practice.

As the popularity of organic produce continues to skyrocket, Europe's farmers are struggling to keep up with the demand. The EU funded an investigation on the potential of intercropping to boost crop yields and quality. Intercropping involves planting two or more crops in the same field at the same time.

Experiments were performed at farms in four different European countries during the project, which was aptly named Intercrop. Scientists with the Department of Agriculture at the University of Reading in the United Kingdom were responsible for evaluating the results from an economic perspective.

Intercrop focused on the simultaneous cultivation of cereal crops and grain legumes.

The University of Reading found that mixing peas with barley used for malting was not likely to be cost effective. This was attributed to the undesirable increase in the nitrogen content of the barley as well as the added costs associated with admixture and cleaning.

On the other hand, the British researchers concluded that intercropping helped boost the market value of wheat used in breadmaking by two to five percent. The cost of crop separation was not incorporated, but was not expected to significantly alter the financial attractiveness of this combination.

The University of Reading is available to provide guidance regarding the financial feasibility of different intercropping combinations for various types of farms.



Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

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Who is the organic product consumer?

A comprehensive European study on consumer trends towards organic products was conducted in order to obtain a better understanding for further marketing initiatives.

Organic products have gained increased visibility in the market in recent years. Their appeal to consumers stems from the perception of being healthier due to the fact that they do not contain agrochemical residues. Furthermore they are known for being better tasting, for being farmed using natural methods and for being environmentally and animal welfare friendly.

Nevertheless, precisely what attitudes and motivations consumers have for purchas-



ing organic products continues to leave a multitude of questions unanswered. The Omiard project has delved into this area of market research to obtain a better understanding and to examine expectations, barriers and behaviour intentions of the organic consumer through a comprehensive European study.

Focus groups and laddering interviews were used to obtain the detailed results. It was evident that the results varied greatly. For example, the consumption of organic food can be viewed as elitist as well as simply in vogue or purely as a healthy lifestyle choice. People who are not consumers of organic food were classified as either simply having no interest or not having the resources to purchase such products due to their availability and cost.

Generally gender did not play a role in terms of consumption;

however, it was shown that age range can be significant and the very young and older consumers generally do not prefer organic products.

A common thread was the issue of consumer trust meaning that consumers need to believe that they are purchasing what they have paid for. Although supermarkets are the most common place to purchase food because of their wide availability and convenience, consumers do not view them as the most reliable for the purchase of organic products in particular.

Furthermore only a minority of consumers purchase food from organic shops. Therefore it is evident that the gap between consumers and producers of organic food needs to be bridged. This in turn would provide a higher level of trust. Further research at national market level is needed in order to more closely examine consumer trends and successful marketing strategies.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 5056

Daily potable water for small rural communities

The efficiency of photochemically active materials to produce molecular oxygen species capable of eliminating water pathogens without the use of any chemical additives has been evaluated during the Aquacat project. The results drafted a roadmap towards the use of solar energy to ensure enough clean drinking water for isolated rural areas to satisfy their daily needs.

Water scarcity has become an increasingly pressing problem in many areas of the planet. The gradual contamination of fresh water resources is causing concern even in countries which, so far, have not experienced such problems. Intensive research efforts have pointed out the critical role that nanomaterials have to play in disinfecting water with the use of solar energy.

Compound parabolic collectors were used by the Aquacat project partners to focus solar radiation onto a transparent carrier filled with contaminated water. The interaction of solar light with suspended semiconductor nanoparticles produced highly oxidative species that can inactivate waterborne microorganisms and degrade toxic compounds.

The combination of sunlight and photochemically active materials was investigated during the Aquacat project as a promising option for rural communities of less favoured countries. The challenge was to

find the optimum photosensitising system for the production of singlet molecular oxygen and provide an attractive alternative to the widespread addition of chlorine.

Researchers at the Universidad Complutense de Madrid in Spain chose methylene blue as a photosensitiser. This water-soluble dye absorbs light both in the ultraviolet and visible spectral range. Moreover, it could easily be incorporated in Nafion[®] polymer films due to its cationic nature.

Nafion[®] polymer films dyed with methylene blue were found to be highly permeable to singlet molecular oxygen as well as resistant to photodegradation by intense light. They could therefore be used as a reference system to measure the production of singlet molecular oxygen.

The results obtained were compared with the production of singlet molecular oxygen by methylene blue and tris(2,2'-bipyridine) ruthenium(II) in acetonitrile solution, and methylene blue in Nafion[®] films swollen in methanol. A system of well-defined production of singlet molecular oxygen would be of great value to the Aquacat project. To achieve this end, further work was planned to extend the characterisation of singlet molecular oxygen production by opaque polymer-supported photosensitisers.

Funded under the FP5 programme 'INCO 2' (Confirming the international role of Community research).

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 5091



Monitoring herbicide levels in soil over time

A new analytical technique may contribute to environmental protection and help promote sustainable agricultural practices.

Atrazine is a potent herbicide that has been banned in the EU, but is still used heavily in other countries. In the framework of the Access project, European experts collaborated with colleagues from South America to study the full life cycle impacts of atrazine and other chlorinated herbicides on the environment.

A key to the Access research was the development of an easy, accurate and inexpensive analytical method to determine herbicide concentrations in soil samples. The test is appropriate for chlorinated herbicides such as atrazine and 2,4-dichlorophenoxyacetic acid (2,4-D) as well as their metabolites.

Furthermore, it is compatible with samples rich in organic matter such as humus.

The work was led by scientists with the University of Buenos Aires in Argentina. Other members of the Access research consortium helped extend the range of detectable herbicides to include, among others, simazine.

The methodology is targeted at countries that rely heavily on agricultural exports but that may not yet have the necessary technical or financial resources to perform such analyses on a regular basis. It also has use following the application of bioremediation measures to eliminate herbicides from a



particular location, for instance in preparation for organic farming.

Funded under the FP5 programme 'INCO 2'
(Confirming the international role of Community research).

Collaboration sought: further research or development support;
available for consultancy.

<http://cordis.europa.eu/marketplace> > search > offers > 5087

Improving prediction of spring floods in northern Europe

A number of modifications made to a computer model in the context of an EU-funded project have greatly improved the ability to forecast floods.

In Norway and other countries in northern Europe, flooding frequently occurs when warm spring temperatures melt snow that has accumulated during the winter. Pre-



diction of these events relies heavily upon hydrological transport models. While these models incorporate rainfall and other meteorological parameters, they have not yet been designed to assimilate data related to the snowpack.

A novel method of estimating snow covered area (SCA) using instrumentation aboard the Envisat satellite was developed during the Envisnow project. Hydrologists with the Norwegian Water Resources and Energy Directorate, one of the Envisnow participants, took up the challenge of integrating the SCA data into their hydrological transport model, HBV.

Tests performed during the project revealed that a version of HBV calibrated against SCA outperformed a benchmark version without negatively impacting the simulated snowmelt discharge. In fact, the forecasts were 28 % more likely to be correct, particularly in cases where SCA values were high.

The Norwegian hydrologists also updated HBV with a dynamic snow distribution model driven by the number of snow accumulation and melting events. The result showed better agreement between the modelled and observed distribution of snow water equivalent (SWE). Optimal model performance was achieved when the aforementioned satellite-derived SCA fields were included.

Funded under the FP5 programme EESD
(Energy, environment and sustainable development).

Collaboration sought: information exchange/training.

<http://cordis.europa.eu/marketplace> > search > offers > 5057

Incorporating snow data into hydrological models

Environmental scientists use computer models of hydrological systems to predict the amount of water resulting from melting snow. Researchers from the Envisnow project improved hydrological models by incorporating Earth observation data for snow cover from a satellite.

Northern Europe and areas filled with mountains receive much of their precipitation in the form of snow. It is necessary for countries which experience seasonable snow cover to be able to accurately predict when it will melt and the amount of water as a result. This information is vital for water resource management, especially with regards to successful flood prediction and the planning of hydropower production.

The Envisnow project used Earth observation data from Europe's environmental satellite Envisat to update hydrological models. These were then used to give more accurate predictions for the amount of runoff from melting snow. Scientists from the Finnish Environment Institute incorporated data from snow covered area (SCA) satellite observations into the project's hydrological model.

An increase in elevation is matched by a fall in air temperature. The effect of a drop in temperature is greater precipitation and therefore more snow, resulting in increased snow melt which is delayed for longer. This activity was simulated in the improved hydrological model to give a more realistic picture of the distribution of snow and its accumulation, and melting.

The method of incorporating data into the hydrological model was improved by using the procedure for incorporating SCA observations, which was then applied to other parameters. These included the amount of discharge, water level and snow water equivalent, which is the depth

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Urban water management guide

A book was created offering guidelines for detailed processes and applications of sustainable urban water management.

The increase of population densities in urban areas has created a higher demand for available water supplies. This in turn has raised concerns regarding the environmental impacts as well as the increasing costs of urban aquifers. Therefore the source of potable water and its appropriate use is in need of examination.

In light of this, the AISUWRS project offered modelling tools for planning alternative approaches for sustainable urban water systems. This served as a means to provide adequate knowledge of the current state of urban water resources and an understanding of the processes involved. Information

of this kind is an important concern for citizens' health and safety.

The analysis covered a range of urban water supply and disposal situations through exhibiting the differences within each situation in terms of how contaminants are handled. Sources, flow paths and sinks of contaminants in each urban area were identified and the impact on groundwater contamination was estimated.

At the end of these efforts, it was planned to produce a book which fully describes the processes and findings in depth. The publication



should act as a sufficient guide for the development of prototype tools for operational use.

Funded under the FP5 programme EESD (Energy, environment and sustainable development).

Collaboration sought: information exchange/training.

<http://cordis.europa.eu/marketplace> > search > offers > 5079

Stormwater management aided by automated expert-level judgement

Without adequate management, urban stormwater may lead to flood and pollution risks. Using a system tool developed as part of this project, stakeholders involved in decision-making will be able to use a knowledge-based system to conduct vulnerability screening as well as to develop case scenarios.

The EU-funded Daywater project served to provide a solution to the negative effects of stormwater pollution experienced in urban areas, such as the overloading of the city

sewer system. Urban stormwater management was found to be impeded by the large number of stakeholders involved and by the necessary multidisciplinary knowledge.



Project partners therefore developed an adaptive decision support system which facilitates decision-making. It is a combination of simulation models, assessment tools, databases, guidance documents and road maps.

One of the partners, a German limited company, developed FLEXT, an expert system

tool. This prototype tool is unique as it has been combined with a geographical information system (GIS). It provides both table-like and graphic interfaces and is suitable for formulating expert systems in classification or diagnostic problem domains.

In practice it can be used to screen areas which are vulnerable to stormwater runoff as well as to test the outcomes of various scenarios. For stakeholders involved in urban stormwater management, this provides a dynamic assessment tool. It allows for decisions to be taken which integrate the spatial topology and the dynamic nature of urban development. Furthermore, this means that expert level judgement can be somewhat automated. This can be particularly helpful in cases such as the planning of on site stormwater infiltration systems, when expert-level judgement is needed repeatedly. By automating some of the high-level judgement necessary, the management process becomes more efficient.

Funded under the FP5 programme EESD (Energy, environment and sustainable development).

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 5092

continued from page 30 **'Incorporating snow data into hydrological models'**

of water that would result if all the snow melted at once. The SCA observations were used to correct the hydrological model so that the true level of snow water storage could be identified. The use of SCA observations in the model was a major advance in computer simulations of the distribution of snow over an area.

The accuracy of the improved model was tested by running the simulation both with and without the SCA observations during the spring, when the snow begins to melt. The researchers then compared the different simulated flood forecasts and used the results to calibrate the model. The final model was then adopted as part of the Finnish operational hydrological forecasting system.

Funded under the FP5 programme EESD (Energy, environment and sustainable development).

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 5025

See also page 34
(The daily mapping of snow)

Establishing salt-resistant varieties of poplar

A protocol developed by researchers with the University of Göttingen in Germany will help identify plants suitable for saline soils, which are becoming increasingly common.

It is forecast that climate change will accelerate the loss of large areas of fertile land to desertification and salinisation. Today's scientists are trying to prepare for this bleak future by identifying which plants and trees will be able to survive in this new environment. The EU-funded Establish project is a prime example. Its aim was to discover varieties of the poplar tree resistant to stresses such as lack of water or high salt content in the soil.

In order to perform the research, it was necessary to develop a standardised protocol for subjecting the different specimens to salt-enriched conditions. The work was led by

researchers with the Institute for Forest Botany of the University of Göttingen (Unigoe).

The key to Unigoe's approach was hydroponics, a soil-less technique for growing plants. Exposure was straightforward as the salt was simply incorporated into the plants' nutrient solution. By eliminating the soil component, maintaining a constant salt concentration was facilitated.

During the experiments, the Unigoe scientists monitored levels of chlorophyll fluorescence and water potential, well-known indicators of plant growth and health respec-

tively. The data was subsequently analysed to help identify genotypes with the greatest salt resistance that could one day be used to reforest degraded areas.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: information exchange/training.

<http://cordis.europa.eu/marketplace> > search > offers > 5097



The give and take of coastal management

A comparative analysis has been conducted on two sites in the Mediterranean in order to determine the role that socioeconomic conditions play on the environment.

Coastal areas are a major part of the global economy involving agriculture, fishing, tourism and industry. These areas rely on the environment and its natural resources; hence, the condition of coastal areas is vital to its well-being as well as to that of the surrounding population.



Unfortunately human activity often can exhaust the environment, taking more from it than it can give. As a result, sustainable development in these areas can pose very challenging scenarios. This calls for proper management of coastal areas, complete with planning policies so that human activities can be incorporated in such a way as to take the environment's capacity into account.

In light of this, the Med-core project examined the socioeconomic conditions in coastal areas through a comparative analysis which involved an in-depth and integrated study of conditions. The similarities found along the coasts of the Mediterranean were similar with regard to environmental and socioeco-

nom conditions. This factor consequently prompted the development of common guidelines for coastal zone management.

For the comparative analysis, two particular southern Mediterranean sites were used: the Rosetta area in Egypt and the Oued Laou area in Morocco. In order to evaluate the potential for putting extensive guidelines into place for the Mediterranean as a whole, both similarities and differences were taken into account. It was found that dwindling environmental conditions have taken a toll on those communities, particularly on the poor, and that extensive developmental efforts are necessary.

Funded under the FP5 programme 'INCO 2' (Confirming the international role of Community research).

Collaboration sought: further research or development support.

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Monitoring coastal regions through the behaviour of sand hoppers

Variations in the behaviour of small crustaceans, known as sand hoppers, were used to monitor the state of coastal environments of the Mediterranean Basin. The use of these biological indicators may improve the management and more importantly, contribute to the conservation of the biodiversity of coastal regions.

Europe's beautiful Mediterranean coasts are under pressure from tourism development and other forms of economic activity. However, this region is one of the most biologically diverse in the world and needs to be protected for future generations. The Med-core project monitored changes to these coastal regions and their ecosystems in order to develop a series of indicators that can give advanced warning of environmental degradation.

Med-core partners from the University of Florence studied variations in the behaviour of sand hoppers. These little creatures are found on beaches and the fringes of coastal environments, such as lagoons and river mouths. Changes in their behaviour can be used to determine whether a beach ecosystem is starting to become degraded.

Scientists studied behavioural patterns that were simple to record during field work

and could be controlled under laboratory conditions. This included the position of sand hoppers in dry or wet substrates and their daily activity rhythms. The creatures' ability to rapidly adapt to the new environment when they are relocated from the shoreline to the drier upper beach is one of their most important survival skills. The level of variation within each sampled sand hopper population was also studied. This involved comparing samples taken during different times of the year and from different populations and species of sand hoppers.

Background data from study sites gathered by other project partners was used to achieve a clearer picture of the behaviour of sand

continued on page 33

The sound investigation of organ cleaning methods

The wind organ is more than a traditional musical instrument, it is a courier of European culture and heritage. Yet, for countless such instruments across Europe, corrosion threatens their integrity, their inspiring clarity and ultimately, their survival.

For many of these classical instruments, the threat of corrosion accumulates within their wind systems. Since many of these are built from lead piping, the collection of aldehydes, volatile organic compounds and organic acids presents a corrosive atmosphere within.

Preserving these pipes presents a more complicated task than could be imagined as cleaning an organ, its chamber and its pipe system can take weeks — an effort that, aside

from including disassembly, might actually damage the structural integrity of the pipes. Since many of these old organ pipes are lead-based, they are soft and malleable and incorrect treatment may bend them thus distorting their sound quality.

Therefore, an EU-funded project Collapse has undertaken a comprehensive study on cleaning organs in a manner that will not weaken or damage their piping systems.

They investigated cleaning methodologies and materials, as well as looked into preventative measures for abating further corrosion to piping.

Part of their findings found that corrosion has its source in the wind system. Therefore, project partners looked into methods in which the corrosive compounds can be sampled and measured to gauge if the organ pallet box is at risk from the damaging chemicals. The project therefore, sets its goals on preserving more than just lead pipes, but also a cultural heritage.

Funded under the FP5 programme EESD (Energy, environment and sustainable development).

Collaboration sought: information exchange/training.

<http://cordis.europa.eu/marketplace> > search > offers > 5102

Guidelines for healthy bumblebee colonies

A new report from the 'Pollinator parasites' project describes the best practices with respect to the detection and control of microsporidia contamination of bumblebee colonies.

Bumblebee (*Bombus spp.*) populations are in decline worldwide. This is particularly worrisome given the fact that bumblebees are critical for the pollination of a number of important agricultural crops. Minute parasites called microsporidia are one of the threats bumblebee colonies face.

The EU-funded 'Pollinator parasites' project developed detection and control techniques. The work was headed by scientists with Applied Plant Research B.V. in the Netherlands.

The fastest, easiest method of detection involved microscopic analysis of a squash preparation. The diagnostic power of this approach could be enhanced by dissecting the Malpighian tubes. However, microscopy was only suitable for finding spores of the deadly member of the microsporidia, *Nosema bombi* (*N. bombi*). In order to determine if *N. bombi* had evolved to the vegetative stage, it was necessary to resort to a molecular technique, namely the polymerase chain reaction (PCR).

During the project, the Dutch researchers also established explicit guidance for reduc-

ing the risk of contamination of bumblebee colonies. The first recommendation involved quarantining queens obtained from the wild and subsequently checking their initial offspring for signs of *N. bombi* before starting a new colony. Care must also be taken not to transmit infection during rearing, which can even occur via exposure to contaminated faeces.

Worker bees are known to wander to other colonies, a phenomenon known as drifting. To avoid possible contamination by these bees, it is proposed that both queens and worker bees are not reintroduced to rearing facilities following pollination assignments in the field.

Finally, considerable care must be taken when managing food supplies to eliminate potential sources of infection. Since pollen pro-

duced by honeybees constitutes the bumblebees' primary source of food, checks must be performed to ensure that the honeybees are themselves not infected with *N. bombi*. Furthermore, food and the equipment used to deliver it should not be shared between colonies. Old colonies as well as dead bumblebees must also be disposed of immediately.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

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continued from page 32 **'Monitoring coastal regions through the behaviour of sand hoppers'**

hoppers. From their adaptive behaviour the suitability of the selected study sites could be assessed. This technique was more effective than estimates of environmental variables, which can be strongly influenced by changes in the climate and from season to season.

The results were compiled into a database for comparative studies of those coastal regions of the Mediterranean, eastern Atlantic and Baltic Sea, where the same species of sand hoppers live. The monitoring programme has now been applied

to other related species of sand hoppers in Chile and Uruguay.

Funded under the FP5 programme 'INCO 2' (Confirming the international role of Community research).

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 5082

The daily mapping of snow

The complementary qualities of optical and radar sensors have been united in order to frequently map snow cover conditions.

When snow melts in the spring, the resulting meltwater runoff can lead to catastrophic floods. Detailed and comprehensive information for the estimation of snowmelt is therefore essential for effective flood forecasting. In light of this, the Envisnow project designed advanced algorithms that exploit the complementary characteristics of optical and radar sensors to draw regional and global maps of snowmelt.

Synthetic aperture radar (SAR) images are advantageous over optical images in their capacity to produce snow maps on a continual basis. However, for mapping the snow covered area



(SCA) parameter, time series of optical and SAR data need to be analysed together. This would result in sensor-independent estimates. The model production line developed by projects partner Norut IT in Norway is capable of automatic data retrieval, pre-processing, parameter retrieval and product generation.

First, each satellite image is analysed separately and then all the images taken on the same day united into a single product. Each image's role in the final product is dependent upon a pixel-by-pixel confidence value that is calculated for every image. The algorithm for the estimation of the confidence value takes various factors into consideration, including the local observation angles, cloud probability and prior information about the state of snow.

Finally, the time series of daily products are merged into a multisensor/multitemporal product which can represent the SCA's probable status. This can serve as an important application in the fields of hydrology and climatology.

Funded under the FP5 programme EESD (Energy, environment and sustainable development).

Collaboration sought: information exchange/training.

<http://cordis.europa.eu/marketplace> > search > offers > 5045

See also page 30 (Improving prediction of spring floods in northern Europe and Incorporating snow data into hydrological models)

Machines sensing their environment

Inspired by the way the human brain processes sensory information, artificial neural networks have been implemented during the Sensemaker project on reconfigurable hardware.

The key element of artificial neural networks is the novel structure of the information processing system. This is composed of a large number of highly interconnected processing units, called neurons, which are working in parallel to solve a specific problem. Spiking neurons differ from conventional artificial neural networks as information is transmitted by means of spikes rather than by varying firing rates.

The Sensemaker project partners believed that this allows spiking neural networks to encompass the rich dynamics required for real-time applications. When implemented on reconfigurable, parallel hardware, neural networks can take full advantage of their inherent parallelism and run orders of magnitude faster than software simulations.

Developing application specific integrated circuit (ASIC) devices for neural networks is, however, both time-consuming and expensive. Researchers at the University of Ulster in the United Kingdom therefore focused on field programmable gate arrays (FPGAs) that provide arrangements of logic components that can be configured with ease. More specifically, an updated configuration bitstream

can be downloaded directly onto the device to achieve the desired change to the system.

To enable the responses of a biologically plausible neural network to be exploited, a conductance-based version of the integrate and fire (I & F) neuron model was implemented on an FPGA platform. A biologically inspired form of the spike timing-dependant plasticity (STDP) was also implemented in hardware to train the neural network.

By utilising a fully parallel implementation of this model, the number of neurons that can be implemented was limited to the number of embedded multipliers provided. On the other hand, time-multiplexed architectures provided for favourable trade-offs between computing speed and size of the neural network.

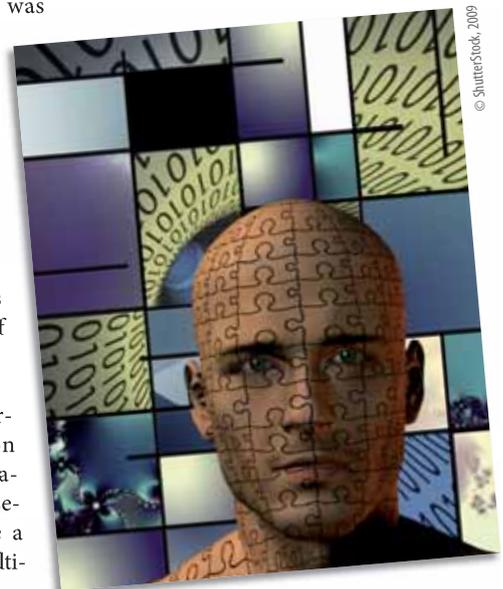
The final system was tested on performing coordinate transformation with promising results. This application was conceived as part of the Sensemaker project that aimed to create a hardware system capable of merging multi-

sensory data and perceptually aware, to some degree, of its environment. Coordinate transformations convert angles of a haptic sensor to (x,y) coordinates that are in turn used to generate a haptic image representation of the search space. However, it was made evident that further improvements to the FPGA-based implementation would be required to achieve real-time performance.

Funded under the FP5 programme IST (User-friendly information society).

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 5065



The right honourable computer, barrister-at-law

European researchers have created a legal analysis query engine that combines artificial intelligence, game theory and semantics to offer advice, conflict prevention and dispute settlement for European law, and it even supports policy.



European law is complex, multi-layered and expanding. There are thousands of regulations, so many that compliance is difficult, time-consuming and expensive. While harmonisation is underway, the process itself demands that individuals, companies and law firms often have to relearn the system.

Meanwhile, areas like intellectual property rights (IPR) and digital rights regulation that seek to combat piracy are becoming evermore complex to understand and apply consistently across Europe.

Thankfully, help is at hand. The EU-funded ALIS project has developed a computerised platform that uses artificial intelligence (AI), game theory and semantic technologies to 'understand' and track the regulations in a large, and expanding area of expertise — in this case IPR.

ALIS sought to develop a working system in IPR to tackle the fundamental technological challenges before expanding it to more areas later on. The system is much more than a simple database of relevant legal regulations. It uses insights from game theory to help contentious parties come to an amicable agreement, either through conflict prevention or dispute resolution, and it can assist lawmaking too.

Game theory looks at how strategic interactions between rational people lead to outcomes reflecting real player preferences. In the Ultimatum game, for example, two players decide how a sum is to be divided. The proposer suggests what the split should be, the responder either can accept or reject this offer. But if the responder rejects the split, both players get nothing.

Researchers have found that often proposers offer 50:50, even though the responder might accept less. They also found that responders always reject splits where they get less than 20%. In economics, this would

be considered irrational, because the responder loses too, but this illustrates that fairness is a very important element in strategic interactions.

These types of interaction can be rendered mathematically thanks to game theory, and the concept is so powerful that it has migrated from applied mathematics to social sciences like economics, political science, international relations and philosophy, as well as hard sciences like biology, engineering and computer science.

Game theory can be used to develop algorithms that find equilibria in games, markets, computational auctions, peer-to-peer systems, security and information markets. And, now with ALIS, it is available for legal systems too. This concept of equilibria supports conflict prevention, dispute resolution and offers decision support for lawmaking.

A key factor in the system is its test for regulatory compliance. This is very powerful. It can help citizens, companies and lawyers quickly scan the relevant legal corpus to discover if they are compliant. It is a key factor for the other roles in the ALIS system as well.

For conflict prevention, dispute resolution and lawmaking, the ALIS first establishes if the parties, or the proposed legislation, are compliant with current law. Once compliance is established, the system can present a series of options based on an analysis of the potential conflict or dispute, or it can pro-

vide information to further assist lawmakers to formulate policy.

Similarly, the tool aims to rapidly speed up the work done by lawyers, helping to resolve relatively straightforward cases faster, so they can concentrate on more complex problems. Here, semantic technologies play a key role by establishing a machine-readable annotation of copyright law for several European countries.

The ALIS project's exploitation and dissemination activities are noteworthy. Mailings, brochures, as well as many presentations and meetings have taken place between potential customers and beneficiaries of the ALIS system.

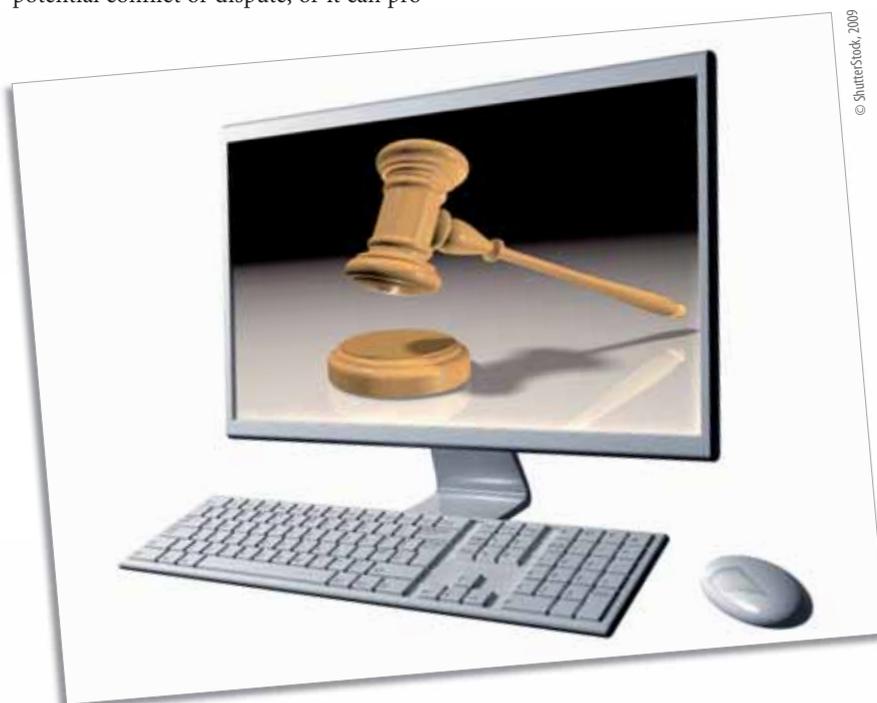
There are two primary customers or users: software providers who could benefit from the methods, logic and innovative information processing techniques developed within ALIS; and legal service providers, lawyers, solicitors and others who can use the system to keep them up to date with a rapidly evolving legal framework and speed up query handling for clients.

In all, ALIS has created a platform that should help ensure legal compliance by citizens, companies and lawyers. And it will help improve the efficiency of justice, by contributing to conflict prevention and dispute resolution, keeping cases out of overworked courts.

But ALIS' true genius is that it creates a powerful technological platform to access legal knowledge, a platform that will become stronger over time.

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<http://cordis.europa.eu/ictresults/index.cfm?section=news&tpl=article&ID=90853>



Multi-standard approach for enhanced communication services

Convergence of wireless mobile and wireless standards, enabling seamless access to integrated broadband services is a vision for the future generation of mobile communication systems that has been investigated within the FLOWS project.

The increasing diffusion of multimedia communications has spurred the FLOWS project partners to address one of the major limiting factors in the performance of wireless communication systems. Their research was centred on transmitting both voice and non-voice signals over multiple channels between the transmitter and the receiver.

By exploiting channels' diversity, fading of the signal due to interference from transmitters using the same channel can be minimised. For example, receivers typically proposed for wideband code division mul-

tiplex access (W-CDMA) systems exploit the multipath diversity inherent in terrestrial wireless channels.

However, where orthogonal spreading codes are used on the universal mobile telecommunications system (UMTS) downlink, multipath propagation can result in poor performance of the receiver. Multiple-input and multiple-output (MIMO) techniques provide an additional source of spatial diversity by creating a set of independently fading channels.



Researchers employ time-reversal space-time block coding (TR-STBC) to provide for significant gains over such multipath channels. FLOWS project partners at the University of York adapted this simple MIMO transmission scheme to chip-level equalisation for W-CDMA receivers. The simplicity of its realisation was of crucial importance for a realisable implementation even in UMTS receivers.

On the other hand, the spectral-domain realisation for the proposed multi-standard receiver allowed typical baseband processing steps to be shared between receivers for W-CDMA- and OFDM-based wireless standards. Both standards require fast Fourier transforms (FFTs) to convert the transmitted time-domain signal back into the frequency-domain before channel estimation and demodulation.

With the use of high-performance application specific integrated circuit (ASIC) device for FFTs the processing speed was significantly improved. Besides providing for communication services of superior quality for rail and street commuters, a multi-standard architecture for a receiver incorporating Hiperlan/2 and digital video broadcasting-terrestrial (DVB-T) functionality has been promised.

Funded under the FP5 programme IST (User-friendly information society).

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 5076

Protocol for computational interactions

A set of interaction protocols composed of global computing entities has been developed providing a framework for verifying computational interactions.

Previously, interaction in the context of global and open computing environments was low-level and thus not verifiable. In response to this, the SOCS project aimed at providing models of complex interactions which allow concrete realisations without the need for simulation techniques. This is possible at the local level, within a single computing environment as well as at the global level, that being within a dynamic collection of open and connected sub-environments.

In order for this to be achieved, computees or individual and aggregates of computational entities were investigated. These entities can form complex organisations known as societies of computees. One example of this may be an air traffic management system in which various airlines, pilots and control centres operate in a global and open environment.

After describing, analysing, and verifying individual and aggregate computees in terms

of their interaction in the context of global, open, and dynamic environments, it was necessary to establish interactions amongst computees. The framework for such interactions may be via direct communication based on standard protocols or derived from individual communicative behaviours.

As part of this effort, a set of interaction protocols in the form of a library was developed. The protocols are expressed via the logic-based formalism social integrity constraint (SIC) and a description in natural language is provided for each protocol. Furthermore a set of interaction examples is available for each protocol complete with explanations and results. Several different types of protocols are available in the library including those for interaction between intelligent agents

as well as protocols for interaction between peers. Included in this is the description of a protocol for medical guidelines and interaction rules between peers concerned with treatment of medical patients.

Funded under the FP5 programme IST (User-friendly information society).

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 5078



Semantics-based software boosts company performance

New semantics-based software tools that accelerate the speed companies can develop or adjust their processes — while slashing costs — have resulted from a major European research project.

Tools developed by SUPER, an EU-funded research project, greatly enhance the business usefulness of the service-oriented architecture (SOA) approach to software development. The new tools raise business process management (BPM) to the business level where it belongs, from the IT level where it mostly resides now.

In SOA, software solutions are built up from individual building blocks that can be reused where the same task is repeated in a range of situations. The advantages of this approach are obvious. But searching out and assessing the usefulness of software fragments can require many hours of work by IT professionals with high levels of analytical skills. As the popularity of SOA grows, the complexity of the search problem increases exponentially.

The SUPER project applied semantics and semantic web technology to the problem. 'SUPER successfully brought three different research groups together,' according to Agata Filipowska, from the Department of Information Systems at the University of Poznan in Poland, a member of the SUPER research consortium.

These groups comprise people working in the semantic web, BPM and information systems. The first group was interested in applying ontologies to describe enterprise models and business processes in general, to show the potential benefits of the application of ontologies for companies.

A second group was interested in the automation of the transition from business process models to execution. They also wanted to check the compliance of processes with existing business rules, monitor execution of those processes, and analyse anything that went wrong using the business vocabulary that could be delivered by ontologies.

Finally, there were information systems people who wanted to see how to automate processes using the SOA approach and semantic web services.

Ontologies are the backbone of the SUPER tools. Ontologies define 'meanings' through formal descriptions of concepts and relationships in an industry as well as carefully defined industry terms. For SUPER, that industry was telecommunications.

Using the SUPER ontologies, telecoms business managers can model new business pro-

cesses, search for existing process fragments, automatically fill in the missing elements in the process model, search for semantic web services that will deliver the functionality, compose business processes out of available web services and execute implemented business process models.

Because SUPER tools can translate business language into machine-readable language — and vice versa — the business managers do not need expertise in the IT behind the tools. They need no help — or very little help — from IT professionals.

In the first phase of SUPER, a telecoms business analyst can use well-known flowchart-like graphics to model a new business process on his or her computer. SUPER matches the industry standard graphics in his/her business process model to concepts and relations from a SUPER ontology stack. Linking the terminology used to represent a process model to ontology entities means the process elements are specified in a machine-readable manner.

From the outputs of the semantic business process modelling phase, the executable description of the process is prepared. Semantic business process configuration involves composition (implementation of the process using web services), then translation from business process modelling ontology (BPMO) to semantically enhanced business process execution language (BPEL), which is then further serialised to an executable specification called BPELASWS. Finally, the executable process model is ready to be deployed to a process engine for execution.

Using semantic web services in the execution phase adds further flexibility. In conventional business process modelling, the web services used have to be specified at design time. If at runtime the specified web service is not available or the usage of another web service would be more appropriate, the process model has to be changed, which is a very time-consuming task. With SUPER that specification does not have to occur until runtime.

During execution, SUPER's tools monitor the performance of business processes. In the analysis phase, this information may be used to check the business processes against key performance indicators and provide feedback for continuous process improvement. The market for SUPER-style solutions is immense. Anyone dealing with software integration based on service-oriented architectures is a potential customer.

Global giant Telefónica sees SUPER tools as important in its drive into the information and communication technology (ICT) outsourcing market. SUPER will help it stay ahead of the game with leading-edge IT solutions. Members of the research consortium, such as Polish Telecom, part of France Télécom, are also looking to exploit the developments commercially. SAP, IBM and IDS Scheer are incorporating SUPER findings into their software offering. And SUPER's open source downloadable tools (<http://ip-super.org>) are attracting a lot of traffic.

'The main innovation and benefit of SUPER is that it supports business analysts as the main people driving the business modelling, implementation and analysis,' concludes Filipowska. In other words, SUPER cuts out the middlemen — and the dangers of mistranslation during vital business transactions.

Promoted through the ICT Results service.

<http://cordis.europa.eu/ictresults/index.cfm?section=news&tpl=article&ID=90800>



Computing the topology of geometric surfaces

Aiming to address the needs of computer-aided geometric design (CAGD) for better intersection algorithms, the 'GAIA II' project consortium introduced approximate algebraic methods that combine speed with correct results.

When using CAGD systems for designing industrial products as a composition of surfaces, intersection algorithms are used to determine the curves where surfaces meet. The intersection of surfaces can seem mathematically simple. This is true for the intersection of two surfaces when they have a regular parametric representation and intersect transversally.

However, when surfaces are near parallel close to the intersection, the implementation of intersection algorithms becomes a real challenge. The primary objective of the 'GAIA II' project was to implement novel intersection algorithms that will improve the performance of CAGD systems and minimise the costs imposed on product creation.

Mathematicians at the Université de Nice Sophia-Antipolis in France used simple techniques such as the Delaunay triangulation to approximate the intersecting surfaces. By simplifying detailed geometric surfaces, programs that subsequently process the data to identify intersection curves can be accelerated and the time required to display the product model decreased.

Nevertheless, traditional surface intersection algorithms based on recursive subdivision will run for a long time before concluding that no results can be found in the case of non-transversal intersections. Using the Delaunay triangulation still left room for quite a few different approaches to the reconstruction of intersecting surfaces

and for improvement in the intersection algorithms.

Think3, the industrial partner of the 'GAIA II' project, implemented the triangulation-based intersection algorithm in a software source code that allowed refinement of the intersection curves identified to the desired accuracy. The triangulation-based intersection algorithm provided a reference implementation for monitoring the time and memory consumption of more advanced intersection algorithms introduced during the 'GAIA II' project. These include algorithms combining numeric methods for approximating the geometry of surface-to-surface intersections with computing the exact topology of intersections between parametric surfaces.

Funded under the FP5 programme IST
(User-friendly information society).

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 5047

Software for simulating highly dynamic systems

General purpose software was designed for simulating an exhaust gas aftertreatment system for heavy duty (HD) truck engines. The project developed a diesel engine aftertreatment system that has contributed to reduced levels of air pollution.

Diesel engines contribute significantly to air pollution by emitting nitrogen oxides (NO_x) and particulates, which have a negative effect on our health and on the environment. Although NO_x reduction technology has been available for petrol engines for some time, it has not been readily available for diesel engines. Therefore, the Ahedat consortium was established to develop and validate an exhaust gas aftertreatment system for HD truck engines. The project's objective was to reduce NO_x emissions and particulates from HD trucks using research based on NO_x adsorption technology.

The Ahedat project differed significantly from other aftertreatment technologies by relying on the dynamic operation and synchronisation of all the different units involved. This meant that unit integration and precise scheduling were necessary in order for the desired results to be achieved. This required a much greater level of sophistication than for previous models developed for other aftertreatment technologies.

Project partners from the Ben Gurion University of the Negev (BGU) created a platform that could simulate several connected units within the highly dynamic and com-

plex exhaust gas aftertreatment system. A number of commercial simulation packages were considered, with researchers selecting FEMLABTM for its flexibility, user-friendliness, numerical tools and graphics.

The BGU therefore developed a simulator based on FEMLABTM which was adapted and developed to improve the whole system. The university completed the simulation by creating a software system that could deal with the level of numerical complexity and facilitate the analysis and presentation of data. The final result was a general purpose and flexible package that could be applied to simulations and other highly dynamic aftertreatment systems.

Funded under the FP5 programme Growth
(Competitive and sustainable growth).

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 5069

Innovative environment for computer-aided medicine

A visualisation and interaction environment has been developed, in which all the information required to plan a hip replacement operation is presented with a set of representations based on medical imaging modalities.

Three-dimensional models of the skeletal muscle structure for the typical patient do not suffice for modern medical practices. Diagnosis and treatment unavoidably rely on the use of non-invasive methods like medical imaging techniques to collect patient-relevant information. Still, surgeons lack tools that would offer a simulated walk

through the human body and the option of virtually evaluating new procedures.

To address this need, the Multisense project combined haptic devices with visualisation tools in a unique virtual reality environment for orthopaedic surgery. The haptic modality would locate and measure the incision

and evaluate the surgical access this incision would provide. In addition, it could help position and orient an implant as well as identify any functional impairment produced by soft tissue damage.

At the heart of this pre-operative environment for orthopaedic surgery lays a semi-automatic modelling tool that uses data collected from computed tomography (CT) scans to create a patient-specific model. Although CT scans allow for the accurate description of bones under the skin surface, the structure of muscles is difficult to dis-

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Digitalising disease diagnosis

Software developed at the University of Helsinki in Finland is helping usher in the digital age of disease diagnosis for intervertebral disc degeneration.

Intervertebral disc degeneration can cause significant, often chronic, back pain and negatively impacts the quality of life of

those it affects. The condition can be brought on simply by ageing, but an important role for environmental and genetic factors has also been established.



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Seven laboratories spread throughout Europe and Israel combined their expertise to investigate the aetiology of intervertebral disc degeneration in the context of the Eurodisc project. Scientists with the University of Helsinki, one of the Eurodisc participants, focused

their attention on improving detection of the disease.

The goal was to move beyond traditional methods based on visual interpretation to a more objective method using software to analyse magnetic resonance (MR) images. The new approach enabled extremely precise measurements of displacement that not only facilitated diagnosis but also provided insight into the possible causes of the disease.

The software-based tool is ideal for use in studies testing the effectiveness of gene and other types of therapy that require repeated sampling. The researchers at the University of Helsinki also believe the software could facilitate the identification of telltale features of forms of the disease associated with intense pain.

Funded under the FP5 programme 'Life quality' (Quality of life and management of living resources).

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 5095

Bringing Plants into the digital age

Novel EU-funded research from the Plants project is helping to incorporate plants into our increasingly digital world.

Nature has for the most part been excluded from the digital revolution. However, there is considerable potential for benefit, particularly in the agricultural sector. With this in mind, the Plants research consortium set about developing the sensors and software necessary to establish an interface with plants.

One of the participants, the Computer Technology Institute (CTI) in Greece, was charged with the task of designing the decision-making components of the Plants system. The status of each individual plant is monitored with a variety of sensors. The system's hierarchy then extends to the local and global scales in which the plants interact with one another and their environment.

The heart of the decision-making process is the 'Plants ontology', a collection of rules

describing plant behaviour and the desirable states at each of the system's levels. The CTI researchers made efforts to enrich the ontology with knowledge obtained from machine learning experiments performed during the project. More specifically, new rules and decision trees were produced following detailed analysis of the plant sensor data.

CTI has copyrighted its contributions to Plants, which it believes will be instrumental in optimising agricultural effi-

ciency, eliminating the unnecessary waste of valuable inputs such as water, nutrients and even pesticides.

Funded under the FP5 programme IST (User-friendly information society).

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 5055



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continued from page 38 **'Innovative environment for computer-aided medicine'**

tinguish. Researchers at the Istituti Ortopedici Rizzoli in Italy took up the challenge of designing a dedicated tool that could support the interactive deformation of a generic musculo-skeletal model.

This interactive limb anatomy atlas is based on detailed digital representations of the human body that have been developed by

the 'Visible man' project. It employs a simple spring-based model to visualise muscle contraction along with the function of lower limb ligaments. Outlines of skeletal muscles are mapped on this generic musculo-skeletal model and then superimposed on synthetic scans generated along predefined axes. These outlines are deformed by simple geometric operations to match the under-

lying muscle structures to offer an accurate representation of the patient's functional anatomy.

Funded under the FP5 programme IST (User-friendly information society).

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 5089

Software solution identifies skills gaps in the workplace

Training employees to do their jobs effectively is something many companies would like to — and need to — improve. Now European researchers are developing software tools to ensure skill gaps are identified and plugged.

In most traditional settings, companies handle learning management and business process management as two wholly separate activities. This results in a mismatch between the training provided to employees and the actual business needs of the company.

The human resources managers who are responsible for deciding on training needs often lack the necessary detailed insight into the corporate context in which training is provided. As a result, the actual training needs of the employees with respect to their changing business duties are not fully met.

Companies in this situation are not operating nearly as efficiently, or as profitably, as they could if there was a proper alignment between individual training and business priorities.

The Prolix project was launched in 2006 to introduce business-process oriented learning — combining corporate training and business process management — to companies and organisations in the EU.

Scheduled to run until the end of this year, the EU-funded project has been developing new software that is able to analyse business processes — and the competencies required for those processes — to identify any skills gaps.

According to project coordinator Volker Zimmermann, 'once we have identified what is needed to make businesses faster or more cost-effective, we can then target training and provide a measured learning outcome.'

Prolix has developed a methodology to ensure the training that companies offer to their employees fits in with business requirements so as to improve the company. The first step is to conduct a business process analysis, which is done with software modelling tools enhanced with competency data related to the specific business processes. Process managers and HR managers within the company provide the necessary information.

This is an ongoing activity because, as processes, products and services evolve and change, so too do the skills gaps and special needs. Once the data is entered, the process becomes automated, with the Prolix tools conducting a skills gap analysis so employees can be given the training courses they need to do their jobs properly.

Once the initial research and development work was done, five test beds were set up with the three main ones being the call centre at a major telecoms operator, the credit control department of a large bank and a public-sector organisation rating social care homes in the United Kingdom.

'In the call centre example there are three levels of support for [callers],' Zimmermann says. 'When a call comes in, the person who answers is the first level and he or she opens a ticket and tries to provide answers and close the ticket. But if he can't, it gets passed to the second level and possibly even to the third — the higher it goes, the more expensive it becomes. If the company wants



to optimise the process, it needs to identify what knowledge the call centre agents need, to make sure most tickets get closed at the first level of support.'

In this example, the Prolix tools were able to identify the knowledge gaps of the first-level staff and make sure they got additional training to fill those gaps. As the telcos' services change and develop, the software continues to monitor the situation and see how well the first-level call centre staff are keeping up with the new developments.

With the care home test bed, individual homes are rated as one, two or three stars depending on the specific competencies of their staff. Prolix is able to measure the level of those competencies and identify the training which needs to be done in homes to get a higher star rating.

The project brings together a consortium of academic institutions, test bed partners, and software development partners, including the two largest European vendors of learning technology, a major business process management company, a competency management company, and a company dealing in learning games. The commercial software partners are from Belgium, Germany, Italy and Finland.

Most of them intend to continue working together once the project is finished to commercialise the system or integrate parts of it into their existing products. 'As a consortium, we are better placed than our American competitors to link learning solutions into business solutions,' says Zimmermann. 'We think it is a European strength to solve complex issues and integrate our solutions with business solutions whereas the American vendors tend to develop standalone applications.'

He points out that there will only be customers for the products spun off from the project if it can be demonstrated that the process improves productivity. 'We think we have already done this with the test beds, which gives us a competitive advantage,' he concludes.

Promoted through the ICT Results service.

<http://cordis.europa.eu/ictresults/index.cfm?section=news&tpl=article&ID=90790>



New machining solutions for microelectronics

Miniature engineering components have become an integral part across the spectrum of cutting-edge electronics. New advanced microforming tools are promising to address the increased tight tolerances of their high-precision manufacture.

From medical equipment to consumer white goods, it seems that miniature engineering components have invaded the electronics industry for good. The importance of such components with dimensions of a few micrometres has led to the development of new tools and advanced techniques for their automated high-precision manufacture.

The Machmini project partners initially focused their research efforts on defining the plastic-deformation characteristics of miniature materials that are crucial for the successful design and construction of miniature components. Microstructural models

considering both the grain size and surface effects that are more pronounced than in bulk materials enabled the improvement of existing manufacturing technologies.

Researchers from the University of Strathclyde worked on an incremental sheet metal forming tool system. Unlike other tool systems that are based on static or semi-static techniques, the ultrasonic impact microforming (UIM) tool system is based on the use of an ultrasonic generator.



Signals produced by the ultrasonic generator drive an ultrasonic transducer that subsequently excites the forming tool of the UIM tool system. This configuration allows the UIM tool system to carry out a variety of miniature material forming operations, from forming previously prescribed patterns of varying depth to producing drawn sections.

A prototype UIM tool system has been developed and delivered to major industries for the assessment of its performance.

Funded under the FP5 programme Growth (Competitive and sustainable growth).

Collaboration sought: marketing agreement.

<http://cordis.europa.eu/marketplace> > search > offers > 5036

High-temperature testing of microelectronic circuits

With the continual improvements in semiconductor fabrication technologies, microelectronics circuits can now be integrated into critical systems used within the automotive and avionics industries. To ensure their integrity and reliability, the ATHIS project partners undertook the challenge of testing them under their real operating conditions.

Silicon on insulator (SOI) technology has been widely recognised as a viable choice for the replacement of conventional bulk silicon (Si) substrates in manufacturing complementary metal-oxide semiconductors (CMOSs). Moreover, SOI technology providing dielectric isolation as well as a significant reduction of the leakage current has been established as the preferred choice in designing heterogeneous electronic systems.

The ultimate aim of the ATHIS project was to ensure the reliability of CMOS transistors built on this technology under operating conditions that exclude the use of conventional semiconductor technologies. Project partners at the Université catholique de Louvain in Belgium tested laterally diffused metal-oxide semiconductor (LDMOS) transistors in high-temperature environments such as those found in a modern engine.

To support results of numerical device simulations, a LDMOS transistor structure

was fabricated on extremely thin SOI films whose thickness did not exceed 80 nm. This is the first qualitative study of the physical phenomena deteriorating the output characteristics of LDMOS transistors in ultra-thin SOI films. In fact, different parasitic effects could be observed at low and high front gate voltages, the kink effect and quasi-saturation respectively.

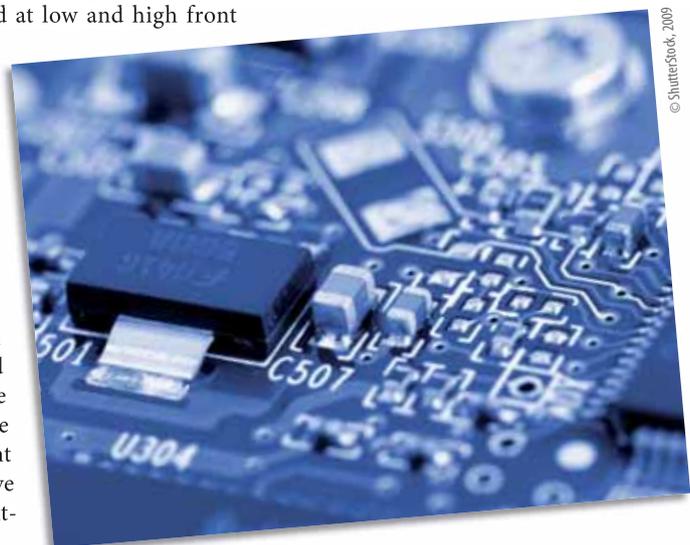
The results of two-dimensional numerical simulations performed on Silvaco's ATLAS platform clearly showed that both these effects should be taken into account in order to improve the breakdown volt-

age. On the basis of available simulation and experimental results, the optimum value for geometrical parameters such as length and doping of the drift region and the field plate length were determined. Additional trade-offs between the characteristics of LDMOS transistors are subject of research in order to further improve their performance.

Funded under the FP5 programme Growth (Competitive and sustainable growth).

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 5063



Tiny robots get a grip on nanotubes

How do you handle the tiny components needed for constructing nanoscale devices? A European consortium has built two microrobotic demonstrators that can automatically pick up and install carbon nanotubes thousands of times thinner than a human hair.

Carbon nanotubes, rolled up sheets of carbon only a few tens of nanometres in diameter, could become an essential part of the nanotechnologist's construction kit. But there is a problem: how can you handle objects which are so thin that they cannot be seen at all with a normal optical microscope?

'The handling and characterisation of these objects has become more and more important in materials science and nanotechnology,' says Volkmar Eichhorn of the University of Oldenburg and its associated institute, OFFIS. 'They have a huge application potential in various products.'

One solution, developed by the EU-funded Nanohand project, is to use mobile microrobots equipped with delicate handling tools. Nanohand builds on the work of Robosem, an earlier EU project that developed the basic technologies that are now being put into effect.

The robots, about two centimetres in size, work inside a scanning electron microscope where their activities can be followed by an observer. 'The whole set-up is integrated into the vacuum chamber of the microscope,' Mr Eichhorn explains. 'There is a glass plate where these mobile microrobots can walk around.'

Each robot has a 'microgripper' that can make precise and delicate movements. It works on an electrothermal principle to open and close the jaws, much like a pair of tweezers. The jaws open to about two micrometres and can pick up objects less than 100 nanometres in size. '[It is] really

able to grip micro or even nano objects,' Mr Eichhorn says. 'We have handled objects down to tens of nanometres.'

At that scale, the intermolecular forces between objects are stronger than gravity. Once a nanotube has been picked up it will stick to the jaws of the gripper and cannot easily be dropped into position. The team have had to develop novel 'pick-and-place' techniques to get around this problem.

One approach is to glue the tube in its final position using electron beam-induced deposition. Another is to use geometrical principles to ensure that the intermolecular forces pulling the tube towards its intended location are greater than those holding it in the jaws of the gripper.

'Worldwide, we are the first project that has really realised the automated microgripper-based pick-and-place experiments,' Mr Eichhorn notes. 'The new thing is the high accuracy and the small scale of the objects — in the range of tens or hundreds of nanometres — and the excellent control and software architecture being built around this whole set-up facilitating a high degree of automation.'

An early success of the project was to improve the performance of an atomic force microscope, a workhorse of nanotechnology. The microscope 'feels' a surface by dragging a fine probe over it. Individual atoms can be sensed and a picture built up. But conventional probes have a pyramid-shaped tip which cannot follow the hills and valleys of

deeply corrugated surfaces. The Nanohand team used their microrobots to automatically pick up a carbon nanotube and attach it to the tip, so greatly improving the probe's ability to sense deep valleys.

This achievement was made with the Nanolab demonstrator, designed for use in experimental laboratory situations.

In parallel, the industrial partners have developed a more robust Nanofab demonstrator, better suited to the needs of industry. They are exploring how the technology could be used for rapid prototyping of new designs for microchips. One idea is to use carbon nanotubes as 'interconnects', the fine wires that make the electrical connections to a chip. Because of their high electrical conductivity, carbon nanotubes dissipate less heat than copper and allow circuits to be packed more densely.

This application is of particular interest to STMicroelectronics, one of the project partners and a heavyweight maker of microchips. 'They would like to have a nanorobotic system where they can do fast and rapid characterisation of these devices,' says Mr Eichhorn. 'Up to now, it was a manual, teleoperated characterisation which was very time consuming.'

Many other industrial applications are possible, including novel devices that could not be constructed any other way. Applications in composite materials, displays and new kinds of transistors are all being talked about.

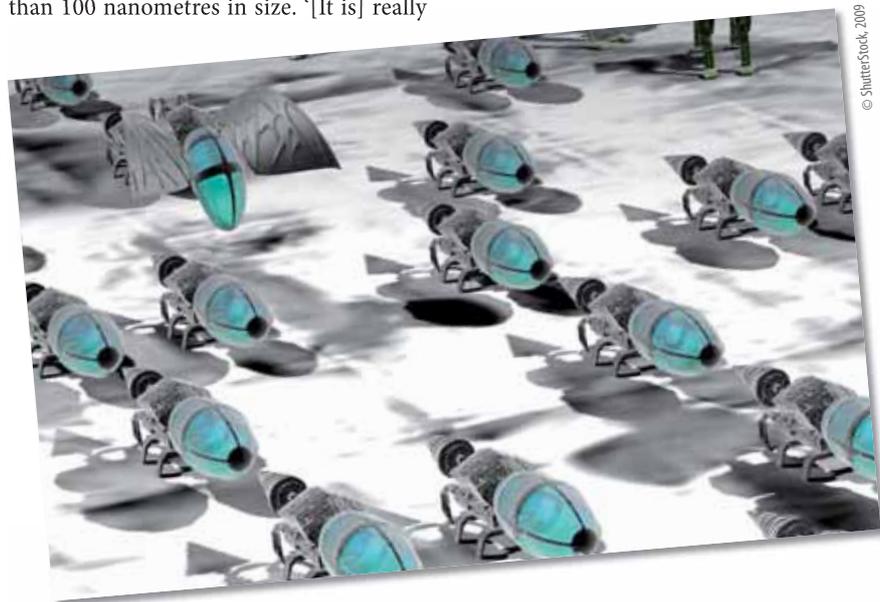
Other groups are working on methods of handling nanotubes, especially in China, Japan and the United States, but the Nanohand system of microrobots and microgrippers is proving effective and reliable. 'It's very promising for nanotechnology applications,' says Mr Eichhorn.

From the start, the project has been run with commercialisation in mind and the first product is already on the market. Two of the industrial partners, Tescan and Klocke Nanotechnik, are collaborating to sell a scanning electron microscope equipped with a nanopositioning system based on Nanohand technology.

The Technical University of Denmark (DTU Nanotech) intends to set up a spin-off to market the microgrippers and the École Polytechnique Fédérale de Lausanne (EPFL) is seeking to further develop the microrobots to the point where they can be commercialised.

Promoted through the ICT Results service.

<http://cordis.europa.eu/ictresults/index.cfm?section=news&tpl=article&ID=90829>



Magnesium takes on aluminium and steel

Pressure on the automotive and aeronautics industries to improve their environmental track record has spurred on Nanomag project partners to develop corrosion-resistant coatings. These are set to replace hazardous chromium-based coating treatments for magnesium alloys.

Reducing the weight of motor vehicles has been identified by the transportation industry as a primary means of decreasing their fuel consumption and subsequently, the output of exhaust emissions. Magnesium, which is one third lighter than aluminum and 80 % lighter than steel, has been increasingly used for this purpose since its first appearance in racing cars during the 1920s.

Magnesium alloys are being incorporated into transmission casings, steering wheels



cores as well as in different structural components of the motor vehicle body. Research conducted within the framework of the Nanomag project aimed to address the Achilles' heel of these otherwise versatile materials, their predisposition to corrosion and poor wear resistance.

Traditionally magnesium alloys have been protected against corrosion and wear with anodising treatments that involve the formation of a thin, compact oxide film strongly adhering to magnesium alloys. However, its cost is too high for mass production. Surface conversion coatings, on the other hand, are formed by treating the alloy surface with solutions containing hexavalent chromium, a hazardous air pollutant.

Plasma enhanced chemical vapour deposition (PECVD) was explored as an alternative surface modification technique. This entails the application of an electrical field to a low-pressure gas mixture, creating a glow discharge. Nanomag project partners

introduced tetraethoxysilane (TEOS) into the plasma, which breaks into reactive fragments that interact with magnesium alloys to form thin films of silicon oxides.

Films of silicon oxides were characterised by chemical and thermal stability, as well as low gas permeability. However, before their use in industrial applications could be considered, the deposition rate would have to be increased. Following a systematic optimisation of the main parameters in the deposition process, research work at the University of Patras in Greece resulted in a significant increase in the film growth rate.

More specifically, they succeeded in increasing the film growth rate by more than 40 % by increasing the frequency of the electric field oscillations from 13.56 MHz to the lower VHF range. These achievements of the Nanomag project may open the way for the industrial application of PECVD, which will give rise to minimal atmospheric emissions while offering superior resistance to corrosion.

Funded under the FP5 programme Growth (Competitive and sustainable growth).

Collaboration sought: information exchange/training.

<http://cordis.europa.eu/marketplace> > search > offers > 5067

Use of titanium dioxide photocatalyst in solar reactor

The photocatalytic activity of specially developed paper used in the degradation of organic pollutants was investigated. The paper was contained in a solar reactor and supported the photocatalyst titanium dioxide (TiO₂).

Drinking contaminated water is believed to be responsible for the death of around 5 million people a year, many of whom are young children. This problem was addressed by the Aquacat project which developed a fully autonomous system for providing clean drinking water. Researchers utilised energy from sunlight to purify water and developed a catalyst that could be reused repeatedly and manufactured without generating toxic waste.

When used in slurry form TiO₂ requires an unacceptable amount of time and effort for filtration. Therefore, project partner Ahlstrom Research and Competence Centre S.A. developed a new photo-inert paper for deposition of the solid. This was placed on the supports inside the solar reactor prototype. The photocatalytic activity of the resulting solid was tested using different contaminants. It successfully degraded a number of pollutants, including phenols, pesticides and dyes. The research team also ensured that the Aquacat prototype was

efficiently designed. They investigated the reaction rate relative to the radiant flux, the initial concentration, and the mass of catalyst employed compared to the number of tubings used.

The initial paper used by the research team suffered from some leakage of TiO₂. The problem was solved through the use of a new preparation of paper-supported TiO₂. This had a reduced amount of photocatalyst and an increased quantity of silica binder. The Aquacat scientists concluded that the solar reactor prototype worked best for a given solar radiant flux when used with the paper-supported TiO₂. They also discovered that the reaction rate was independent of the flow rate, making it possible to achieve a low flow rate of two litres per minute.

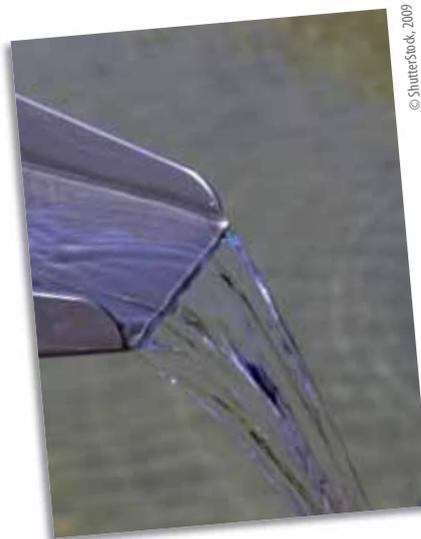
A low flow rate allowed catalyst deposited from the leaching and abrasion of the support to be preserved. It also enabled low levels of electrical power from photovoltaic cells to be used to run the recirculation pump.

Furthermore, the reduced flow allowed purified water to be conserved under clean conditions without the threat of recontamination. Yet another advantage of the slower water flux meant that the prototype could be maintained under clean conditions between successive runs. This helped prevent the build-up of biofilms, fungi and algae.

Funded under the FP5 programme 'INCO 2' (Confirming the international role of Community research).

Collaboration sought: further research or development support.

<http://cordis.europa.eu/marketplace> > search > offers > 5081



Process advances improve superconducting wires

Square and round Bi-2223-based superconducting wires developed during the Big-powa project promise improved efficiency and smaller size for electrical energy transport and storage systems.

During the last few decades there has been remarkable progress in the development of materials that lose resistance to the flow of electric current below a certain temperature. These superconducting materials that can maintain an electrical current without applied voltage have led to a continuous increase in the current capacity of wires used to transport electrical power over long distances.

Compared with other high-temperature superconducting materials however, Bi-2223 was seen as the most promising candidate for the industrial fabrication of high-temperature superconductor systems. The ultimate aim of the Big-powa project was to provide the R & D base for the fabrication of

Bi-2223 superconducting wires that would allow easy assembly of coils and other system components.

Two-axial rolling is a promising deforming technique for silver-sheathed Bi-2223 tapes that can lead to the desired texture both parallel and perpendicular to the tape surface. Project partners at the University of Geneva used a combination of drawing and two-axial rolling to fabricate silver-sheathed Bi-2223 wires with different filament arrangements and lengths that exceeded 200 m.

More specifically, single-core Bi-2223 tapes were inserted into square silver tubes with different configurations. The square tubes were

then deformed into square wires by using a two-axial rolling machine. Round wires were drawn from these square wires before the last few steps of two-axial rolling. These wires were heated to 820 °C and subjected to one or two intermediate deformations.

Both wire geometry and twisting were found to have a positive effect on alternating current (AC) losses of the fabricated round or square Bi-2223 wires. Alternating current loss measurements were performed by means of dual Hall effect sensors on twisted and untwisted wires and revealed the superiority of square wires over standard wires with flat filaments. Moreover, their relatively low values of critical current density is hoped to open the way for large-scale industrialisation of power applications of superconductors.

Funded under the FP5 programme Growth (Competitive and sustainable growth).

Collaboration sought: information exchange/training.

<http://cordis.europa.eu/marketplace> > search > offers > 5096

Insight into self-assembled semiconductor nanostructures

Research during the Nanomat project was devoted not only to the growth, but also the detailed characterisation of self-assembled semiconductor quantum dots. The strong interest in these nanostructures was motivated by their unique electronic properties that make them ideal as building blocks for a new generation of advanced laser devices.

Self-assembled semiconductor quantum dots are formed when layers of semiconductor materials are deposited on a substrate and the lattice mismatch between them is sufficiently high. In the past, it had been shown that significant improvements in the performance of laser diodes can be obtained with the use of arrays of quantum dots stacked on top of each other. This has been generally attributed to the increased uniformity of stacks of electronically coupled dots.

The consortium of the Nanomat project sought to gain deeper insight into the fun-

damental properties of stacked layers of self-assembled indium arsenide/gallium arsenide (InAs/GaAs) quantum dots that remained poorly investigated. For larger distances between successive layers of vertically coupled quantum dots, each layer was expected to be independent of the others. Reducing the inter-layer distance, on the contrary, would result in a different dot morphology or strain profile due to electronic coupling between them.

The electronic coupling between self-assembled InAs/GaAs quantum dots and their structural ordering was extensively studied

in the laboratories of the Katholieke Universiteit Leuven in Belgium. Techniques including photoluminescence in pulsed magnetic fields and atomic force microscopy were employed. The Nanomat project partners began by elucidating the mechanisms underlying the coupling of quantum dots. They progressively learned a great deal about the basic nature of quantum dots and determined how their growth can be manipulated to deliver the desired properties.

Moreover, improved structures of semiconductor quantum dots emerging from fundamental research were tested for their suitability for real-life applications, bringing these advances closer to industrial realisation.

Funded under the FP5 programme Growth (Competitive and sustainable growth).

Collaboration sought: information exchange/training.

<http://cordis.europa.eu/marketplace> > search > offers > 5086

Simple verification of temperature measurements

Aiming to inspire maximum confidence in infrared ear thermometers (IRETs), the Incolab project partners have developed measurement standards and the associated experimental set-up for verifying their correct operation.

Since the 1980s when they were first introduced as a new non-invasive alternative measuring method, IRETs have become very popular. These battery-operated thermometers are inserted in the auditory canal without touching the osseous component or the tympanic mem-

brane. The thermal emission from the medial aspects of the auditory canal is measured and readings are displayed within seconds.

In order to be able to verify the accuracy and reliability of these readings, an experi-

mental set-up was designed by researchers at the University of Ljubljana in Slovenia. This consists of a black body radiator approximating the ear canal. In the laboratory, a small hole to a larger cavity was used as a black body radiator through which almost no radiation passes and none is reflected.

Light entering through the small hole would have to be reflected at the walls of the cavity multiple times before it escaped and would almost certainly be absorbed in the process.

continued on page 45

Addressing amplified spontaneous emission in lasers

Scientists involved in advanced particle physics experiments may benefit from a new laser source with improved contrast developed at the National Centre for Scientific Research in France with the use of a nonlinear filter.

A number of projects on the cutting edge of technology have been funded by the EU. In the case of the SHARP project, the research was devoted to eliminating interference associated with amplified spontaneous emission (ASE) in ultra-high intensity laser applications.

The Laboratory of Applied Optics (LOA) coordinated with the SHARP project, which included nine other research institutes hailing from five different EU Member States. LOA and its partners designed and tested a prototype based on two chirped pulse amplification (CPA) laser systems.

The initial CPA module produces femtosecond pulses with millijoule intensity. The

pulses are then passed through a special non-linear filter that induces birefringence, which polarises the laser beam. This enables the system to separate out any extraneous ASE, which does not polarise, from the original femtosecond pulse. The resulting beam is subsequently amplified by the second CPA module.

Experiments with different pulse energies, beam diameters and chirp rates led to the identification of the optimal pulse cleaning settings. The result was a significant increase in contrast by three orders of

magnitude. Finally, it should be noted that filtering also helped ensure the excellent spatial quality of the beam.

Funded under the FP5 programme 'Human potential' (Improving the human research potential and the socioeconomic knowledge base).

Collaboration sought: information exchange/training.

<http://cordis.europa.eu/marketplace> > search > offers > 5060



Noise and vibration analysis in mechanical presses

Excessive noise and vibration caused by machine tools can have a serious effect on workers' health. A European initiative was developed to investigate the reduction of noise in large machine presses.

The Noiseless project was established to develop quieter machine tools by carrying out effective noise control measures and increasing tool life by reducing wear. The knowledge and technology generated by the project will result in improved design protocols for the European manufacturing sector. The Noiseless consortium comprised ten project partners from six different countries and included machine manufacturers, active damping suppliers, scientific research institutes and end-users.

Project partner Werkzeugmaschinenlabor (WZL) der RWTH Aachen from Germany

used modal and finite element analysis to investigate noise and noise reduction techniques in large presses. The researchers studied the transmission of vibration through the press structure and the effect of changes to the counterbalance system and the drive train speed. Modal analysis was also used to study the behaviour of vibration for the machine press as a whole.

The WZL researchers worked closely with Spanish project partners Fagor Arrasate, who design and produce mechanical and

hydraulic presses for industry. The team used drawings supplied by Fagor Arrasate as the basis for the finite element model. The model enabled noise and vibration from the presses to be investigated and provided the initial stage for a complete simulation of the press structure and press drive train.

The results from this study can be used to design quieter machines that benefit the physical and psychological wellbeing of the operators. Furthermore, the use of the model reduces the need for costly experimentation and can help extend the working life of the presses.

Funded under the FP5 programme Growth (Competitive and sustainable growth).

Collaboration sought: information exchange/training.

<http://cordis.europa.eu/marketplace> > search > offers > 5099

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The black body cavity was immersed in a stirred water bath of stable temperature that was specifically designed for evaluating the IRETs' performance.

Comparison measurements were performed with reference thermometers and black body cavities of different shape, temperature and emissivity. Deviations in the measurement of the same temperature with different thermometers were proven to be the result of an unusual combination of unfavourable influences.

Heating of the IRET's detector when touched by the user's hand may influence the temperature measurement, as well as the operation of its electronic systems. Deviations were also observed when IRETs were positioned differently at the aperture of black body cavities. These findings represent useful information for users of IRETs and can prevent large measurement errors.

On the other hand, the experience gained during the Incolab project was used for the development of a new code of practice for testing clinical

thermometers against black body radiators. Project partners have actively participated in the harmonisation of measurements standards issued by the International Organisation for Standardisation and recommendations by the International Organisation of Legal Metrology.

Funded under the FP5 programme Growth (Competitive and sustainable growth).

Collaboration sought: information exchange/training.

<http://cordis.europa.eu/marketplace> > search > offers > 5031

The following upcoming events were selected from the event diary of the Directorate-General for Research and from the CORDIS event calendar. For further information on past and upcoming events, please visit:

<http://ec.europa.eu/research/events>

<http://cordis.europa.eu/events>

European space weather week

The sixth 'European space weather week' (ESWW) will take place from 16 to 20 November 2009 in Bruges, Belgium.

This year's meeting will discuss recent advances in both scientific and application-based domains and how these advances relate to user needs. There will also be an opportunity to discuss the space weather community's contribution to possible future European Space Agency (ESA) action in the area of space situational awareness.

During a workshop, new data, tools and techniques will be discussed and demonstrated, with a view to aiding the transition between new scientific results and user-oriented space weather services. The meeting will also include a number of hands-on splinter sessions and several dedicated business meetings on community development.

For the second time, there will be a space weather fair, where users and service providers will have the opportunity to interact in an informal working environment.

The ESWW 2009 is being jointly organised by the Solar-Terrestrial Centre of Excellence (STCE), ESA, the Space Weather Working Team (SWWT) and European Cooperation in Science and Technology (COST).

For further information, please visit:
<http://sidc.oma.be/esww6/index.php>

Forum on ICT for sustainable homes

The first edition of the 'ICT for sustainable homes' research and industry forum will be held in Nice, France, on 16 and 17 November 2009.

The forum will be devoted to the new challenges faced by all those developing innovative products and services for the home environment, addressing such issues as:

- putting ICT to work for 'greener homes' (lower energy consumption, reduced impact on the environment);
- new consumer patterns (more meaningful and affordable products);
- new markets at the international scale;
- 'greener homes' which give the elderly and disabled a better life, in which health, security, communication, knowledge and learning are improved thanks to ICT.

For further information, please visit:
<http://www.ict-sustainablehomes.org>

Course in exposure assessment

A course entitled 'Exposure assessment I: chemical exposure assessment analysis and modelling' will take place from 16 to 20 November 2009 in Umeå, Sweden.

The objective of the course is to give an introduction to the field of exposure assessment, with a specific focus on chemical analysis and various modelling techniques. It is intended for PhD students, post docs, senior scientists and other professionals. Funding for travel, subsistence and course fee is available for PhD students and post docs.

The course is organised by RA-Courses, a project funded by the EU, in collaboration with the Swedish Karolinska Institutet and the EU-funded Cascade network of excellence.

For further information, please visit:
<http://www.cascadenet.org/projectweb/4667c4853b2a6/Courses.html#Course7>

European nanoelectronics forum

The 'European nanoelectronics forum 2009' will take place on 17 and 18 November 2009 in Noordwijk, the Netherlands.

A combination of speeches, poster and demo sessions will cover the latest developments in the field. The event is jointly organised by the Association for Euro-

pean Nanoelectronics Activities (Aeneas), the European Nanoelectronics Initiative Advisory Council (ENIAC) and the Cluster for Application and Technology Research in Europe on Nanoelectronics (Catrene).

While participation is by invitation only, an invite may be requested via the website given below.

For further information, please visit:
<http://www.nanoelectronicsforum2009.org>

Third European conference on ambient intelligence

The third 'European conference on ambient intelligence' (AMI-09) will be held in Salzburg, Austria, from 18 to 21 November 2009.

Ambient intelligence is an area which combines the concepts of ubiquitous technology, intelligent systems and advanced user interfaces, putting humans at the centre of technological developments.

The event aims to bring together researchers from academia and industry across various disciplines making up the field of ambient intelligence, to present the latest results, discuss the state-of-the-art developments and think about the future.

AMI-09 will include keynotes, technical papers, workshops, industrial case studies, posters and demos, panels and landscapes. There will also be opportunities to look into the next decade of ambient intelligence.

For further information, please visit:
<http://www.ami-09.org>

Earth observation and the water cycle

A conference entitled 'Earth observation and the water cycle: towards a water cycle multi-mission strategy' will be held from 18 to 20 November 2009 in Frascati, Italy.

Recent advances in Earth observation (EO) satellites have made possible improved global observations of several key parameters governing the global water cycle. In the coming years, an increasing number of EO missions will be launched by space agencies, enhancing our capacity to observe the Earth's surface. The full exploitation of this capacity by scientific and institutional users requires coordinated research efforts to develop robust global and regional operational products using

observation and modelling systems and data assimilation capabilities.

The specific objectives of this topical conference are:

- to assess recent progress and uncertainties in the full range of water cycle observations: precipitation, soil moisture, clouds, evapotranspiration, water vapour, surface water and groundwater measurements as well as surface heat fluxes and the Earth radiation budget;
- to identify the main needs and uncertainties in modelling and data assimilation from global to basin scales to improve our knowledge of water cycle science and our ability to quantify future changes in water cycle variables;
- to advocate the challenges and opportunities in water cycle science in order to reduce uncertainties in water-related climate change impacts and adaptation strategies in water resources;
- to consolidate a scientific roadmap outlining the main priorities for the development of robust global and regional geo-information data products, improved models and effective data assimilation systems.

For further information, please visit:
<http://www.congrex.nl/09c16>

European food science day

The communication network CommNet is organising a 'European food science day' on 18 November 2009 in Brussels, Belgium.

At the 'European food science day' key results in the field of food quality, food safety, nutrition and health will be addressed. Experts will discuss topics such as the melamine case, swine flu, food allergies, nutrition in pregnancy for life-long health, and the impact of infant-feeding on obesity.

This event is a collective effort of 10 research networks within CommNet. Together they represent more than 2 000 European researchers. The event's goal is to increase awareness of this field of research.

For further information, please visit:
http://www.commnet.eu/index.php?option=com_content&view=article&id=53

International conference on management

The 10th annual 'Management international conference' (MIC) 2009 will take place from 25 to 28 November 2009 in Sousse, Tunisia.

The aim of the conference is to present and discuss research that contributes to the sharing of new theoretical, methodological and empirical knowledge, and to a better understanding of management practices, particularly in the fields of creativity, innovation and management.

MIC 2009 is a conference for those involved in management studies. This year's event will concentrate in particular on creativity and innovation that are becoming important attributes for a successful society. There is a need for skills and competences that enable people to embrace change as an opportunity and to be open to new ideas in a culturally diverse, knowledge-based society.

For further information, please visit:
<http://www.mic.fm-kp.si/2009>

Conference on women's scientific careers

The second international 'Empowering women engineers' careers in industrial and academic research' (Prometea) conference on women's scientific careers will be held in Paris, France, on 26 and 27 November 2009.

Organised by two French partners of the EU-funded Prometea network, the Conference of the Deans of French Engineering Schools (CDEFI) and the French equal opportunities association Ecepie, the event intends to:

- create opportunities of exchange between researchers;
- take stock of the situation of women in engineering and evaluate the impact of public policies and of new corporate practices on their careers (more flexibility, development of teleworking, blurring of the border line between private life and work, gender-neutral parental leaves, day care services);
- encourage the emergence of new social models better adapted to the reality of contemporary social life.

For further information, please visit:
<http://www.prometea.info/conference2009>

Conference on fast reactors and related fuel cycles

An international conference entitled 'Fast reactors and related fuel cycles — challenges and opportunities' will take place from 7 to 11 December 2009 in Kyoto, Japan.

Organised by the International Atomic Energy Agency (IAEA) and hosted by the Japan Atomic Energy Agency, the conference aims to promote the exchange of information on national and multinational programmes, new developments and experience. This event also seeks to identify and critically review important problems, while stimulating and facilitating co-operation, development and successful deployment of fast reactors.

Topics include:

- advanced and innovative reactor concept designs and associated objectives and driving forces;
- recycle strategies for fast reactors and associated technologies;
- proliferation resistance and physical protection;
- economics and performance;
- transition scenarios: the path to fast reactor deployment;
- fast reactor safety;
- advanced fuels for fast reactors;
- structural materials: new challenges, manufacturing and performance;
- coolant technologies and instrumentation;
- in-service inspection and repair;
- advanced and innovative fast reactor component and system design, and technologies;
- past experience with fast reactors, lessons learned and perspectives: design, construction, commissioning, operation, decommissioning;
- fundamental issues, new experiments and requirements;
- advanced simulation, modelling and verification/validation/qualification in various areas;
- availability and capability of experimental facilities;
- human resources, education, infrastructures and knowledge management.

For further information, please visit:
<http://www.fr09.org>

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