ACADEMIA #52

Das Wissenschaftsmagazin der Europäischen Akademie Bozen
La rivista scientifica dell'Accademia Europea di Bolzano
La zaita scientifica dla Academia Europeica de Bulsan
The Science Magazine of the European Academy Bozen/Bolzano

2/**2010**

MY SCIENCE

Science as told by young journalists from 28 countries
Junge Journalisten aus ganz Europa berichten über Wissenschaft
Quando la scienza viene raccontata da giovani giornalisti europei

Poste Italiane s.p.a. – Spedizione in Abbonamento Postale – 70 % – DCB Bolzano – TAXE PERÇUE – Economy – C

MY SCIENCE is a project co-operation of

The MY SCIENCE European Program for Young Journalists is a support action aimed at improving the wider public's understanding of EU research, as well as the scientists' engagement towards the public. The project is funded under the FP7 "Science in Society" programme. The 18-month project is primarily focused on developing the basic infrastructure of a two-way communication between scientists and journalists through six training programs provided to 85 young journalists by scientists in research laboratories, who possess a background in training and scientific/technical know-how in ongoing EU funded projects. **www.my-science.eu**

IMPRESSUM

Informationen/Informazioni
T +39 0471 055055 F +39 0471 055099

Herausgeber/Editore
EURAC Europäische Akademie Bozen
EURAC Accademia Europea di Bolzano

Verantwortliche Direktoren/Direttori responsabili
Werner Stuflesser & Stephan Ortner

Erscheinungsweise/Pubblicazione
vierteljährlich/quadrimestrale

Redaktion/Redazione
Sigrid Hechensteiner (Chefredakteurin/caporedattrice)
Valentina Bergonzi (Vize-Chefredakteurin/vice-caporedattrice)
Peter Farbridge (englische Redaktion/ redazione inglese)

Redaktionsanschrift/Redazione
Drususallee 1, 39100 Bozen/Italien
Viale Druso 1, 39100 Bolzano/Italia
T +39 0471 055055 F +39 0471 055099
E-mail: press@eurac.edu

Grafik/Grafica Elisabeth Aster

Fotos/Foto Annelie Bortolotti

Druck/Stampa Longo Spa

Papier/Carta Dalum Cyclus Offset

Das nächste Magazin erscheint im Juli 2010.
Il prossimo numero uscirà in luglio 2010.

Numero e data della registrazione alla cancelleria del tribunale 19-94 del 5 dicembre 1994.
ISSN 1125-4203

Sie können dieses Magazin kostenlos bei uns beziehen/Potete ricevere gratuitamente questa rivista.
Redaktionsschluss 10. Mai 2010
Chiuso in redazione il 10 maggio 2010

Editorial — This issue features the best of My Science, an innovative scientific communication project financed by the EU.
EURAC and POLIS (Young Journalists Association) invited 85 young writers from 28 countries to get a close-up look at making science – funded by the EU – accessible for the public.
What a treat to work on this issue, to receive so much creativity from these writers, to realize that scientific communication can read like Le Monde Diplomatique or a page off a blog, and still be fresh, informative, thought provoking.
Favourite moment? Skyping with Veronika in Prague, who like me – in North America at the time – was scrooging connectivity in a café. As we spoke, I imagined her in a charming bistro on some Kafkian cobblestone street. Ah Prague, Prague!
She was in a Starbucks. Ah, well.

Peter Farbridge
English Editor of ACADEMIA

Editorial — Unser ACADEMIA-Sonderheft zu My Science lässt 22 junge Journalisten aus ganze Europa zu Wort kommen. Im Rahmen des EU-Projekts wurden sie von vier Forschungseinrichtungen in Wien, Prag, Gödöllö (Ungarn) und Bozen eingeladen, um sich mit Forschern auszutauschen. Ihre Erfahrungen mit der Wissenschaft haben sie in diese ACADEMIA einfließen lassen. Als Redaktion haben wir uns sehr über diesen erfrischenden Blick von außen gefreut.

Sigrid Hechensteiner
Chefredakteurin

Editoriale — Hanna, Tobiasz, Iza, Stafan, Eleonora, Elles, Samuel... Tra la mitteleuropea Vienna, la periferica Bolzano, la storica Gödöllö e la romantica Praga, la nostra redazione ha incontrato nei mesi passati quasi novanta giovani giornalisti scientifici. Si tratta dei partecipanti a My Science, il progetto finanziato dalla Ue che li ha portati in giro per i laboratori di mezza Europa. I 22 pezzi migliori compongono questo numero di ACADEMIA. Per ora una edizione speciale, che ci auguriamo diventi un contributo duraturo!

Valentina Bergonzi
vice - caporedattrice

01 Farah Fahim (EURAC/Department of International Relations and Project Service), Sigrid Hechensteiner (EURAC/Department of Scientific Communication) and Prof. Siegfried Benkner (University of Vienna/Head of the Department of Scientific Computing)

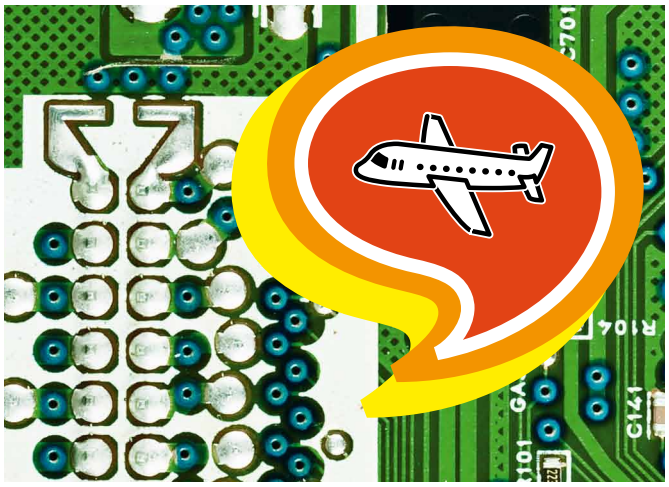
02 Peter Farbridge (EURAC/Department of Scientific Communication)

03 Daniela Mezzena (EURAC/Department of Scientific Communication)

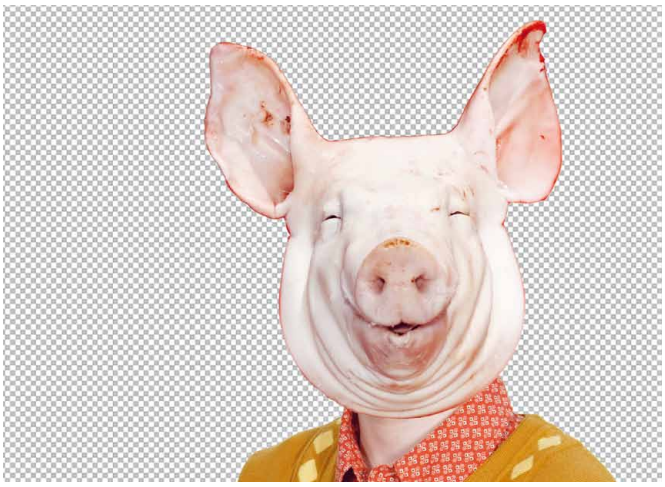
04 Jan Dąbkowski (President of Young Journalists' Association 'Polis')

05 Valentina Bergonzi (EURAC/Department of Scientific Communication)

Inhalt/Indice/Content



09 A new era of data-intensive science is upon us. Researchers at the University of Vienna's Department of Scientific Computing are demonstrating how advanced computing capabilities can help researchers manipulate and explore massive datasets.



16 Science fiction? This Photoshop morphing may look ridiculous, but cloning and stem cell research from labs like BioTalentum in Gödöllő, Hungary, is making the far-fetched plausible.

25 Face it. It's not easy being human. The European Academy of Bolzano/Bozen (EURAC) is carrying out research that illustrates humanity's precarious existence.

46 Love 'em or hate 'em, manufactured chemicals are here to stay. Although, at the Institute of Chemical Technology in Prague, the Czech Republic, researchers are enlisting 'good' chemistry to fight the 'bad'.

01

01 Foto von links nach rechts: Farah Fahim, Eva Maria Moar, Karina Zabielska, Mitarbeiterinnen im EURAC-Bereich Internationale Beziehungen und Projektservice. Die drei haben My Science koordiniert.

Es war einmal ein Forscher ...

Forschung im stillen Kämmerlein ist out. Wenn die EU Wissenschaft finanziert, so legt sie großen Wert darauf, dass darüber berichtet wird. Im Rahmen des von der EU geförderten Projekts My Science hatten Jungjournalisten aus ganz Europa die Chance, Wissenschaft aus Forschermund erzählt zu bekommen. ACADEMIA hat mit **Farah Fahim, Eva Maria Moar** und **Karina Zabielska**, den Projektverantwortlichen, gesprochen.

Frau Fahim, im Rahmen des EU-Projekts My Science hat die EURAC und POLIS (Young Journalists Association) gemeinsam mit drei Partnern, 85 junge Schreiberlinge in Sachen Wissenschaftsjournalismus ausgebildet.
Fahim: Ausgebildet ist das falsche Wort. Voraussetzung für die Teilnahme waren journalistische Vorkenntnisse. Ziel war es, jungen oder angehenden Journalisten die Welt der Wissenschaft näher zu bringen. In sechs Workshops zu den Themen Informatik (Universität Wien), Genetik (Bio Talentum, Gödöllö/Ungarn), Erdbeobachtung, Erneuerbare Energien und Minderheiten (EURAC, Bozen) und Chemie (Institut für Chemische Technologie, Prag) bekamen sie Einblick in den Forscheralltag, Laborarbeit inklusive.
Moar: My Science hilft die Berührungsängste abzubauen. Und zwar nicht nur jene der Journalisten, sondern auch jene der Wissenschaftler. Letztere misstrauen den Medien häufig. Werfen Journalisten vor, komplexe Inhalte als zu simpel oder reißerisch darzustellen. Bemühen sich oft aber auch nicht, eine klare, für Laien, also auch die meisten Journalisten, verständliche Sprache zu sprechen.

Wissenschaftsjournalismus ist demnach ein Wechselspiel zwischen Journalisten und Wissenschaftlern?
Moar: Unbedingt. Und ich glaube My Science hat da einen ganz neuen und innovativen Weg aufgezeigt. Der Großteil der Teilnehmer war begeistert, so nahe an die Wissenschaft ranzukommen. Viele von ihnen sind auch jetzt noch, nach den Workshops, mit den Wissenschaftlern in Kontakt geblieben. Und den Forschern hat es sichtlich Spaß bereitet, junge, interessierte Menschen aufzuklären.
Zabielska: Marc Zebisch, Leiter des EURAC-Instituts für Angewandte Fernerkundung, hat etwa mit großer Spannung auf die Artikel gewartet. „Wenn der Beitrag nicht klar genug formuliert ist," meinte Marc, „dann liegt das oft auch am Unvermögen des Forschers, komplexe Zusammenhänge zu vermitteln."

Warum finanziert die EU-Kommission so ein Projekt?
Zabielska: Die EU investiert viel Geld in die Forschung. Was für Projekte das sind und wem sie nützen, wissen die wenigsten Bürger. Ein Projekt wie My Science, das den Journalisten vorwiegend in EU-geförderte Forschung Einblick gibt, ist in mehrerlei Hinsicht von Nutzen: erstens berichten junge Journalisten in ihren Landesmedien über EU-Forschung, zweitens schnuppern sie in den Beruf des Wissenschaftsjournalisten rein, und drittens lernen auch die Wissenschaftler den Umgang mit den Medien.

Wird es eine Neuauflage von My Science geben?
Fahim: Das wissen wir noch nicht. In jedem Fall werden wir der EU-Kommission in unserem Abschlussbericht nahelegen, auch weiterhin Ausschreibungen im Bereich der Wissenschaftskommunikation zu machen. Viele Teilnehmer bedauern, dass es sich bei My Science um ein einmaliges Angebot gehandelt hat. Sollte die Kommission neuerlich ein Programm ausschreiben, würden wir uns natürlich wieder bewerben. Erfahrung haben wir jetzt ja. Wir überlegen uns bereits mit der Abteilung Wissenschaftskommunikation der EURAC eine kontinuierliche Weiterbildung auszuarbeiten.

Die aktuelle ACADEMIA ist eine Sondernummer des Projekts My Science.
Moar: Gemeinsam mit der ACADEMIA-Redaktion haben wir für jeden Workshop die besten Beiträge ausgewählt. Das Ergebnis ist ein spritziger Mix aus Interviews, Reportagen und Berichten. Wissenschaft aus dem Munde von 22 jungen Schreiberlingen aus 11 Ländern. Sowas gibt es nicht alle Tage.

Das Interview führte
Sigrid Hechensteiner

Exploring the Earth's Unseen Flora

Every year, 6000 billion bits of digital information are created in the form of the zeros and ones of computer binary code—about three times greater than in all books ever written. Europe is mobilizing to get a handle on this flourishing "data garden".

From studies on the tiniest ecosystems to those intocelestial events in deep space, scientists use computers to simulate physical and biochemical reactions, or even just to predict the weather. Their experiments have produced a plethora of data, all of which needs to be sorted, treated and analysed. At the University of Vienna in Austria, one of the oldest in Europe (14th century), researchers are developing a new generation of computer tools (data-integration tools, databases, data-mining software, etc.) intended to organize this unruly mob.

Managing the Data Déluge

"Jaguar-Cray", "Roadrunner", "Kraken XT5", "JUGENE-Blue Gene"—such are the barbaric names for the new 'brains' of science, computer hardware capable of a million billion operations per second. Veritable race horses of the computer world—whose advances are perhaps as significant as a present day calculator is to the abacus—, they enable the simulation of structures that are as complex as they are varied. In climatology or in seismology, computer models are not only extremely complex, but are updated in real-time by an army of sensors. "The strength derived from coupling historical observation with computer modelling represents the Fourth Paradigm," says Viennese researcher Peter Brezany. At the CERN laboratory (the birthplace of the Web), these behemoths are used, for example, to simulate the Big Bang. Other countries use them to recreate the conditions of a nuclear test (for example, France's Atomic Energy Commission).

But modelling also comes in useful in the world of industry. Computer simulations are at the heart of prototype conception in the fields of auto and aeronautical manufacturing. Surprisingly, the 'Cell' processor of PlayStation 3—created to simulate physical environments in 3D—are used in the fight against degenerative diseases, cancer and AIDS (Folding@Home, FightAIDS@Home). The machines are linked together into so-called "clusters" which increases their computing power. Understandably, the difficulty in managing these complex and heterogeneous infrastructures has similarly increased. Hence the rationale behind the University of Vienna's PEPPHER project (Performance Portability and Programmability for Heterogeneous Many-core Architectures). This programme will create a framework for the development of software flexible enough to adapt to tomorrow's heterogeneous processing elements, in certain cases projecting over five to ten years into the future.

A Tale of Amorality

"As with every human endeavour, the use of these techniques brings with it some risks. But their potential to contribute to the collective good is extraordinary," explains PEPPHER's Project Coordinator Sabri Pllana. "As with projects like ADMIRE (data mining) and @neurIST (detection of aneurisms), most of our research areas directly concern information sciences or health." Indeed, other projects at the department deal with cancers or reducing world hunger. Whatever the degree of their precision, these simulations can only show an approximation of 'reality'—one missing parameter and the results can be completely distorted.

Regardless, in the Seventh Framework Programme for Research and Technological Development (FP7), the European Union plans to invest € 9.1 billion between 2007 and 2013 for IT research (out of a total budget of € 53 billion). In 2009 the Union spent 2.4 billion in this sector, all programmes considered. But as Manfred Halver of the Austrian Agency for the Promotion of Research (FFG) is quick to add, "By comparison, we spend a billion on agriculture every day." It's a question of competitiveness. And there's the rub. In these kinds of programmes, sponsorship is a must. But for which applications, and for what results? What should be the balance between private and public sector? In Vienna, one of the participating organizations of the ADMIRE project is developing business software for resource management (both financial and human). These applications allow for, among other things, insight into consumers and their needs. On the other hand, Google, Facebook, and online video games wouldn't exist without these "server farms", infrastructures made possible thanks to the advancement of supercomputers. These computers are capable of "the best and the worst," explains Dorian Karatzas (Head of Sector, Ethics Review, DG Research, European Commission). "It all depends on how they are used." The multiplication of data, whether personal or not, is undeniable—its management is another story, and its protection always a challenge. The very controversial "Ipv6", the next generation of Internet Protocol (IP), conceived to "identify" consumer products, is only one example of the whither this future world "data garden" could grow.

Matthieu Dailly
m.dailly@gmail.com

Matthieu Dailly

Specialized in science and technology, journalist Matthieu Dailly received a diploma from the Centre de Formation et de Professionalisation des Journalistes de Paris (2009). An advocate for web documentary, he is currently a freelance journalist, and blogs for the current affairs hyperlocal "La Gazette du 7.7" of Seine-et-Marne.

Searching for Knowledge in a Flood of Information

When it comes to data analysis, data mining is a relatively new kid on the block. It is used, among other things, to create models that can predict or describe any number of scenarios, from shopping habits to floods. The ADMIRE project is mining the potential of this new technique.

Just think about this: every move in our modern world is associated with the collection of data. In 2009, 4.1019 bytes of data was generated, roughly equivalent to 8.5 billion DVDs. We're already generating much more data worldwide than we are able to store. So in today's world there is a strong need to approach existing data in order to extract pertinent values. That's what data mining is all about.

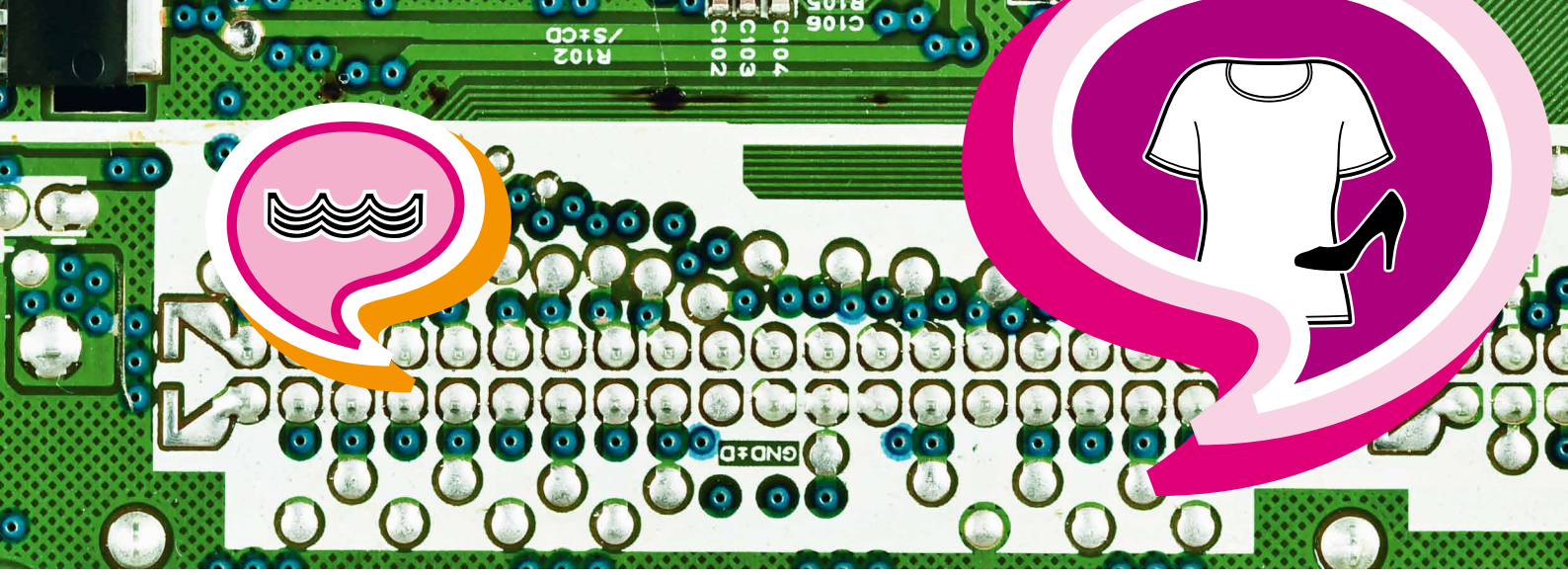
"Statistics is used mainly for analyzing existing data. Data mining focuses on finding patterns in data," explains Professor Peter Brezany from the Department of Scientific Computing at the University of Vienna. "In some way, data mining uses statistics as one of its tools." By definition then, data mining refers to identifying valid and potentially useful patterns in large volumes of complex data. These patterns can be useful for either prediction or description. The end product of data mining is knowledge.

Tools of the Trade

Data mining specialists use many methods to 'mine' data for knowledge or valuable information. One of the simplest and most widely-used methods is called "Association Analysis". This method looks for associations between variables. A supermarket is a good example: people who buy milk also want to buy cereal (which is associated with the former). Or, in another example, people from ages 20 to 30 with a certain level of education are interested in a specific portfolio of financial products. Another technique is 'clustering'. Like classification—which arranges data in groups—clustering tries to group elements with similar attributes into groups (called clusters). Significant in this technique is that you don't need to pre-define (as is the case with classification) what an element's attributes are in order to put it into one class or another. Clustering aims to create these classes at run-time and assign elements that are "similar" to the same cluster. Take clothing sizes, for example. Most people will fit into M (medium) or L (large) clusters, a few of them to S (small) clusters, and then the rest into smaller clusters called XS (extra small), XL (extra large). You (or the computer) decide if you want to assign people to three clusters M, L and S, or if you want to be more precise and have better-fitting clothing, you can choose to add XS and XL and have five clusters. Clustering techniques, therefore, will analyze the element's attributes (hip width, leg length, height, etc.) and assign people to clusters accordingly.

An Admirable Challenge

The ADMIRE project, coordinated by the University of Edinburgh, Scotland, aims to address another important aspect of data mining—data sources are usually distributed and heterogeneous (the data is stored in different ways). So users and developers of data mining and integration need to be able to have an abstract perspective over the whole lifecycle of data. ADMIRE is trying to deal with these issues by providing a framework and tools that help to approach and extract meaningful data sets from these different systems. It's like trying to write a novel in dozen languages, in which every other sentence is in a different language. (To top it off, you don't even know these languages well!)



With a total budget of € 4.3 million and with participating universities from the UK, Austria and Spain, the project is scheduled to run from 2008 to 2011. Thus far the ADMIRE framework has been deployed in two contexts. The first is a commercial company in Poland, where it is used for business analyses such as churn prediction. Churn prediction tries to foresee reasons why a customer might stop using their services or products, so they can make better decisions to prevent it from happening. The second is a flood modeling and simulation in Slovakia, which we will discuss in a little bit more detail.

Getting Its Feet Wet

The deployment of this implementation of the ADMIRE framework takes place in Slovakia at Slovak Academy of Sciences. Areas near major rivers in Slovakia are under certain risk of flooding. There was a large flood in 1999, but most local people remember better the year 2002, when the capital Bratislava was endangered by the unexpectedly high level of water in the Danube River. "To build a reliable model for environmental simulations, you must collect huge amounts of heterogeneous data from many meteorological and hydrological stations, as well as other domains," explains Dr. Ivan Jančiak, who works for ADMIRE project in University of Vienna. There are existing physical and mathematical environmental models which are used today to make predictions. However, flood prediction is a very complex problem that needs a lot of accurate input data to make an accurate prediction. "The main target for us is to find out if the technology behind ADMIRE is useful in real life," said Ondrej Habala, who is responsible for the pilot application in Slovakia. Ondrej works at the Institute of Informatics at the Slovak Academy of Sciences. He and his colleagues are participating in the development of the ADMIRE framework. The pilot project is called "Flood Forecasting Simulation Cascade", and aims principally at working with environmental data. Meteorological and water management institutions are actively participating in providing relevant environmental data, such as water level, water temperature, soil parameters or rainfall. Three different scenarios constitute the core of the pilot application. The first scenario predicts the water level and water temperature at the Orava dam. This prediction is important, because when water temperatures are very low in winter, huge blocks of ice can be created that clog the river and increase the danger of a flood. The second scenario forecasts potential rainfall from radar pictures, a new domain that can help meteorologists make more precise weather predictions. The third scenario is related to the first two. It tries to predict a water level increase in the major dams in Slovakia over a 24-hour period. In data mining, the data is usually extracted from a dynamic source database, that is, one that is constantly being updated with new data. It is then stored in a temporary static database on which data mining methods are applied. "The difference with ADMIRE," Ondrej's explains, "is that it is trying to extract data directly from the source database, in real time and integrate it for further processing."

Albeit unique, it has its drawbacks.

If a data mining system is well fed with data and well trained, it can make very precise predictions. But data mining can't foresee an event that has not yet occurred: it can train itself with historical data and learn how to make more and more precise prediction, but if a chance extreme event has never been recorded in the historical data set that the data mining was trained for, the precision of predicting and modeling of such an event becomes limited. It remains to be seen how scientists can predict the unpredictable.

Samuel Kroslak
skroslak@gmail.com

Samuel Kroslak

Samuel Kroslak grew up in Slovakia, studied Informatics at Slovak University of Technology, and now works as a freelance software developer. He is always working independently and tries hard not to screw up things more than they are.

Wenn die Informatik mit der Medizin...

Ein Besuch in der Abteilung für Scientific Computing der Uni Wien klärt auf, was wissenschaftliches Rechnen ist und was damit alles bewirkt werden kann: beispielsweise in der Medizin.

@neurIST wurde im Rahmen des FP7 von der Europäischen Kommission finanziert: 17,5 Millionen Euro kostete es insgesamt, davon wurden ungefähr 13 von der EU beigesteuert.

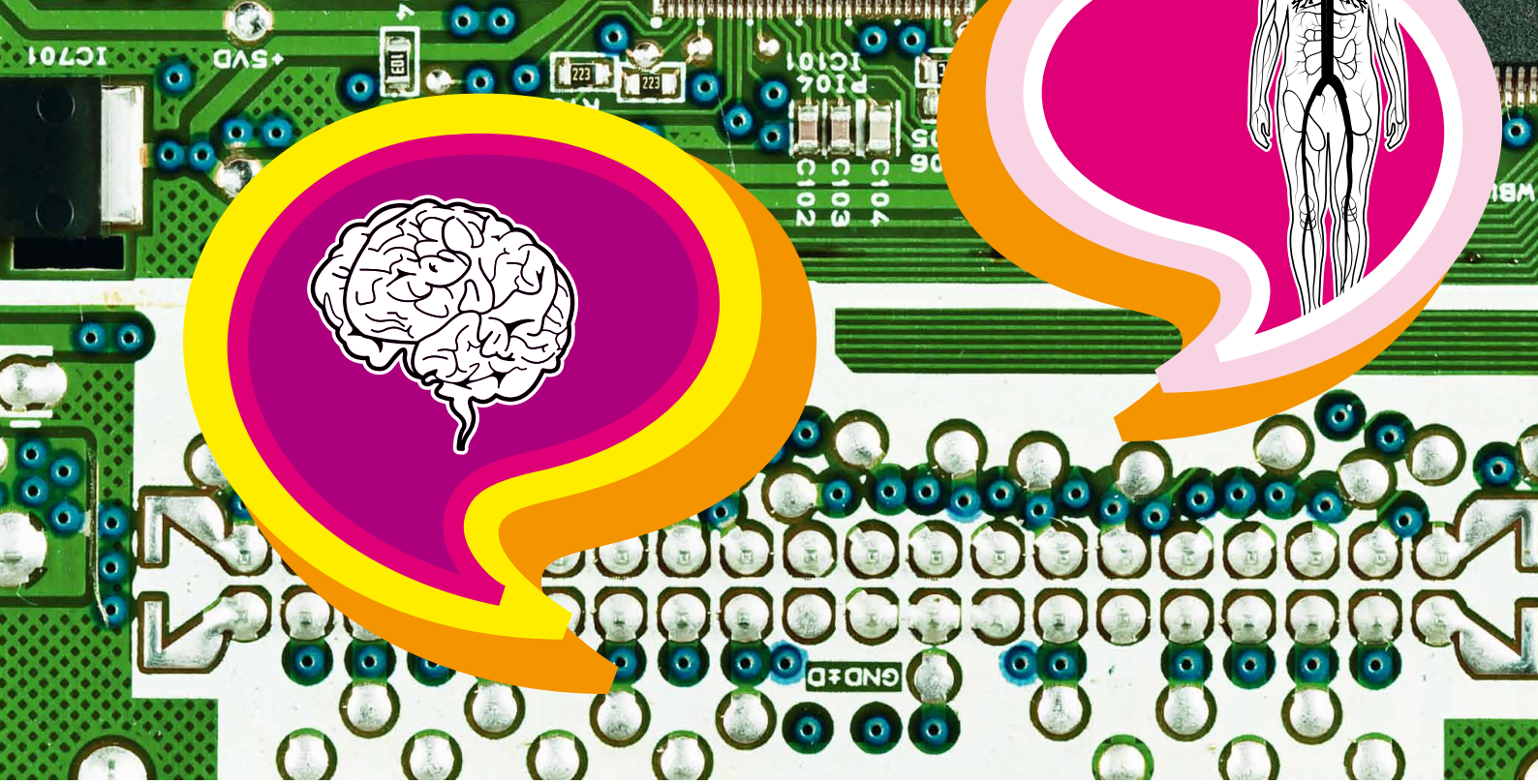
„Es ist, als ob wir die maximale Geschwindigkeit eines Ferraris alle achtzehn Monate verdoppeln würden", Wilfried Gansterer, Vorstand des Forschungslabors Computational Technologies and Applications der Fakultät für Computerwissenschaften in Wien, bringt es auf den Punkt, wenn er von der ständig wachsenden Computer-Leistung spricht. Laut Mooreschen Gesetz - nach Gordon Moore, dem Mitbegründer der Firma Intel, benannt - verdoppelt sie die Prozessorenleistung der Computer alle eineinhalb bis zwei Jahre.
Vom Commodore 64 der Neunziger Jahre zu den aktuellen Laptops war es ein rasantes Rennen. „Heutige Computer wären vor zwanzig Jahren Supercomputer gewesen", erklärt Siegfried Benkner Vorstand der Abteilung für Scientific Computing an der Fakultät für Computerwissenschaften in Wien. Ein Supercomputer sei ein Hochleistungsrechner, der im obersten realisierbaren Leistungsbereich arbeite. „Vor allem in der Wissenschaft kommen solche Rechner zum Einsatz. Ohne sie wäre es gar nicht möglich, die enormen Datenmengen zu verarbeiten."
Aber an der Fakultät für Computerwissenschaften ist nicht nur von Supercomputern die Rede. Professoren und Forscher schmeißen auch mit Begriffen wie **Cloud Computing** und **Grid Computing** um sich. Auch sie ermöglichen – ähnlich wie Supercomputer – numerische Simulation und allerlei Berechnungen sowie Darstellungen, die real gar nicht durchführbar wären oder einfach zu viel kosten würden. Konkret simulieren die Forscher im Bereich Scientific Computing Autounfälle, Naturkatastrophen oder chirurgische Eingriffe, „etwa eine Operation am offenen Gehirn", erklärt Peter Brezany, Professor für Scientific Computing in Wien.
„Beim Öffnen der Schädeldecke verändert sich der Druck im Gehirn. Dadurch kann sich beispielsweise auch ein Tumor verschieben. Mit Hilfe von Computersimulationen kann seine neue Lage exakt berechnet werden. Ein riesiger medizinischer Vorteil."

Cloud Computing
Beim Cloud Computing befinden sich die Anwendungen und Daten nicht auf einem lokalen Rechner, sondern auf Rechnern in einer metaphorischen Wolke (engl: cloud), die untereinander vernetzt sind: der Zugriff auf entfernte Systeme erfolgt dabei beispielsweise über das Internet.

Grid Computing
Grid Computing (vom Englischen Gitter) ist eine Form des verteilten Rechnens, bei der ein virtueller Supercomputer aus verschiedenen, miteinander in Verbindung gesetzten Computer erzeugt wird. Dies ermöglicht es, rechen- und datenintensive Probleme zu lösen, die die Leistungsfähigkeit eines einzelnen Systems übersteigen würden.

Wenn von wissenschaftlichem Rechnen die Rede ist, geht es nicht nur um Simulationen. Datenspeicherung und virtuelle Verbindung zwischen Firmen, Krankenhäusern und Labors zählen ebenso zu den Forschungsbereichen der Wiener Abteilung. Wie im Falle von @neurIST, einem Projekt zur Entwicklung einer allgemeinen Grid-Infrastruktur für die Verwaltung und Verarbeitung heterogener Daten zur Diagnose und Behandlung von Aneurysmen. Aneurysmen sind Ausbuchtungen beziehungsweise Ausweitungen von Arterien, die an Stellen entstehen, an denen die Gefäßwand geschwächt ist. Ursachen dafür können eine angeborene Schwäche aber auch verletzte Gefäßwände sein, etwa in Folge eines Skiunfalls.

@neurIST sieht, auf fünf verschiedene Teilprojekte unterteilt, die Erstellung einer Datenbank vor. Zurzeit nehmen 783 Frauen und 420 Männer aus sechs Partner-Krankenhäusern in Genf, Oxford, Rotterdam, Barcelona, Sheffield und Pécs am Projekt teil. Sie haben hierfür ihre Zustimmung gegeben. Die Herausforderung im



Projekt besteht darin, die Informationen zu den einzelnen Patienten in den Datenbanken des jeweiligen Krankenhauses zu belassen und sie zeitgleich virtuell auch anderen – am Projekt beteiligten Ärzten – zur wissenschaftlichen Weiterverarbeitung zugänglich zu machen.
Martin Köhler, Forscher der Abteilung für Scientific Computing der Universität Wien, meint: „Mit Hilfe der Datenbank, können Ärzte Vergleiche anstellen. Ein Patient in Barcelona leidet etwa an einem ähnlichen Aneurysma wie eine Patientin in Rotterdam. Erfahrungswerte in der Behandlung des spanischen Patienten, können dem niederländischen Betroffenen helfen. Ärzte können die Erfolgschancen eines Eingriffs besser abwiegen, bzw. eventuelle damit verbundene Risiken abschätzen." Die Datenbank kommt aber auch der Forschung zugute. So kann zum Beispiel bei familiärer Häufung von Aneurysmen auf genetische Ursachen geschlossen werden und bei Bedarf dem Krankheitsbild vorgebeugt werden.

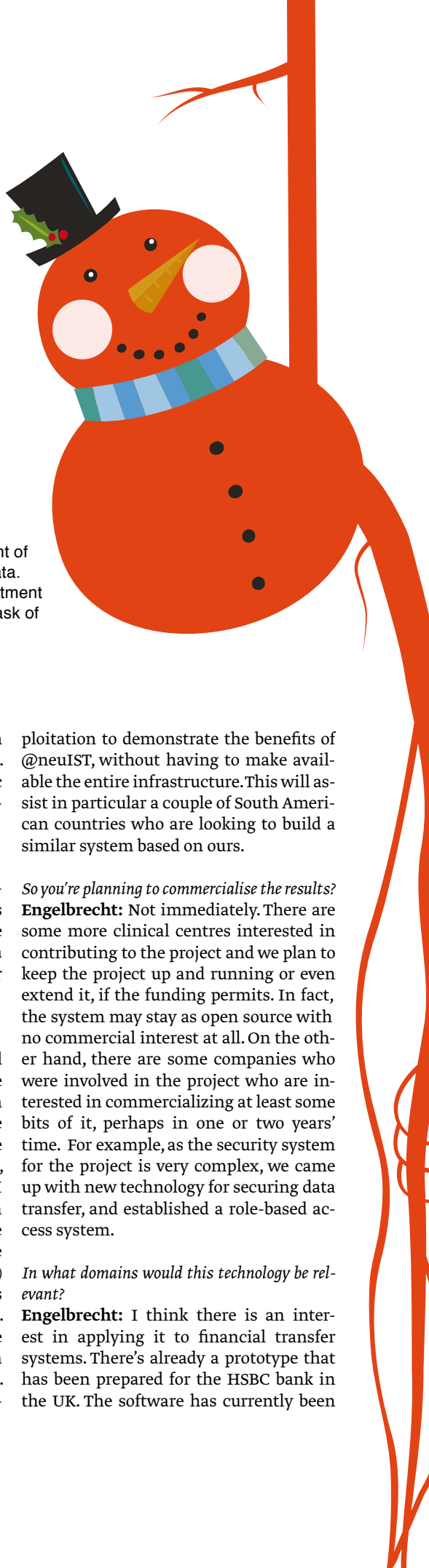
Als sehr wichtig erweist sich bei @neurIST auch der Datenschutz: „Die Anonymität des Patienten muss zu hundert Prozent gewahrt werden. Gibt es etwa Aufzeichnungen von Eingriffen oder Fotos, muss darauf geachtet werden, dass der Patient nicht erkannt werden kann", erklärt Martin Köhler. Die gesamten relevanten Daten werden pseudonymisiert sobald sie ein Krankenhaus verlassen. Pseudonymisierte Daten enthalten keine Informationen, mit derer Hilfe man die Daten zu einem Patienten zurückverfolgen kann.

@neurIST steht an der Schnittstelle zwischen Medizin und Informatik. „Computer-Wissenschaftler könnten zwar in Eigenregie ein System erarbeiten", so Siegfried Benkner, „aber kein Arzt wäre dann in der Lage, dieses zu verwenden." Informatiker müssen also eng mit Ärzten zusammenarbeiten. „Am Anfang wusste ich so gut wie nichts über Aneurysmen", erinnert sich Projektmitarbeiter Gerhard Engelbrecht und lacht. Zwar habe er im Laufe der Monate immer mehr zum Thema erfahren, aber Mediziner sei er deshalb noch lange keiner. „Das System erschafft ja nichts, es stellt Ärzten Daten und Darstellungen in einer neuen Form zur Verfügung", erklärt Martin Köhler. Wie diese Daten aufbereitet sein sollen, damit sie medizinisch relevant sind, das müssten schon die Ärzte bestimmen. Insgesamt beteiligen sich rund 100 Fachleute am Projekt. Zwei Drittel davon sind Ärzte.

Michela Perathoner
michela.perathoner@gmail.com

Michaela Perathoner

Michela Perathoner aus Bozen hat Internationale Beziehungen und Diplomatie an der Universität Siena studiert. Nach zahlreichen Studien- und Arbeitserfahrungen in Italien, den USA, Belgien, Spanien und der Schweiz, lebt sie gegenwärtig in Jerusalem, wo sie in der internationalen Entwicklungshilfe und als freie Journalistin tätig ist.



@neurIST @ work

The @neurIST Project was created to increase the quality of diagnosis and treatment of patients at risk of cerebral aneurisms by decreasing the fragmentation of medical data. My Science caught up with computer scientist **Gerhard Engelbrecht**, whose Department of Scientific Computing at the University of Vienna was behind the monumental IT task of making sense of reams of heterogeneous information.

What is the outcome of @neurIST for your department?
Engelbrecht: We learned a lot about various scientific fields, developed new software, and worked a great deal on data integration, which was a relatively new subject in our department. We dealt with huge data sets, integrated them, and made them accessible via the Internet. We've progressed in the area of data security and cloud computing as well. We were inexperienced in those areas when the project started.

And I presume you definitely know more about "red snowmen"?
Engelbrecht: [laughs] Aneurysms do look like red snowmen. Who knows what they would resemble if you coloured them blue?

You mentioned cloud computing just now. Did you have to use cloud and grid computing in the project to get the power necessary to deal with that amount of data?
Engelbrecht: Originally we just wanted to have a "cyber infrastructure", a sort of umbrella that covers both these technologies. We already had frameworks for grid computing, mainly in the areas of high-performance computing and compute-intensive applications. In the end, we carried out the project on certain machines we have here, put it all on a server and in a cloud—the Amazon cloud, for example. Happily, the system we created is generic enough to apply to other problem domains, not only aneurysms.

Will these domains be medicine-related?
Engelbrecht: Of course medicine will remain a focus, but other sciences, such as physics and chemistry, are similar in the technical sense, as they have huge data sets and require a degree of simulation or computation.

When will the project finally be finished?
Engelbrecht: The project was scheduled to be finished in December 2009, but we had an extension until the end of March 2010, the date of the final review. Some partners have already closed off on the project, but we, as the service providers, will be involved up until the very end. I think the @neurIST services (along with the Web portal) will run at least for the next full year. These will be used to give researchers and clinicians access to (bio) medical data and computing resources which are relevant to aneurysm research. We also plan to build a software package which can then be used, for example, in the Amazon Elastic Compute Cloud (EC2). The rationale behind this is further exploitation to demonstrate the benefits of @neuIST, without having to make available the entire infrastructure. This will assist in particular a couple of South American countries who are looking to build a similar system based on ours.

So you're planning to commercialise the results?
Engelbrecht: Not immediately. There are some more clinical centres interested in contributing to the project and we plan to keep the project up and running or even extend it, if the funding permits. In fact, the system may stay as open source with no commercial interest at all. On the other hand, there are some companies who were involved in the project who are interested in commercializing at least some bits of it, perhaps in one or two years' time. For example, as the security system for the project is very complex, we came up with new technology for securing data transfer, and established a role-based access system.

In what domains would this technology be relevant?
Engelbrecht: I think there is an interest in applying it to financial transfer systems. There's already a prototype that has been prepared for the HSBC bank in the UK. The software has currently been

01

01 Gerhard Engelbrecht

released as open source, but as is often the case with such products, lack of support leads to their death on the Net somewhere down the line.

Tell me about your personal role in @neurIST?
Engelbrecht: My personal contribution was to make guarantees possible. Meaning if you have a certain task that is computationally-intensive—yet has to be finished in a specific period of time—one must guarantee it can be done. Take CT imaging, for example. Guarantees mean you can say in advance: "I'm going to put you into the CT scanner and 50 minutes later you will have the completed image". It's called "Quality of Service". This becomes even more essential if you're in an operating room and a computation is required. Then you have to reserve some IT resources in advance so that you know that they are available during the surgery. So I built systems for this and performed related research. This was basically my contribution.

That's an almost heroic notion. A colleague of yours, Siegfried Benkner, mentioned the growing need for hero programmers.
Engelbrecht: He's surely right. But a hero programmer, in my opinion, is rather somebody who is open to new frameworks, new techniques and new ways of working. For instance, there is a new trend called "extreme programming" in which two people work in tandem on the same problem, sometimes even on the same computer.

What does that mean? Do you apply two different solutions to one task and compare them?
Engelbrecht: No, we work on the same problem. One inputs, the other watches, and then we switch. The work goes very quickly because you can immediately see the problems and possible errors in the other's work, and can correct them immediately. Four eyes see better than two.

Was this technique used for @neurIST as well?
Engelbrecht: Sure. In computer research, we usually have to develop a new concept or architecture very quickly from scratch, and in very competitive conditions because our final goal is not to release a stable product, but to demonstrate or prove that it works. Sometimes this can mean having to find a prototype in a couple of hours. Being that effective when you are alone is very difficult because you can get stuck on a problem and work on it over and over again. But if you work on it with two—or even three people—you usually get very quick results. Extreme programming was defined two or three years ago, but we had actually done this before that. We found it to be very effective and that we could progress very fast.

Do you consider yourself a hero then?
Engelbrecht: A hero? No. I see myself more as a contributor to further development. I like my job, of course. But a hero for me is someone who really invents something spectacular or earth shaking.

Hanna Siemaszko
hanna.siemaszko@gmail.com

Hanna Siemaszko

Hanna is a Polish-English translation studies graduate (with Arabic as a minor) who loves to deal with words. As a typical Polish person she moved to Budapest to teach English. She is interested in IT and mad about volleyball.

It's a Pig's Life

From a physiological perspective, pigs resemble humans in many ways. Their organs, such as the heart, liver or kidney, work quite similarly to ours. Thanks to these animals, we may someday be able to prolong our life expectation—and have more time to enjoy ham sandwiches.

It might seem like science fiction, but so-called "xenotransplantation"—using animal organs in human patients—is likely to become a reality in the not-so-distant future. It will only be possible under certain conditions and after overcoming a number of obstacles, and pigs, so far, are the hottest candidate to become humanity's new rescue workers. The widely-known and -used transplantation pattern 'human to human', could soon be replaced by 'pig to human'. A human heart which suffered from a heart attack might be changed to the beating of a piglet's heart, and livers destroyed by alcohol could be switched for a pig's. And patients who have to go through dialysis to clean their blood could be given a pig's kidneys.

Spic-and-Span Pig

Not all pigs are suitable for this purpose. Individual pigs targeted to be organ donors would have to live a very sterile life, full of tests to prevent the transmission of viruses and bacterial diseases. Pigs tissue composition differs from that in humans in some specific aspects and transplanted pig organs would be rejected violently by the human immune system. Therefore scientists have suggested a solution of creating genetically-modified "humanised" pigs specifically for this purpose, whose organs would be more acceptable in a human body. "If we manage to create such a pig, it will become a universal donor which would help overcome donor organ shortages" says Hungarian scientist András Dinnyés. Dinnyés, a biotechnology professor at Szent Istvan University in Gödöllö in Hungary, also runs a biotechnology company, BioTalentum Ltd, which is involved in transgenic animal research. "In this case, a genetically-modified pig would be safer donor, because we could avoid potential disease's transmission from human to human." In any case, even human organ donors must be stringently tested for bacterial or viral contamination. Viruses can be hidden inside the organs and are not easily detectible. Research on xenotransplantation is also supported by the European Commission. Scientific teams from several European countries, such as Italy, Great Britain, Germany, Netherlands and France are involved in a large scale European Union financed project. "It's a promising project, most of the technological elements are available, but there are many further steps to complete it" says Dinnyés.

You Won't Grunt

The most likely organ to be transplanted first seems to be the kidney or the liver. With a pig's heart, complications may emerge due to the fact that, contrary to pigs, people are bipeds. Therefore, the human heart undergoes greater strain that the pig's heart valves might not be able to cope with. But there are other questions to be answered—for example, the operating life of a pig's organ. Will the organs have to be replaced after several years? Scientists don't know yet. Similarly, it is not understood what would happen if a ten-year-old received a piglet's heart. How much would the organ grow within the human body? The financial and economical potential also needs to be taken into consideration. "At first, a genetically modified pig will be costly. When we cloned the first piglet, it was also very expensive. But the second one was cheaper, the third one even cheaper and today it is a reasonably priced method," says Professor Dinnyés.

Poor Piggy

The pig seems to be the most applicable donor also for other reasons. The killing of pigs is generally accepted: no pig, no Wiener schnitzel. Nonetheless, obstacles may emerge, particularly for religious reasons. Muslims and Jews consider a pig as unclean animal. "Perhaps we could transplant monkey's organs as well," explains professor Dinnyés, "but here we meet the problem of how sacrifice of non-human primates would be accepted within the society. Many species are protected and they are also more complicated to breed, and the genetic engineering in this field is far behind that in pigs." Yet another complication could be human mentality. When we think of a pig, the majority of us still imagine the stench of the piggery, the grunting and so forth. "But if somebody has two possibilities – potentially die while on a waiting list for a human donor organ or try out a pig's organ, I believe, that many people would choose the second option," suggests Dinnyés.

You Can't Fool Me

The biggest obstacle of xenotransplantation is the immune system. You can imagine what happens if you force the body to accept a tissue from different species—it's like refuelling a petrol engine with diesel fuel. The human body is very sensitive and a warning light usually appears even after transplanting human organs, which are of the same biological context. Although some of the most acute reactions would be prevented, even the genetically engineered pigs' organs would initiate some rejection processes. Unlike the engine, which can't be persuaded to operate otherwise, scientists have the means to stupefy human immune system and prevent organ rejection. But as with motion sickness pills which can compromise mental alertness, a suppressed immune system cannot protect the body totally, and viruses and bacteria are creating an increased risk in the patients.

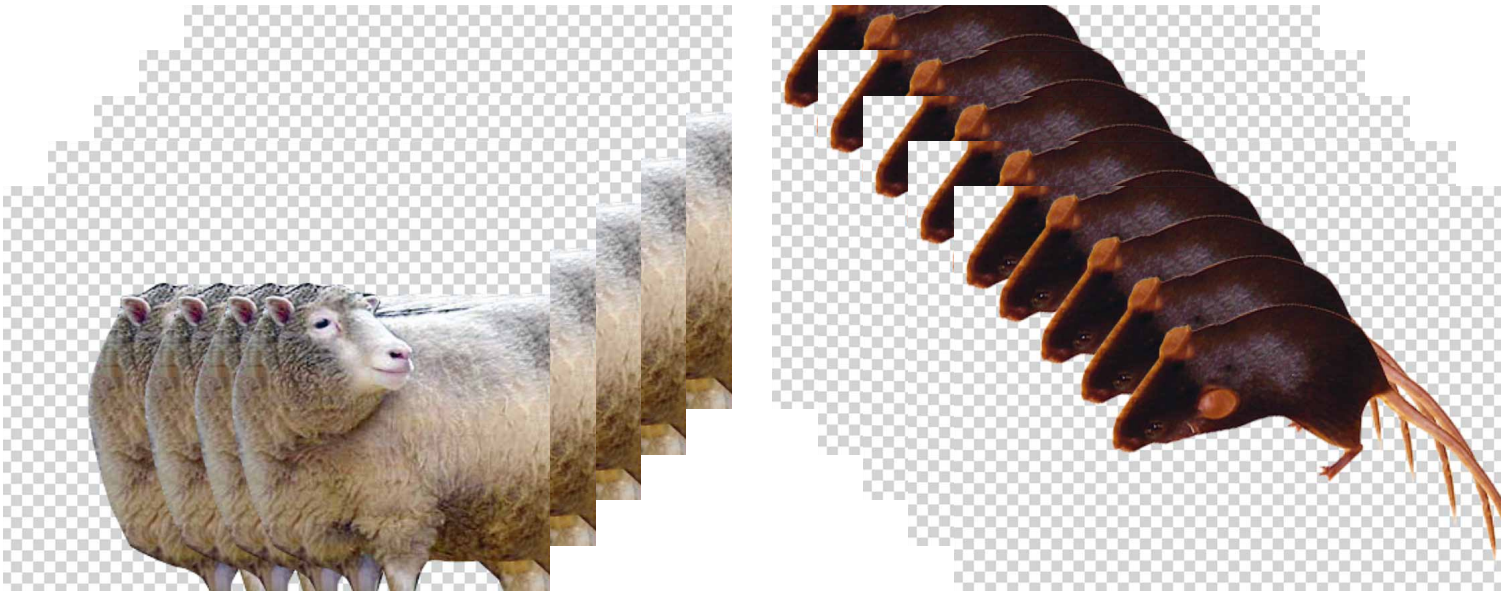
For the Moment, They're Just Delicious

The lack of organs for transplantations is a very current issue—every year, many people die from the want of a suitable donor. Xenotransplatation is one of the possible solutions. Scientists don't want to guess when the first pig organ might be transplanted, however they are shooting to make it happen within a decade. On the other hand is it also possible that by this time completely new technology will be discovered and xenotransplantation will be left aside.

Veronika Pitrová
V.Pitrova@seznam.cz

Veronika Pitrová

Veronika Pitrová is a student of journalism based in Prague. She has been working for an international news desk for the private TV channel NOVA, has experience as a domestic political reporter, and, during a stay in Paris last year on an exchange programme, served as France-based reporter for Czech national radio. She is primarily interested in EU-related matters and political reporting, however she wouldn't turn down the chance to report on any other topic.



Making a Difference in the Lives of Many

András Dinnyés was the leader of the team that cloned the sheep "Dolly", the first cloned mammalian in the world. For Dinnyés, politicians can be far too quick to intervene in the ethical quandary of transgenic research.

Can science do anything it wants?
Dinnyés: Personally I think we should focus on research that has a potential to have a positive impact on people. We should strive to improve the quality of life. This is why I moved away from agricultural sciences, where I began, to biomedical sciences. It has a stronger impact on people's lives. After all, science is influenced by the "market" and there is a push for applied research. As scientists, we need feedback from society on what is useful science and what is not. Scientists often do not consider the big picture; they always think they are doing something interesting. But there are limitations in investing public money in things that nobody wants, whether for ethical or economic reasons. As we are using public money, performing market research before investing that money is well justified and fair. On the other hand, not every research can and has to be directly applicable, as we need discoveries from basic sciences that improve the scientific world and pave the way for a better future. After all, in science you should expect the unexpected; otherwise it's not a scientific discovery at all.

Is cloning extinct species and pets a waste of time and money?
Dinnyés: Certain issues would have an immediate positive impact, creating novel medical model animals in rabbits or rats – projects I am working on—or for endangered species preservation, for example. But although cloning a mammoth may sound exciting to a ten-year-old, it's really only a commercial interest. Imagine if every zoo ordered one. A panda costs one million dollars to rent, since the animal and all its progeny remain Chinese property. Think what a real life mammoth would cost! That would mean big business and great publicity for cloning but it would not change or improve society.

Why is the communication between science and society so hard?
Dinnyés: Science is often handled as an ivory tower because to do it you need lots of knowledge and you specialize more and more – including the proper terms and vocabulary. That's why the communication is so difficult: scientists often are not able to explain what they do in simple terms. Unfortunately, usually there is no science communication training at the universities. Scientists should try harder and they should be trained in this. Of course not every scientist will be good at it. Universities should do much more, as EU-research programs typically have communication courses for scientists and students.

How do you feel about the way society deals with your area of research?
Dinnyés: I feel both happy and sad. Most people know about the research and some are excited about it. But it's the details they don't understand.

How can this be changed?
Dinnyés: The image is distorted through the media, politicians and interest groups. Most people do not understand the potential benefits before I have a chance to talk

01

01 András Dinnyés is known worldwide for his expertise in research into reproduction and biotechnology. Dinnyés was team leader for the team that generated the first cloned mammalian worldwide, a sheep named Dolly. Later, he also cloned the first animal in Hungary, which was a mouse with the name Klonilla. Currently, he is a professor at Szent Istvan University in Gödöllö, Hungary. Furthermore, he is the founder and CEO of BioTalentum Ltd, a research company which works on transgenic animal technologies and stem cell technologies, especially on embryonic and induced pluripotent stem cells. His company has numerous international cooperations and plays a leading role in several European Union financed research projects.

to them about the details. But there is no time to discuss these with every person on the planet. So that's why media sources are crucial. On the other hand, it is hard for laypeople to know which article is reliable and which is not, since articles for and against specific research appear every day. I think that journalists need much more scientific training, as they need to understand what they're writing about. It's the same with sports or the arts: You should not comment on a football game when you do not know the rules. I think it is naive to say that someone with no knowledge about science will write a better and more objective article.

Is the biotechnology climate in the EU good for science?

Dinnyés: It varies depending on the topic and the country. In the EU, animal research and the use of human embryonic stem cells are strictly regulated. In Hungary, I'm a member in the regulatory advisory bodies helping the government and the Academy of Sciences to formulate better policies. I'm trying to pave the way for future scientists.

Can regulators keep up with science?

Dinnyés: Novel scientific discoveries, such as, for example, induced pluripotent stem cells, are coming out so fast that the regulations cannot cope easily with the novel scenarios created by them. These stem cells can be made from adult cells, such as skin or fat cells, unlike the normally used embryonic stem cells. I have a strong interest in researching this stem cell type in humans and to become the first to obtain a permission to use them in research. Only by setting up a company, though, was I able to react fast enough on the new discoveries – universities are much slower.

Do you feel that the rules are too strict?

Dinnyés: Rules are very important as they provide a frame for the work. But political influence on sciences is another issue. When in the Netherlands, they cloned the first bull named "Herman" it was very advanced-staged work worldwide. But then the government decided that it was too risky and the company had to move the animal to Finland and later to the US for freedom to do that line of research. When politicians think something is risky they just intervene even if the regulations and rules are not there and often they do not understand the techniques. When the former US President Bush forbade the investment of public money into human embryonic stem cell research, the only thing that happened was that the transparent public institutions were forced to stop their federally-funded research. But the private companies could carry on and nobody would know what they were doing. That's obviously not the best way of dealing with such issues.

How should we then deal with these controversial issues?

Dinnyés: Communication between scientists and key stakeholders, including patient organizations, industry and politicians should be started in a very early stage. This would allow a better legislation to be in place by the time a new discovery starts to be applicable. Of course, this is a bottom up approach compared to the typical paternalistic top-down regulatory systems.

Do you understand society's scepticism?

Dinnyés: Society has the right to be careful and conservative. Being skeptical is a bit more sad, as it reflects the fact that scientists failed to balance the negative side effects with the positive benefits of the new discoveries. Furthermore, scientists often made exaggerated promises, under pressure from media or grant agencies. And there is a payback time for every mistake made. However, if we look at the progress we can expect, as a scientist, I am not skeptical at all – I strongly believe that what we might achieve will make a difference in the lives of many.

Djoke Hendriks
djokehendriks@gmail.com

Djoke Hendriks

Djoke Hendriks has a bachelor degree in chemistry with a specialization in biochemistry. Since she was interested in news and journalism from an early age, she decided to do a Master's in journalism. She has almost finished and will continue studying because she also wants to earn her masters degree in biochemistry. Djoke wrote many articles for the magazine for chemistry students and recently did an internship at the science section of a Dutch national newspaper named NRC Handelsblad. She also likes reading lots of fantasy books, playing the transverse flute and listening to many kinds of music.

Deceiving Destiny

Skin is supposed to be skin and the fate of a heart's cell is to be the cell of a heart. That would seem to be a fact, no? Well, Induced Pluripotent Stem Cell technology is about to change all that.

When you were a small child, you might have had a chance to become anybody you wanted: a pilot, doctor, or prime minister. With age you were slowly deprived of such a great variety of choices. If you spent the majority of your youth playing football, you might have a chance to be a professional sports player, but you couldn't convert to, for example, a concert pianist. As time passes, all human beings become more specialized.

The same thing happens with our cells. At the beginning of life, a human being (called an 'embryo' at this point) consists of very few cells. These cells have the ability to be transformed into any cell in the organism--muscle, blood or brain, whatever the need may be. This magic feature is called 'pluripotency' and is specific to cells known as 'stem' cells. Cells such as these that exist at the beginning of an organism's development are called embryonic stem cells (ESC). However, in many adult tissues—including bone marrow, muscle, and brain—there are cells which have similar features, but whose ability to differentiate is limited. These so-called 'adult' stem cells are designed to replace those cells that are broken during injuries or by diseases. The important thing about adult stem cells is that they are unspecialized. That makes them similar not only to embryonic stems cells, but also to cancer cells. Thorough analysis of the process of cell specialization, therefore, can help us better understand cancer and birth defects.

Miracle or Sin?

But another reason why scientists are involved in this subject is the potential application of pluripotent stem cells for producing tissues in medical therapies. Many people have defective organs—they might need a new heart, kidney or liver. Yet the number of people needing a transplant is much higher than the number of organs available for transplantation. With pluripotent stem cells, it may become possible to generate, for example, heart muscle cells in the laboratory, and then introduce those cells into the hearts of patients with chronic heart disease, eliminating the need for a transplant. Thanks to this technology, not only heart diseases could be healed: in the future, many other disabilities, including Parkinson's disease, burns, diabetes and arthritis, could be treated as well.

Whether embryonic or adult stem cells, the possibility of obtaining a renewable source of replacement tissue is far too tempting not to be explored. The best material for this research has been frozen surplus embryos, which are created during *in vitro* fertilization. But here there appears an important question: is an embryo a human being? If so, it would mean killing one person to heal another. There are many arguments for and against granting embryos the right to life, and not only the public, but also legislators are divided on the issue.

Saving Lives and Embryos

Induced Pluripotent Stem Cells (iPSCs) are a new, equivalent technology that may overcome the dilemma of destroyed embryos. With this technology, normal cells can be genetically reprogrammed to a state like that of embryonic stem cells. Cells that are already specialized can be changed into a state of pluripotency, and after that they can become any part of the body. A skin cell changed into a liver cell? It may sound more like science-fiction, but it is a reality of science now.

How does it work? Let's start with basics. The properties of all cells are determined by their genetic material and how it's functioning. The same information is written in DNA in every cell, but the part of that information used by the cell is different for every cell type. The best way of transforming a cell into a different cell is to change how it uses its own DNA. If we want to induce embryonic stem cell characteristics in a normal cell, we must force it to express genes responsible for maintaining the defining properties of embryonic stem cells. To reprogram cells, pluripotency factors are used. These factors are proteins – genes responsible for their production can be introduced into the DNA of the host cell – and within a few weeks some of the cells will be transformed into stem cells.

The history of induced pluripotent stem cells is relatively short. It started in 2006, when the group led by Japanese scientist Shinya Yamanaka reprogrammed the skin cells of a mouse into pluripotent stem cells. This breakthrough discovery marked the beginning of rapid development in this field. One year later, stem cells from human skin were obtained.

IPSCs seem to be very similar to ESCs, with one crucial difference: they are not obtained from embryos. This liberates them of the important ethical dilemma of "killing people or just destroying cells", but it is not the only advantage over ESC. Tissues produced by adult stem cells derived from a patient, do not initiate rejection after transplanting them back into the same patient. This feature is very important from a medical point of view.

Out of the Frying Pan

There's nothing in the world with only a good side: there are a few disadvantages of the iPSC method. Currently the most serious problem concerns introducing genes that reprogram the genome to become pluripotent. These pluripotency factors were originally introduced through the use of a retrovirus that incorporates itself into the host cell's DNA. However, depending upon where the gene sequence is inserted, it can cause mutation or cancer. Obviously, the initiation of cancer, in even a small number of treated patients, ▸

skin
heart
liver
lungs
brain
kidney

would make such treatments unusable for human therapy. Researchers have begun work on alternate methods. Retroviruses were succesfully replaced with safer lentviruses. Another solution was cloning reprogramming genes into a circular piece of DNA called a plasmid. Subsequent culture of the iPSC over a period of weeks resulted in the complete loss of the plasmid, but continued pluripotency. Other possibilities include applying ready proteins (instead of introducing genes), where the 'recipe' for these proteins is written.

The technology is very young and not all the safety concerns and side effects are understood. Years of research must go on before it can be used in transplantation medicine. And there is one more issue that could make this delay even longer. Cell lines produced by induced pluripotency can only be used for specific patients, whereas there are already established embryonic stem cell lines and many adult stem cell sources which are potential alternatives. Only time will tell which system will serve in actual medical use. In the meantime, state institutions and biotech companies are actively patenting the technologies. If it seems more beneficial for practice and profit, they might lobby to investigate embryonic stem cells instead of iPS cells despite the ethical benefits of saving embryos. Money often wins over ideas...

Tobiasz Lemański
tobiaszlemanski@gmail.com

Tobiasz Lemański

Tobiasz Lemański was born in 1985 in Trzebnica, Poland. In 2009 he completed a degree in Biotechnology at the Wrocław University of Technology and Postgraduate Studies in Journalism at Wrocław Faculty of Theology. He cooperates with "Żak", "Gość Niedzielny" and others.

Chimeras: What You and Mice Have in Common

They could look like a myth, or like science fiction, but the reality is that the use of chimeras in genetic research might one day have a profound effect on our quality of life.

"Myths," said 4th century Roman historian Salustius, are "things that never happened but always are." One such myth, from the Greeks, tells a story of chimera, a monster with the head of a lion, the body of a goat and the tail of a snake. From other myths we may also learn about sphinxes, lions with a human head, or centaurs, which are a mixture of man and horse. In other cultures as well we may encounter similar creatures—Quetzalcoatl, from Mesoamerica was a feathered serpent worshipped primarily by Aztecs. Today chimeras still exist. You may even be one yourself.

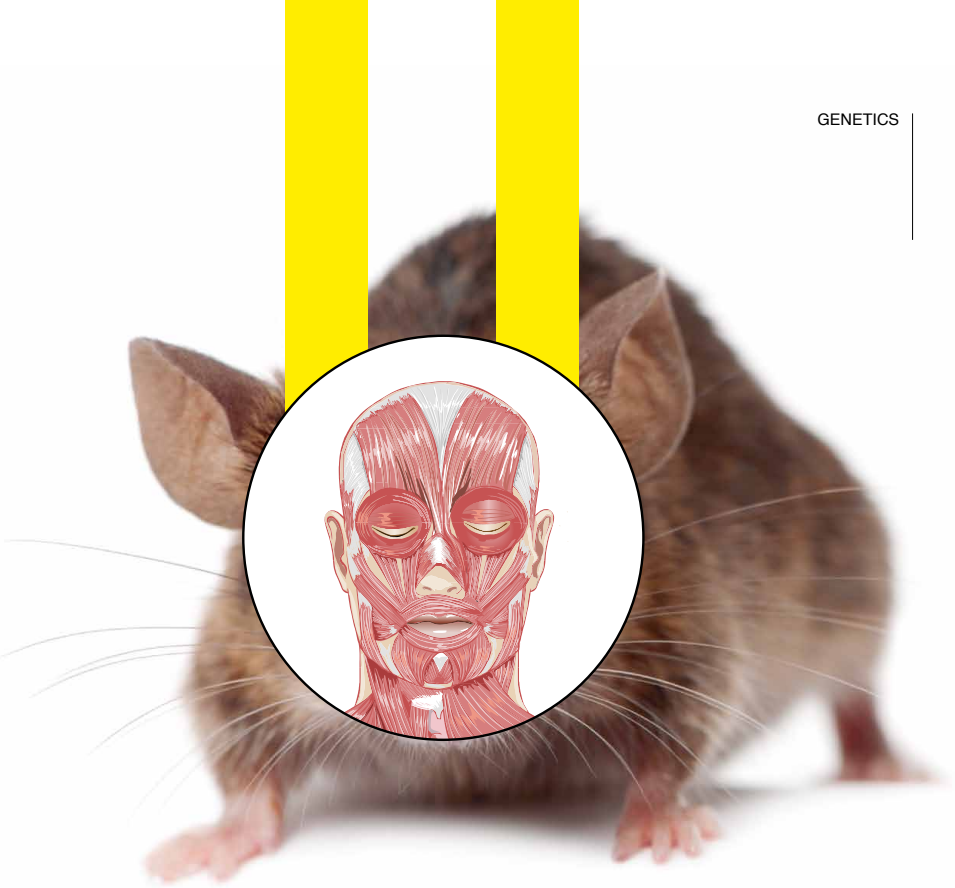
"If you have an older brother or sister, you might be chimera," says Andras Dinnyés. Dinnyés is an internationally-renowned scientist working on embryology, cloning and stem cell biology. He is the co-founder and director of BioTalentum Ltd, in Hungary, where chimeras are critical to the laboratory's research.

What is a chimera? In scientific terms, a cellular chimera is an organism that has two or more genetically different cell populations that come from different zygotes. A zygote is the fertilized cell that eventually divides to form an embryo (and later on, a baby). Chimeras may occur naturally: sometimes, a few cells of a fetus may remain in the mother's body, even for years, and then "join" to those similar cells of a new fetus. Just as Dinnyés said above, a human 'chimera' can have two different DNAs in different parts of the same body! (It is very difficult to detect, however, as a series of DNA tests must be performed.)

Fabulous, not Freaky

Animal chimeras are not scary monsters at all, but usually laboratory mice, often identifiable by their mix of different coat colors. The first mice chimeras were created in 1981 by the Polish scientist, Andrzej Tarkowski. To create a chimera, one needs two specimens of any given animal. Mice are usually chosen for their fast reproduction cycles that enable long lines of "family trees" through which cellular changes can be observed. Moreover, the embryonic division of mice, humans, bovines and the other mammals are very similar during the initial stages.

When scientists combine fertilized embryos collected from animals of differing species, called 'inter-species chimerism', the chimeras most often have four parents (two embryos that are fused together). With inter-species chimeras, the parent species must be closely enough related in order to have a chance for the jigsaw-puzzle offspring to be born alive and relatively healthy. After being matched, the chimera embryos are transplanted into an ani-



mal that can give birth to them. (In 1984, a chimeric 'geep' was produced by combining embryos from a goat and a sheep.) Scientists (and we too, as in fact, scientists are working for us!) need these chimeras to better understand developmental processes occurring at a cellular level. Sometimes, fluorescent color markers are added to the genes of chimeras in order to follow the origin of the cells more closely. Most importantly, mice chimeras can be created from a host embryo and embryonic stem cells of another mouse. If these cells are genetically-modified, the resulting mouse can offer a standard method to generate models for human diseases – a useful technology which earned a Nobel prize in 2007 for its inventors, Drs Mario R. Capecchi, Martin J. Evans and Oliver Smithies.

Biologically Talented

Chimeras are critical at the laboratories of Biotalentum Ltd., where scientists are currently making genetically-modified mice for medical research teams. In programs funded by the European Union, Biotalentum Ltd. is studying various aspects of Induced Pluripotent Stem (iPS) cell technology, among other areas, the signaling pathways involved in pluripotency.

Pluripotency means that a cell has a great level of flexibility and may undergo further 'specialization' into any kind of cell in the body. Pluripotent cells include embryo-derived "embryonic stem cells". IPS cells, however, can be produced from somatic cells—for example a skin cell, which are already specialized—after introducing very powerful genes to reprogramme them into a state of pluripotency. The first time iPSCs were derived was in 2006, from a mouse, and then just one year later from a human subject by Japanese scientist Shinya Yamanaka. IPSCs may be differentiated *in vitro* into any type of host cell and *in vivo* into live animals. IPS cells are very similar to embryonic stem cells in their characteristics. This is very important because the latter are capable of renewing themselves, which this holds great promise for regenerative medicine. Regeneration may be done in two ways: by cell replacement therapy, for example, in cardiac diseases, diabetes, or Parkinson's disease; or by gene therapy, for example, in sickle cell anemia. In principle the idea is relatively straightforward: somatic cells are taken from a patient then de-differentiated in order to derive pluripotent cells from them and then differentiated again into healthy, somatic cells that can replace diseased cells in humans.

The research at BioTalentum is exploring other future applications as well. Dinnyés explains: "We're producing cardiac and neuronal test cells from them for drug testing purposes. If human iPS cells are derived from a patient with a genetic illness, the cells can help to analyze the consequences of the genetic abnormality and to test for potentially effective therapeutic drugs."

In the English language the term chimera has also come to mean "hard to believe or difficult to understand". But now, you know that it is not the case! To end with another ancient saying: *sapere aude* (dare to know)!

Alexandra Budzyńska
alexandra.budzynska@googlemail.com

Alexandra Budzyńska

Alexandra Budzyńska is a Social Sciences student who loves to investigate the connections between all the various branches of human activity. From time to time she has worked in a volunteer capacity for media companies. Her motto is: "be the change you wish to see in the world".

This way up

Handle with care

Fragile

Keep dry

Human Being®

INGREDIENTS: (Percent of Mass)

Oxygen 65%, Carbon 18%, Hydrogen 10%, Nitrogen 3%, Calcium 1.5%, Phosphorus 1%, Potassium 0.25%, Sulfur 0.25%, Sodium 0.15%, Chlorine 0.15%, Magnesium 0.05%, Iron 0.006%, Fluorine 0.0037%, Zinc 0.0032%, Silicon 0.002%, Rubidium 0.00046%, Strontium 0.00046%, Bromine 0.00029%, Lead 0.00017%, Copper 0.0001%, Aluminium 0.000087%, Cadmium 0.000072%, Cerium, Barium 0.000031%, Tin 0.0000024%, Iodine 0.000016%, Titanium 0.000013%, Boron 0.000069%, Selenium 0.000019%, Nickel 0.000014%, Chromium 0.0000024%, Manganese 0.000017%, Arsenic 0.000026%, Lithium 0.0000031%, Mercury 0.000019%, Caesium 0.0000021%, Molybdenum 0.000013%, Germanium, Cobalt 0.0000021%, Antimony 0.000011%, Silver 0.000001%, Niobium 0.00016%, Zirconium 0.0006%, Lanthanum, Tellurium 0,000012%, Gallium, Yttrium, Bismuth, Thallium, Indium, Gold 0.000014%, Scandium, Tantalum 0.0000002%, Vanadium 0.000026%, Thorium, Uranium 0.00000013%, Samarium, Tungsten, Beryllium 0.000000005%, Radium 0.000000000000000001%.

100% ORGANIC

Contents may vary in colour

100% Biodegradbale
Please Recycle

Genetic Data: Fragile, handle with care!

Individuals could endure serious consequences and the loss of fundamental rights and freedoms from the misuse of their personal genetic data. But how do we ensure privacy and protection in the fast-evolving field of modern genomics?

Maybe it hasn't occurred to you yet, but all that personal data left behind during your daily use of web browsers and social networking Internet sites is also used in a number of other ways, including commercially. When Internet companies like Facebook use your personal profile in order to define your consumer habits and profit potential, it becomes evident that your data should be protected in some way. Important questions crop up: Do you agree with your data being used by third parties for any means whatsoever? Does this data belong to you and can you protect it?

There is a contemporary field of scientific research in which very similar questions arise. But in this case, the issues are much more crucial because this science deals with the very essence of our biological being; it is able to see into the very biological programme lying behind our human body (and to some degree even our psychology). This is as intimate as one can get to the biological foundation of an individual. Therefore we must face important ethical and legal issues to ensure the protection of this information and fundamental human rights. This is even more critical because we are dealing with probably one of the fastest developing research fields, which could in the near future become as widespread as the Internet. I am referring to the modern science of genome research, in short, genomics.

A Step Into the Unknown

Ever-better and -faster technologies for sequencing the human genome have opened new and promising pathways for this research and its direct application in a number of fields, including bio-medical applications and forensic science (along with its use in judicial procedures)—time will tell what will be the whole scope of all possible technological and commercial benefits. Genetic databanks are fast on the rise, and some of the state-maintained ones already contain samples of entire national populations. It is precisely the collection and handling of this rapidly growing genetic data that provokes ethical concern. The fact of the matter is that mishandling of this kind of personal data could endanger fundamental freedoms and respect for human dignity. Governments, NGOs and society in general are therefore calling for international guidelines, as well as concrete national legal regulations.

Science is often a step into the unknown, but normally the interests and welfare of individuals have priority over those of science. Nonetheless, the golden aim of science—progress for society—ensures a great amount of freedom for research. If there is any kind of risk involved in certain scientific procedures, decisions often fall to the pragmatic calculation between benefit and risk. Of course this logic can't escape the subjective ground it stands on: it is difficult to establish general guidelines for universal ethics. The 20th century showed humankind that rational thought, so highly praised by the enlightenment, nonetheless produced, in the very midst of western civilization, barbaric and non-humane scientific experimentation with human subjects. As a result of this social trauma, the Nuremberg Trials after WWII produced—besides the famous Universal Declaration of Human Rights—a set of generally accepted ethical principles for medical research called the Nuremberg Code. Since then, all research involving human subjects had to be conducted in accordance with three basic ethical principles: respect for persons, beneficence and justice.

When Humans Become Laboratory Mice

Another important outcome of Nuremberg was the demand for so-called "informed consent" (IC) in research with humans. This mechanism for protecting human rights has since then become not only ethically but also legally binding. In general, IC has ensured that any human being involved in scientific research participates out of his free will and without financial or other personal gain. This individual must also understand the complete scope of the particular research in which he is involved.

However, this 'traditional' concept of IC has been challenged by modern genomics, which has evolved beyond classical clinical analyses. Nowadays, research may evolve through time (post hoc analyses) and develop beyond the scope for which IC was obtained. Genome research therefore brings up issues that have not been accounted for in the classical risk/benefit analysis, whose focus was mainly on physical harm: by using human biological samples, proteomic and genetic data, today's genomics opens up new and unforeseen risks. Furthermore, the subject of genomic research is not only the individual participant who donates a biological sample but also many others who share with him the same genetic material. Their IC wasn't obtained. How can we then jus-

tify the research and possible disclosure of his genetic material? This calls for a new, broader conception of the subject in genetic research that would take into account this problematic.

The risks that follow the above problems are manifold and they concern not only the research participant but also his relatives or even larger (ethnic) groups. Genomics enables, for instance, the prediction of genetic predispositions and characteristics, which shouldn't be disclosed or made accessible to third parties without the approval of the individual (subject) concerned. In particular I am speaking of employers, insurance companies, educational institutions, legal institutions and criminal prosecutors, private companies and the families in question. This could lead to unemployment, uninsurability, and family breakups (due to unintentional demonstration of non-relatedness), to name only a few examples. Since genes reveal all the biological characteristics of a human body (and even the psychological), it could be fertile ground for discrimination. There is also the additional concern of the abuse of this confidential data due to the increasing importance of human genetic information for economic and commercial purposes. How can we possibly ensure the protection of privacy of individuals under these circumstances? This is an important issue that we need to address.

Can Informed Consent Save Us?

An important step to regulate the use and storage of human genetic data was taken with the International Declaration on Human Genetic Data by UNESCO in 2003. In Article 6 of this document is the already-mentioned IC: "It is ethically imperative that clear, balanced, adequate and appropriate information shall be provided to the person whose prior, free, informed and expressed consent is sought. Such information shall, alongside with providing other necessary details, specify the purpose for which human genetic data and human proteomic data are being derived from biological samples, and are used and stored." Informed consent, as a mechanism for insuring the protection of personal freedoms, human dignity and human rights, should in the opinion of many experts be further developed to address the issues modern genomics brings along.

There is therefore no surprise that IC was a hot topic at the international conference on biobanking entitled "Harmonising Biobank Research: Maximising Value - Maximising Use", which took place in Brussels, in March of 2009. These kinds of occasions are of high importance to this scientific field, for they encourage the biobanking community to interact as genomic science advances at its high pace and share insights in order to continually raise the quality of biobanking science, while questioning pertinent trends. One of the expert spokespersons at the conference, whose presentation addressed consent in genomics, was the Italian bioethicist Deborah Mascalzoni from the Institute of Genetic Medicine at EURAC in Bolzano-Bozen. She suggested a revitalization of informed consent in order that it could adapt to the new advances in genomics which have changed the research landscape. As her scientific work mainly focuses on IC in Genomics and Public Participation, Mascalzoni's suggestion is that, "informed consent should be seen as an ongoing process between researcher and participant, and not just as a once-and-for-all decision. Research following the initial storage of samples needs to be likewise explained and may be announced using new communication methods". This introduces a much more tighter collaboration between researchers and participants, in which the latter can become more actively involved. From this, a healthy interplay between scientific interests and broader society could evolve.

Hand in Hand

These ideas go hand-in-hand with the need for public awareness of contemporary scientific research, the publics' participation in decision-making and the development of policies grounded on broadly accepted ethical grounds. Of course the use of these seemingly strict and complicated regulations should be simplified as much as possible so that scientists won't be hindered excessively in their work. But the scientific community needs to understand that it is by regaining trust in scientific research from the broader public that it can eliminate much of the irrational suspicions and negative opinions of science. This can lead to a healthy equilibrium where research subjects have fewer risks and the scientists more freedom to do their work.

Martin Marzidovsek
marzidovsek@gmail.com

Martin Marzidovsek

Born 1982 in Maribor, Slovenia, Martin graduated in Cultural Studies and Social Anthropology. Currently involved in a Ph.D. study in Contemporary Philosophy at the Slovenian Academy of Sciences and Arts, he is also active as a documentary and fiction filmmaker.

01

1000-Metre Medicine

In October 2009, The European Academy of Bolzano (EURAC) launched its 11th Institute, Mountain Emergency Medicine, under the direction of **Hermann Brugger**, Associate Professor at the Innsbruck Medical University. Quick out of the gate to acquire epidemiological data, can Brugger raise this little-known and underfunded field into a *bona fide* science?

When was the idea of creating the Institute born?
Brugger: The idea started in 1998 out of the necessity to have such an institute, as at the time one didn't exist anywhere in the world. For the past ten years, we have been dealing with the questions of where to locate the institute and where to get funding.

Why did you opt for the Alps and not elsewhere?
Brugger: In the Alps you have every possible kind of mountain incident and accident: there are glaciers, many rock climbers, winter activities and a lot of tourists in the summertime. It's also where we found the necessary funding.

Can you tell me about the purpose of the experiment with pigs you did in Austria this past January?
Brugger: It's a quite long story. The two main causes of death for someone buried under an avalanche are asphyxia and hypothermia, but we still don't know which one comes first. If hypothermia develops quicker than asphyxia, the prognosis can be good when the person is rewarmed. However, if it's the other way around, there's nothing to be done. We know that almost everyone who has survived under the snow, even if found unconscious, does not have serious after-effects. Though they appear to be asphyxiated, they can not be, as otherwise they would have brain damage. We really don't know what is happening in these patients.

What happened during the experiment?
Brugger: First of all, we decided to do tests on pigs because human tests in hypothermic subjects are forbidden and physiologically pigs are pretty similar to us. Besides, there was a long past history of hypothermia testing on pigs. The experiment was fully approved by the Austrian Ministry of Science and Research, and we did an extremely accurate planning of the study. We carried out eight tests without any problem. But then

02

01 Hermann Brugger

02 The outdoor lab for hypothermia testing on pigs.

03 The study, that had been extremely accurately planned, had to be stopped due to protests against animal testing.

03

the media caught wind of what we were doing and reported it in a very negative way. There was an outcry in Austria from people who were against animal testing, even though we have made sure that the pigs would not suffer.

But nine pigs died, right?
Brugger: Yes, in animal testing it is always so: the animal is never allowed to recover if they've been anaesthetized. It's a standard procedure, and unfortunately there was no other subject we could do the tests on. The question is so important for the survival of avalanche victims that we had to do this testing. It's really a great pity that we had to stop prematurely because we could save many lives if we had completed the study.

How?
Brugger: Every winter in the Alps alone we lose about a hundred skiers—most of them healthy and young. If we knew which problems come first, we could give the right recommendations to the doctors. Most of the time you have four or five victims in an avalanche, and doctors need to know who to rescue first. Some of the victims may appear to be dead, yet can be revived successfully. But to do this you have to use complicated and expensive machines—for example, heart-lung machines to give extra-corporeal circulation. You should only do this if there's a reasonable chance of survival; that is only if hypothermia was the reason for cardiac arrest. When the victim develops asphyxia first, and is found after thirty minutes there's no way of saving them. We think you can stop resuscitation right there at the scene of the incident.

Did you achieve any of your objectives?
Brugger: We still haven't completed the analysis of the eight cases we managed to study, but we are hoping that we can lay the groundwork to answer our basic research question.

Why do you think you are the first ones to get an institute of this kind?
Brugger: This is a very small area of research with only a very few researchers working throughout the world. I spent the last 20 years developing a network of researchers in Europe, North America, as well as South America and Southeast Asia. This has helped me to create this institute without large amounts of money. Perhaps it wasn't possible to do this previously.

Where do you get the funding?
Brugger: EURAC is a private research institution that gets funding from a mixture of sources, such as local government and private institutions.

How do you co-ordinate with the Innsbruck Medical University and other institutions?
Brugger: We cooperate on different projects, such as the experiment with pigs, depending on the strengths of our partners. We also work with the International Commission for Mountain Emergency Medicine, the International Society of Mountain Medicine and the UIAA Medical Commission.

Were you first a doctor and then a mountain lover or the other way round?
Brugger: I started climbing when I was a young boy. Then when I started studying to be a doctor, I became a member of the mountain rescue team here in South Tyrol. That's when I started dealing with all the issues I am now actively working on in the Institute.

Elena Ledda
elenaledda@hotmail.com

Elena Ledda

Elena Ledda is a freelance journalist with a Foreign Languages (Spanish and Chinese) University Degree who's been living for three years in Barcelona and collaborating with both Italian ("L'Unità", "Carta") and Spanish ("El Periódico de Catalunya" among others) newspapers and magazines. She combines her job as a journalist with acting and directing plays and forums of Theatre of the Oppressed in middle and high schools in Catalunya.

"I have found my home here..."

Writer Evelin Szarka visited the streets of the village of Hajós to track down the current situation of minorities in Hungary. On a bench in front of his grandfather's home, 'Uncle' Béla, shared with Evelin his perspective on the Swabian experience.

Night is falling. Tiny shadows tremble on the white walls. A fresh breeze runs along the cracked sidewalks, and grey cats slip through the narrow alleys. Spring has painted charming colours on the lively green trees. Time has stopped here. A wrinkle-faced man comes down the slope; he calmly whispers some words in German to his dog, then stops to stuff his pipe. His name is Béla (Uncle Béla to his friends), and the place is Hajós, a small village in the Southern part of Hungary famous as Europe's longest winery route. Each house has its own history, each panned window can tell secrets to the traveller.

"Howdy, daughter. Nice view, eh?," Béla laconically greets me, and he sits slowly down on a green wooden bench. Who is this strange man? As he waits for some friends to arrive, his answer reveals the exciting journey of his family and his joyful life as a member of the Swabian minority in Hungary.

Strong Roots

"My Swabian ancestors were settled in Hajós as pioneers 300 years ago by the Archbishop of Kalocsa," Béla begins. "Not by force, not at all... they repopulated the area and grew grapes. Their integration was easy and quick." Although many international conflicts affected these families in the intervening centuries, thanks to their skills and close relationships formed with local Hungarians, Swabian farmers were able to stay and preserve their traditions, language and culture.

Béla turns back and points to the cosy house behind us. "My great grandfather built this cottage with his own hands. One of his Hungarian friends made these excellent wood carvings." He touches the old craftwork carefully. "Their families worked and had fun together. You know, they were together through thick and thin. Yes, Hungarians and Swabians always helped each other here."

Minorities have strong roots in Hungary. As an inheritor of the multiethnic Austro-Hungarian dual monarchy, Hungary constantly had to deal with minority issues during the 20th century. Ten percent of the population - approximately one million people - belongs to a minority. What's more, they live scattered geographically throughout the country. The latter fact makes it even more complicated to handle the delicate questions of minorities. Undoubtedly, the Hungarian people have always felt a strong empathy with these people, as nearly one-third of the Hungarians live as minorities outside the borders of the mother country. This was one of the main reasons why they made efforts to save them from discrimination and guarantee a friendly and liveable environment for these small communities.

Impressive Legislation

The 1993 "Law on the Rights of National and Ethnic Minorities" as well as its amendments approved by the Parliament in 2005 have provided effective legal instruments for protecting the one ethnic (the Roma) and twelve national minorities who can give evidence of having lived in Hungary for more than 100 years. Approximately 200,000 German-speaking citizens, like Béla, profit from these legislative actions in the country.

The minority self-government system gives them the right to act on the outside of or within the local government structures. In the first case the majority of the elected representatives must belong to a minority, while in the latter, at least one-third of the representatives should be members of minority groups. The main goal of the representatives is to boost the visibility and effectiveness of self-governments through participation in the decision-making in the fields of culture and education. What's more, the law entitles them to maintain their own educational and cultural institutions where their language can be used according to the Constitution.

Putting Jargon into Practice

Béla and I have been watching the spectacular twilight with wandering thoughts for a while. Then the old man raises his head abruptly and gives a mischievous grin. He recalls his memories of the local wine festival broadcast on TV last month. 'Just singing and dancing all day. Can you imagine? Our children decorated the trees with amazing paper lanterns and colourful ribbons. It was magical! And yes, you should have heard the cheers of the Swabian brass band after they heard they won new musical instruments.'

In fact, I had read in the local paper that a project funded by the Department of

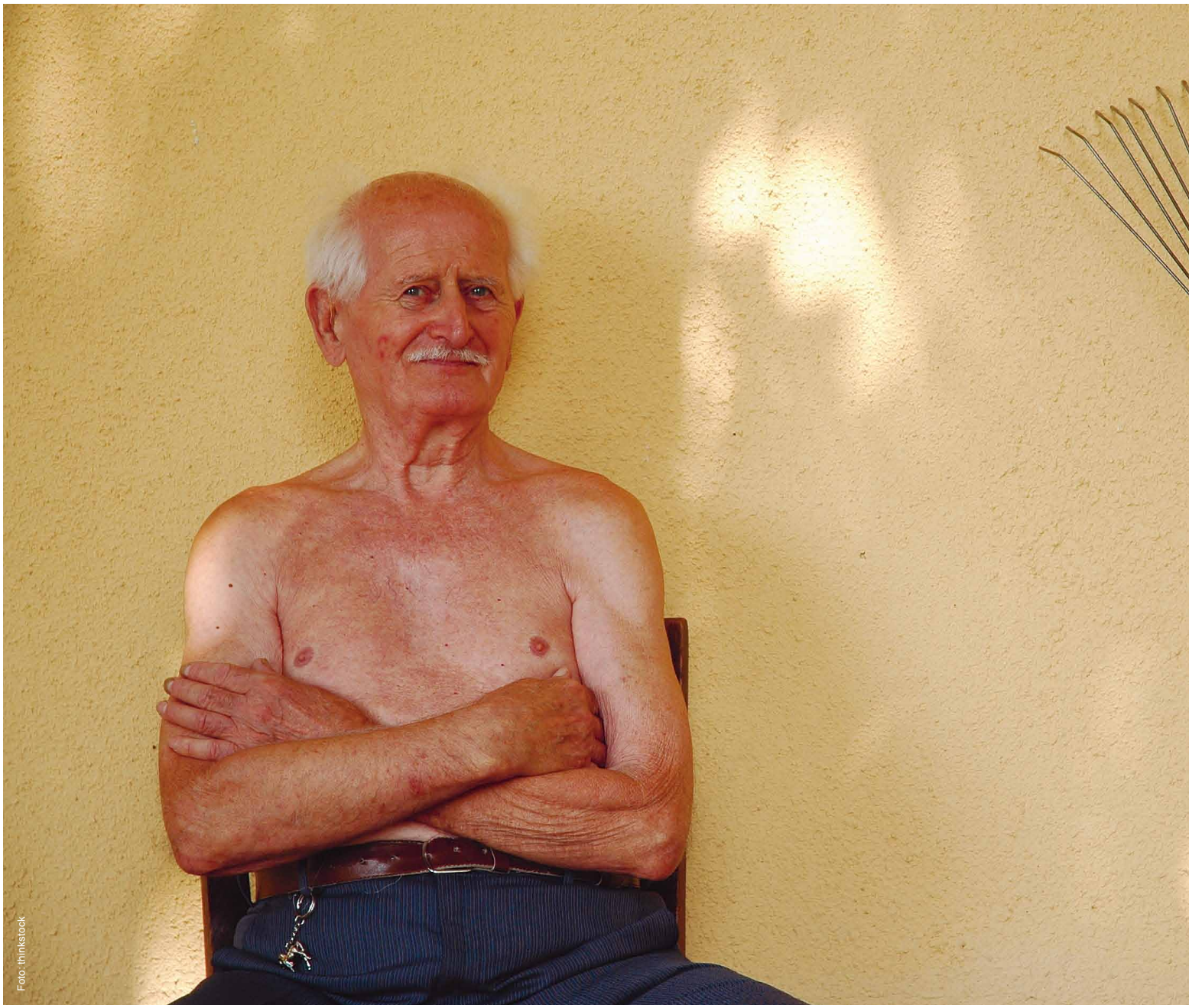


Foto: thinkstock

National and Ethnic Minorities had supported the event. This institution is responsible for the creation of minority policy concepts, the preparation and the co-ordination of relevant government decisions, as well as the monitoring and the continuous evaluation of the situation of minorities. It also facilitates the exchange of information between the government and the minority communities, so local organizations are aware of the most important details and deadlines of the ongoing projects.

Béla speaks respectfully of the efforts made by the department, even though he complains about the democratic deficit. He also criticizes the weak and often not legally-binding actions and measures of the Parliamentary Commissioner for Ethnic and National Minority Rights, although he admits its important role in raising awareness of minority issues amongst Hungarians.

We discuss the role of the Foundation for the German-speaking Minority in Hajós, which not only helps to strengthen their self-perception by organizing special events, but also puts emphasis on carrying out successful projects in order to raise their living standards. The Foundation bought a lot of new toys for the local kindergarten last year. I start smiling – I cannot help it - as he describes the joy of the children. “Oh, those little angels,

they were so delighted with new cars, dolls and those big colourful illustrated storybooks," he splutters enthusiastically. "My granddaughter got a beautiful doll with shiny long hair. When I arrived there to take her home, she ran to me in excitement and showed me the wonderful braids she had made for her new friend."

Panem et Circenses?

Béla wants to see many excited glowing faces all over the world, so he declares he will bring up minority issues during the race for the Hungarian presidency in 2011. As one of the priorities, Hungary could bring together the nations across Central Europe to stand up for minority rights all over the European Union. "Let me say it as simply as I can. You know the saying, 'bread and circuses'. Minorities get noisy and glamorous festivals in the EU, but if one of us gets lost in the legal net of Europe, or if we feel that our rights are violated, little help comes from the institutional bodies. There's a gap between everyday people and high politic... they don't always hear us or understand us. That's why I feel a bit distant from community decisions."

Suddenly, he becomes very talkative and worried. He is twiddling with his brown suspenders. "Please don't get me wrong. I am totally satisfied with my life, I love living here. But I see many abuses on TV and I can't see why these things are happening... We should respect each other's history, the various traditions, the different needs... but we should also put our egos aside and learn how to act as a member of a society or a bigger community. This is the key to live together in peace."

It is time to go now. His friends are approaching us in a cacophony of different languages, vivid debate and loud laughter. The old man's eyes fill with tears as he takes out a small book from his pocket. It is about his village, his family and his friends – people with different ethnic backgrounds who share the same history. He stares at the cover for a moment and hands the book to me. "Read it and you may understand how I feel", he says emotionally. "I do not need it anymore. All is right here. Inside me." He points to his heart.

Uncle Béla puts his hat on and stands up youthfully. He winks at me and scuttles off to greet his friends. My eyes follow the silhouette of the cheerful group until it disappears in the distance. His last words echo in my mind: "I know where I belong. I have found my home here."

Evelin Szarka
evelin.szarka@gmail.com

Evelin Szarka

Evelin Szarka is a Hungarian International Relations expert, with a specialization in political science and identity issues. She has worked as a science journalist for the past three years.

Hamsters, Storks, and Other Poles

According to the data from the Polish Central Statistics Office, in 2008 there were roughly 650,000 Poles working or looking for work in the UK—a figure that the world's financial crisis could hardly make a dent in. Writer Pawel Rozmus traces the Polish migrant path to the isle of fish and chips.

The foggy way across the English Channel is one of the most popular routes for the citizens of Poland. Poles in the UK are considered to be an example of a large 'new minority' which is, according to EURAC-researcher Roberta Medda-Windischer in her paper entitled Old and New Minorities: Reconciling Diversity and Cohesion, "a group formed by individuals and families, who left their original homeland and emigrate to another country generally for economic and, sometimes, also political reasons."

True to form, the Poles in England have travelled to England for both.

After the fall of the Communist regime in 1989, the ideologically-engendered flight of Poles to the UK petered off, and a new, economic exodus began to grow in size. Then, in 2004, just after Polish accession to the EU, Tony Blair's government opened the British labour market without any restrictions-- the "white-red wave" flowed to England, mainly to London, but also to smaller cities: the new economic boon on the island attracted Poles like iron to a magnet.

Agata is a 27-year-old Polish student living in UK with her husband. She echoes the money-quest nature of Polish immigration. "I'm not planning to go back to live in Poland, mainly for financial reasons. Most Polish immigrants don't think of going back to their country anytime soon." Iza, 26-year-old archeology student at the University of Portsmouth agrees perfunctorily: "They pay very well here."

Free as a Bird, Happy as a Hamster

According to the CRONEM Institute of Research's document "Class and Ethnicity-Polish Migrants in London", Polish immigration is generally dominated by young or middle-aged men who come just after secondary school and also students who travel to the UK for temporary work during their holidays. Agata offers her opinion: "I know many people who have come to the UK after graduating from universities in Poland just to find low paid (and mainly manual) jobs. I think it's because of either a poor level of English, low self-esteem or an urge to start earning as soon as possible to be able to rent a room, pay bills, buy food, etc."

Regardless, the research out of CRONEM suggests that about 1/5 of those surveyed declared that they are planning to remain in the UK for good. Known as 'Stayers', they are often the representatives of "earlier migration wave" (from the nineties or even earlier), and who today are well tied into the British social fabric.

For the rest of the Polish ex-pats though, staying in the UK is assumed to be but a temporary experience. They come at a stage of their lives when they would like to improve their language skills or gain new contacts and abilities. Researchers from University of Surrey defined three further types of Polish immigrants.

Firstly, there are seasonal migrants who are found mostly in low-paid occupations and students or farmers who usually stay between two to six months, all of whom are known as 'Storks'. Those who treat their migration as a mercenary activity, with the principal aim of acquiring enough capital for investments in Poland are known as 'Hamsters'. They may stay a bit longer than the Storks do, but they also cluster in low-earning occupations, and often are embedded in Polish social networks.

'Searchers' are by far the biggest group. These are young, individualistic and ambitious persons who keep their options deliberately open, and who are not rooted in one particular country. They can be found either in low-paying occupations or highly skilled professional jobs. For them, every option is open to them: pursuing a career in London, returning to Poland when the economic situation improves, or migrating elsewhere (a concept known as 'intentional unpredictability').

On the whole, the jobs that are available to Poles demand fewer skills and are lower paid, especially in comparison to British workers (and sometimes even by more than a half). A summary of the statistical data demonstrates that Poles have been habitually working as manual labour in constructing industry, as cleaners or nannies, or in catering or hospitality (the so-called 'routine jobs'). As Iza explains, "It is unlikely that somebody with a poor education will become a manager here." On the other hand, according to Iza, there are many training programs that support such persons and always a possibility of being promoted. "The majority of people I know have well-paid jobs, or, if they are students, work as a waiter or bartender suits them fine."

Living Apart Together

Some Polish immigrants do not know the English language, as Polish-speaking shops and non-government institutions

sprouted up after the deluge of immigrants. In places with a high concentration of Poles—Ealing, for example—their mother tongue is all they need to get by. If they do need contact with English-only officials it is also likely they'll meet a Polish compatriot in the Home Office or local Job Centre. In Agata's opinion, "Those who come without any English skills usually don't stay in the UK for long, and don't succeed." "Nobody will ignore you though, if you do not speak fluently," Iza offers. "Brits are incredibly patient with the use of their language."

The individualist drive of immigrants to improve their own economic lot combined with diversity of the emigrants are having a destructive influence on the cohesiveness of the Polish community in the UK. Older Polish immigrants with lower linguistic competences are a solid part of the national environment. They can only function there where they can communicate in Polish. The younger, fluently English-speaking Polish generation, for its part, has an individualized and situational attitude towards their ethnicity – for them, it is not important. That said, they still define themselves as Polish (sometimes, paradoxically, they even exploit national ties when it is useful to them).

The majority of Polish immigrants are very cautious with their contact with fellow citizens. They do not want to be trapped in a Polish ghetto and lumped into one category along with the more marginalized elements of their community who can give the country a so-to-speak "bad name". This is especially important for them in view that they have to compete in an overcrowded labour market, where national reputation can influence employability.

Fortunately, Polish people are not seriously discriminated in the UK. As European citizens, they have formally guaranteed rights on par with the rest of the society. What's more they are white-skinned and mainly Catholic, and as such have something in common with mainstream British population. The self-motivation of Poles to earn money and work dutifully is also appreciated by the population. According to Iza, "The law clearly forbids discrimination and all job offers have an addendum: 'We value diversity and welcome applications from all sections of the community'. In England people are getting used to immigrants. For them, it makes no difference if you are from Poland, Pakistan or Yorkshire. They either like you or not—it depends only on your personality. I know at least ten mixed-nationality couples and they've never mentioned that either families are against their relationships."

Nonetheless, a weak job market can, of course, create its frictions. The British tabloid press has aggressively written about demonstrations against the "cheap Polish labour" that is co-opting the workforce of the British "Nationals". Recently, the Isle of Grain—the small spot near London—was the centre of controversy, when, in February 2009, British workers officially protested against the hiring of Polish labour over 'British' labour in the construction industry. Although they staged a violent blockade of a factory, they assured the press that it was not a demonstration against Poles, *per se*, but as one trade unionist touted, "the campaign for fair access to jobs for British workers... about protecting people working in Britain from exploitation regardless of where they come from. It is a class issue not a race issue." An uneasy statement, perhaps, in an uneasy situation.

Pawel Rozmus
rozmusp@gmail.com

Pawel Rozmus

Paweł Rozmus was born in 1986 and still living in Kraków, Poland. He is a Master's student in Sociology, interested in social issues and the mass media's influence on society.

01

Tutankhamun Redux

In February 2010, a team of molecular biologists unveiled a new picture of the life and death of Egypt's most famous pharaoh – Tutankhamun. EURAC's **Albert Zink**, a member of the Cairo lab team, explains the revelations that have come from this innovative analysis of the Egyptian Royal Family.

Your recent article in Journal of American Medical Association stole the attention of media around the world. Is this the first DNA research ever done on the Egyptian Royal Family?
Zink: It was the first of its kind. There had already been some work done on Egyptian mummies, but it primarily concentrated on DNA pathology – dealing with diseases such as tuberculosis or malaria. This is the first genetic research ever done that has tackled the problem of the genetic relationships of Egyptian mummies, especially royal mummies. Previous tests on Egyptian Royal Family gave negative results, so some people even argued at the beginning of our study that we would never get verifiable results.

This scepticism may have had a solid basis. When Howard Carter discovered the mummy of Tutankhamun almost 90 years ago, little did he realize that even touching the bones can hamper further research.
Zink: The mummy has been touched many times since its discovery and this is the major problem when dealing with ancient DNA. To avoid taking a contaminated sample, you cannot take it from the outer surface of the mummy, you always have to go deep inside. We did the sampling with a little bone drill so we could take the samples from inside Tutankhamun's bone material. The drill left small holes in the mummy, but nobody will ever see them.

You are also working on DNA analysis of Ötzi, the mummy in Bolzano's archaeology museum. Was the experience gained with Ötzi helpful when dealing with Tutankhamun?
Zink: It was essentially different because Ötzi is a different kind of mummy – a frozen mummy. The technique used to extract the DNA was quite similar, however we had to adapt our methods to Egyptian mummies because we encountered a unique set of problems. The biggest one was the embalming substances that the ancient Egyptians used, for example the bitumen, various waxes and oils. They caused problems during the extraction process, as they had diffused into the bone and inhibited the chemical reactions we needed to analyze the DNA. We had to clean the samples and get rid of all these substances. It took us almost half a year, but before we removed them our results were so poor we even thought that maybe there wasn't any DNA at all. We later realized that this embalming material had helped to protect the DNA of the mummy. So, on the one hand the mummification process gave us some problems finding the DNA, and on the other it clearly enhanced the DNA preservation.

You determined the family tree of Tutankhamun. Are there any other clues that molecular biology can give archaeologists to help reconstruct this past life?
Zink: Diseases, for instance – this is an area of research that really gives us insight into the past life styles. The results are not only based on molecular biology but also on other investigations such as computer tomography. For example, we detected malaria in King Tut and other family members, so now we know that this disease was present at that time and that it also reached the royals. We also have evidence that tuberculosis was present in ancient Egypt, maybe not among the royal family, but it was quite frequent in ancient times. This shows us that these people endured similar diseases as today. We learned from radiological images that ancient Egyptians also suffered from atherosclerosis, a hardening of the arteries that had been thought to be a contemporary disease linked to a mod-

01 Albert Zink

02 Bones and mummies have been touched many times since their discovery. This is a major problem when dealing with ancient DNA.

ern sedentary lifestyle. It is quite obvious now that the Royal Family had a very comfortable lifestyle like ours. They had protein rich diet and really didn't move too much—except for some hunting, they didn't do any kind of physical exercise.

What about Tutankhamun—what was his life and death like?
Zink: What we know is that he died very young, at 19-years-old, and had been in very bad health since his birth. He had some genetic malformations and malaria. Perhaps he died due to a combination of all those problems. Even if some media reports that the cause of his death was malaria, we cannot say for sure that he died from one condition or another.

Do you see a future for investigations similar to yours?
Zink: The next step should be to extend these investigations. It would be interesting to see the distribution of some diseases, for example, the frequency of malaria in the whole population. Did simple folk suffer from atherosclerosis as well, what was their lifestyle, and did their nutrition patterns influence the diseases? Other research on ancient DNA could show us where the ancient Egyptians came from, whether they are an African or European population, or maybe a population coming from the Near East. Also, archaeology and molecular biology should be combined. We need archaeology to know what mummies we are dealing with: were they kings or common people? What is written on the temple walls isn't always the reality. The images in royal tombs show mostly the pharaohs in their glory, and depict their victories, whereas our investigation gives us clues about their real lives. So we kind of created a new picture.

Iza Romanowska and Nabil el Kente
izoken@gmail.com – ekn@hotmail.fr

02

Iza Romanowska

Iza is a postgraduate researcher at the Centre for Archaeology of Human Origins, University of Southampton. She looks into stone tools of the first Europeans – Homo heidelbergensis and in her spare time she reports on science for Polish Public Radio webpages.

Nabil el Kente

Nabil has a postgraduate degree in molecular anthropology and scientific communication. Besides scientific journalism, he works in France at a public science and technology research institute (IRD). He's a part of a team dealing with capacity-building for research in developing countries.

Wo ist die Schlagzeile, Professor?

Der journalistische Alltag braucht Überschriften, die Wissenschaft sucht Differenzierung. Die Ethik bildet einen Anknüpfungspunkt für beide Bereiche. Dennoch ist gerade die Frage nach dieser „praktischen Philosophie" Ausgangspunkt hitziger Debatten über Grundsätze, wie der My Science Workshop zum Thema „Ethik und Forschung" an der EURAC bewies.

Selbst der Arbeitstag beginnt verschieden. Wenn eine Forscherin morgens in ihr Labor tritt, ist die Welt hinter ihr für eine gewisse Zeit nebensächlich. Diese Abgrenzung ist Grundlage für ihre Arbeit, ihre Konzentration. Der gewöhnliche Journalist geht den umgekehrten Weg: Seine Richtung geht täglich nach draußen. Er muss Neues aufnehmen und es schnell verarbeiten, morgen ist es wahrscheinlich wieder vergessen. Als Journalist ist man gezwungen, seinen Produkten eine tägliche Relevanz zuzusprechen. Nützlichkeit oder Erfolge muss der Wissenschaftler in weniger kurzen Abständen liefern, dennoch stehen beide Berufsgruppen unter scharfer Beobachtung von Politik, Geldgebern, Verlegern. Besinnung auf übergeordnete Werte, die den Alltag stützen, scheint daher allzu notwendig.

Jungjournalisten aus ganz Europa dachten in Bozen über das Verhältnis von Ethik und Wissenschaft nach. Die Bioethikerin Deborah Mascalzoni, die am EURAC-Institut für Genetische Medizin arbeitet, präsentierte dazu vorerst Grundbegriffe der Ethik, die auf der Grundfrage Tun oder Unterlassen aufbauen und erklärte die Disziplinen der Ethik, etwa Metaethik (Analyse) und deskriptive Ethik (empirische Beschreibung). Dann legte sie den Medienleuten Produkte ihrer Zunft vor, in denen auf ethische Maßstäbe verzichtet wurde.

Der erste Fall ist aus Italien. Er ist ein besonders bizarres Beispiel einer Mischform aus suggestivem Apell, Bericht und Porträt. Der Titel: „Mit 17 Jahren entschied ich mich gegen die Abtreibung – Heute bin ich mit meiner Tochter obdachlos." Bestehend aus einem „offenen Brief" und einer Beschreibung der Akteurin, ist der Artikel direkt an den Bürgermeister von Rom gerichtet. Die Unverantwortlichkeit dieses Artikels liegt vorerst in der totalen Auflösung der Anonymität der Protagonistin. Ihr vollständiger Name ist bereits in der zweiten Zeile zu lesen. Im offenen Brief verkündet diese ihre Adresse mit Hausnummer und Türklingel. Die Einleitung komponiert die Geschichte der Protagonistin als pervertierte Sozialreportage. Wo Sensibilität gefragt wäre, wird überzeichnet („Ein glückliches Kind – eine tief verzweifelte Mutter"). Ein ironischer Unterton wird nicht vermieden, als geschrieben wird, dass die 17 Jahre alte schwangere Arbeitslose, die von ihren Eltern auf die Straße gesetzt wird, sich auf ihre „glückliche kleine Familie" freute. Ergänzt wird

die traurige Skurrilität durch Spekulation: „Ihre eigene Familie kann ihr nicht helfen, vielleicht will sie es nicht." Im Nebensatz wird erwähnt, dass die Protagonistin kurz davor steht, aus ihrer Sozialwohnung geworfen zu werden, ihr Kind steht vor der Überstellung in ein Pflegeheim. Der Artikel endet ohne weiteren Kommentar der Redaktion. Die Grundfrage des Journalismus, nämlich „wie" wird etwas dargestellt, wird einfach ignoriert. Die verzweifelten Worte der Protagonistin stehen eben nicht für sich.

Eine ebenfalls skurrile Mischform ist ein Artikel mit dem Titel „Protonenstrahlen brennen Tumore weg (...) Wie wir mit unheilbarem Krebs fertig werden". Das vollmundige Versprechen dieser Schlagzeile wird im Laufe des kurzen Textes mehrmals relativiert, freilich erst im letzten Drittel: „Diese Therapie ersetzt die konventionelle Therapie nicht." „Das Zentrum wird im Jahr 2013 mit der Arbeit beginnen." Abgesehen davon ergeht sich der kurze Artikel in einer ausführlichsten Zitation eines Wissenschaftlers, der komplizierten Therapievorgang beschreibt und unterlässt es, nachvollziehbare Erläuterungen vorzunehmen, bzw. in diesem Falle, zu vereinfachen, ohne falsche Erwartungen aufzubauen.

Die Journalistik hat eine Vielzahl an Instrumenten und Analyseebenen zur Verfügung, um solche schlechten Beispiele in ihrer Schlechtigkeit aufzuschlüsseln. Meistens münden diese Analysen im Sammelbegriff der „zunehmenden Boulevardisierung". Dieser Begriff hat sich zu einer außeruniversitären Binsenweisheit entwickelt. Dabei ist diese Annahme medienwissenschaftlich gesehen Schnee von gestern, präziser: von vor zehn Jahren. Der in Münster lehrende Kommunikationswissenschaftler Frank Marcinowski hat schon 2001 festgestellt, dass die Beharrungskräfte des öffentlich-rechtlichen Fernsehens weit dominanter sind, als jede „Depolitisierung" hinsichtlich der Themen. Professor Rudi Renger von der Universität Salzburg - Fachbereich Kommunikationswissenschaft - spezifizierte ebenfalls schon 2001, dass die sog. Boulevardisierung zwar zu einer Differenzierung des Programmangebots, beispielsweise bei Nachrichtenformaten führe, aber die Veränderung von „Inhalt, Stil und Aufmachung" auch zu einer Popularisierung von Themen führe. Die Wissenschaftler Göran Djupsund und Tom Carlson erregten bereits 1998 Aufsehen, als sie in einer Untersuchung der skandinavischen Presse feststellten, dass es in der finnischen Presse die Boulevardisierung (immer gemeint ist Veränderung in Inhalt, Stil und Aufmachung) zwar zugenommen habe, in schwedischen Zeitungen hingegen eine Wende festellbar sei, also ein Saturierungseffekt aufgetreten ist.

Weitere kommunikationswissenschaftliche Ansätze begriffen Wissenschaftler als Interessensvertreter, die sich genauso sicher mit Journalisten austauschen können müssen wie alle anderen „Stakeholder", die den Journalisten umgeben. Die Auswüchse dieser Ausrichtung waren und sind zwischengeschaltete PR-Beauftragte, die jeder Studie ihre Sensation aufsetzen und zunehmendem Misstrauen zwischen Journalisten in Wirklichkeit sehr zuträglich sind.

Was steht aber heute außer Zweifel: Wissenschaftler und Journalisten tun aus eigenen Interesse gut daran, zusammenzuarbeiten. Dafür soll die Wissenschaft nicht ihre Substanz der Differenzierung aufgeben müssen und der Journalismus nicht seine Funktion der Verdeutlichung. Journalisten und Wissenschaftler müssen sich daher kennenlernen, um Missverständnisse zu vermeiden, bevor sie ihnen in ihrer Außendarstellung schaden. Möglichst in einem eigens dafür konstruierten Rahmen. Dies hat das „My Sience" Programm beabsichtigt. Nicht nur kommunikationswissenschaftlich gesehen ist es damit auf dem aktuellen Stand.

Stefan Mair
stefanmair@rolmail.net

Stefan Mair

Stefan Mair, 1987 in Bruneck geboren, studiert Publizistik und Kommunikationswissenschaft an der Universität Wien. Er ist freier Mitarbeiter beim RAI Sender Bozen und hat literarische Texte bei Athesia-, Kyrene-, Tappeiner- und Wespennest Verlag veröffentlicht.

A Blast of Fresh Air

EURAC's Institute for Applied Remote Sensing takes a deep breath and analyzes the data for air pollutants over South Tyrol. Just how much does particulate matter play a role in climate change? The science gives no certain answer, but this atmospheric research may help us one day to breathe a little easier.

Have you ever wondered if the temperature reading your thermometer indicates when you feel ill is precise or not? In fact, the measurement has an error margin of 0.5 degrees and that's exactly the 'noise' that researchers of the Institute for Applied Remote Sensing have to face every day at EURAC in the uncertain science of atmospheric research.

"The data is not clean—often the error is larger than signal—but we can measure the change of the noise," says atmospheric researcher Marcello Petitta. Petitta's daily work is to analyze air pollutants over Bolzano such as particulate matter (PM), the 'small balls' of solid or liquid aerosol caused by both natural factors and human activity. Dust storms, forest fires or sea spray are the natural ones, but the burning of fossil fuels, industrial activities and transport vehicles have been increasing PM measurements in the last 50 years.

The goal of the EURAC project is to develop methods for the monitoring of the concentration and the spatial distribution of fine particulates using MODIS sensors installed on the Earth Observation satellites. These sensors can measure PM thanks to their capacity to reflect blue radiation of the spectrometer camera, which sends new data of a determined point twice a day. The Province's meteorological stations provide additional information at ground level.

Too Much of a Good Thing

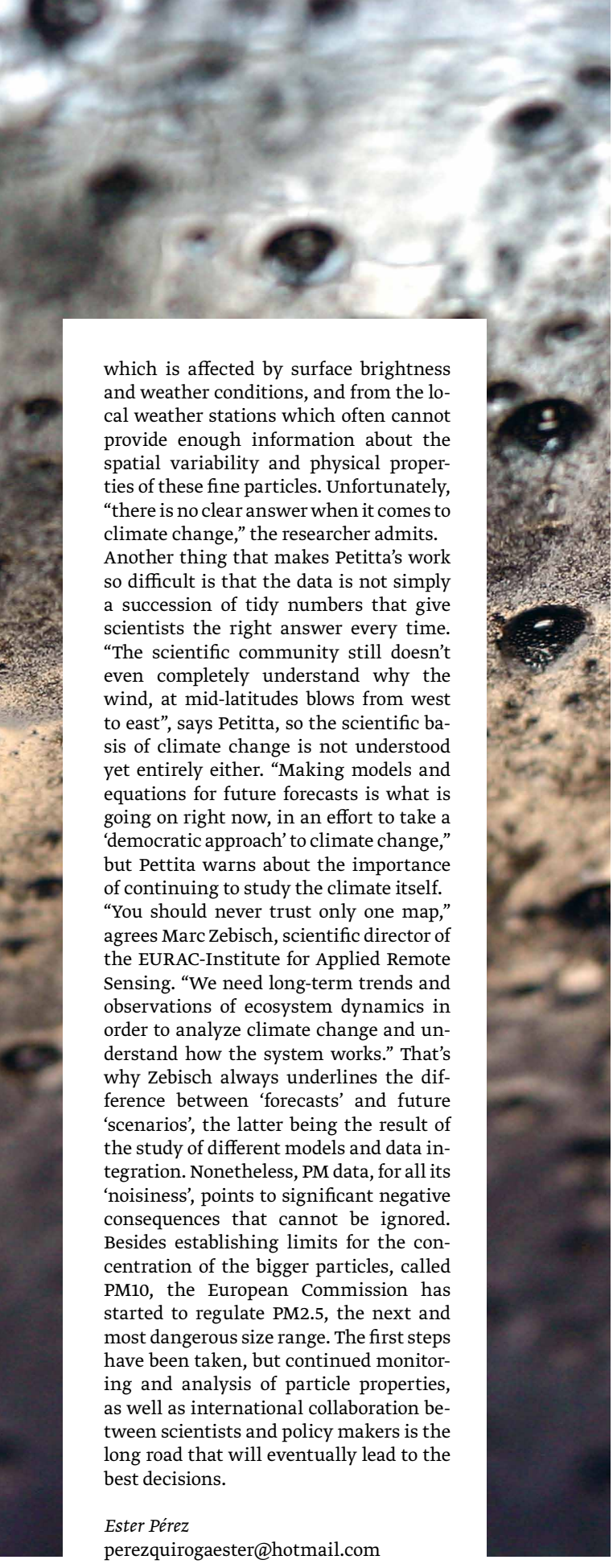
Aerosols influence climate in two ways: directly, through scattering and absorbing radiation, and indirectly, through acting as condensation nuclei for cloud formation or though modifying the optical properties and lifetime of clouds. Clouds, in their turn, affect global temperatures in two ways: they cool the climate by reflecting back incoming sunlight but can also warm the climate by trapping outgoing infrared radiation from the surface.

The consequences of the increasing number of particulate matter on human health are directly related to pulmonary and cardiovascular diseases. PM enters the respiratory tract and provokes asthma, bronchitis and chronic obstructive pulmonary disease (COPD). With their tiny diameter—40 times smaller than a hair—they can even reach the alveoli (the smallest branches of the lungs) and interrupt the O2 flow in the blood.

"The smaller their diameter is, the more dangerous they can be for environment and humans, and these are the ones that human activity generates the most," Petitta explains. One of the clearest examples of this is the London smog of 1952. Low temperatures made people burn more coal for heating, which, together with vehicle pollution and heavy winds from industrial areas, increased PM and sulphur dioxide in the smoke. The number of deaths reached to more than 4,000 that winter.

Research is in the Air

Everyday, Petitta sits in front of his computer to download the data from the Terra and Aqua satellites, as well as from the province's thirteen weather stations, to make maps of different PM scenarios that contribute to the formulation of strategic policy decisions. The 'noise' he faces comes from the satellite data,



which is affected by surface brightness and weather conditions, and from the local weather stations which often cannot provide enough information about the spatial variability and physical properties of these fine particles. Unfortunately, "there is no clear answer when it comes to climate change," the researcher admits.
Another thing that makes Petitta's work so difficult is that the data is not simply a succession of tidy numbers that give scientists the right answer every time. "The scientific community still doesn't even completely understand why the wind, at mid-latitudes blows from west to east", says Petitta, so the scientific basis of climate change is not understood yet entirely either. "Making models and equations for future forecasts is what is going on right now, in an effort to take a 'democratic approach' to climate change," but Pettita warns about the importance of continuing to study the climate itself.
"You should never trust only one map," agrees Marc Zebisch, scientific director of the EURAC-Institute for Applied Remote Sensing. "We need long-term trends and observations of ecosystem dynamics in order to analyze climate change and understand how the system works." That's why Zebisch always underlines the difference between 'forecasts' and future 'scenarios', the latter being the result of the study of different models and data integration. Nonetheless, PM data, for all its 'noisiness', points to significant negative consequences that cannot be ignored. Besides establishing limits for the concentration of the bigger particles, called PM10, the European Commission has started to regulate PM2.5, the next and most dangerous size range. The first steps have been taken, but continued monitoring and analysis of particle properties, as well as international collaboration between scientists and policy makers is the long road that will eventually lead to the best decisions.

Ester Pérez
perezquirogaester@hotmail.com

Ester Pérez

Ester Pérez studied Journalism at the Santiago de Compostela University, in Spain. After working in a press agency and two radio stations she decided to go to Italy to do her Master's in Citizen Journalism and work in cultural communication. Relocated back in her native Spain now, she is a freelance journalist interested in environment and the arts.

A Question of Responsibility

Marc Zebisch is tired of convincing sceptics that climatic change is a fact. The head of EURAC's Institute for Applied Remote Sensing says the time to act is now. We interviewed him to find out his thoughts on the politics and prospects of planetary survival.

01

The anthropological climate change is a global issue and a global responsibility. Can we, and will we share our European technological achievements with the poorer parts of the planet?

Zebisch: For sure, Europe is very interested in exporting 'climate-friendly' technology. In particular, renewable energy technology is a big global market, with competition between Europe, China and the US. The question is more, can the poorer areas of the world afford to buy European technology. But first, there are a lot of 'low tech' achievements—for example, solar water heating—that might for poorer countries be more appropriate for regional application. Renewable energies, mainly solar, could also become a market for them.

Would sharing our knowledge be enough to help the poorest countries?

Zebisch: Definitely not. First, we have to understand that at the moment the average European citizen emits 2-3 times more GHG (greenhouse gases) than the average Chinese citizen and 5-10 times more than the average Indian citizen. Hence the ball is clearly in the court of the rich countries. Secondly, poor regions are very often the production site of consumer goods for the rich countries. So it is clearly our responsibility to support such places by introducing clean technology, which should be financed through higher product prices. Furthermore, the Kyoto Protocol has already foreseen the so-called Clean Development Mechanism, which allows industrialized countries to invest in GHG-reducing technologies in developing countries to compensate for emissions produced in the industrialized world.

What did you find the most important in the last Intergovernment Panel on Climate Change (IPCC) report, and why?

Zebisch: For me, the most important statement in the report is this: "Most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic GHG concentrations." This is an advance since the 2001 report's conclusion: "Most of the observed warming over the last 50 years is likely to have been due to the increase in GHG concentrations". This helps a lot when arguing with stakeholders who can very often be skeptical about the importance of human influence. Only when we manage to convince them can we start talking about climatic change mitigation and adaption measures. The big achievement of the IPCC is the collection and summary of all the work which has been done in different parts of the world through different scientific disciplines.

Are we really going to face more disasters due to the climatic change, or will we just know more about them, and by knowing more, be more afraid?

Zebisch: The question is, "what's a disaster?" What we know very well is that we should expect, and be prepared for, climatic change. That means changes over the long-term in average tempera-

01 Marc Zebisch, Scientific Director of the Institute for Applied Remote Sensing, is specialized in monitoring and modeling land-use dynamics and the consequences of global change by means of remote sensing, GIS and computer models. He graduated at the Potsdam University and obtained his Ph.D. at the Technical University of Berlin. He contributed as co-author to the EEA-report 'Impacts of Europe's changing climate' and as a leading author to the report 'Climate Change in Germany – Vulnerability and Adaptation of Climate Sensitive Systems'.

02 How well will we be prepared to increasing natural disasters such as landslides, rock falls or floods?

tures and levels of precipitation. We know already this will have severe consequences for regions like the Alps. For instance, less water in the summertime from melting snow means higher risk of droughts in summer for agriculture. If we consider this a 'disaster', the question becomes more "how well we will prepare ourselves?" What we don't know so well is to what extent natural hazards such as floods, landslides or rock falls will increase. Several studies indicate we will see an increase due to an expected increase of extreme precipitation events—causing floods and landslides—and the melting of permafrost—causing rockfalls. But here, the scenarios are not robust enough to give reliable quantitative information.

Should we focus on creating systems preventing us from the bad effects of climatic change, or we rather should construct warning systems?
Zebisch: The first strategy should always be to avoid or respectively mitigate climatic change by reducing greenhouse gases emissions. There is a big potential and demand for that, particularly in the industrialized world. Calculation in the framework of the Copenhagen climate conference showed that industrialized nations should reduce their emissions by up to 80% until 2050 to reduce the warming to the 2°C level. The second strategy is adaptation to the unavoidable. This includes early warning systems, for instance, for floods, droughts, etc., as well as system that could prevent us from suffering bad effects, for example, higher dikes, more retention areas for floods, and more effective water management systems including water storage for droughts. The answer is not "either or". The challenge is to investigate intelligent and cost-effective measures which ideally contribute to mitigation and adaptation.

Which issue related to the anthropological climatic change should be in your opinion discussed and researched more, and which one should we stop talking about?
Zebisch: We should definitely stop discussion as to whether there is something like climatic change or not. There is more than enough evidence of an accelerating warming and many consequences of this are already being observed. Instead, we should discuss more about how we can reduce greenhouse gas emissions globally as fast as possible. Considering this, Copenhagen was a real throwback. From the perspective of science there is still a lot to improve in the regional to local scale. Here, climatic scenarios are less accurate and, particularly for precipitation, it sometimes shows contradicting results. But the most important thing at the moment is not to talk but to act.

Maciej Mikulewicz
beniakrzyk@gmail.com


Foto: thinkstock

02

Maciej Mikulewicz

Maciej Mikulewicz is a student of Polish Philology at the Adam Mickiewicz University in Poznan. He writes for the 'Glos Wielkopolski, Polska The Times' and on the 'Krytyka Polityczna' web page.

01 The Ishtar Gate at the Pergamon Museum in Berlin.

Custodians of History

Far from the battlefields of Iraq, the ancient Ishtar Gate is supposed to be safe from harm in its new home in Berlin. Not so. Scientists from the Institute of Renewable Energy at EURAC are collaborating on a new monitoring system that could go a long way to preserving this and other monuments around the world.

Built over 2500 years ago in the very centre of Babylon, she's seen a lot—endless festive parades, foreign invasions and daily life—all now long gone. But these days she faces a peril greater than ever before—relentless vibration caused by thousands of little feet, passing boats, sudden changes in humidity and temperature as well as hands of curious people wanting to touch her centuries of history. The Ishtar Gate can't take it much longer.

Researchers from several European countries including Germany, Poland and Italy are striving to ensure that such a sad fate will not happen to the fascinating historical monuments in Europe and the Near East. A number of institutions, including the University of Stuttgart and Zagreb, the Polish Academy of Science and EURAC, are collaborating on the development of a monitoring system called "Smart Monitoring of Historic Structures (SMooHS), which will measure environmental data at the Museum Island in Berlin, Palazzo Malvezzi in Bologna, and Jarah, Alt Gerasa in Jordan in order to assess possible threats to the integrity of these precious monuments.

01

Keep it Simple

The monitoring stations will be comprised of common, commercially-available and fairly inexpensive equipment, but they will be upgraded with a few innovative features. First of all, a wireless system will be introduced (since hardly anyone likes cables coiling round the ancient stones), and secondly, scientists want to make the whole system user-friendlier. "Previous systems provided the user with loads of data which had little meaning. We're working on a system that will process the most basic measurements into a meaningful pattern," says Alexandra Troi from the Institute for Renewable Energy of EURAC. Wardens will not have to calculate the average temperature or humidity level but instead will be warned by the system whenever the conditions rapidly change and become harmful to the old structures. With this information they can take appropriate action based on recommendations given by the monitoring system itself.

An Ounce of Prevention

The Ishtar Gate is one of the case studies. Taken from Iraq at the beginning of the last century, it found its home on the Museum Island in Berlin, safely protected from the ups and downs of its country's unstable history. In recent years, however, small cracks have started to appear on the surface of the monument, causing understandable concern. Old walls are susceptible to sudden changes in temperature and humidity levels—materials naturally stretch and shrink according to the conditions, but if the variation is too extreme the material cannot return to its original shape and cracks can appear.

Yet the Pergamon Museum monitors such changes and generally takes good care of the monument, so the sudden deterioration of the Ishtar Gate must have another source. Vibrations caused by the masses of tourists visiting the Museum every year as well as large cargo boats passing around Museum Island could be such factors, but it will be thanks to the new monitoring systems that the exact cause will be determined. "Preventing damage is always cheaper then repairing it, but what concerns us more is that with every restoration process you lose part of the original historical material," says Troi. After all, allowing the Ishtar Gate to be damaged thousands of kilometres from the battlefields of Iraq would be something of an embarrassment.

Iza Romanowska
izoken@gmail.com

Iza Romanowska

Iza is a postgraduate researcher at the Centre for Archaeology of Human Origins, University of Southampton. She looks into stone tools of the first Europeans – Homo heidelbergensis and in her spare time she reports on science for Polish Public Radio webpages.

01

01 No solar technology so far on the rooftops of Cagliari's residential buildings. But things may change.

Mediterranean Sun and Alpine Technology

EURAC's research in energy efficiency is often a model for regions with cold climates, but what about the Mediterranean area? In Cagliari, Sardegna Ricerche's Renewable Energy Cluster started facing the challenge last year, taking into account South Tyrolean experience to find its own path up the green energy trail.

From my window on the ninth floor, the blocks of residential buildings in Cagliari stand out clearly against an atypical leaden sky. The warm Sardinian sun has decided to hide behind a thick blanket of clouds, and the only thing that reminds me I have come back from South Tyrol is the cry of the seagulls. After attending the My Science workshop on renewable energy at EURAC – European Academy Bozen/Bolzano, I look at these ugly, post-economic boom buildings with new eyes, and catch myself thinking that, even if they had solar technologies implanted on their naked roofs, on this cloudy day they could not capture a single sun ray. But they could still benefit from passive technologies... if only they were provided with them.

I wonder what Roberto Lollini, EURAC's Enerbuild project leader, would say if he saw this cityscape: compared to the advanced technical solutions of the Energy Saving and Producing (**ESAP**) **buildings** he studies, Cagliari must look like an energy-wasting, urban jungle. His presentation at the My Science workshop was held on a cold, Alpine day in February, but that office was a pleasant island of warmth, while my room, in spite of the Mediterranean climate and the traditional radiator, is simply a fridge.

"It has always been this way," says Giuseppe Desogus, Ph.D. in Civil Engineering at the University of Cagliari (as if he knew about my room). "In the South of Italy, it has not been a tradition to insulate houses, so the winter comfort temperature was lower than in northern regions. Now cultural behaviour is changing and the interest in **passive houses** in hot climates is growing." The energy challenge was accepted in Sardinia by Sardegna Ricerche, the regional research centre which established the Renewable Energy Cluster in 2008. Like the EURAC Institute for Renewable Energy, the Cluster focuses on different research projects funded by the European Union, but, unfortunately, the financial means are not at the same level: while EURAC manages to raise consistent funds from several programmes, the Cluster has to content itself with the O.R.P. (Operative Regional Programme) 2007-2013. Nevertheless, four labs have been set up: biomass, energy efficiency, photovoltaics, concentrated solar thermal and renewable hydrogen. Giuseppe is a young passionate researcher at the Energy Efficiency Lab, managed by the University's Architecture Department. He fell in love with environmental topics during his university days, when Jeremy Rifkin's book "Entropy", struck him on the road to specialization.

ESAP Building
Energy Saving and Producing. A building endowed with integrated passive technologies for energy efficiency (e.g. continuous thermal insulation, double and triple glass windows, etc.) and active technologies for the production of energy from renewable sources (usually solar thermal and photovoltaic panels).

Passive House
A passive house is a building in which a comfortable interior climate can be maintained without active heating and cooling systems (Adamson 1987 and Feist 1988). The house heats and cools itself, hence "passive".

Mission Difficult, But Possible

Sardegna Ricerche's Energy Efficiency Lab constantly refers to national and international research, especially to South Tyrol's experience in eco-building design and certification. But what Sardinia should really import from EURAC are the Enerbuild approaches that are oriented towards Small to Medium-sized Enterprises (SMEs). "We provide craftsmen, architects, public builders and end-users with technical know-how, political decision-making tools and even financial tools in order to support the demand for ESAP buildings," explains Roberto Lollini. "The objective is to create the appropriate environment for SME innovation in the Alpine area." The result? All of society benefits from the scientific work, creating a kind of 'virtuous' circle of knowledge,

economic development and environmental sustainability—a circle left unclosed in Sardinia because of an eternal missing link: SMEs themselves. "Except for a few exceptions, we have no productive sector —admits Giuseppe Desogus—but we hope to implement some projects for the technological transfer to enterprises as soon as we receive the second part of the O.R.P. funds. At the moment, we are still in the monitoring phase."

Mission difficult but possible: retrofitting existing buildings, in particular, the traditional **adobe houses** and residential blocks built between the Sixties and the Eighties around the historical centre of Cagliari – precisely those horrible buildings outside my window. The traditional houses, located in the Campidano plain and along the Cixerri river, can be imagined as the Mediterranean alternative to Alpine wooden houses, and owe their insulation capacity to the amount of straw used in the mud bricks (called ladiri in Sardinian language), since earth alone is not a good insulator. "In fact, it is not allowed by Italian law, unless combined with other materials," specifies Giuseppe. "By experimenting with new mixtures that use natural materials such as waste sheep wool--which until recently was just thrown away at great expense--we are getting results comparable with other insulators."

Together with adobe buildings, in 2009 the lab monitored some blocks of council flats, similar to the Branzoll/Bronzolo passive house monitored by the EURAC in collaboration with the IPES (Social Housing Institute of the Autonomous Province of Bolzano). But Cagliari is very far away from the South Tyrolean standards: thin walls and huge **thermal bridges** (for example, drafty windows) make these flats unliveable, especially in summer, when they turn to human sized ovens. What to do with them? "Their tall and light structure does not favour any considerable refurbishment", reflects Giuseppe. "The Alpine tradition could inspire some wooden solutions, but the answer is probably their integration with a good cooling system."

This is where the EURAC's SolarCombi+ project could really help: "SolarCombi+ is a system which brings together cooling, heating and the production of domestic hot water by means of solar thermal collectors and **sorption chillers**, and puts them in a single unit made compact and easily installable for end-users," explains the project's leader Roberto Fedrizzi. Vice Head of the Institute for Renewable Energy, Alexandra Troi agrees, "What's really amazing about sorption chillers is that you need solar energy when you have it: in the summer."

Which is particularly true in Sardinia, as Giuseppe Desogus recognizes: "It could be a solution for the real problem of Southern Italy, that is, the summer climate. In 2002, the European Union launched an alarm about the electric congestion due to traditional chillers, so we could evaluate to study sorption chillers once we obtain more funds."

And in the meantime? "Starting in April, we are going to be monitoring some glass buildings in the Cagliari area followed by the summer performance of all the buildings we've already examined." The lab collaborates with other research centres, such as the Centro Abita of the University of Florence and the BEST Department of the Polytechnic of Milan, but what about the EURAC? "At the moment, we are not in contact."

Who knows, this could be the starting point.

Eleonora Cipollina
ecipollina@gmail.com

Adobe House
A dwelling built with sun-dried bricks made of earth and straw.

Thermal Bridge
Part of a building envelope where there is a higher heat loss to the exterior, for example around windows or at the wall/roof edge.

Sorption Chiller
A machine able to exploit heat from an external source (e.g. solar collector or heat waste from an industrial process) to cool an indoor environment, thanks to a fluid solution which is cyclically conducted in a liquid and gaseous state, thus absorbing and releasing heat.

Eleonora Cipollina

Freelance journalist born in a golden cage called Sardinia, Eleonora has always struggled to travel and meet new cultures, discovering her own by contrasting it with others. A very dynamic and resourceful young woman, thanks to the constant training of sorting out her own messes. Almost environmentally- and health-conscious, she is addicted to only one drug: chocolate.

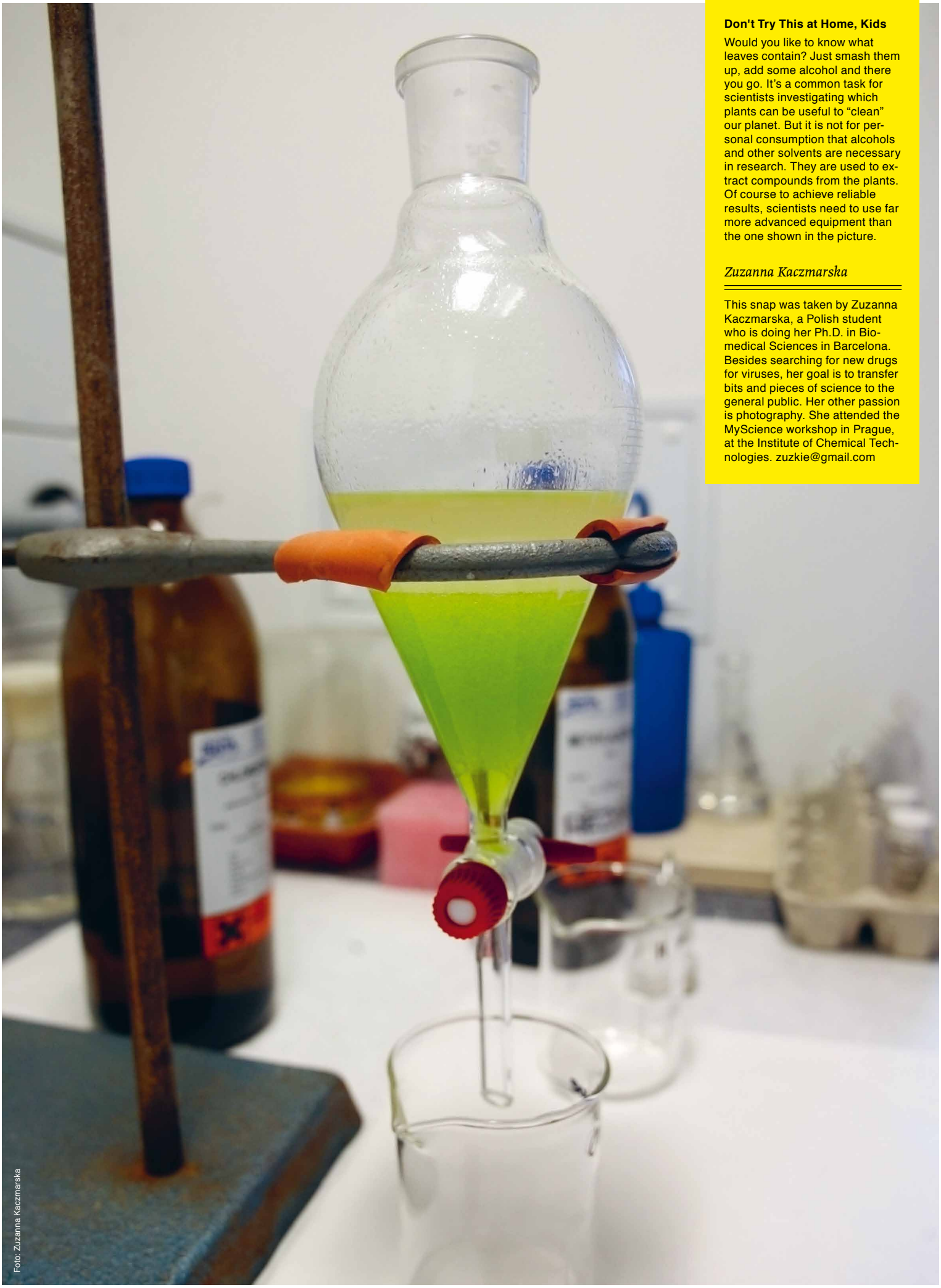


Foto: Zuzanna Kaczmarska

Don't Try This at Home, Kids

Would you like to know what leaves contain? Just smash them up, add some alcohol and there you go. It's a common task for scientists investigating which plants can be useful to "clean" our planet. But it is not for personal consumption that alcohols and other solvents are necessary in research. They are used to extract compounds from the plants. Of course to achieve reliable results, scientists need to use far more advanced equipment than the one shown in the picture.

Zuzanna Kaczmarska

This snap was taken by Zuzanna Kaczmarska, a Polish student who is doing her Ph.D. in Biomedical Sciences in Barcelona. Besides searching for new drugs for viruses, her goal is to transfer bits and pieces of science to the general public. Her other passion is photography. She attended the MyScience workshop in Prague, at the Institute of Chemical Technologies. zuzkie@gmail.com

Foto: Zuzanna Kaczmarska

01

It Takes a Warrior to Fight Toxins

Jan Rezek is currently doing biochemical research focused on removal of toxic substances called PCBs from the environment. But when I first saw Jan Rezek, I thought, "Is that a scientist or a rock star?"

Judging by your looks, you must have an unusual hobby.
Jan Rezek: Well, nowadays my main hobby is Musado, a martial art of Korean origin. It is basically a very efficient self defense street fighting style; there are no special rules, but it is all about defending with minimum effort and maximum results. It was developed by a German who went to Korea to learn old Korean martial art and then modernized it by removing elements useless in street fights, for example, acrobatics. Nowadays even the Czech army uses it as their combat style.

Have you ever had to defend yourself in the street?
Rezek: I'd say in some situations it's better just to give the money to the guy and save your life, or just run away if there's a chance, as fighting can end up with losing a life. But I think people avoid fighting me when they see me, even in really dangerous places.

Any other hobbies besides Musado?
Rezek: Some time ago I played bass guitar in a band. I also like to travel when I have the opportunity.

Where have you been so far?
Rezek: I spent a year in Colombia, where I met my wife, Alba. I've also been to Africa and I hitch-hiked all over Europe.

Well, why become a scientist then?
Rezek: I've always been attracted to nature, and when I was a child my father would always explain things to me as both of my parents are teachers. I guess this combination was what shaped my future career. When you are a scientist you in a way always remain a child, because you constantly learn something new and discover things.

What do you plan to do in next ten years?
Rezek: There are basically two options: I'm here in Czech Republic or I'm in Colombia, as Alba and I want to stay close to one of our grandparents who would help us with babysitting (smiles). Currently, if my wife decides on a place to complete her specialization in medicine I will try to follow her and find an appropriate place for a postdoc there. The research I'm doing now is a kind of a second line fight as PCBs do not kill you instantly. Perhaps in the future I'll move to the front line of combat.

What do you mean?
Rezek: In Colombia I worked in a lab connected to tropical diseases, where I worked, for example, with multi-resistant tuberculosis. In that type of research you have to work fast to determinate specific bacteria or viruses, and if not, the infected men will die in several days. Perhaps in the future I would like to do something similar, even complementing my wife in her medical work. That's a first line combat.

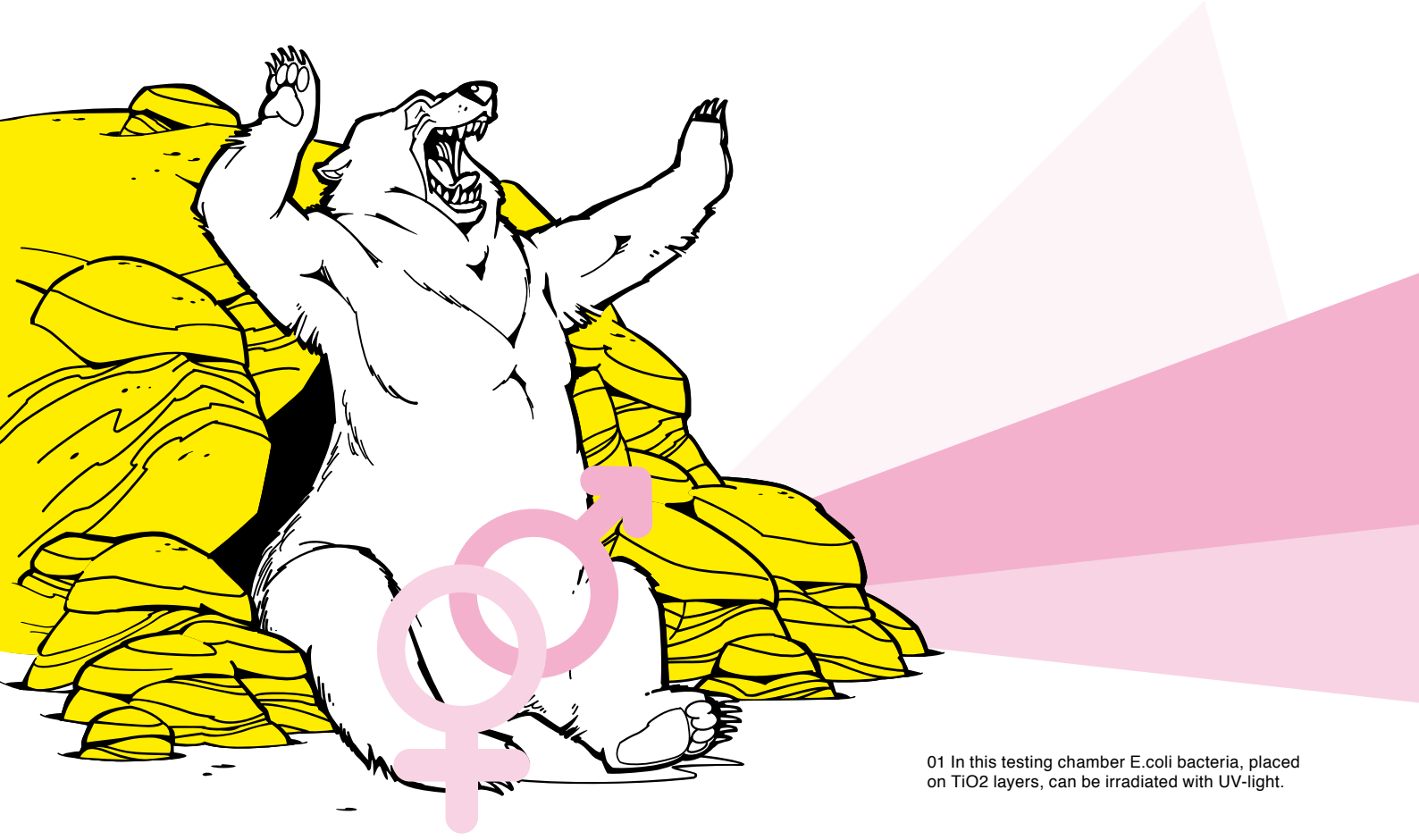
Grażyna Zawada
Grazyna.Zawada@krakow.agora.pl

Grażyna Zawada

Grażyna Zawada, born 1983, is a freelance journalist for "Gazeta Wyborcza", the major Polish daily and also other English-language media in Krakow, Poland. She has a MA in Teaching Polish to Foreigners and a BA in Literature Comparative Studies. Her other field of journalism besides science is animal welfare.

Environmental Entente
"Our research can cast new light on interconnection between microorganisms and plants, especially aimed at bioremediation, achieved by cooperation between plants and microorganisms," says Tomas Macek from Institute of Chemical Technology (VSCHT) in Prague, Czech Republic. He and his team are working on a project called METAGENOM trying to develop an easy and cheap way to degrade pollutants, mainly polychlorinated biphenyls (PCBs). Jan Rezek has been part of this since March 2009.

01 Jan Rezek



01 In this testing chamber E.coli bacteria, placed on TiO2 layers, can be irradiated with UV-light.

The Stubborn Life of PCBs

What's the link between hermaphrodite polar bears in Norway, mass poisoning in Japan, and GM tobacco in Prague? PCBs—a family of ubiquitous toxic molecules that were banned long ago, but are still causing silent damage around the world.

In the late 1990s, scientists discovered hermaphrodite polar bears near the island of Svalbard, in Norway. Genetically, they were female, but had little penises in front of their vagina. Some scientists put the blame on a family of man-made pollutants called Polychlorinated Biphenyls, or PCBs. These molecules could mimic sexual hormones, hence messing with the bears' sexual organs.

PCBs have been manufactured and used since 1929 in many countries, for example, under the market name "Apirolio" in Italy. Because of their insulating properties, they became common ingredients in many products, such as electrical transformers or paint. Unfortunately, PCBs are highly toxic. In 1968 in Japan, 280 kilos of rice bran oil were contaminated by the oil factory's machines, causing a PCB mass poisoning; thousands of people suffered from skin problems, menstrual troubles or a weak immune system. Three decades later, in Belgium, poultry and pigs contaminated with dioxin in their feed caused a memorable outcry. The public generally remembers this food crisis as "the dioxin scandal" – but toxic PCBs were added to the feed mix, too. Animal studies confirmed that PCBs are highly toxic for the liver and can cause cancer, or damage the reproductive and immune systems. Most countries stopped producing them in the 1970s.

What does that have to do with hermaphrodite polar bears? Well, PCBs are very resistant and can travel through water or air across thousands of kilometres, far away from polluting factories, and decades after they have disappeared from the market. The water that reaches the Arctic accumulates PCBs along the way and the plankton is contaminated. Fish eat the plankton, seals eat the fish, and polar bears eat the seals... at every step of this simple food chain, PCBs accumulate in the fatty tissues to reach disruptive levels. In 2001, the Stockholm Convention on Persistent Organic Pollutants blacklisted PCBs forever. This international treaty requires that signatories do their best to prevent further damage. Chemists and biologists are busy trying to clean up the mess, but PCBs are tough to get rid of.

Searching for the Hideout

PCBs have no particular smell or taste, and are too small to see with the naked eye. So how do we know that they are there at all? Enter Kamila Kalachova, Ph.D. student at the Institute of Chemical Technology Prague. Kalachova is part of a sprawling EU-funded research project called CONf-

01

fIDENCE. Researchers in 10 countries are joining forces to establish cheap, reliable methods to track contaminants in various types of food.

Kalachova hunts down PCBs in fish, such as smoked trout. From the initial fish sample, she extracts a clear liquid and finds out if it contains PCBs, and in what quantities. Part of her bench work looks like kitchen experiments – adding a bit more of this solvent, shaking the mixture a bit longer. After about six months of trial-and-error, Kalachova perfected a protocol that can now be used routinely in any lab. Her fast-track method can detect several types of toxic molecules in one go, and in a few hours, whilst the conventional method required a few days.

Benches and corridors are bustling with dozens of young chemists searching fish, breakfast cereal or beer for dozens of harmful contaminants. Yet, working in food safety research has not affected Kalachova's diet and habits. "I look at the ingredients, but I eat everything," she says confidently. Organic chemistry will keep inventing new contaminants, and analytical methods can only do their best to keep pace. "If they do something that is free (of one contaminant), one or two years later they'll find something else. Everything is contaminated, anyway," Kalachova asserts. She does not seem worried, though: "the key is to eat small amounts of everything."

Killing the Villains

Three blocks down from Kalachova's office, at the Czech Academy of Sciences, Jan Rezek strives to eliminate PCBs from the surface of the Earth. The brutal, traditional method is burning—at around 1000°C, PCBs are destroyed. Unfortunately, burning is impractical and the by-products themselves can be toxic. The newer trend is bioremediation, i.e. finding plants and microbes that can do the job for us. It's cheaper than digging out tons of earth to set them on fire, and gentler too.

Rezek cultivated tobacco in the lab to confirm that plant tissues can take up PCBs and use them for their own growth. He also exposes himself to toxic PCBs in dumpsites, looking for real-life plants that can grow on contaminated soil, and searching for the best cleaning species. "Of course it's dangerous, but someone has to do it," Rezek says simply of his work. Then comes meticulous detective work to reconstruct the chain of chemical reactions: to understand how plants degrade PCBs and what they turn them into. Scientists hunt not only for plants that can degrade PCBs, but also for micro-organisms that live comfortably in symbiosis around those plants' roots. "We know various micro-organisms that can (grow on PCBs) in the lab, but under most natural conditions, they don't survive well," Rezek explains. The metagenomic approach allows biologists to screen all genes of all bacteria living around a plant's roots at once. The general idea is to identify the genes responsible for the degradation, and use them to create transgenic plants. Both transgenic plants and microbes would work together to clean up the soil.

However, in the EU, strict regulations mean that GM plants hardly ever leave the lab. Such transgenic tobacco could only be planted in contaminated dumpsites after a change of policy. Further down the line, these cleaning plants might spare the next generations of polar bears from bizarre sexual symptoms.

Tania Rabesandratana
tania.rabesan@gmail.com

Tania Rabesandratana

Tania Rabesandratana is a 28-year-old multilingual science journalist. She is French but likes to bounce from one city to the next. After an MSc in Science Communication at Imperial College London, followed by several years working in Vienna and Santiago de Chile, she is now based in Brussels.

The Bacteria Battles

Czech researchers are developing a special surface coating as a weapon in the fight against 'the hospital bug' MRSA. Currently being tested in laboratories, this protective layer may help to prevent the spread of harmful bacteria in both stables and hospitals.

Have you ever heard of MRSA? This bacterium is causing major health problems in hospitals throughout Europe. And there was no way to fight it, until now. Czech researchers are developing solutions that can destroy harmful bacteria in no time. You just have to spray it on the walls and turn on ultraviolet (UV) light. Two of the researchers show us exactly how it works. *Staphylococcus aureus* is a common bacterium frequently found in your nose and on your skin. It can grow fast on surfaces like tiles, floors and windows. When your immune system is weak, for example when you are sick or just had surgery, this bacterium can cause nasty infections. And once you are infected it is hard to find a good cure. Since the introduction of penicillin in 1943 almost all strains of *Staphylococcus aureus* became resistant to widely used antibiotics. MRSA, also known as 'the hospital bug', is the most common form of these resistant bacteria.

Radical Solution

In 2005 researchers discovered an animal-derived clone of MRSA that causes disease in pigs and piglets, but also in humans. This clone is being used in the European FP7 research project PILGRIM to study MRSA in both veterinary settings and in public health. Josef Krýsa and Jiří Zita from the Institute of Chemical Technology, Prague (ICT Prague) are participating in PILGRIM. In the battle against MRSA they are developing surfaces coated with the mineral titanium dioxide (TiO2). In addition, their hope is that in the future, walls and floors of hospitals can be cleaned with a solution of TiO2 that destroys harmful bacteria in no time when illuminated with UV-light.

"TiO2 is a photocatalyst, which means it uses UV-light to speed up a chemical reaction between water and oxygen," Zita explains. "Reactive particles, or free radicals, are produced as a result. These particles attack bacteria by first destroying their cell walls and later also their cell membranes." Several different solutions containing TiO2 particles are being prepared and tested in the laboratory of ICT Prague at this moment. Zita shows two of them: an orange solution that has to be heated before it can be used and a transparent solution that can be used directly on surfaces. "The transparent solution would be ideal to use, but it has only been in our laboratory for a few months now. So it still needs extensive testing."

With a mechanical 'dipping' device, the solutions are put on small glass slides. In this way TiO2 layers of different thickness are produced. Zita already discovered that a thin layer of TiO2 solution is the most stable: "It is difficult to make scratches on a thin layer or remove complete parts of it from the glass slide. But on the other hand, the chemical reaction of a thick layer is much stronger because it absorbs a higher amount of light. In other words, the activity of a thick layer is higher. Finding of an optimal layer thickness is necessary."

"The activity of the layers is tested by dipping the glass slide coated with TiO2 into blue ink," Zita continues. "Under UV-light, the reactive particles produced attack the color pigment of the ink. When the layer is active the ink will become transparent after just a few minutes of UV-radiation. The ink of layers that are not active will stay blue, even after more than several hours under UV-light." Layers that pass the test of activity are transferred to the microbiology laboratory of ICT Prague. Here it is investigated if those layers are really useful for the destruction of living bacteria.

Zita: "Our microbiology laboratory is not equipped to work with MRSA, so the layers are tested on *Escherichia coli* (E. coli), another bacterium." E. coli grows really well on glass plates when the right culture medium is provided. You can measure this growth by counting the bacteria colonies at intervals. "At ICT Prague we built a special testing chamber to irradiate E. coli bacteria placed on TiO2 layers with UV-light. If a layer is working well the number of bacterial colonies should go down." TiO2 layers that are successful in these test will be send to the Royal Veterinary College in London. Here the layers are tested on living strains of MRSA.

Safe for Bipeds and Quadrupeds

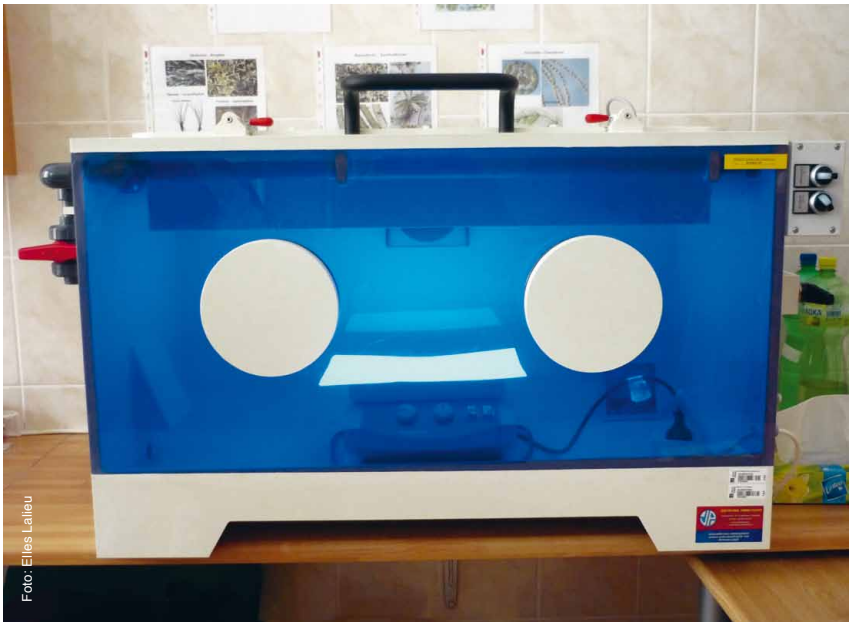
No need to be concerned about reactive particles though. While all these laboratory tests are still in progress Krýsa and Zita have already thought of the practical implications of their cleaning method. Is it safe to clean hospitals using UV-light and reactive particles? According to Zita it is. "To start the chemical reaction we use UVA-light with a wavelength of 330 to 400 nanometers. That kind of UV-light is part of the sunlight that reaches your skin every time you take a walk outside. It is no problem to turn on the UV-light, for say half an hour, to clean a hospital room full of patients. Some people are concerned about the use of reactive particles, but there is no need to be. These particles have a very short life-span. Once they have killed a bacterium, they are gone."

Before we can benefit from the effects of TiO2, pigs will. In collaboration with Danish researchers, the ICT Prague will develop specially-equipped stable boxes. The air in these stables is constantly cleaned. Walls and floors will be covered with white paint containing sufficient amounts of TiO2. For half of the day UV-lights will be on to remove MRSA out of the pig's environment. If this works Krýsa and Zita have developed a method that can not only keep MRSA out of the stables, but also away from the farmers and even far from the hospitals.

Elles Lalieu
elles.lalieu@kennislink.nl

01+02 The reactivity of layers is tested under UV-light, but also under visible light.

01



02

Elles Lalieu

Elles Lalieu studied Biology and Science Communication at the University of Leiden (NL). Since her graduation in August 2008 she has been writing for several Dutch popular science websites. The main projects she is working on are www.kennislink.nl and www.degrotegriepmeting.

Foto: Gabrielli Irene

01

Basta un poco di zucchero...

Molti cuochi italiani si trasferiscono all'estero per esportare le tipicità nostrane, dai canederli ai malloreddus. Altri, un po' speciali, emigrano per preparare piatti altrettanto speciali: zuccheri. Cucinati a dovere, possono prevenire infezioni da parte di alcuni dei virus più aggressivi per l'uomo come Ebola, HIV o TBC. È il caso di **Benedetta Bertolotti**, trentenne cremonese, che, dopo la laurea in chimica industriale all'Università di Milano, ha scelto un dottorato all'Istituto di Tecnologie Chimiche (ITC) di Praga, per lavorare al progetto Carmusys.

Cosa significa la parola Carmusys e quali sono le finalità di questo progetto?
Bertolotti: Carmusys sta per Carbohydrate Multivalent System as Tools to Study Pathogen Interactions with DC-SIGN. Il nome è un acronimo inglese che in italiano suona più o meno come: sistema di carboidrati polivalenti per studiare interazioni patogene con DC-SIGN. Il nome può spaventare ma, in realtà, nasconde un concetto piuttosto semplice: si tratta di studiare le interazioni della proteina DC-SIGN, solitamente presente in tutti gli esseri umani, con alcuni agenti portatori di malattie, principalmente virus. Sappiamo che questa proteina si trova sulla parete di particolari cellule del sistema immunitario: quando un virus penetra nell'organismo, si attacca ad essa e la sfrutta per veicolare l'infezione dentro alla cellula, e da lì a tutto il resto del corpo. Il progetto Carmusys cerca di costruire chimicamente delle molecole, nella fattispecie zuccheri, che siano in grado di legarsi alla proteina prima e meglio di quanto non faccia il virus, in modo da impedirne l'attacco e quindi l'infezione.

Qual è il suo ruolo all'interno del gruppo di ricerca?
Bertolotti: Una volta che i colleghi tedeschi del *modelling* dell'Anterio Consult & Research GmbH di Mannheim hanno disegnato al computer la struttura che sembra la più adatta a legarsi a DC-SIGN, entro in gioco io per cercare di riprodurla nella realtà. Il mio lavoro parte da uno zucchero, il mannosio, che in natura si trova abitualmente nelle palme o nelle carrube e che già di per sé mostra un'alta affinità con DC-SIGN. Attraverso una serie di reazioni che possono essere anche venti o quaranta, ognuna delle quali può richiedere dai cinque minuti ai cinque giorni, io cerco di dare allo zucchero la forma più adatta per renderlo ancora più "appetibile", irresistibile, per la nostra proteina.

Come stabilisce il percorso di reazioni per ottenere lo zucchero "giusto"?
Bertolotti: Nell'impostare queste le reazioni mi affido perlopiù a esperienze note, riportate in letteratura, ma come succede

in cucina, a volte le ricette devono essere un po' modificate a seconda di quello che uno ha a in frigo e di quello che vuole ottenere. Capita che per una sequenza di quaranta reazioni mi trovi a dover consultare sessanta "ricettari" diversi. Una volta riuscita a sintetizzare uno zucchero della struttura che cerchiamo, toccherà poi ai laboratori di biologia e virologia testarne l'efficacia.

E finora quali sono i risultati raggiunti dal team?
Bertolotti: Ad oggi il nostro gruppo ha già trovato, per alcuni di questi zuccheri modificati, un buon effetto antivirale contro i virus dell'HIV e dell'Ebola.

Cercare un dottorato all'estero: più un desiderio o una necessità?
Bertolotti: Direi entrambi: già durante la tesi di laurea mi ero scontrata con i ben noti problemi dell'università italiana. La mancanza di finanziamenti, i tagli , il precariato... L'alternativa era orientarsi al settore privato ma in questi anni anche le grandi multinazionali tendono a chiudere molte delle loro sedi, ad accorpare tutto in pochi centri di ricerca grandi e a trasferirli in paesi dove hanno maggiori sgravi fiscali e incentivi. Diciamo che "costretta" a cercare qualcosa mi sono orientata verso un dottorato, perché rimane un titolo molto appetibile per un ricercatore, e al di fuori dell'Italia dove spesso è più semplice trovare spazio o comunque ci sono maggiori possibilità. Tra le tante domande inviate, mi hanno risposto dall'ITC di Praga per lavorare a Carmusys: mi è sembrato subito molto interessante, il paese mi ispirava, e mi sono detta, perché no?

Lei che ha lavorato in entrambi, quali differenze nota tra un laboratorio italiano e uno ceco?
Bertolotti: Per quella che è la mia esperienza direi che rispetto all'Italia, i miei attuali colleghi hanno, in generale, un'età media più bassa; e questo vale sia per i ricercatori che per i professori. Per quanto riguarda il laboratorio chimico, invece, non ci sono grandi differenze di strumentazione di base. Però qui in Repubblica Ceca la ricerca gode di maggiori finanziamenti e quindi ci sono meno problemi per ordinare gli ingredienti per le reazioni, si investe nell'acquisto di nuovi apparecchi,... Questo è importante per un laboratorio perché consente di avere analisi più rapide e più precise. Ma senza andare sulle grandi spese, basti pensare che quando lavoravo in Italia mi sono dovuta comprare da sola il camice di laboratorio, mentre qui considerano equipaggiamento base, non solo camice e pantaloni, ma anche le chiavette USB!

Intervista di
Irene Gabrielli

Irene Gabrielli

Irene Gabrielli ha 27 anni, ha una laurea in scienze naturali e si occupa di comunicazione della scienza attraverso vari linguaggi: dalla ludodidattica, alla comunicazione istituzionale, passando per la realizzazione di testi per l'editoria scolastica e di prodotti multimediali. Oggi il lavoro l'ha portata a Trieste, domani chissà.

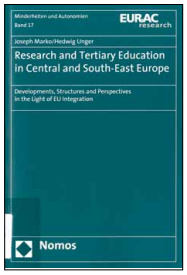
02

Le lingue di Carmusys
Carmusys è un consorzio di ricerca finanziato dalla Comunità Europea nell'ambito del VII Programma Quadro, che coinvolge dieci centri di ricerca universitari e due privati, provenienti da sette paesi diversi. Agli incontri ufficiali (almeno due l'anno), però, la lingua più parlata è l'italiano. Sono infatti ben cinque i nostri connazionali coinvolti nel progetto: Benedetta Bertolotti all'ITC di Praga, Martino Ambrosini al DC4U B.V. di Bussum, Anna Bernardi all'Università di Milano, Cinzia Guzzi all'Instituto de Investigaciones Químicas di Siviglia e Maurizio Perdicchio al VU University Medical Centre di Amsterdam.

01 In laboratorio serve tanta pazienza e un pizzico di creatività.

02 Benedetta Bertolotti

Publikationen ⋆ Pubblicazioni ⋆ Publications



Research and Tertiary Education in Central and South-East Europe

Developments, Structures and Perspectives in the Light of EU Integration

Joseph Marko, Hedwig Unger
Baden-Baden, Nomos, 2010, 155 pages
ISBN 978-3-8329-4718-7

While tertiary education in Europe is faced with challenges through ongoing processes of globalization, the countries of SEE face additional problems because of multiple transition processes from authoritarian regimes to multi-party democracy and rule of law, and from centrally planned to market economies in the aftermath of the violent dissolution of SFRY. An interdisciplinary and inter-cultural research team at Graz University, supported by collaborators in SEECs, conducted academic research on the topic of research and tertiary education in SEE. The main goal of this publication is to analyze the development of the normative standard setting by the Bologna Process and the Lisbon Strategy and the consequences which result from these processes for the integration of SEE countries into a EHEA and ERA; to analyze the institutional settings and processes within and between organisations of research and tertiary education in all of the SEE countries in their relation to the systems of state, society and economy and to describe developments with regard to the analytical framework developed, and, finally, to identify the challenges and needs for future reform processes for a full integration of SEE countries into the EHEA and ERA. The research concept was methodically based on a deconstructive-neo-institutional approach which combined normative and empirical analyses. After reflecting the results on the ground in SEE countries, policy recommendations are elaborated.

E-Government

Konzepte, Modelle und Erfahrungen

Kurt Promberger, Günther Früh, Josef Bernhart
Wien, Linde, 2010, 313 Seiten
ISBN 978-3-7073-1745-9

Seit über 20 Jahren gibt es in vielen entwickelten Staaten mehr oder weniger intensive Bemühungen, die internen und externen Geschäftsprozesse ihrer politisch-administrativen Systeme mit Hilfe moderner Informations- und Kommunikationstechnologien (IKT) zum Nutzen der Zivilgesellschaft (Bürger, NGOs, Interessensvertretungen) und der Wirtschaft (Unternehmen) schneller, effizienter und effektiver zu gestalten. All diese Anstrengungen werden häufig unter der Bezeichnung „E-Government" zusammengefasst. Getrieben wird diese Entwicklung vom technologischen Fortschritt, der neue Interaktionsformen zwischen Staat und Gesellschaft ermöglicht.
Die Publikation entstand im Rahmen eines von der Autonomen Provinz Bozen-Südtirol finanzierten Forschungsprojekts zum Stand und zu den Entwicklungsperspektiven von E-Government in den öffentlichen Institutionen Südtirols.
Das Buch wendet sich an Führungskräfte und Mitarbeiter in der öffentlichen Verwaltung unterschiedlicher Ebenen und Bereiche sowie an alle, die sich am Thema in Diskussion und Umsetzung beteiligen.

Kärntner Ortstafelstreit

Der Rechtskonflikt als Identitätskonflikt

Jürgen Pirker
Baden-Baden, Nomos, 2010, 338 Seiten
ISBN 978-3-8329-5163-4

Der Kärntner Ortstafelstreit ist ein besonderes Phänomen der österreichischen Zeitgeschichte. Der Minderheitenkonflikt wird hierbei als scheinbarer Teil einer "Kärntner Identität" aufrechterhalten und findet seinen Ausdruck in einem Winden um die Legalität, wie die diversen Ortstafelmetamorphosen der jüngeren Vergangenheit belegen. Indiziert ist dadurch die Frage nach einem tiefer liegenden Identitätskonflikt, der sich hinter dem vordergründig ausgetragenen und medial wahrnehmbaren Rechtskonflikt verbirgt. Aufbauend auf einer historischen Betrachtung der wesentlichen Entwicklungen von 1955-2008 werden Fragestellungen der kollektiven Identitätskonstruktion und des Nationalismus in Kärnten als Prämisse des bis heute bestehenden Konfliktes thematisiert. Die für die Ortstafelfrage relevanten Gesetzesnormen auf nationaler, internationaler und zwischenstaatlicher Ebene bilden neben der Rechtsprechung, den verschiedenen Auslegungsvarianten der Gesetzesbestimmungen und Rechtsmeinungen den Fokus eines weiteren Abschnitts. Abschließend analysiert der Autor die Wechselwirkungen von Politik, Identität und Recht im Kärntner Konflikt anhand der Identitätskonzepte der diversen Interessensvertreter beider Bevölkerungsgruppen. Er illustriert damit jene Faktoren, die den Kärntner Minderheitenkonflikt in einem zusammenwachsenden Europa am Leben erhalten.

Il maestro del sonno eterno

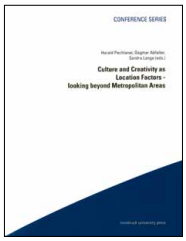
Dario Piombino-Mascali, presentazione di Arthur C. Aufderheide, prefazione di Albert R. Zink
Palermo, La Zisa, 2009, 126 pagine
ISBN 978-88-95709-52-9

Quali segreti custodisce Rosalia Lombardo, la 'Bella Addormentata' delle Catacombe di Palermo, ritenuta a ragione la più bella mummia del mondo? Quali alchimie hanno permesso la perfetta conservazione di una bambina di due anni, a quasi un secolo dalla sua morte? Chi ne è stato l'artefice? Tali interrogativi, rimasti per lunghissimo tempo irrisolti, trovano ora finalmente risposta in questo saggio dell'antropologo Dario Piombino-Mascali. Una ricostruzione appassionante della vicenda che lega la piccola Rosalia Lombardo ad Alfredo Salafia, imbalsamatore palermitano dai contorni finora velati dalla leggenda. Un viaggio avvincente, che l'autore compie prendendo per mano il lettore e conducendolo nel cuore di una storia mai rivelata prima, se non attraverso frammenti e contraddizioni.

Betreuung von Multiple Sklerose Patienten in Südtirol: Ansätze zum integrativen Management chronischer Krankheiten Assistenza dei pazienti affetti da sclerosi multipla in Alto Adige: approcci per una gestione integrata delle malattie croniche

Bernhart J. ; Promberger K. ; Schumacher K. ; Vigl S.
Bozen, EURAC Research [u.a.], 2009, 40 Seiten
ISBN 978-88-88906-53-9

Man nennt sie die Krankheit der tausend Gesichter. Menschen, die an Multipler Sklerose erkrankt sind, wissen nie, was sie erwartet. Ihre Krankheit entwickelt sich in Schüben und führt zu Nervenschmerzen, Sehstörungen und Lähmungen. Heilbar ist sie bislang nicht. Etwa 600 Patienten sind es in Südtirol. Alle 600 zeigen ein ganz eigenes Krankheitsbild. Für alle ist jeder Tag eine neue Herausforderung. Alle 600 müssen individuell betreut und medizinisch versorgt werden.
Wie die Patienten und ihre Angehörigen die Betreuungssituation in Südtirol empfinden, hat das EURAC-Institut für Public Management im Auftrag der Multiple Sklerose Vereinigung in einer Studie erhoben und in einer zweisprachigen Publikation veröffentlicht.



Culture and creativity as location factors - looking beyond metropolitan areas

Harald Pechlaner, Dagmar Abfalter, Sandra Lange
Innsbruck, Innsbruck Univ. Press, 2009, 211 Seiten
ISBN 978-3-902719-30-0

Culture and Economy provide two essential foundations for life. Although the materialistic focus of economy may be considered an antipode to the more intangible and idealistic focus of culture, both have in fact various intersections. Culture represents an important factor with regard to international competition and cultural activities play a critical role in both social innovation and economic development. Cultural work encourages creative impulses and engenders new sources of supply.
Most of the research carried out on the interplay of culture and economy concentrates on metropolitan areas, on cities and regions which are traditionally connected to cultural production, such as London or Berlin. The ideal conditions for cultural innovation are perceived to reside within an urban environment, and cultural supply is principally perceived as location factor for cities and urban areas. The focus of this book differs in that it pays particular attention on culture and creativity in non-metropolitan areas and on the potential differences between rural and metropolitan areas concerning the interplay of culture and economy. This publication includes contributions which have successfully passed a two-stage, double-blind, peer review process and have been presented and discussed at the Scientific Conference "Culture and Creativity as Location Factors - looking beyond Metropolitan Areas", organized by the European Academy of Bolzano-Bozen together with the Department of Strategic Management, Marketing and Tourism of the University of Innsbruck in June 2008.

Kultur und Kreativität als Standortfaktoren

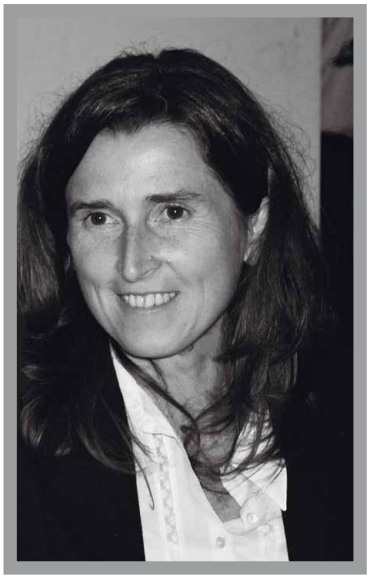
Harald Pechlaner, Gerhard Glüher, Sandra Lange
Bozen, Verl.-Anstalt Athesia, 2009, 117 Seiten
ISBN 978-88-8266-621-7

Das Anwachsen von qualitativ hervorragenden Kulturangeboten wird als Bereicherung nicht nur für das kulturelle Leben, sondern auch für die Wirtschaft wahrgenommen. Um die Wettbewerbsfähigkeit von Städten und Regionen zu erhöhen, fördert man daher bewusst Kultur und die "kreative Klasse". Kulturarbeit liefert Impulse, bringt neue Angebote hervor und aktiviert Menschen. Engagierte, »kreative« und hochqualifizierte Arbeitskräfte können langfristig an eine Region gebunden werden und das Image sowie die Attraktivität eines Standortes positiv beeinflussen. Das Buch enthält Beiträge der Tagung "Culture meets Economy", welche die Bedeutung von Kultur und Kreativität für die Erhaltung von Wettbewerbsfähigkeit und Innovationsleistungen von Standorten untersuchte. Die Veröffentlichung wurde von der Stiftung Südtiroler Sparkasse gefördert.

gefördert von
Stiftung Südtiroler Sparkasse
Fondazione Cassa di Risparmio
sostenuto da

EURAC'S HEART

It was she who built up the EURAC-Department of International Relations and Project Service. It was she who pushed EURAC to participate in the My Science Program. And it was she who in February 2010, exactly a year into My Science, passed away at the far-too-young age of 44. Cristina Boglia remembered…



"Opportunities for researchers depend a lot on the success of funding applications and development of new partnerships." This is Cristina Boglia, speaking last year to ACADEMIA about the role of her department. How right she was: EURAC would not be where it is without her.

For six years now, EURAC's Department of International Relations and Project Service has had its finger on the pulse of funding sources for research. Today, the department she founded in 2004 boasts a staff of ten, is responsible for over 30 EU projects, and manages 15 million Euros in project financing.

She could have done much more too. But in the early days of February 2010, Cristina Boglia, our accomplished colleague and beloved friend, died at the age of 44. She leaves behind a husband and two teenage daughters, and we are thinking of them at this time.

Cristina arrived at EURAC in 2000. At first she worked for the Institute for Minority Rights, seeking funding opportunities for their research projects. Cristina understood this work intimately from "the other side" — she had a great deal of experience at "The European Training Foundation" in Torino. There, she managed and evaluated a number of EU Commission projects in the Balkans.

"Cristina was extremely creative at elaborating project proposals for EURAC," remembers Emma Lantschner, former researcher at the Institute for Minority Rights, now assistant professor at the University of Graz. "I was always amazed by her positive energy and attitude. What surprised me the most was that, whatever the project—language minorities, democracy, human rights, or the social integration of new minorities—she always had such impressive background knowledge. Cristina was capable of giving us content ideas to elaborate research projects."

Eva Maria Moar, the new director of EURAC's Department of International Relations and Project Service, remembers her fine professional abilities: "She was incredibly patient when explaining the basics of project development to researchers and helping them make a successful application. Cristina knew the subtle difference between general and concrete objectives, between project goals and project outcomes. She taught us how to interpret calls for submission and which documents needed to be included in them. From her, we learned how to translate an initial idea into a concrete project which would fall in line with the goals of an EU program."

Sometimes Cristina had to cool researchers down, if they started to get too technical about their projects. "Science has to go hand-in-hand with society. The EU likes funding projects that have a direct impact on the everyday lives of people," was her advice to EURAC's researchers.

Her perseverance paid off. From year to year, EURAC received more and more financial support from the EU. Suddenly other research institutes starting looking to her expertise too. Finally, in 2004, the Department of International Relations and Project Service began working for all eleven of EURAC's institutes.

Now Cristina would work tirelessly to keep all researchers informed about calls for submission. She took the time to understand the nature of their work, and would very often offer a new project idea along with the call for submission. In countless meetings, the Department discussed content and possible project challenges. There, Cristina was able to brush off the skepticism ("We don't have enough time to make this happen!") with her endless optimism and enthusiasm. She was capable of finding pragmatic solutions for the most complex situations. And even if she cajoled an institute to submit an application over and over and over again, by the time they finally did, no one was fed up with her—she always found a way to strike a healthy balance between gentle persuasion and passionate prodding. And whenever the deadline loomed close (it was always close), and documents or texts were missing, the department just rolled up its sleeves and had a good laugh.

In the end, it was the people—not just the projects—that were important to her. She studied assiduously the social context of EURAC's work in Cypress and Asia. She participated in people's lives. And for some, she made a big difference. While travelling through India, she met a young girl and decided on the spot to personally provide her with a scholarship. After the earthquake in Pakistan, she immediately organized a multicultural lunch break at the EURAC to collect money for EURAC's partner institutions in Pakistan. She brought project partners into her home, and we too, have often enjoyed the hospitality of her wonderful family.

Cristina, you founded and managed the Department with enthusiasm, level-headedness, good humor and practicality. The architecture is there now. We will continue the work in your spirit.

And you will be missed!
Your colleagues

NACHRICHTEN
NOTIZIE *NEWS*

DEM FEINSTAUB AUF DER SPUR

Institut für Angewandte Fernerkundung

Wer Anfang März 2010 im Raum Meran unterwegs war, dem wird ein weiß-rote Heißluftballon nicht entgangen sein. An Bord waren 20 Kilogramm Technik der Universitäten Mailand Bicocca und Perugia sowie der EURAC. Ziel der Forschungsfahrt war es, täglich Feinstaub-Stichproben zu entnehmen. Bodenstationen liefern Daten der unmittelbaren Umgebung. Satellitenaufnahmen wiederum nehmen nur starke Trübungen der Atmosphäre wahr. Ob die größte Feinstaubkonzentration aber in Bodennähe oder in 1000 Metern Höhe liegt, wie sich Feinstaub in der Atmosphäre zusammensetzt und horizontal verteilt, das kann man nicht vom Satellitenbild ablesen. Genau diese Lücke schließt das Ballon-Projekt. Während das Flugobjekt aufsteigt, entnimmt es rund alle sechs Meter eine Luftprobe sowie Daten zur Temperatur, dem Luftdruck und der Luftfeuchte. Die Messungen werden direkt auf den Laptop übertragen und können sofort ausgewertet werden. Die Ballontestreihe wird aufzeigen, welche Art von Feinstaub sich in der Winterzeit über Südtirols Süden ansammelt, wie sich die Teilchen in der Atmosphäre verteilen und wie sie auf Luftfeuchtigkeit und Temperatur reagiert. Anhand der Studienergebnisse können die EURAC-Forscher dann auch die Satellitenmessungen von Feinstaub verbessern.

EIN NEUES HAUS FÜR DIE SCHÖNSTE MUMIE DER WELT

Institut für Mumien und den Iceman

1920 verstarb die gerade einmal zweijährige Rosalia Lombardo an einer Lungenentzündung. Sie wurde vom bekannten Arzt Alfredo Salafia einbalsamiert und in der Kapuzinergruft in Palermo aufgebahrt. „Die Katakomben sind feucht und staubig", erklärt EURAC-Forscher Marco Samadelli, „der ideale Nährboden für Pilze, Schimmel und Bakterien". Um die schönste Mumie der Welt vor dem Zerfall zu bewahren, haben nun Forscher des Instituts für Mumien und den Iceman - gemeinsam mit einem Mailänder Unternehmen - eine maßgeschneiderte Vitrine entwickelt. Samadelli: „Mit einem Luftaustausch von drei Litern in 100 Jahren, kann man sie als fast vollkommen luftundurchlässig bezeichnen. Mit Stickstoff gefüllt, schützt sie Rosalia u.a. auch vor Oxidation." Für die Entwicklung der Hülle haben die Forscher insgesamt drei neue Patente angemeldet. Um Rosalia ja keine Schaden zuzufügen, wurde sie mitsamt ihrem alten Sarkophag in die neue Hülle eingeführt. Ihr altes Haus wurde vorher gereinigt und sterilisiert. Winzige kabellose Sensoren im Inneren ihres neuen Zuhauses machen es möglich, Temperatur und Luftfeuchtigkeit auch über die Entfernung von 1000 Kilometern am Computerbildschirm der EURAC zu überwachen.

EURAC DELEGATION VISITS INDIA

Institute for Minority Rights

EURAC researchers Sergiu Constantin, Günther Rautz, Alexandra Tomaselli, and Giovanni Poggeschi travelled to Kolkata, India to participate at the Final Conference within the EURASIA-Net Project, which took place from March 18 to 21, 2010. The researchers also gave some presentations at the "International Workshop on Minority Issues" organized by the National Law University in Orissa. Topics ranged from international protection of minority and indigenous peoples' rights, European and national standards, as well as issues of federalism (in particular the case of Nepal).

PLATTFORM FÜR GRUNDRECHTE TAGT IN WIEN

Institut für Minderheitenrecht

Vom 15. bis 16. April 2010 fand in Wien das nunmehr dritte Treffen der Plattform für Grundrechte statt. Diese Plattform wurde als Kooperationsnetz verschiedener nichtstaatlicher Organisationen eingerichtet, um die Grundrechteagentur in ihrer Arbeit zu unterstützen und letzterer als Ideengenerator, Informant und Kommentator beizustehen. Das Institut für Minderheitenrecht, welches ebenfalls Mitglied dieser Plattform ist, wurde bei dieser Tagung in Wien durch Alice Engl vertreten. Die verschiedenen NGO-Vertreter diskutierten unter anderem mögliche Projekte der EU-Agentur für 2012 sowie die thematischen Prioritäten des Rahmenprogramms 2013-2017. Anschließend wurden die Vorschläge den Mitarbeitern der Grundrechteagentur präsentiert. Gefordert wurden unter anderem eine stärkere Fokussierung auf die Rechte von Kindern und Asylsuchenden sowie eine bessere Berücksichtigung von Minderheiten-relevanten Themen in allen EU-Politiken (minority mainstreaming). Abschließend wählten die Vertreter der Zivilgesellschaft einen Ausschuss von neun Mitgliedern, welcher die Arbeit der Plattform koordiniert und als Bindeglied zwischen selbiger und der Grundrechteagentur dient.

UNSERE KULTURLANDSCHAFT DER ZUKUNFT

Institut für Alpine Umwelt

Am 15. April lud das EURAC-Institut für Alpine Umwelt zum halbjährlichen, großen Meeting im Rahmen des Projekts „Kultur.Land.(Wirt)schaft - Strategien für die Kulturlandschaft der Zukunft" (KuLaWi, gefördert durch INTERREG IV Italien - Österreich). Im Meeting stellten die Projektpartner erste Ergebnisse vor: Um konkrete Strategien für die (zukünftige) Hofbewirtschaftung identifizieren zu können, wurden bereits in mehreren Tiroler und Südtiroler Untersuchungsgebieten Fokusgruppendiskussionen mit Bäuerinnen und Bauern durchgeführt. Auch ein Fragebogen ist in Arbeit, mit dessen Hilfe man diesen Sommer in einer breit angelegten Aktion bei Einheimischen und Touristen Antworten auf die Frage finden will, welche Landschaft sich die heutige Gesellschaft wünscht. Das EURAC-Institut für Alpine Umwelt, das die Lead-Partnerschaft innehat, präsentierte erste Ergebnisse zur Landschaftsentwicklung der vergangenen 150 Jahre in ausgewählten Untersuchungsgebieten sowie die offizielle Projekt-Homepage, die unter http://kulawi.eurac.edu alle Informationen zum Projekt bereithält.

LA VOCE DEGLI UIGURI

Istituto sui Diritti delle Minoranze

Rebiya Kadeer, la più nota dissidente cinese e presidentessa del Congresso mondiale degli uiguri, ha tenuto la "Lezione annuale sui diritti delle minoranze" dell'EURAC, lo scorso 26 gennaio. L'attivista uigura per i diritti umani ha parlato della sua detenzione in Cina e dell'esilio negli Stati uniti. Madre di undici figli, Rebiya Kadeer era una imprenditrice di successo quando, nel 1999, fu condannata a otto anni di prigionia a causa di presunti tradimenti di segreti di stato. Sotto la pressione di organizzazioni internazionali per la tutela dei diritti umani e per intervento diretto degli Stati uniti, fu liberata sei anni più tardi ed espulsa dalla Cina. All'EURAC Rebiya Kadeer ha perorato la causa del popolo uiguro, una minoranza mussulmana di circa dieci milioni di persone, di cui otto insediati nella Repubblica popolare cinese, che aspira alla autonomia.

WER HAT DIE SCHÖNSTE WIESE IM GANZEN LAND?

Institut für Alpine Umwelt

Das Jahr 2010 ist das Internationale Jahr der Biodiversität. Gerade in Südtirol, einem über Jahrtausende von der Landwirtschaft geprägtem Land, entstand das Meiste der heutigen Vielfalt erst durch die Hand der Bäuerinnen und Bauern. Auf Initiative der Landesräte Hans Berger und Michl Laimer organisiert das Institut für Alpine Umwelt in Zusammenarbeit mit der Südtiroler Bauernjugend, der Universität Innsbruck, dem Naturmuseum Südtirol, dem Sennereiverband Südtirol, den Abteilungen Natur und Landschaft, Landwirtschaft und Forstwirtschaft und dem Heimatpflegeverband Südtirol den Wettbewerb „Wer hat die schönste Wiese im ganzen Land?". Der Wettbewerb honoriert die Leistungen der Bäuerinnen und Bauern für die nachhalti-

ge Entwicklung der Kulturlandschaft und der damit verbundenen Biodiversität und soll auch eine Anregung zum standortangepassten Bewirtschaften im Sinne der Artenvielfalt sein.

NEUE JOBS BRAUCHT DAS LAND

Institut für Public Management

Die Wirtschaft ankurbeln und die lokalen Kreisläufe stärken – aber wie? Die Südtiroler Bürgermeister und Vertreter der Wirtschaft gehen im Auftrag der Landesabteilung Arbeit dieser Frage nach und haben bereits zwei attraktive Berufsprofile identifiziert. Zum einen den „Energie-, Bau- und Sanierungsberater“ im Vinschgau, zum anderen den „Promotor lokaler Kreisläufe“ im Pustertal. Das Institut für Public Management begleitet das Projekt wissenschaftlich und bereitet derzeit gemeinsam mit Gemeindenverband und Wirtschaftsring die Umsetzung der beiden Berufsprofile vor.

NACHHALTIGKEITSBERICHT NATURNS

Institut für Public Management

Wie nachhaltig handeln wir? Die Gemeinde Naturns hat beschlossen, sich dieser Frage zu stellen und das Institut für Public Management beauftragt, einen Nachhaltigkeitscheck durchzuführen.
Gemeinsam mit ausgewählten Vertretern aus den Bereichen Umwelt, Wirtschaft und Soziales wurden in drei Arbeitsgruppen alle Nachhaltigkeitsthemen einer Gemeinde systematisch durchforstet und Entwicklungsmaßnahmen generiert.
Zielsetzung ist ein öffentlich gemachter Bericht, der die Grundlage nachhaltiger Entwicklung der Gemeinde Naturns darstellt und alle Verantwortungsträger miteinbezieht.

IDENTIFICATI TREDICI GENI ASSOCIATI ALLA FUNZIONE RENALE

Istituto di Medicina Genetica

30 studi epidemiologici coinvolti, 130 ricercatori provenienti da Europa e Stati uniti, oltre 90.000 individui di origine caucasica analizzati. Sono questi i numeri del consorzio di ricerca CKDGen (Chronic Kidney Disease – Genetics, genetica della malattia renale cronica), coordinato da Caroline Fox della Harvard Medical School di Boston (USA), nel quale l'Istituto di Medicina Genetica EURAC ha avuto un ruolo di primo piano. Lo studio, durato oltre un anno, ha portato all'individuazione di tredici geni correlati alla funzione renale nell'organismo umano. Si tratta di una scoperta di grande interesse per la genetica; costituisce infatti la base per nuovi e approfonditi studi che potranno consentire notevoli progressi sia nella ricerca scientifica, sia nella prevenzione dell'insufficienza renale. I dettagli dello studio sono stai pubblicati l'11 aprile nella versione online di Nature Genetics, la principale rivista di genetica a livello internazionale, e verrà inserito nella sua edizione cartacea di maggio.

RISIKO-GEN FÜR PLÖTZLICHEN HERZTOD ENTDECKT

Institut für Genetische Medizin

Das Institut für Molekulare Biotechnologie (IMBA) entschlüsselte 490 Gene, die für das Funktionieren des Herzens von Taufliegen (Drosophila) essentiell sind. Die EURAC forschte als Mitglied des internationalen Forschungskonsortiums QTSCD (QT-Intervall and Sudden Cardiac Death) parallel dazu an menschlichen Genom-Varianten. Die Untersuchung von Elektrokardiogrammen von über 15.000 Personen aus Südtirol, Sardinien, Deutschland und den USA erbrachte den Beweis, dass die Erkenntnisse über bestimmte krankheitsrelevante Gene nicht nur für die Fliegen, sondern ebenso für den Menschen von Bedeutung sind. Die Forscherteams des IMBA und der EURAC liefern damit gemeinsam entscheidende Informationen für die Entwicklung innovativer therapeutischer Ansätze und neuartiger Herzmedikamente. Die Ausgabe des Wissenschaftsmagazins CELL vom 2. April 2010 widmet seine Titelgeschichte diesem Thema. Im gemeinsamen Forschungsvorhaben nahmen die Wissenschaftler besonders das neu entschlüsselte Herz-Gen NOT-3 unter die Lupe. Wurde dieses oder ein verwandtes Gen aus dem NOT-Signalweg bei der Taufliege blockiert, kam es zu schweren Herzrhythmusstörungen, die bei Stress zum Herztod des Insekts führten. Diese Erkenntnisse konnte der Forscher Keji Kuba (Akita Universität Japan) ebenso an Mäusen bestätigen. Das Forscherteam der EURAC rund um Peter Pramstaller und Andrew Hicks konnte schließlich mit der gezielten Untersuchung der menschlichen Genom-Varianten beweisen: Änderungen der Gene der NOT3-Region führen auch beim Menschen zu Herzrhythmusstörungen bis hin zum plötzlichen Herztod.

INTERNATIONAL SCIENTIFIC WORKSHOP NEW MINORITIES & TOURISM

Institute for Regional Development and Location Management

On January 22nd and 23rd, 2010 the Institute for Regional Development and Location Management and the School of Tourism of the University of Queensland (Australia) organised an International Scientific Workshop on New Minorities and Tourism. The scientific workshop hosted thirteen researchers from ten different countries who presented the state-of-the-art research in this field. Themes of the two days of workshop were the role of New Minorities as entrepreneurs in tourism; the social integration of New Minorities and the role of New Minorities' culture in tourism.

DIE FREIBERUFLER IN SÜDTIROL

Institut für Regionalentwicklung und Standortmanagemen

Das Institut für Regionalentwicklung hat gemeinsam mit der Vereinigung Südtiroler Freiberufler eine Studie durchgeführt, welche die Rolle und Bedeutung der Freiberufler in Südtirols Politik, Wirtschaft und Gesellschaft unter die Lupe nimmt. Die Ergebnisse der Studie, an der 1041 Freiberufler aus allen Berufsbereichen teilgenommen haben, wurden im Rahmen einer Pressekonferenz am 21. Januar 2010 an der EURAC vorgestellt. Sie zeigt auf, dass die Freiberufler durchaus eine bedeutende Rolle im Südtiroler Wirtschaftsleben einnehmen, vor allem aufgrund ihrer fachspezifischen Leistungen und Kompetenzen. Handlungsbedarf besteht hinsichtlich einer verbesserten Sichtbarkeit der Berufsgruppe. Die Studie wurde mit Unterstützung der Stiftung Südtiroler Sparkasse realisiert.

gefördert von Stiftung Südtiroler Sparkasse Fondazione Cassa di Risparmio sostenuto da

SEETAC'S FIRST MINISTERIAL CONFERENCE IN BUCHAREST, ROMANIA

Institute for Regional Development and Location Management

On February 3rd and 4th, 2010, Julia Böhnisch and Thomas Streifeneder attended the first Ministerial Conference of the South East European Transport Axis Cooperation (SEETAC) in Bucharest, Romania. Several Ministries of Transport of South East European countries as well as other SEETAC project partners (NGOs and research institutes) gathered for a technical project meeting. SEETAC aims at creating transborder cooperation to promote a sustainable transport network in South East Europe. The discussion focused on Pan European transport corridors, traffic bottlenecks, cross-border cooperation and recent infrastructural plans.

VISUALIZING LANGUAGE

Institute for Specialised Communication and Multilingualism

Chris Culy and Verena Lyding presented a conference paper about their innovative techniques for visualizing textual data from corpora. The visualization of language-related information is a new, rapidly expanding field, and EURAC is one of the leaders. The paper, called "Visualizations for exploratory corpus and text analysis", was presented at the 2nd International Conference on Corpus Linguistics in A Coruña, Spain, May 13th to 15th, 2010.

GUIDA TURISTICA IN LINGUA DEI SEGNI ITALIANA

Istituto di Comunicazione Specialistica e Plurilinguismo

Nei prossimi mesi prenderanno il via, a cura di Lisa Danese, le attività di elaborazione della prima guida turistica multimediale della città di Bolzano in lingua dei segni italiana (LIS). Lo strumento, pionieristico nel panorama italiano, consentirà ai sordi di affrontare una tipologia di testo per loro estremamente complesso e di svincolarsi dalla necessità di affidarsi al servizio di visita guidata in LIS. Il progetto è sostenuto dall'Università Cà Foscari di Venezia e dalla Fondazione Cassa di Risparmio di Bolzano.

EURAC SCIENCE CAFÈ IN TRASFERTA

Istituto di Comunicazione Specialistica e Plurilinguismo

"Multilinguismo: un fenomeno in crescita. Conseguenze cognitive e sociali dell'essere poliglotta" è il titolo dell'Aperitivo Neuroscientifici del Centro Mente Cervello dell'Università di Trento, che si è tenuto giovedì 15 aprile nella caffetteria le Arti del MART a Rovereto. Chiara Vettori, linguista e ricercatrice dell'Istituto di Comunicazione Specialistica e Plurilinguismo, ed Eduardo Navarrete, neuropsicologo e assegnista del dipartimento di psicologia dello sviluppo e della socializzazione dell'Università degli Studi di Padova, hanno parlato di costi e benefici congnitivi del plurilinguismo, delle influenze ambientali sui processi di apprendimento e delle loro esperienze personali e di studio. L'aperitivo è stato moderato da Valentina Bergonzi, curatrice degli EURAC science cafè. L'edizione 2010 degli EURAC science cafè prenderà il via mercoledì 26 maggio.

INTERNATIONAL WINTER SCHOOL FEDERALISM AND GOVERNANCE

Institute for Studies on Federalism and Regionalism

The International Winter School Federalism and Governance took place from February 1st to 12th, 2010 in Innsbruck and Bolzano/Bozen. Francesco Palermo, Karl Kössler, Jens Woelk, Giovanni Poggeschi, Alice Engl and Andrea De Petris lectured at this year's edition with the focus on Local Government in Federal and Regional Systems. Twenty-one Ph.D. students, researchers and civil servants from 18 countries and four continents analyzed and discussed with international experts and practitioners local policies in federal and regional states. The Winter School was organized by Paulina Borowska as a common project of the EURAC-Institute for Studies on Federalism and Regionalism and the University of Innsbruck (the Faculty of Law and the School of Political Science and Sociology) in the frame of the cooperation agreement. Special thanks go to Südtiroler Sparkasse Foundation, Autonomous Region Trentino-South Tyrol and the Province of Bolzano/Bozen, Merlin Foundation, Austrian Federal Ministry of Science and Research (BMWF) and Institut für Föderalismus (IFÖ) for their financial support. The next edition of the Winter School Federalism and Governance will take place in February 2011 and will focus on cross-border cooperation.

MASTERLEHRGANG IM KOSOVO

Institut- für Föderalismus- und Regionalismusforschung

Vom 20. bis 24. Januar 2010 weilten Elisabeth Alber und Karl Kössler im Kosovo, um im Rahmen des Masterlehrgangs „Civil Society and Local Development" zu unterrichten. Dieses innovative Fortbildungsprogramm ist ein Projekt der Universitäten von Galway und Graz mit der Universität Prishtina. In Bezug auf das Mastermodul zu den Themen Föderalismus und Regionalismus wurde die Unterstützung des entsprechenden Instituts der EURAC angefragt. Elisabeth Alber und Karl Kössler beschäftigten sich in der Folge mit der Zusammenstellung eines umfassenden Lehrplans für dieses Modul und übernahmen selbst einen Teil des Unterrichts. In täglichen Seminareinheiten wurden im Januar gemeinsam mit den Studenten verschiedenste Themen diskutiert, die von Kanada bis Bosnien reichten und auch die Stellung Südtirols innerhalb des italienischen Regionalstaats beleuchteten.

EINE NEUE HERAUSFORDERUNG

Institut für Minderheitenrecht

Emma Lantschner, Forscherin am Institut für Minderheitenrecht sowie Beraterin der Organisation für Sicherheit und Zusammenarbeit in Europa, verlässt

nach 10-jähriger Mitarbeit die EURAC und tritt an der Universität Graz eine Stelle als Assistenzprofessorin an. Am Institut für Österreichisches, Europäisches und Vergleichendes Öffentliches Recht der Rechtwissenschaftlichen Fakultät der Karl-Franzens-Universität Graz wird Emma Lantschner künftig ihre Habilitation vorbereiten. Prof. Josef Marko, Leiter des Instituts für Minderheitenrecht, wird sie auch in Zukunft als ihr Supervisor betreuen. Wir wünschen Emma alles Gute und viel Freude für Ihre neue Herausforderung in Graz.

CORSO MONDIALE DI PERFEZIONAMENTO PER FRATTURE DELLE OSSA A BOLZANO

La AO Foundation coagula specialisti delle patologie della mano ed è la più grande società scientifica del settore a livello mondiale. L'AO Foundation è stata fondata nel 1958 da quattro traumatologi svizzeri; oggi è presente in 87 paesi e conta più di 3000 soci. L'AO Foundation detta le linee guida per il trattamento delle fratture alle mani. A marzo, l'EURAC convention center ha ospitato un corso specialistico coordinato da David Espen, luminare che collabora con la Casa di Cura Santa Maria di Bolzano. Alle conferenze tenute da medici di fama internazionale provenienti italiani, svizzeri, austriaci e statunitensi, hanno partecipato quaranta medici da ogni parte d'Italia. Il corso è stato realizzato anche grazie al contributo della Fondazione Cassa di risparmio.

gefördert von Stiftung Südtiroler Sparkasse Fondazione Cassa di Risparmio sostenuto da

„JUNGE FORSCHER GESUCHT!": 1. PREIS GEHT IN DIE SCHWEIZ

Wissenschaftskommunikation

Die siebenköpfige internationale Expertenjury hat sich Mitte April nach längerer Beratung in der Academia Engiadina in Samedan (Schweiz) für Nicole Hauser und ihr Chemie-Projekt zur Herstellung von Polyanilin entschieden. Die synthetischen Polymere werden für die Herstellung von Leuchtdioden verwendet oder als Korrosionsschutz bei der Beschichtung von Metallen. Die Schweizerin studiert mittlerweile an der ETH-Zürich. Die wissenschaftliche Fragestellung, die professionelle Präsentation auf universitärem Niveau und die kompetente Beantwortung der Fragen waren für die Fachjuroren ausschlaggebend, den mit 4000 Euro dotierten ersten Preis, an sie zu vergeben. Das Geld wurde von der Stiftung Südtiroler Sparkasse zur Verfügung gestellt.
Der zweite Platz ging mit 2500 Euro an ein Schülerteam aus dem Trentino mit einer geisteswissenschaftlichen Arbeit über die Soldaten an der russischen Front in den Valli Giudicarie im Ersten Weltkrieg. Mit dem Projekt zur Kupfergewinnung im Bergwerk in Prettau sicherten sich die Brunecker Gewerbeoberschüler den dritten Platz und nahmen 2000 Euro mit nach Hause. Neben konkreten Vorschlägen, wie Wasser bei der Kupfergewinnung möglichst wenig durch Schadstoffe belastet wird, haben die Schüler auch ökonomische Faktoren bei der Wasseraufbereitung berücksichtigt.

QUANDO IL FREDDO VIENE DAL SOLE

Istituto per le Energie Rinnovabili

Nell'ambito del progetto SolarCombi+, portato avanti dall'Istituto per le Energie Rinnovabili assieme ad altri sei centri di ricerca europei e a cinque partner industriali produttori di macchine ad assorbimento, i ricercatori dell'EURAC hanno testato in tre grandi città, Napoli, Strasburgo e Tolosa, diverse ipotesi per la realizzazione di piccoli impianti ad assorbimento, per il riscaldamento, raffrescamento e preparazione di acqua calda per uso domestico. I risultati delle simulazioni hanno permesso di individuare le configurazioni più efficienti e di sviluppare una serie di regole di buon progetto per questo tipo di impianti. In questo modo le case produttrici potranno proporre sul mercato configurazioni pacchetto: non solo le macchine, ma l'intero sistema già testato e standardizzato. Le linee guida elaborate dal team di ricerca europeo offrono inoltre alle pubbliche amministrazioni un punto di riferimento per monitorare l'efficienza degli impianti ed evitare sprechi energetici. Per saperne di più: www.solarcombiplus.eu

EFFICIENZA ENERGETICA IN ARCHITETTURA E TECNOLOGIE PER LO SFRUTTAMENTO DELL'ENERGIA SOLARE

Istituto per le Energie Rinnovabili

La collaborazione con l'Agenzia internazionale per l'energia è il filo conduttore di due eventi organizzati dall'Istituto per le Energie Rinnovabili nella primavera 2010.
A marzo, architetti e ingegneri da diversi paesi, tra cui Canada, Stati Uniti, Svezia, Norvegia, Germania e Svizzera, si sono incontrati in EURAC per una due giorni durante la quale si sono discussi metodi per massimizzare l'efficienza energetica senza penalizzare il design, sviluppando soluzioni che permettano di ottimizzare l'integrazione dell'energia solare in architettura. Alla fine di aprile, Bolzano ha ospitato il convegno "In Case of Sun". All'appuntamento - organizzato dall'EURAC e dalla Libera Università di Bolzano, in collaborazione con il TIS innovation park - hanno preso parte esperti da tutta Europa, Nuova Zelanda e Australia.

PREPARATEVI ALL'ESTATE. È TEMPO DI SCIENCE CAFÈ!

Communicazione Scientifica

ACADEMIA vi equipaggia per la stagione estiva. In allegato a questo numero trovate un comodo sottobicchiere per le vostre bevande rinfrescanti. E, mentre sorseggiate, prendete nota del programma degli EURAC science cafè che ci trovate stampato sopra.
L'appuntamento è al mercoledì sera, alle 20.30, sulla terrazza della torre dell'EURAC, dal 26 maggio al 15 settembre. Si parlerà di lingua dei segni, agricoltura biologica, voto elettronico e tanto altro ancora. Per saperne di piú: http://tower.eurac.edu

Die neuen ökologischen Stofftaschen aus Biobaumwolle der EURAC- und ECO library waren ein richtiger Renner. Besonders die Grüne erfreute sich großer Beliebtheit.
– Hier das Team der Bibliothek von links nach rechts: Gerlinde Schmiedhofer, Antje Messerschmidt, Alessia Pavanello, Elisabetta Tait, Daniela Obojes und Elisa Bonzagni.

www.minet-tv.com

minet

RAI Sender Bozen - MINET

In Zusammenarbeit mit dem Institut für Minderheitenrecht und mediaart informiert die Rai monatlich über Aktuelles zum Thema „Minderheiten" in all ihren faszinierenden Facetten zwischen Gesellschaft, Politik und Kultur.

Die nächsten Sendetermine:
Mittwoch, 26.05.2010, um 20.20 Uhr, Rai Sender Bozen

Rai

ZEPPELIN

trasmissione radiofonica della Sede Rai di Bolzano dedicata a cultura, scienza e attualità presenta:

ACADEMIA ON AIR

Giovedì 10 giugno 2010, ore 15

in diretta dagli studi RAI di Bolzano sulle frequenze di RadioDue approfondimenti dei temi trattati in questo numero di ACADEMIA. Conduce Paolo Mazzucato con Sigrid Hechensteiner e Valentina Bergonzi.

VETRINA. Kreative Köpfe interpretieren die Titelgeschichte der laufenden ACADEMIA. Die Zeichung zum Thema „Wissenschaftskommunikation“ des 30-jährigen Tattoo-Künstlers Teo aus Bozen geht unter die Haut. *Una comunicazione indelebile: così Teo, tatuatore bolzanino di trent'anni, interpreta la storia di copertina di ACADEMIA 52.* Science communication under your skin: Tattoo artist Teo, 30 years from Bolzano, gives his interpretation of our cover story.
highscoretattoo@gmail.com