In the news

LGC Forensics admits two DNA-fingerprinting errors

A blunder by LGC Forensics, which led to a British teenager being wrongly accused of rape, was due to human error, according to the UK’s Forensic Science Regulator, Andrew Rennison.

Adam Scott, 19, was due to stand trial in connection with a sex attack on a woman in Blackley, Manchester, UK, having been arrested at his home in Truro, Cornwall, after DNA was recovered from the scene. He was held on remand at Forest Bank Prison, Salford, but it transpired that he had never visited Manchester.

However, LGC Forensics, used by Greater Manchester Police to carry out DNA testing, had said that there was a definite match with Scott’s DNA.

The charges were dropped when it emerged the DNA sample was contaminated at the LGC Forensics laboratory in Teddington, West London (Fig. 1).

Scott was completely cleared. His DNA sample had arrived at the LGC Forensics laboratory a few days earlier in relation to another matter. LGC said that plastic trays had been incorrectly re-used in the laboratory, but claimed that no other cases of contamination had been found.

“The Forensic Science Regulator has agreed with LGC Forensics that the root cause of the contamination was human error in the incorrect re-use of plastic trays as part of the robotic DNA extraction process,” stated LGC, which deeply regretted the contamination.

“New processes have been introduced to prevent such an error happening again and 26,000 samples that have been processed since the robotics were introduced in March 2011 have been checked to ensure they had not been contaminated.

“This checking is now complete and no other cases of contamination have been found.”

Scott expressed relief, anger, and disgust after the charges against him were dropped.

Further apology

However, only the next day, LGC Forensics had to apologize to the family of Gareth Williams, whose body was found inside a hold-all in the bath of his London flat in August 2010, after it emerged a DNA error had laid a false trail of inquiry into his death.

The mistake followed discovery of a partial trace of a second person’s DNA on one of Williams’s hands. To rule out possible contamination from any of the investigators at the scene, those details were loaded manually onto a database. However, that entry was never checked.

LGC said that one of its staff members had made a “typographical error” while inputting data, which meant that no match showed up, leading Scotland Yard to spend more than a year trying to trace a non-existent suspect.

It was only in March, when the files were checked, that LGC scientists realized that the correct trace matched the DNA of a Metropolitan Police scientist.
“Having made further checks, LGC identified the partial profile as matching that of a Metropolitan Police scientist, who was involved in the original investigation of Mr. Williams’s home,” an LGC spokeswoman said. “The Metropolitan Police service was immediately notified. We are sorry for any pain this error may have caused Mr. Williams’s family.”

LGC said that it had carried out a review of all other profiles that had been checked using the same system over the past four years.

“No other errors have been found, and we have introduced an additional check into our system to prevent any recurrence of the error,” the LGC spokeswoman said.

The naked, decomposing body of Williams was found inside a padlocked sports bag. The 31-year-old worked for the UK’s Government Communications Headquarters (GCHQ) and was attached to the UK’s MI6 overseas spy agency at the time of his death.

**Public inquiry needed**

As a result of these two errors, critics of the closure of the UK Government’s Forensic Science Service (FSS) at the end of March called for a public inquiry.

“This simply should not happen,” said Professor Peter Gill, who had worked for the FSS and was one of the developers of DNA profiling in the 1990s. “Surely there is sufficient evidence to open a public inquiry because we are now getting regular reports of widespread system failure.”

“There are wider concerns about whether LGC can be trusted to provide a proper level of forensic back-up to all investigations, remembering they are providing forensic DNA and analytical background to a lot of criminal cases,” said Westminster Coroner Fiona Wilcox.

**Malaysia strengthens halal-food analysis**

Malaysia is strengthening its research capabilities for halal-food products, with particular emphasis on food authentication and safety, as a result of collaboration between Agilent Technologies and Universiti Putra Malaysia (UPM).

As “halal” is an Arabic word meaning lawful or allowable, Muslims can consume any product deemed halal. According to World Halal Forum, the halal-food market is worth about $662 billion a year, almost 17% of the global food industry.

Agilent announced the agreement with UPM’s Halal Products Research Institute (HPRI), Malaysia’s top research organization for halal products, to help Malaysia assert itself as the world halal hub. “HPRI was established to uphold the sanctity of halal through research and services,” said HPRI Director Professor Russly Abdul Rahman. “This announcement with Agilent is a major step for UPM in nurturing top-notch halal scientists and in delivering world-class research programs that are needed to increase the confidence in halal products and services.”

Under the agreement, Agilent will provide HPRI with the Agilent 6490 Triple Quadrupole Liquid Chromatography/Mass Spectrometry System, which offers 10 times more sensitivity compared to its nearest rival, along with access to global expertise in food safety and authenticity testing. Liquid chromatography is useful for separating non-volatile and thermally-fragile molecules. For more complex mixtures or when more information is required, the chromatograph is used in conjunction with a mass spectrometer, which is effective in identifying unknown compounds and determining the amount of each substance encountered.

<table>
<thead>
<tr>
<th>TrAC’s 10 most downloaded articles*</th>
</tr>
</thead>
</table>

* In the 90 days before 23 April 2012
“Agilent has long been developing analytical tools and methods used by government, industry and private laboratories worldwide to detect and to measure food content and quality as well as food safety,” said Tan Mei Mei, regional business director for Agilent. “We are thrilled to have the opportunity to collaborate with UPM for halal research that will benefit mankind.”

Agilent will provide HPRI with competency training for its professionals undertaking chemical analysis. Through this collaboration, HPRI will drive research into the development of methods for porcine-gelation screening and amino-acid profiling, including adulteration analysis and confirmation.

HPRI leads research in three core areas:

1. halal science, including biotechnology, food science and new methodologies for halal-product authentication and certification;
2. halal policy and management, including the application of Islamic law for disciplines such as marketing, consumer behavior, security and logistics management of halal slaughter; and,
3. halal services, including alternative techniques for the development of halal products (e.g., alternative sources for halal gelatin).

Contact:
Professor Russly Abdul Rahman
Department of Process and Food Engineering
Universiti Putra Malaysia
Tel.: +603 89468408/8377
E-mail: russly@food.upm.edu.my

analytica is world’s premier event

The 23rd analytica, the international trade fair for laboratory technology, analysis and biotechnology, concluded in Munich, Germany, in April with more than 30,000 visitors – making it the analytical-chemistry event with the largest attendance of professionals in the world.

The three new Live Labs on the topics of Forensics and Clinical Diagnostics (Fig. 2), Plastics Analysis, and Food and Water Analysis (Fig. 3) were popular attractions, as, for the first time ever at a trade fair, participants experienced what really happens in an analytical laboratory.

“This year’s highlights included the Live Labs, which did a dynamic and impressive job of demonstrating how laboratories analyze food to identify ingredients or pathogens and how plastics are characterized,” said Norbert Bargmann, Deputy CEO of Messe München. “Strong visitor interest and positive feedback from the exhibitors encourage us to develop this new concept further.”

“The Live Lab concept was very well received by everyone in our company and by our customers,” said Markus Wick, Director of Waldner Laboreinrichtungen, Southern Branch. “Based on our experience in 2012, we will support its ongoing development.”

More than 30,000 visitors from over 110 countries came to the fair in Munich. A survey by market research institute TNS Infratest found that the visitors came with intentions to make investments:

• 29% planned to invest more than €100,000 ($132,000) in laboratory and analysis equipment;
• 16% planned €50,000–100,000 ($66,000–132,000); and,
• 20% planned €25,000–50,000 ($33,000–66,000).

“Besides the research aspects of this event, no other trade fair focuses so intensely on business ties,” said Bargmann, as just less than one-third of all visitors were from companies with more than 1000 employees.

Based on the TNS Infratest survey, customer satisfaction in analytica is at its highest in the last 16 years.

The countries with the largest numbers of visitors were Austria, Switzerland, UK, Italy and France. There was also a significant increase in the number of visitors from the USA (with just less than 14%). For the first time ever, the Analytical &
Life Science Systems Association (ALSSA), an American trade association, held a meeting at the fair.

1026 exhibitors from 37 countries presented their products and equipment for research and industrial laboratories. Besides Germany, the countries with the largest number of exhibitors included the USA, UK, France, Switzerland and The Netherlands.

**analytica Conference**
More than 1700 visitors participated in the **analytica Conference**, an increase of more than 40%.

“The organizers of the analytica Conference – the German Chemical Society, the Society for Biochemistry and Molecular Biology and the Society for Clinical Chemistry and Laboratory Medicine – are very satisfied with its outcome,” said Martin Vogel, Chairman of the GDCh Working Group for Analytical Chemistry at the German Chemical Society.

“Attendance at this year’s lectures was so good that it was standing room only in many of the rooms. The conference’s topics were very well received among participants and speakers from Germany and abroad. For them, the conference is an important, established analysis platform in Europe.”

120 renowned speakers examined the latest trends and current topics in analysis methodology and applications in 22 symposia. Besides the award ceremonies of the GDCh Working Group for Analytical Chemistry, highlights included lectures on X-ray diffraction techniques in drug testing, point-of-care diagnostics, applications for separation techniques in the life sciences, doping analysis, proteome research, nanoparticles in the environment and clinical metabolomics.

**Related program**
For three days, the Biotech Forum and the Laboratory & Analytics Forum were platforms for practically-oriented exhibitor presentations. Attendance at the seminars for laboratory experts was also high.

On the final day of the fair, **analytica Job Day** served as a career springboard for future industry professionals, and **Finance Day** gave visitors access to information about the latest financing trends in the life sciences.

The next analytica takes place in Munich from 1–4 April 2014.

**Webcasts available for Pittcon 2012**
For those who did not have the opportunity to attend Pittcon 2012 in Orlando, Florida, USA, or who want to re-visit a technical session, the Pittcon organizers have made available on their website webcasts of over 40 technical sessions (Fig. 4):


It is also possible to share these sessions with colleagues by clicking the “share” link on each video and either copying the URL, sending a direct email or sharing on Facebook, Twitter and/or Google+.
Trio takes WITec Paper Award

The winners of the WITec Paper Award 2011 were Professor Diedrich A. Schmidt, North Carolina A&T State University, USA, and Taisuke Ohta and Thomas E. Beechem both from the Sandia National Laboratories, Albuquerque, New Mexico, USA (Fig. 5) for their paper “Strain and charge carrier coupling in epitaxial graphene” [1].

The paper was submitted by Prof. Schmidt, who also receives a €500 ($660) Amazon Gift card. Prof. Schmidt most recently took a position as an Assistant Professor of Nanophysics at the North Carolina A&T State University and was formerly a member of the Physical Chemistry Department at Ruhr-University Bochum, Germany, where he did parts of the work presented in the paper.

Each year the WITec Paper Award honors the best peer-reviewed scientific paper that included results and images acquired with a WITec microscope system. A WITec Panel evaluated the submitted papers in terms of scientific relevance, data quality and the level of instrument-feature utilization.

Some 47 authors participated in the WITec Paper Award 2011 competition. Due to the very high number of advanced papers submitted to WITec, the jury made the decision to award Honorable Mentions to three other exceptional papers [2–4].

As a prize for the Honorable Mention, each submitting author receives the Springer book, Confocal Raman Microscopy, edited by WITec scientists.

In 2012, WITec will again award the best scientific paper including results and images acquired with a WITec microscope system.

Submissions can be sent for consideration in the award to: papers@witec.de

References

THz spectrometer tests substances

A terahertz (THz) spectrometer (Fig. 6) provides reliable, contact-free identification of substances, following its launch at the analytica trade fair by Fraunhofer researchers and the Hübner Company.

“You place the suspicious parcels or letters in a kind of drawer, and the device uses THz waves to determine whether it contains explosives,” explained Joachim Jonuscheit, deputy division director at the Fraunhofer Institute for Physical Measurement Techniques (IPM) Kaiserslautern, Germany, who is the researcher in charge of THz analysis. “This protects confidentiality, and the mail can then be delivered safely.”

Attacks in Rome and Frankfurt in December 2011 fueled the security industry’s interest in the analytical device.

“Most dielectric materials (e.g., plastics, clothing or paper) are transparent to microwaves and can also be penetrated by THz waves with comparatively low reduction,” said Jonuscheit.

For non-destructive testing, the THz range is very interesting, as it combines the benefits of the adjoining spectral ranges (i.e. high penetration depth and low scatter), accompanied by good spatial resolution and the capability of spectral identification of unknown substances.

The device features a database with the spectral “fingerprints” of hazardous materials and can be extended to include additional substances.
materials at any time. It compares the spectral fingerprint of the substance being analyzed with values in its database and returns a clear result. The scanner operates using transmission and reflection analysis.

In safety checks, the THz wave offers low-loss penetration of envelopes made of paper or plastic to detect any chemical substances within. If a package contains metal – as housing for an explosive device – the wave is reflected and measured by the receiver, so suspicious packages can be identified quickly.

Now the researchers also want to gain a foothold in the pharmaceuticals and chemicals industries. “Until now, makers of pharmaceuticals had to prepare extra samples if they wanted to find out whether the mixture ratio in a particular drug was right, whether the chemical was in the desired crystalline structure, and whether quality was all right,” said Jonuscheit. “Depending on the substance and the material involved, our device clearly detects all the chemicals found. It also provides basic analysis of the mixture ratio of multiple substances.

“THz analysis also allows conclusions about the substances’ crystalline structure,” he said. “For instance, you can determine whether a potentially unwanted recrystallization has taken place. In the future, this can spare chemicals and pharmaceuticals manufacturers painstaking preliminary analysis and sample preparation.”

Contact:
Joachim Jonuscheit
Fraunhofer Institute for Physical Measurement Techniques IPM
Kaiserslautern, Germany
Tel.: +49 631 2055107
E-mail: joachim.jonuscheit@ipm.fraunhofer.de

IR spectroscopy finds oxygen defects

Scientists of Karlsruhe Institute of Technology (KIT) and Ruhr-Universität Bochum (RUB), Germany, have developed a new infrared (IR) spectroscopy method in order to study processes at surfaces of oxides used as catalysts, because, in the chemical industry, heterogeneous catalysis is of crucial importance to the manufacture of basic or fine chemicals, in catalytic converters of exhaust gas, or for the chemical storage of solar energy [1].

At the surface of catalytically-active solids, highly complex chemical processes take place, and have to be understood in detail in order to improve products and to reduce costs. The processes are known well for metals. However, conversions at the surface of oxides – compounds of metals or non-metals with oxygen – have hardly been studied so far.

The research team of Professor Christof Wöll from KIT and Professor Martin Muhler from RUB first studied processes at surfaces of oxide monocrystals and then transferred the findings to powders, the technically most important form of oxide materials. Doing this, they were the first to bridge the gap between fundamental research into reference systems and applied research into real catalysts. A newly developed combination device for IR spectroscopy allows highly precise measurements of the vibration frequency of carbon monoxide. The exact value of this vibration frequency is highly sensitive to defects, which result from the removal of individual oxygen atoms from oxide materials.

“Oxygen defects act as active centers and give the material a high catalytic activity,” explained Prof. Wöll.

With the new combination device for IR spectroscopy, the researchers from Karlsruhe and Bochum developed a method that was first calibrated for reference systems. For the first time, they then measured defect densities of real catalyst powders using a high-performance FTIR spectrometer made by Bruker Optics (VERTEX series).

To demonstrate their new method, the researchers used rutile, the most important modification of titanium dioxide (TiO₂).

“This material, used as white pigment and in photocatalysis, is normally chemically highly inert and rendered catalytically active by the oxygen defects only,” explained Prof. Wöll.

Such defects in powder materials have only been detected indirectly so far, according to Prof. Muhler.

With their method, the researchers, including Mingchun Xu, Heshmat Noei and Yuemin Wang from RUB, and Karin Fink from KIT, followed the “surface science” approach developed by the Noble Prize Laureate Gerhard Ertl. They demonstrated the potential of their method by studying the carbon-carbon coupling reaction of formaldehyde to ethylene. Doing this, it was confirmed that the density of
oxygen defects at the surface of r-TiO₂ nanoparticles is of decisive importance to the catalytic activity of the oxide powder and, hence, to the yield (Fig. 7).

Contact:
Professor Christof Wöll
Institut für Funktionelle Grenzflächen (IFG)
Karlsruhe Institute of Technology, Germany
Tel.: +49 72160823934
E-mail: christof.woell@kit.edu

Reference

LGC Genomics launches in USA

LGC Genomics has launched a genomics services laboratory based at the Cummings Center, Beverly, near Boston, Massachusetts, USA.

As a supplier of genomics products and services, including genotyping, DNA extraction, and Sanger and next-generation sequencing, LGC Genomics has seen the number of employees in this business expand from one to 20 in the past year and this new facility marks a significant step in its investment program in the USA.

The new laboratory will initially focus on providing genotyping and nucleic-acid-extraction services using the company’s KASP and sbeadex technologies in combination with its SNPline-genotyping instrumentation.

The LGC Genomics business merged with KBioscience in July 2011 to create a new company providing a portfolio of genomics products and services. Today, the business offers a range of laboratory solutions through its laboratories in Boston, Berlin and London. As well as genomic services, these solutions include a variety of laboratory instrumentation and reagents used across diverse applications from agricultural biotechnology and drug development to discovery-based biomedical research.

LGC Genomics is both supplier of genomic services in a high-throughput laboratory setting and an expert developer of instrumentation and chemistry solutions to overcome problems seen daily in a fast-paced laboratory environment. This combined approach has enabled the company to develop solutions tailored directly to the needs of the market. A strong commitment to product development and an expanding product development portfolio has underpinned the business’s strong growth over the past three years.

“We are delighted to be announcing the opening of our new Cummings Center laboratory,” said Simon Parsons, LGC Group CFO and LGC Genomics Divisional Director. “This facility is an important element of our expansion program in North America. Our expanded laboratory service capacity will enable us to deliver solutions to those groups looking to expand internal capacity through outsourcing and will also enable us to deliver improved products for customers conducting their own genomics research and analysis.

“The delivery of high-quality genomics products and services is fundamental to tackling many of the key global issues confronting science, such as sustainable food production and improving health. The new laboratory offers a significant opportunity for us to support these important areas of research across North America,” he said.

Contact:
LGC Genomics
Berlin, Germany
Tel: +49 (0)30 5304 2200
E-mail: service@lgcgenomics.com
Website: www.lgcgenomics.com