

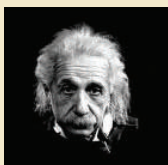


SciTech in Brief

Information Services Centre, No. 363, Bauddhaloka Mw., Colombo 07

Science Quote

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Albert Einstein

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INSTANT DETECTION OF MELAMINE IN MILK

Recently there was mayhem around the world on infant milk and other food made out of milk laced with melamine. This was an eye opener to the scientists to find a melamine detection method which is not time consuming and sensitive to minute quantities.

Chemists at Swiss Federal Institute of Technology Zurich have developed a new mass spectrometric (MS) analysis method with which polluted milk with melamine can be detected reliably within 30 seconds.

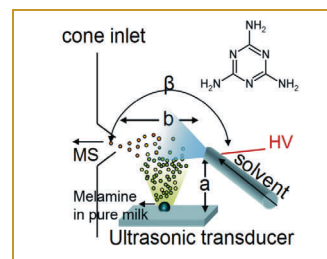
If melamine is added to milk, its nitrogen content increases and so does the supposed quality of the milk measured on that basis. If the chemical at high concentration binds to cyanuric acid, which is used as a disinfectant, it forms insoluble crystals that can produce fatal kidney stones. This reaction has caused the death of 6 babies in China since September 2008. The level of melamine

found in Chinese milk was more than 1,000 times higher than the maximum value of 2.5 ppm permissible in foods according to European legislation.

Recently the scientists described a new MS-based method to determine the concentration of melamine in milk quickly and reliably. They used a method known as Extractive Electrospray Ionisation (EESI). EESI involves feeding the sample mixture in the form of an aerosol or fine dispersion into a conventional electrospray. In this process, the sample is extracted into the charged droplets created in the electrospray source and is simultaneously ionised. The resulting ions are then analysed by the MS. In the case of milk, ultrasound must also be used first of all to atomise the sample so it can be entrained into the electrospray for MS analysis.

Using ultrasound-assisted EESI-MS, the analysis could be done without

any sample preparation steps. The method is fast and very accurate, and needs no more than one drop of milk. Previously, an analysis required between 20 - 60 minutes to determine the concentration of melamine in milk sample using standard methods. Using the current method the analysis of milk, milk powder and wheat gluten could be done. According to the researchers, EESI-MS can, in principle, be used to determine the level of melamine in any foodstuff. The detection limit is 500 ppb, which is five times less than the limit value allowed in foods in the USA and EU.



Zhu et al., Rapid detection of melamine in untreated milk and wheat gluten by ultrasound-assisted extractive electrospray ionization mass spectrometry (EESI-MS). *Chem. Commun.* 2009.

NOBEL PRIZES FOR CHEMISTRY OF LIFE AND MATTERS OF LIGHT

The 2009 chemistry Nobel Prize has been awarded for the study of the structure and function of the ribosome, to Venkatraman Ramakrishnan, Thomas Steitz and Ada Yonath.

The ribosome translates genetic code into proteins, which are the building blocks of all living organisms. It is also the main target of new antibiotics, which combat bacterial strains that have developed resistance to traditional antibiotic drugs. These new drugs work by blocking the function of ribosomes in bacterial cells, preventing them from making the proteins they need to survive. Their design has been made possible by research into the structure of the ribosome, because it has revealed key differences between bacterial and human ribosomes. Structures that are unique to bacteria can be targeted by drugs.

Prof. Ramakrishnan is based at the Medical Research Council's Molecular Biology Laboratories in Cambridge, UK. Thomas Steitz is based at Yale University, US, and Ada Yonath is from the Weizmann Institute in Israel. The prize is to be shared equally between the three scientists.

The work is based on a technique

called x-ray crystallography.

Three scientists, Charles Kao of UK, Willard Boyle and George Smith, both North Americans, who corralled light to transform our communications systems share this year's physics Nobel Prize. The Royal Swedish Academy of Sciences, which administers the prize, said half of the award would go to Kao. It was his insight while working in Britain in the 1960s, which allowed researchers to take fibre optics to transmit light over much longer distances than had previously been possible. Kao's team at Standard Telecommunication Laboratories in Harlow proposed the means to improve dramatically the purity and therefore the efficiency of the glass material used to construct the fibres. Today, fibre optics underpin the communication age. The hair-like cables speed data around the globe in the form of rapid pulses of light. The modern telephony system is built on the technology, and high-speed broadband internet would not be possible without it.

The other half of the prize is to be split between Boyle and Smith. Their breakthrough was made at Bell Laboratories, US. The North Americans' group invented the first

digital sensor, a CCD (charge-coupled device), in 1969.

The CCD contains arrays of photosensitive cells which become charged when light falls on them. The more light, the greater the charge. The chip reads out this signal, which can then be used to render an image.

The academy said the work of Boyle and Smith revolutionised photography, as light could be now captured electronically instead of on film. While the technology delivered instant pictures to the masses, CCDs have also transformed scientific observation. Specialist detectors are now incorporated into the imaging systems of all space missions. The Hubble telescope, for example, records its wondrous views of the cosmos on CCDs. The vivid landscapes of Mars returned by robotic vehicles have also been captured on CCD.

The Nobel Prizes, which cover chemistry, medicine, literature, peace and economics are valued at £900,000. Laureates also receive a medal and a diploma.

<http://news.bbc.co.uk>

INDIA'S FIRST Bt CROP GETS REGULATORY APPROVAL

India's national biotech regulatory agency, Genetic Engineering Approval Committee (GEAC) in the Ministry of Environment and Forests (MoEF) in New Delhi, recently gave its approval to the commercial cultivation of the country's first genetically-modified (GM) food crop, a brinjal (aubergine) *Solanum melongena* L, variety, amidst widespread protests by anti-GM activists. The decision has to be ratified by the MoEF and notified in the government gazette.

As reported the committee had considered the extensive reports on its biosafety trials and approved it for environmental release. This variety of Bt brinjal was developed by Mahyco Monsanto, a subsidiary of US crop giant, Monsanto. GEAC had used results from 11 large scale field trials of the Bt brinjal crop conducted under expert supervision in different parts of the country.

So far India has approved only a single GM crop, Bt cotton, which was allowed to be cultivated commercially in 2002. The runaway success of Bt cotton, more than 85 % shifting to this GM variety, within years of its introduction has definitely influenced the government decision. The GEAC decision, if ratified by the political arm of the government, will provide an annual income of \$ 800 million to farmers with projected annual savings of about 40 % of input costs that now go into the large scale use of pesticides.

India is the world's second largest producer of brinjal, accounting for nearly 26 % of the global production. Only China is ahead of India with 30 % global share of brinjal, one of the few food crops which is believed to be native to the Indian subcontinent. This humble and highly nutritious, low fat, egg

shaped product is known as the "poor man's vegetable".

India's anti-GM activists have been running a big campaign against the introduction of GM food crops in the country in recent months. They express concern over the possible risks associated with GM brinjals that need to be tested. They said that the Committee is relying on data from Mahyco and not from an independent source. Genetics experts also stated their concern over the introduction of GM brinjal due to the lack of adequate biosafety studied.

<http://www.biospectrumasia.com/content/151009ind10944.asp>

BioSpectrum; Asia edition, December 5, 2009

RICE BY-PRODUCTS GENERATE BILLIONS IN GLOBAL REVENUES

The rice by-products industry the world over has evolved into a multi-billion dollar venture. Rice bran cooking oil, perceived as the healthiest plant-based edible oil, is now highly commercialized in Thailand. Chicken-flavoured instant porridge is in the market in Japan, in addition to the popular rice milk and rice wine. In the US, the most popular breakfast cereals are Kellogg's rice Krispies; in



Rice milk

Rice wine

California, Knorr has been marketing instant goto and champorado.

Snack items have become common in the Philippines. Rice-based chifon cakes, brownies and cream puffs have also been developed. Likewise, now in the pipeline are rice-based drinks or beverages (beer, tea, coffee and wine) and fortified products (rice noodles, espasol, canned rice and sprouted

brown rice). In the Republic of Korea, processing of rice by-products such as rice cakes, sweets, gruels, flavours, wines and drinks has been expanding. Currently, the Republic of Korea's leading processed rice food is the aseptically packaged cooked rice "H a e t b a n".

www.philstar.com; VATIS Update: Food processing; Mar-Apr 2009



Rice crispies

Rice oil



Rice Champorado

Rice Sprout

FUNGI BEAT INSECTICIDE RESISTANCE IN MOSQUITOES

Insecticide resistance in mosquitoes is a growing problem for malaria control and this can be reversed by infecting them with a fungus, new research shows.

Researchers infected insecticide-resistant African *Anopheles* mosquitoes with two fungus species already known to kill mosquitoes: *Beauveria bassiana* and *Metarhizium anisopliae*. Three days after infection, the mosquitoes were exposed to two of the main mosquito insecticides. More fungi-infected mosquitoes died than uninfected controls.

Earlier research has found that mosquitoes are fatally infected when a suspension containing fungal spores is sprayed or painted on surfaces attractive to the insects.

The spores stick to the mosquito and then germinate, eventually penetrating the insect's outer surface, absorbing nutrients, destroying cells and releas-

ing toxins. Infected mosquitoes die within 14 days before they have a chance to mature and pass on the malaria parasite.

The bonus effect is that when an insecticide-resistant mosquito is infected with fungus it becomes sensitive again to the insecticide, said a researcher in the Laboratory of Entomology at Wageningen University in the Netherlands.

The researchers believe this occurs because being simultaneously bombarded with both a fungus and an insecticide probably overwhelms the enzymes that normally make a mosquito resistant to insecticide.

Mosquitoes use enzymes to break down the insecticide, to eat it up. The researchers assumed that the detoxifying enzymes also have to work to get rid of the fungal toxins. The inability to cope up with more toxins cause the destruction.

According to the researcher it's beneficial to use insecticide alongside the fungus as they increase the effectiveness of each other.

The researchers are now attempting to create a long-lasting fungal product that can be used in the field in Africa. They are also trying to determine the best locations and delivery methods for the fungus.

The temperature differences in the laboratory and field and the the treatment was effective only for a month in the field and needed reapplying. Thus they are trying to make a coating for the spores that will protect them from desiccation and allow the treatment to work for much longer. The researchers believe it could be 2–3 years before such a product can be tested on a large scale.

SciDev.Net

NANOPARTICLES: DOWNSIZING TO REACH

The use of nanoparticles in skin preparations has raised concerns over whether these particles might be able to pass into the body and build up to potentially toxic levels. The commonest nanoparticle used in cosmetics and toiletries are titanium dioxide and zinc oxide which are used to make sun protection products transparent or liposomes, used to improve the effectiveness of anti-aging products. These products permeate the outer layer of the skin. However, some nanoparticles are capable of penetrating deeper into the skin gaining access to lymph and blood vessels. This is the basis of delivery of therapeutics via the skin to the blood and to the target organ. The

problem is that we do not know how the nanoparticles pass through the skin and what effects they have on the human body. Clearly an improved understanding of the effects of nanoparticles requires a great deal of research and testing. The question is how this can be done by using the test methods that are currently available.

An increasingly popular form of non-animal testing uses reconstituted skin models such as EpiSkin and EpiDerm that are produced by culturing adult human epidermal cells on a suitable base such as collagen. One of the biggest concerns in these models is that the models lack the pores and hair follicle openings that are thought to

be a major route for the nanoparticles to enter. Using live animals not possible due to the structural differences of the human and animal skin.

Microdialysis on human volunteers is a promising method where concentration of the substance of concern in fluid around cells is measured using probe. However, this is a very expensive method than using skin models.

The regulatory bodies are becoming stricter on the use of and exposure to the nanoparticles. Financials and animal welfare costs involved suggests to reconsider the use of nanoparticles in cosmetics.

SPC, August 2009, Vol 82(8)

'BARCODE' TO HELP IDENTIFY PLANTS

An international team of scientists has agreed on a standard "DNA barcode" for plants that will allow botanists to identify species quickly and easily. They hope the agreement will lead to the formation of a global plant DNA library, which can be shared by the scientific community.

The barcodes are expected to have a number of uses, including identifying illegal trade in endangered species.

The findings appear in the Proceedings of the National Academy of Sciences. The lead author of the communication, Head of Genetics and Conservation at the Royal Botanic Garden, Edinburgh, Scotland insisted on the

importance of plant identification.

Co-author, a conservation geneticist at Royal Botanic Gardens, Kew, said the development would allow larger areas to be surveyed more quickly. Further she pointed out the shortage of expert botanists in plant identification. Most important thing about this process is that one can identify plants from different life stages or just fragments of plants.



Barcodes will be used to catalogue the world's 100,000 tree species

Barcoding will help to increase information and understanding of biodiversity and where things are growing around the world. Using this method rather than having specialist botanists, samples could now be sent back to laboratories to be processed and identified. She said the new method would also help to put the necessary conservation measures in place quickly, to save endangered species.

One use will be to build a DNA database for the world's 100,000 tree species, many of which are deemed to be of either conservation or economic importance.

<http://news.bbc.co.uk/2/hi/science/nature/8172673.stm>

New Additions

Ceramic Processing and Sintering

Rahaman, M. N. (Author)

Taylor & Francis

Accession no. 39718

Computer Graphics and Multimedia

Di Marco, J.

IDEA Group Publishing

Accession no. 39714

How to Manage Records in the e-Environment

Mc Leod, J. & Hare, C.

Routledge

Accession no. 39715

Mastering Apache Velocity

Gradcki, J. D.

Wiley Publishing Inc.

Accession no. 39688

Authentic Leadership

George, B.

Jossey-Bass

Accession no. 39686

Lessons in Learning, e-Learning and Training

Schank, S. C.

Pfeiffer

Accession no. 39674

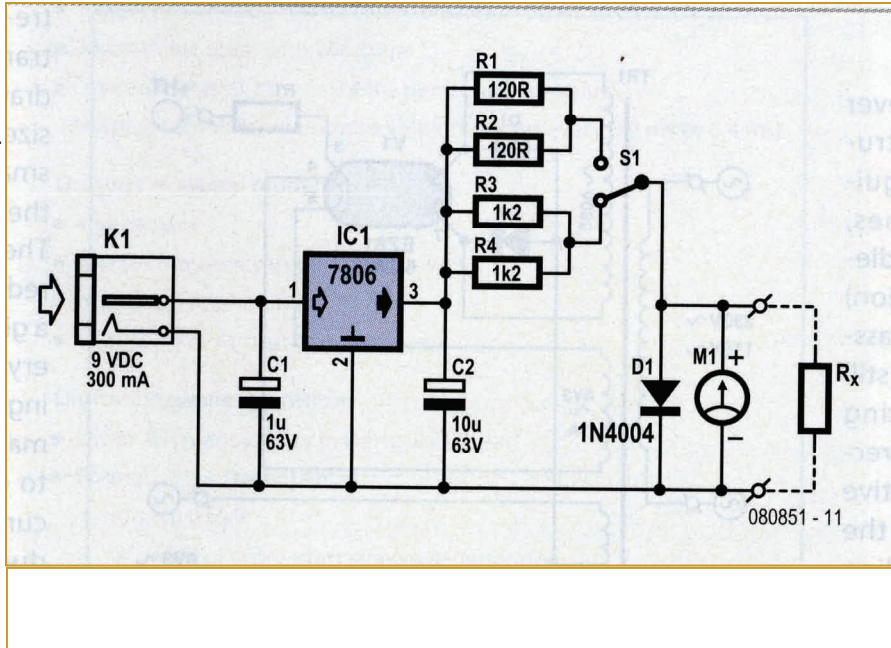
MEASURING MILLIOHMS WITH A MULTILETER

Low values of resistance can be troublesome especially when large current flow through them. As an example a current of 10 A passing through a terminal with a contact resistance of 50 m Ω will produce a voltage difference of 0.5 V. This result in power loss of 5 W is dissipated in the termination and can give rise to a dangerously high temperature which may degrade insulation around the wires.

Measuring low values of resistance is not easy. Low cost multileters do not include a milliohm measurement and

specialist equipment is expensive. The simple circuit has been described to allow milliohm measurement on a standard multimeter. The

300 mA at 9 to 12 V. The circuit supplies a fixed current output of 100 mA or 10 mA selected by switch which connects either to 60 or 600 Ω resistor into the constant current generator circuit.



The accuracy of the measurements are influenced by the contact resistance of the switch, precision resistors, 6 V supply level and the accuracy of the voltmeter.

Elektor July/August (2009),

circuit consists of little more than 6 V voltage regulator and a main adapter capable of supplying around 35(391/392): 106

DRINK TENDER COCONUT WATER

Tender coconut water is one of the richest sources of electrolytes. It is rich in chlorides, potassium, and magnesium and has moderate amounts of sugar, sodium and proteins. Coconut water is also a good source of dietary fibre, manganese, calcium, riboflavin and vitamin C.

As a natural isotonic beverage coconut water helps prevent dehydration and relieves exhaustion by replenishing natural salts lost by the body. It is widely used in tropical countries as a means for oral rehydration needed during diarrhoeal attacks. It is essentially fat free and has zero cholesterol and some studies have reported that it can have some effect on improving 'good cholesterol' levels (HDL) in the body. Coconut water is natural diuretic, so increase the flow of urine and helps in preventing urinary tract infections. Also it reduces the incidence of kidney stones. Coconut water helps in relieving constipation by improving intestinal functions and promotes digestive health. It is often recommended to people suffering from acidity and ulcers

Coconut water contains high level of lauric acid which is used by the body to make monolaurin – a disease fighting fatty acid derivative. Lauric acid has anti-fungal, anti-bacterial and anti-viral properties which protect the body against virus infections and boost the immune system.

Indian Coconut Journal Vol. LII (5)

Events: RECOMBINANT VACCINES – STRATEGIES FOR CANDIDATE DISCOVERY AND VACCINE DELIVERY

Location: The Biopark, Broadwater Road, Welwyn Garden City, Hertfordshire, AL7 3AX, UK

Date: 12 March 2010

Organisation: Euroscicon

Chair: Dr Eleanor Berrie, Clinical BioManufacturing Facility, University of Oxford, UK

Description: As both genomic and post-genomic analyses of pathogens and disease has advanced the production of successful recombinant vaccines we now require the strategies to both select appropriate molecules and deliver these vaccines effectively to stimulate protective immune responses. Both candidate discovery and the tools for delivering vaccines effectively will be explored and discussed at this one day event

This meeting has CPD accreditation.

For more information, please go to: www.regonline.co.uk/builder/site/Default.aspx?eventid=171164

Contact Details

Please email: enquiries@euroscicon.com

FRIENDLY BACTERIA KEEP YOUR SKIN'S DEFENCE IN CHECK

Being caked in germs sounds unpleasant, but “friendly” bacteria living on our skin may play a vital role by keeping in check the inflammation triggered by injury and unwanted bacteria. The discovery extends the list of bacteria that the human body relies on to function. It also suggests that antibacterial hand gels and soaps might exacerbate skin conditions characterized by excessive inflammation.

The commonest family of bacteria found on the skin is *Staphylococcus*, members are often harmless unless they get into wound. To see if they might actually be useful to humans, a scientist at the University of California and his team added molecules released by *Staphylococcus* to cells found in the human skin.

They found that one molecule called lipoteichoic (LTA), stopped some skin cells from releasing chemicals that trigger inflammation, part of the body's immune response. LTA had a similar effect when added to the skin of live mice.

The researcher says that although inflammation is essential for recovery from injury, the ability to damp it down is key because prolonged inflammation can lead to skin diseases like psoriasis. His team also notes that LTA's proactive role seems limited to the skin surface: in immune cells taken from deeper layers, it provoked inflammation.

In the gut, friendly bacteria control inflammation, while in the mouth they may kill strains that cause decay and halitosis.

New Scientist 28th Nov. 2009

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