Indian Science in Indian Media

विज्ञान एवं प्रौद्योगिकी विभाग
DEPARTMENT OF
SCIENCE & TECHNOLOGY
सत्यमेव जयते

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Highlights of India Science Wire (ISW) stories
October 2019

India Science Wire - highlighting Indian science in Indian media

The coverage of science and technology particularly relating to research done in Indian research institutions, is generally very poor in Indian media. There are several reasons for this situation, one of them being the lack of credible and relevant science content. In order to bridge this gap, Vigyan Prasar launched a unique initiative - India Science Wire (ISW) – in January 2017.

The news service is dedicated to developments in Indian research laboratories, universities and academic institutions. Almost all news stories released by this service are based on research papers by Indian scientists published in leading Indian and foreign journals. All news stories and features are written and edited by a team of professional science journalists with decades of experience in science journalism.

News stories based on happenings in Indian research labs are released to media houses on a daily basis. These stories are also uploaded on ISW website and are simultaneously promoted though social media – Twitter and Facebook. At present, the service is available in English and Hindi.

Reach out ISW Editor with story ideas, comments and suggestions at indiasciencewire@gmail.com

ISW website: http://vigyanprasar.gov.in/isw/isw.htm

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THE HINDU BusinessLine

Indian scientists achieve high precision in gene editing

Dinesh C Sharma New Delhi | Published on October 01, 2019

Indian scientists have developed a new variant of currently popular gene editing tool, CRISPR-Cas9, and have shown that this variant can increase precision in editing genome while avoiding unintended changes in DNA.

The researchers have also shown that this type of gene editing can be used to correct sickle cell anemia, a genetic blood disorder. The experiments have been done in human-derived cells from patients of sickle cell anemia, according to findings of the study published in leading scientific journal Proceedings of the National Academy of Sciences (PNAS).

The study has been done by researchers from the Delhi-based Institute of Genomics and Integrative Biology (IGIB) of the Council of Scientific and Industrial Research (CSIR).

By reprogramming and using a naturally occurring gene editing system - CRISPR-Cas9 - found in bacteria, scientists globally have been engaged in ‘editing’ genome of various organisms.

CRISPR-Cas9 stands for ‘Clustered regularly interspaced short palindromic repeats and CRISPR-associated protein 9.’ This protein can be programmed to go to a desired location in the genome and correct or edit defective strands (such as those involved in certain diseases) of DNA. The technology, when perfected, may be used to treat several genetic disorders.

However, the current technique faces challenges as the ‘molecular scissors’ could sometimes miss its target and result in unintentional results.

One of the widely used Cas9 enzyme in gene editing is Streptococcus pyogenes Cas9 (SpCas9) and its engineered variants. They have been harnessed for several gene-editing applications across different platforms, but concerns remain regarding their off-targeting at multiple locations across the genome. To overcome these problems, Indian researchers used another naturally occurring Cas9 from bacteria called Francisella novicida.

“We have shown that Cas9 from Francisella novicida (FnCas9) can perform genome editing through homology directed repair and this can be used for correction of disease causing mutations,” said Dr. Debojyoti Chakraborty, senior scientist at IGIB, who led the study, while speaking to India Science Wire. “It has extremely high specificity of DNA interrogation and does not tolerate mismatches in the target both under in vivo and in vitro conditions.”

“This protein (FnCas9) has shown negligible binding affinity to off-targets differing by one or more mismatches, rendering it highly specific in target recognition,” the researchers have observed in their study.

The technique has been applied to correct DNA derived from patients of sickle cell anemia. “We demonstrate FnCas9-mediated correction of the sickle cell mutation in patient-derived induced pluripotent stem cells and propose that it can be used for precise therapeutic genome editing for a wide variety of genetic disorders,” researchers said.

The research team from IGIB included Sundaram Acharya, Arpit Mishra, Deepanjan Paul, Asgar Hussain Ansari, Mohd. Azhar, Manoj Kumar, Riya Rauthan, Namrata Sharma, Meghali Aich, Dipanjali Sinha, Saumya Sharma, Shivani Jain, Arjun Ray, Suman Jain, Sivaprakash Ramalingam, Souvik Maiti and Debojyoti Chakraborty.

(India Science Wire)

Twitter handle: @dineshcsharma

Published on October 01, 2019

Research Stash

New Technique to Trap and Move Tiny Particles Using Laser

October 1, 2019

In a development that could help make advanced lab-on-chip devices like portable diagnostic kits, researchers at the Centre for Nano Science and Engineering (CeNSE) in Indian Institute of Science, Bengaluru, have come up with a technique to trap and move nano-sized particles in a fluidic medium using light.

The technique, developed by Ph.D. student Souvik Ghosh and Associate Professor Ambarish Ghosh, uses a focused laser beam to trap and maneuver a nano-sized silver disk, which in turn can attract and ensnare nanoparticles when light is shone on it.

The ability to trap and manipulate microscopic objects using light — a Nobel Prize-winning advancement — has led to breakthroughs in many fields. Called "optical tweezers", they, however, are not efficient at capturing nano-sized particles.

Researchers overcame this challenge with what is called "plasmonic tweezers", which can trap much smaller particles, such as viruses or quantum dots, at lower light intensities. The plasmonic tweezers use metallic nanostructures such as gold or silver, which generate a strong electromagnetic field around themselves when light hits them, and this field attracts and traps nanoparticles. But, unlike optical tweezers, they are fixed at a spot and can only capture particles close to them.

In their earlier work, researchers had managed to transport nano-scale cargo using plasmonic tweezers integrated with magnetic nano-robots. However, the tweezers could not be used for certain types of colloids such as magnetic nanoparticles. In the new study, published in Nature Communications, the team has developed a nano-manipulation technique that works on optical forces alone and is, therefore, more easily applicable to standard lab-on-chip technologies.

They used a nano-disk made of silver as a plasmonic tweezer and maneuvered it using a focused laser beam that acted as an optical tweezer. This allowed them to manipulate nanoparticles even in magnetic colloids and biological buffer solutions.

The researchers said that the new approach could be used to precise capture, transport and release particles such as nano-diamonds or quantum dots. As it uses low-intensity light, the approach would also enable non-invasive manipulation of fragile biological specimens such as bacteria, viruses, and proteins, according to a press release from the institute.

“What we have achieved is the capability of manipulating very, very small particles, with much lower light intensity. This is important for things that can be damaged, such as living cells, or even non-living things where high-intensity beams can heat up the material,” said Ambarish Ghosh.

Sunderarajan Padmanabhan

शहरी क्षेत्रों में बाढ़ पूर्वानुमान के लिए नई प्रणाली विकसित

उमाशंकर मिश्र अक्टूबर 9,2019

भारत में विकसित अपनी तरह की यह पहली रियल टाइम एवं एकीकृत शहरी बाढ़ पूर्वानुमान प्रणाली है। यह पूर्वानुमान प्रणाली कंप्यूटर प्रोग्राम पर आधारित है, जो विभिन्न स्रोतों से प्राप्त आंकड़ों के आधार पर ज्वार और तूफान में क्षेत्रीय मौसम एवं लहरों का अनुमान लगा सकती है।

नई दिल्ली। (इंडिया साइंस वायर): भारी बारिश के कारण देश के कई शहरी इलाके इन दिनों बाढ़ का सामना कर रहे हैं। भारतीय शोधकर्ताओं ने एक विशेष प्रणाली विकसित की है, जो शहरी क्षेत्रों में बाढ़ का पूर्वानुमान लगाने में मददगार हो सकती है।

भारत में विकसित अपनी तरह की यह पहली रियल टाइम एवं एकीकृत शहरी बाढ़ पूर्वानुमान प्रणाली है। यह पूर्वानुमान प्रणाली कंप्यूटर प्रोग्राम पर आधारित है, जो विभिन्न स्रोतों से प्राप्त आंकड़ों के आधार पर ज्वार और तूफान में क्षेत्रीय मौसम एवं लहरों का अनुमान लगा सकती है।

इस प्रणाली की शुरुआत चेन्नई में हो रही है, जहां इसका संचालन राष्ट्रीय तटीय अनुसंधान केंद्र द्वारा किया जाएगा। यह प्रणाली भारी बारिश की घटनाओं पर नजर रखेगी और इसके उपयोग से बंगाल की खाड़ी में आने वाले ज्वार की ऊंचाई और चेन्नई शहर के जलाश्यों और वहां बहने वाली अडयार और कोऊम नदियों में जल स्तर सहित सभी मापदंडों को ध्यान में रखते हुए बाढ़ का पूर्वानुमान किया जा सकेगा।
यह बाढ़ पूर्वानुमान प्रणाली क्षेत्रीय मौसम एवं ज्वार पूर्वानुमान मॉडलों के साथ-साथ ज्वारीय बाढ़, शहरी क्षेत्रों में जलाश्यों एवं नदियों के जल स्तर, जलप्रवाह और तूफान जल निकासी मॉडलों पर आधारित है। इस पूर्वानुमान प्रणाली के छह प्रमुख घटक हैं, जो आपस में एक दूसरे से जुड़े हुए हैं।

इस प्रणाली में नदियों का जल स्तर मापने वाले संवेदकों का उपयोग किया जाता है और बाढ़ का अनुमान लगाने वाले मॉडलों के साथ-साथ जलाशयों और नदी के प्रवाह पर आधारित हाइड्रोलॉजिकल मॉडल भी इसमें शामिल हैं। इसके सभी घटक स्वचालित हैं और किसी भी स्तर पर मैनुअल हस्तक्षेप की आवश्यकता नहीं पड़ती।

इसे विकसित करने वाले शोधकर्ताओं का कहना है कि यह प्रणाली पूर्वानुमानित बाढ़ के दृश्य मानचित्र तैयार करने में मददगार हो सकती है। चेन्नई में दिसंबर 2015 की बाढ़ के आंकड़ों के साथ इस प्रणाली की वैधता का परीक्षण किया गया है। इस प्रणाली के विकास से संबंधित अध्ययन शोध पत्रिका करंट साइस में प्रकाशित किया गया है।

इस प्रणाली को विकसित करने वाले शोधकर्ताओं का कहना है कि बढ़ते शहरीकरण के कारण प्रवासियों की बसावट बाढ़ की आशंका वाले क्षेत्रों में भी बढ़ी है। इसे देखते हुए बाढ़ पूर्वानुमान तंत्र और बाढ़ मानचित्रों का विकास जरूरी हो गया है। इसे भारत सरकार के प्रमुख वैज्ञानिक सलाहकार के कार्यालय की पहल पर भारतीय प्रौद्योगिकी संस्थान (आईआईटी), बॉम्बे के नेतृत्व में विकसित किया गया है।

बेंगलुरु स्थित भारतीय विज्ञान संस्थान, भारतीय प्रौद्योगिकी संस्थान (आईआईटी) मद्रास और चेन्नई स्थित अन्ना विश्वविद्यालय के शोधकर्ताओं के सहयोग से यह प्रणाली पृथ्वी विज्ञान मंत्रालय, मौसम विभाग, राष्ट्रीय मध्यम अवधि मौसम पूर्वानुमान केंद्र, राष्ट्रीय तटीय अनुसंधान केंद्र, भारतीय राष्ट्रीय महासागर सूचना सेवा केंद्र, राष्ट्रीय सुदूर संवेदन केंद्र और इसरो की साझेदारी में विकसित की गई है।

(इंडिया साइंस वायर)

BioTech Times™

Coluthur Gopalan, father of nutrition science in India, is no more

By Dinesh C Sharma October 3, 2019

New Delhi, October 3: Dr. Coluthur Gopalan, widely considered as the father of nutrition research in India, is no more. He was responsible for initiating nutrition research in independent India leading to a number of interventions such as the Integrated Child Development Services, midday meal scheme for school children, goiter prevention programme.

Dr. Coluthur Gopalan, decorated with top civilian honours and several professional awards, would have turned 101 on November 28 this year. He passed away in Chennai early today.

He was the director of the Hyderabad-based National Institute of Nutrition (NIN) from 1960 to 1974 and Director General of the Indian Council of Medical Research from 1974 to 1979. He later founded the National Nutrition Foundation and served as its Chairman till the end.

Starting his professional career in nutrition research at the Nutrition Research Laboratory (NRL) during the British period, he continued his journey over the next six decades. In the late 1950s, NRL moved to Hyderabad and became NIN, Gopalan took over as Director and expanded research to several key areas. Since nutrition is a multi-disciplinary subject, he set up divisions for clinical research, biochemistry, biophysics, endocrinology, analytical chemistry, food toxicology and the field units.

At NIN, he laid the foundation for research to tackle problems such as protein-energy malnutrition, Vitamin A deficiency, Phrynoderma, Lathyrism, fluorosis and Pellagra. The National Nutrition Monitoring Bureau (NNMB) was also a result of his labour.

Under his leadership, ICMR expanded research into neglected communicable diseases and modernized the working of the council. Three new institutes – Malaria Research Institute; Vector Control Research Institute and Leprosy Research Institute were established to develop and implement preventive and management strategies for these diseases.

"NIN today bears testimony to his genius as an architect and father of nutrition sciences in ndia. Research under his leadership formed the basis of major national nutrition programmes initiated in the 1970s – ICDS, Massive Dose Vitamin-A and iron supplementation," commented Dr. R Hemalatha, Director, NIN.

Dr. Gopalan also got NIN to work on Indian foods, resulting in a publication called Nutritive Value of Indian Foods which was based on analyses of over 500 Indian foods. This work was used for calculating dietary in-take of all nutrients. This made India the first developing country to have its own 'recommended dietary allowances.'

"Dr. Gopalan was a visionary institution builder. He viewed medical and nutrition science from a holistic perspective and always wanted to address them taking a multi-disciplinary and multi-sectoral approach. His contributions to medical science in general and nutrition science, in particular, are immense. He, in fact, brought nutrition to centre stage and was instrumental in putting it as an important driver in developmental plans and policies of the country," said Dr. Balram Bhargava, director general of ICMR.

(India Science Wire)

Indian scientists provide new insight into bipolar disorder

Now Indian researchers have found that such patients carry some residual impairment in terms of processing of information even in their 'normal' phases

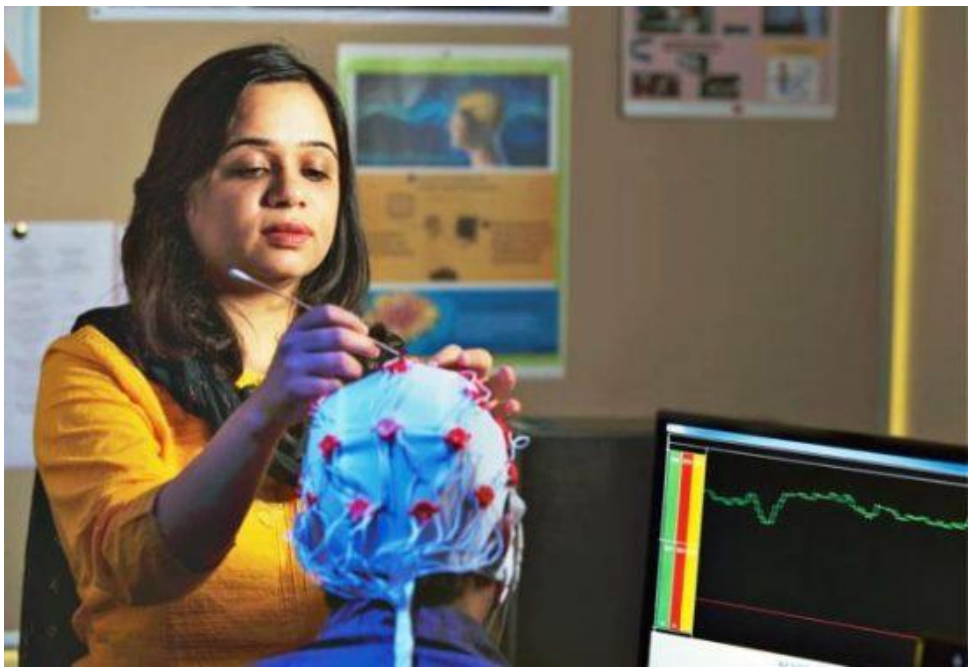
By **BioVoice News Desk** - October 4, 2019

By Susheela Srinivas

Bengaluru: Bipolar disorder is a mental health condition in which patients undergo intense mood shifts that oscillate between depression and elevated moods. Normally patients experience episodes few and far between or occur many times a year, often disrupting their functionality. In other times, they are seen to adjust reasonably adequately with medication and psychotherapy.

Now Indian researchers have found that such patients carry some residual impairment in terms of processing of information even in their 'normal' phases.

The study has been done jointly by researchers from the National Institute of Mental Health and Neuroscience (NIMHANS), Bengaluru, and All India Institute of Medical Sciences, New Delhi. It included two groups of 30 individuals each, matched in age, gender and education. The first group comprised those with bipolar disorder while the other was control group of healthy individuals.



Dr. Divya Sadana

"We hypothesised that individuals could have deficiencies in the form of slow mental thinking or speed of motor activity, difficulties in concentrating for required task duration, difficulties in planning and decision making or had mild forgetfulness even in their normal phase. We found that few deficiencies do continue," said Dr Divya Sadana, the first author of the study, while speaking to India Science Wire.

The two groups were subjected to a set of 10 to 12 neuropsychological assessments and questionnaires, standardised to the Indian adult profile that determines the speed of processing information, attention, fluency, planning, mental flexibility and memory functions. The test called NIMHANS Neuropsychological Battery is used to assess cognitive deficits in bipolar disorder patients.

The normal phase of the bipolar patients was ensured by checking that they did not have a relapse of the condition in the last three months.

“The results indicated that the bipolar group had ‘statistically significant’ low scores on the speed of processing information as compared to healthy controls, although there was no significant difference in memory and executive functions,” explained DrRajnish K Gupta, a team member, who was involved in the statistical analysis of the study.

In the bipolar group, processing speed deficits continue in the euthymic phase. “However, better performance has been observed on unstructured tasks compared to healthy control. These cognitive markers have implications in diagnosis and rehabilitation,” added Dr. Jamuna Rajeswaran, the leader of the team. She noted that although the sample size was small, the methodology adopted was robust and the study was spread over five years to ensure exact matching between the two groups.

The team comprised Divya Sadana, Rajnish Kumar Gupta, Sanjeev Jain, Ravi G.S, K. Thennarasu, and Jamuna Rajeswaran (NIMHANS); and S. Senthil Kumaran (AIIMS). The results have been published in journal **Asian Journal of Psychiatry.**

(India Science Wire)

DownToEarth

Large graphical health warnings on tobacco packets more effective: Study

Such warnings help prevent initiation and motivate cessation, find researchers

By Jyoti Singh Last Updated: Friday 04 October 2019

In India, the number of deaths caused by tobacco per year is expected to touch 1.5 million by 2020, up from 1.3 million deaths in 2017. Among the measures taken to reduce tobacco consumption is the use of large-sized pictorial warnings on tobacco packs. But tobacco industry has been opposing increasing the size of such warnings, raising doubts about their effectiveness.

Now a new study has shown that large health warnings on tobacco packets with plain packaging can be highly effective in conveying ill effects of tobacco to people.

It has found that such warnings would be more impactful through increased visibility of the warning thus help prevent initiation and motivate cessation.

Researchers studied perceptions of both adolescents and adults on the effects of larger size graphic health warnings covering 85 per cent of the area of the packets against those covering 40 per cent of the area currently being used.

The study included 2,121 participants from Delhi, Najafgarh, Hyderabad and Ranga Reddy district. Of them 62 per cent were urban residents, and 72 per cent had never used tobacco. Half of the participants were from lower socioeconomic category and 46 per cent belonged to the middle socioeconomic category.

The study participants were shown four different types of packets — conventional packs, dummy packs with conventional background but with warnings in 40 per cent of the area, dummy packs with conventional background but new warnings in 85 per cent of the area and dummy packs with plain background and new warning in 85 per cent of the area.

Researchers used an interviewer-administered questionnaire and it was conducted as individual face-to-face interview. It was found that packs with 85 per cent graphical warnings were perceived to be more effective in increasing noticeability of the warnings and conveying the intended health message.

These warnings were also effective in preventing non-users from initiating tobacco use, and motivating users to quit.

“India lacked research evidence to defend the large warnings against the legal challenges posed by the tobacco industry. At the same time, there was lack of evidence in India to show that these large warnings would be more effective on plain tobacco packs and that there was widespread support for these plain packs in the general public,” said Gaurang Nazar, a member of the research team from Public Health Foundation of India, while speaking with *India Science Wire.*

The study also highlighted the need for plain packaging instead of commercial packaging of tobacco packets, in line with the experience in elsewhere.

A study conducted in Australian had shown that plain packaging accelerated the decline in smoking prevalence and reduced the appeal of tobacco packs.

The study findings have been published in the journal *Tobacco Induced Diseases*. The study team included researchers from PHFI; HRIDAY; Indian Institute of Public Health, Hyderabad; University of California; University of Oxford and University of Melbourne.

(India Science Wire)

जामुन की पैदावार के लिए खतरा बन सकता है यह छिद्रक कीट: शोध

कीटों का आक्रमण हो जाए तो फलों की पैदावार प्रभावित होने के साथ-साथ उनका स्वाद और रंग-रूप भी बिगड़ जाता है। भारतीय शोधकर्ताओं ने जामुन के फलों के विकास के ऐसे महत्वपूर्ण चरणों का पता लगाया है, जो अनसेल्मेला केरची नामक छिद्रक कीट के प्रकोप के प्रति संवेदनशील होते हैं। इस नए शोध से मिली जानकारी इस कीट से निपटने के लिए प्रभावी रणनीति बनाने में मददगार हो सकती है।

अनसेल्मेला केरचीकीट जामुन के फलों को बदरंग और बेस्वाद बनाकर नष्ट कर देता है। इन कीटों के प्रकोप से जामुन के फलों पर गहरे काले रंग के छेद हो जाते हैं और फल का 62 प्रतिशत तक हिस्सा नष्ट हो जाता है। इस अध्ययन में शोधकर्ताओं ने अनसेल्मेला केरची के प्रकोप से बेंगलुरु के ग्रामीण इलाकों में जामुन की फसल को बड़े पैमाने पर नुकसान होने का भी पता लगाया है।

जामुन को नुकसान पहुंचाने वाला यह एक हाइमेनोप्टेरान कीट है। यूलोफिडे परिवार के इस फाइटोफैगस (वनस्पतियों को खाने वाले) कीट का लार्वा जामुन के बीजों को खाता है। कीट से ग्रस्त बीजों की अंकुरण क्षमता प्रभावित होती है, जो जामुन उत्पादकों के लिए चुनौती बनकर उभर सकता है।बेंगलुरु के भारतीय बागवानी अनुसंधान संस्थान के शोधकर्ताओं द्वारा किया गया यह अध्ययन शोध पत्रिका करंट साइंस में प्रकाशित किया गया है।

अध्ययन के दौरान कीट से ग्रस्त जामुन के पेड़ों से फल एकत्रित करके उन्हें आकार, रंग, कठोरता के आधार पर पांच वर्गों में बांटा गया और फिर फलों का व्यास एवं लंबाई, बीजकोष की मोटाई और बीजों का व्यास दर्ज किया गया। करीब 25 डिग्री सेल्सियस तापमान पर प्लास्टिक के डिब्बों में फलों को व्यस्क कीटों के बाहर निकलने तक रखा गया। इस बीच कीटों के बाहर निकलने, फलों पर निकास छेदों की संख्या और उनका व्यास दर्ज किया गया। इसके बाद, कीटों से ग्रस्त फलों पर चीरा लगाकर उनके वास्तविक स्वरूप में हुई क्षति का आकलन किया गया है।

फलों को चीरकर देखने पर उनमें पूर्ण रूप से विकसित 10-15 व्यस्क कीट देखे गए हैं। अध्ययनकर्ताओं का कहना है कि कीटों का प्रकोप फलों के चौथे और पांचवें चरण में सबसे अधिक होता है और नर कीटों की तुलना में मादा कीटों की संख्या अधिक देखी गई है। फल के बाहरी हिस्से पर उभरने वाले निकास छिद्र फल की मध्य परत से होते हुए बीज के भीतर कीट लार्वा को पोषित करने वाले केंद्र जुड़े होते हैं।
फलों के विकास के विभिन्न चरणों का साकारत्मक संबंध इन काले छिद्रों के उभरने से पाया गया है।

शोधकर्ताओं के अनुसार, फलों के विकास का दूसरा चरण इन कीटों के प्रकोप के लिए अधिक संवेदनशील होता है। इस दौरान वनस्पतियों से बने कीटनाशकों का उपयोग कीटों के प्रकोप को कम करने में मदद मिल सकती है।

जामुन सियाजियम प्रजाति का फल है। क्वींसलैंड, मलेशिया और पपुआ न्यू गिनी जैसे देशों में अनसेल्मेला वंश की दूसरी कीट प्रजातियां अनसेल्मेला मिल्टोनी, अनसेल्मेला मैलेसिया और अनसेल्मेला ओकल्ट सियाजियम प्रजाति के फलों- ब्रश चेरी, लिलि पिली और जावा ऐपल के लिए प्रमुख खतरे के रूप में देखी गई हैं।

बेंगलुरु स्थित राष्ट्रीय कृषि कीट संसाधन ब्यूरो के डाटाबेस में जामुन को नुकसान पहुंचाने वाले कीटों की करीब 78 प्रजातियों का उल्लेख किया गया है। हालांकि, डाटाबेस में मौजूद कीटों में से किसी का संबंध अनसेल्मेला केरची से नहीं मिलता है। इसी से पता चलता है कि इस कीट से जामुन पर पड़ने वाले दुष्परिणामों की ओर पर्याप्त ध्यान नहीं दिया गया है। शोधकर्ताओं का कहना है कि समय रहते इस कीट की रोकथाम न की गई तो यह जामुन की पैदावार को बड़े पैमाने पर प्रभावित कर सकता है।

भारत में अनसेल्मेला केरचीप्रजाति के कीट पहली बार वर्ष 1957 में पुणे में पाए गए थे। हालांकि, अनसेल्मेला केरची छिद्रक कीट के कारण जामुन को होने वाले नुकसान और इसके आर्थिक महत्व के बारे में विस्तृत अध्ययन नहीं किया गया।शोधकर्ताओं में पी.डी. कमला जयंती, अंजना सुब्रमण्यम, ए. रेखा और बी. आरा. जयंती माला शामिल थे।

(इंडिया साइंस वायर)

DownToEarth

Molecular mechanism of gender differences in sexual behaviour deciphered

Hyderabad researchers study the differences in the central nervous systems of male and female of humans and other organisms and how they consequently show different sexual behavior

By Sunderarajan Padmanabhan Last Updated: Friday 04 October 2019

Sexual reproduction is central to maintenance and propagation of all organisms. Besides the sexual organs, male and female of human and other higher organisms have differences in their central nervous system (brain and spinal cord) and consequently show different sexual behaviour.

How does this occur? Does it happen at the embryonic stage itself or later? Researchers at the Hyderabad-based Centre for (CDFD) DNA Fingerprinting and Diagnostics have found some answers.

Human and other higher organisms have two major identifying features: a well-defined anterior-posterior axis (head to tail axis) of the body; and a highly complex central nervous system.

The 'head to tail' axis of the body is characterised by divergent non-repetitive regional features seen along the length of the body such as the ears, eyes, mouth, nose, arms, and legs. A family of genes called Homeotic genesexpress serially along the head to tail axis and givedifferent regional identities to the cells by regulating differential gene expression.

The central nervous system comprising the brain and the spinal cordruns along the length of the body and has 'head to tail' axis determined by Homeotic genes.The divergent and non-repetitive features in central nervous systemare in the form of different neuronal cell types, whichcarry out different functions like locomotion, feeding and mating.

Among other things, gender-based differences — sexual organ and behaviour — are critical for successful mating and propagation of species.

For development of the sexual organsand their functioning, tail end of the body is evolutionarily specialized for sexual mating across different organisms. However, several aspects such as how sex-specific differences in central nervous system and consequently sexual behaviour arise are not yet known.

In their study done in fruit fly *Drosophila melanogaster*, CDFD researchers have found that Homeotic gene involved in making the tail end of its body worked with the DM domain gene in central nervous system to bring about sexual dimorphism in early developmental stages. DM domain genes are important for sexual development.

The team found that in female fruit fly, the interaction resulted in death of a small subset of neural stem cells, while such a thing did not happen in the male fruit fly. Thus, female did not have a subpopulation of specialized neurons, while the male had them. This led to differences in mating behaviour of female and male fruit flies.

Speaking to *India Science Wire*, team leader Rohit Joshi said what has been found in fruit fly could be happening in human and other higher organisms too. "This is the first report indicating that Homeotic genes and DM-domain genes physically interact and that Homeotic gene are capable of using sex specific forms of DM-domain gene as partners in gene regulations," he said.

"Considering the wide-ranging role of Homeotic gene and DM-domain gene in development and determination of sexual identity, their capacity to collaborate with each other could be a common theme for generating and maintenance of sexual dimorphism in animal development across different species," he added.

Besides Joshi, the study team included Neha Ghosh, Asif Bakshi, Risha Khandelwal and Srivatsan Govinda Rajan, who is currently at Department of Biological Sciences, University of Illinois at Chicago.

The team has published a report on its work in scientific journal *Development*. The study was funded by the Wellcome Trust DBT India Alliance Intermediate Fellowship and the Department of Science and Technology, among others.

(India Science Wire)

Newsroom 24X7

CSIR launches eco-friendly crackers

by Newsroom24x7 Network October 5, 2019

Union Minister for Health & Family Welfare, Science & Technology and Earth Sciences, Dr. Harsh Vardhan at a press conference on Green Crackers, in New Delhi on October 05, 2019. DG CSIR Shekhar C. Mande is also seen.

Sunderarajan Padmanabhan

New Delhi: Minister for Science and Technology and Earth Sciences Dr. Harsh Vardhan on Saturday launched a set of new crackers that promises to help reduce particulate emissions by 30 per cent while producing the same level of light and sound effects of traditional fireworks.

The new firework, which cover popularly used sound emitting crackers, flowerpots, pencils, chakkar and sparklers, are based on formulations developed by a consortium of eight laboratories under the Council of Scientific and Industrial Research (CSIR) led by Nagpur-based National Environmental Engineering Research Institute.

Launching the `green' crackers at a press conference, Dr. Harsh Vardhan said the crackers would be available at the same cost as the traditional ones. "Some of them may even be cheaper," he said.

He noted that about 230 firework manufacturers have signed the memorandum of understanding for using the formulations developed by CSIR scientists. Of them, 165 have gone further and have also entered into non-disclosure agreement.

CSIR had taken up the project to develop eco-friendly crackers in the wake of directions of the Supreme Court restricting the use of fireworks to address the growing problem of pollution in different parts of the country.

The project adopted a two-pronged approach. While one stream of activity was focussed on improving the traditional crackers through reduction in the level of Barium Nitrate, which is the main villain, the second pathway aimed at replacing Barium Nitrate with a more benign Potassium Nitrate.

As part of the exercise, the scientists also set up a new facility that could be used by manufacturers to characterise the raw material and analyse the compositions of the chemicals used in fireworks.

The Minister said that the new and improved crackers have been demonstrated to manufacturers and their associations such as Tamil Nadu Fireworks and Amorces Manufacturers Association and Indian Fireworks Manufacturers Association, besides the Central Pollution Control Board and Petroleum And Explosives Safety Organisation, which is responsible to control transport, storage and usage of all explosive materials.

Besides National Environmental Engineering Research Institute, the consortium consisted of Central Electrochemical Engineering Research Institute, Indian Institute of Toxicology Research, Indian Institute of Chemical Technology, National Chemical Laboratory, Central Electronics Engineering Research Institute, National Botanical Research Institute and Central Mechanical Engineering Research Institute.

Dr. Harsh Vardhan said the new set of crackers would have a prominent green logo to differentiate them from the conventional ones. Further, it would carry QR code for monitoring. Scanning of the code would provide all information about the product including the chemicals and the process used.

(India Science Wire)

THE HINDU BusinessLine

Satellite-based advisory service launched for deep sea fishermen

Sunderarajan Padmanabhan New Delhi | Published on October 09, 2019

The Indian National Centre for Ocean Information Services (INCOIS) and Airport Authority of India on Wednesday launched a new system that expands the scope for disseminating alerts and other messages to fishermen who go for multi-day fishing and other such activities deep inside the seas.

At present, fishermen get advisories, forecasts and early warnings through a wide range of dissemination mechanisms such as Potential Fishing Zones (PFZ) advisories, ocean state forecasts, high wave alerts, tsunami and storm surge early warning services. But these messages can be transmitted only up to a distance of 10 to 12 km from the coast. Such information needs to be conveyed even to those venturing into the sea beyond 50 nautical miles (90 km) and further.

The new service, formally launched by the minister for science and technology and earth sciences Dr Harsh Vardhan, will fill this gap.

The gap in communication was severely felt during the Ockhi cyclone of November-December 2017, when fishermen who had gone out for deep sea fishing before the onset of the cyclone could not be informed the impending storm. This resulted in loss of life, serious injuries to those rescued and severe damages to fishing boats and fishing gear.

The new system is designed to overcome the problem. It consists of a specially designed device and a mobile application. It works by using the communication opportunity provided by GAGAN (GPS-Aided Geo Augmented Navigation) satellite system of the Indian Space Research Organization (ISRO) and Airports Authority of India. GAGAN consists of three geosynchronous satellites - GSAT-8, GSAT-10 and GSAT-15 and its footprints cover the entire Indian Ocean round the clock.

Alerts and other messages would be sent through GAGAN and the device would receive and transfer it to a mobile phone through blue tooth communication. The mobile application would decode and display the information. It is enabled to do so in nine languages. The technology for the device has been transferred to a Bengaluru-based company, Acord. The device has been named GEMINI (GAGAN Enabled Mariner's Instrument for Navigation and Information).

Dr. Harsh Vardhan launched the system in the presence of Dr Madhavan Rajeevan (Secretary, Ministry of Earth Sciences), Dr. Satheesh C.Shenoi (Director, INCOIS) and other senior officials.

The minister also launched an improved version of the Potential Fishing Zone (PFZ) forecasts developed by INCOIS. The new version will provide advisories three days in advance. The forecasts are generated using the modern tools of numerical models and thus are expected to help provided the advisories even when skies are overcast.

(India Science Wire)

Twitter handle: @ndpsr

Grand challenge for cancer research announced

written by **BioTech Times Desk** October 9, 2019

By Dinesh C Sharma

New Delhi, October 9: An estimated one million new cases of cancer are reported in India every year. Almost a third of them are preventable cancers. The use of innovative approaches for screening, early diagnosis as well as treatment and palliative care can save many lives. To develop such approaches that are cost-effective and affordable, the India Cancer Research Consortium (ICRC) has announced a grand challenge for researchers.

Best research ideas will get funding of up to Rs 1.5 crore a year for three years. The grants will be given for ideas in six thematic areas – prevention and epidemiology, diagnostics, therapeutics, palliative care, basic biology and innovation. The objective will be to produce outcomes that are translatable into practice. Those having a multidisciplinary collaborative approach will be preferred.

Research ideas and projects that are ready for implementation or scalability in the form of deliverables and point-of-care technologies will be given priority. Given the fact that India has a huge burden of tobacco-related cancers and cancers among women, new ideas should focus on common cancers like tobacco-related, cervical cancer, breast cancer etc. Considering the high incidence and paucity of data on cancers in the North-East, projects from North-East region will be given preference.

ICRC has been floated by the Indian Council of Medical Research (ICMR) and the Department of Health Research to "promote, articulate and prioritize cancer research" in the country.

"We have so many research institutions engaged in research in the basic biology of cancer. Moreover, research is mostly done in isolation and there is no integration. The idea behind ICRC is to include all aspects of cancer research like prevention, diagnostics, therapeutics, palliative care and innovation along with basic biology, and produce outcomes that can find ready applications," said Dr. Ravi Mehrotra, chief executive officer of ICRC.

The activities under the consortium will complement the existing scientific and operational research in cancer. The consortium, he said, would also bring together all relevant stakeholders including researchers, healthcare professionals, cancer survivors,

legislators, public health representatives, policymakers, caregivers and volunteers to address the problem of cancer.

"We want to harness and reinforce research in a coordinated way in order to achieve tangible impact on cancer control as well as provide a framework to the research community through the establishment of a common platform for a trans-institutional alliance with ICMR at the centre," he added.

A bulk of the cancer burden in the country is due to low awareness and closely linked to socioeconomic inequalities in access to health care. Almost three of five cancer deaths in India are associated with tobacco or infectious diseases.

"We need to encourage appropriate trans-sectoral and translational approaches in cancer research to bring ground-level transformation in the way cancer is diagnosed and treated in India," said Dr Mehrotra.

The last date for sending research proposals is October 29.

(India Science Wire)

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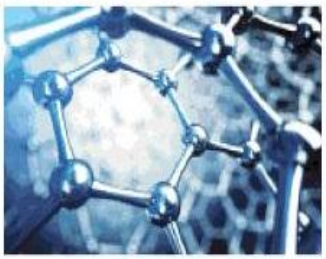
अध्ययन

यह अणुओं और परमाणुओं की इंजीनियरिंग है जो जैव-सूचना व प्रौद्योगिकी जैसे विषयों को साथ लाती है, नैनोकण के उपयोग से मानव जीवन सरल हुआ है, पर इनका अत्यधिक प्रयोग हानिकारक हो सकता है...

विज्ञान के पहलुओं को जोड़ती है नैनो तकनीक

नई दिल्ली, आइएसडब्ल्यू : नैनो तकनीक का उपयोग विभिन्न क्षेत्रों में हो रहा है। नैनो एक ग्रीक शब्द है, जिसका शाब्दिक अर्थ सूक्ष्म या छोटा होता है। हर वो कण जिसका आकर 100 नैनोमीटर या इससे छोटा हो नैनोकण माना जाता है। किसी नैनोकण की सूक्ष्मता का अंदाजा इसी से लगा सकते हैं कि मनुष्य के बालों का व्यास 60 हजार नैनोमीटर होता है। नैनो-टेक्नोलॉजी शब्द का प्रयोग पहली बार वर्ष 1974 में नॉरियो तानिगुची द्वारा किया गया था। यह अणुओं और परमाणुओं की इंजीनियरिंग है, जो भौतिकी, रसायन, जैव-सूचना व जैव-प्रौद्योगिकी विज्ञान जैसे विषयों को आपस में जोड़ती है। धरती पर जीवन के आरंभ के समय से निरंतर प्रकृति में होने वाले परिवर्तनों के साथ- विभिन्न नैनोकणों का निर्माण हो रहा है।

अत्यधिक सूक्ष्म आकार के कारण नैनोकणों के रसायनिक एवं भौतिक लक्षण बदल जाते हैं। उदाहरण के लिए जिंक धातु के नैनोकण बनने पर ये पारदर्शी हो जाते हैं। नैनोकणों का उपयोग उपभोक्ता उत्पादों से लेकर चिकित्सा उपकरणों, सौंदर्य प्रसाधन, रसायन, इलेक्ट्रॉनिक्स एवं प्रकाशिकी, पर्यावरण, भोजन तथा पैकेजिंग, ईंधन, ऊर्जा, कपड़ा और पेंट, नई पीढ़ी की दवाएं और प्लास्टिक



प्रतीकात्मक

इत्यादि में हो रहा है।

कृषि क्षेत्र में भी हो रहा उपयोग : भारतीय शोधकर्ताओं ने रबड़ से बनी हाई-परफार्मेंस नैनो-कम्पोजिट सामग्री विकसित की है, जिसका उपयोग टायरों की भीतरी ट्यूब और इनर लाइनरों को मजबूती प्रदान करने में किया जा सकता है। कृषि में नैनोकणों का उपयोग नैनो-उर्वरक, नैनो कीटनाशक/खरपतवारनाशी, भंडारण, संरक्षण, उत्पाद गुणवत्ता सुधार तथा फ्लेवर आदि में हो रहा है। नैनोकणों ने न सिर्फ फसलों की वृद्धि, बल्कि कृषि उपयोगी सूक्ष्मजीवों को भी प्रभावित किया है।

दो प्रकार के होते हैं नैनोकण : मोटे तौर पर नैनोकणों को कार्बनिक और अकार्बनिक पदार्थों में विभाजित किया जा सकता है। अकार्बनिक नैनोकण धातु (चांदी, एल्यूमीनियम, टिन, सोना, कोबाल्ट, तांबा, लोहा, मोलिब्डेनम, निकल, टाइटेनियम) एवं उनके धातु-ऑक्साइड का अत्यधिक प्रयोग हो रहा है। वही, जिंक ऑक्साइड नैनोकणों का उपयोग सौंदर्य प्रसाधनों में होता है। गोल्ड नैनोकणों की कोटिंग से ऊंची इमारतों या गाड़ियों के ग्लास आसानी से साफ किए जा सकते हैं। कॉपर के नैनोकण फफूंद तथा जीवाणुनाशक के रूप में चिकित्सा में प्रयोग हो रहे हैं। इनमें बैक्टीरिया तथा फफूंद को नष्ट करने की क्षमता होती है।

बढ़ी स्वास्थ्य की चिंता : नैनोकणों के उपयोग के साथ कुछ चुनौतियां भी उभर रही हैं। धात्विक नैनोकणों के उत्पादन और उपयोग में लगातार वृद्धि होने के कारण पर्यावरण और मानव स्वास्थ्य को लेकर भी चिंता बढ़ रही है। विशेषज्ञों का मानना है कि मिट्टी प्रत्यक्ष या परोक्ष रूप से नैनोकणों का भंडार बन रही है। शोध पत्रिका साइंस एंड टोटल एनवायरनमेंट में प्रकाशित शोध के मुताबिक शुद्ध पानी में उगाए गए पौधों की तुलना में कॉपर-ऑक्साइड नैनोकणों से प्रदूषित पानी में उगाए गए जौ की जड़ों में कॉपर की मात्रा 5.7 गुना और पत्तियों में 6.4 गुना अधिक पाई गई है।

DownToEarth

A new technique to protect copper from corrosion

IIT (BHU) researchers used a technique called 'floating film transfer method' to obtain ultrathin films of an organic material, squaraine, and to transfer it over the copper articles as layers

By Sunderarajan Padmanabhan Last Updated: Thursday 10 October 2019

Researchers at Indian Institute of Technology (BHU), Varanasi, have developed a new method that promises to protect copper, which is one of the most popular commercial metals, from corrosion in a cost effective manner.

Over the years, scientists have developed several techniques to combat the problem of corrosion of copper. However, they are expensive or highly complex or provide incomplete protection in acidic media. The new method promises to overcome these problems.

Researchers used technique called 'floating film transfer method' to obtain ultrathin films of an organic material, squaraine, and to transfer it over the copper articles as layers. The anti-corrosion activity was tested in the presence of hydrochloride using electrochemical

techniques as well as surface characterization techniques. The tests showed that nearly 40 per cent corrosion protection is reached with just one layer of squaraine and increased up to 98 per cent with four layers.

There are several ways to protect copper from corrosion, but squaraine has an interesting chemical structure. It has a hydrophobic functional group at one end, a hydrophilic functional group at the other end and the two are connected to a square unit in the middle. This helps it dissolve in both hydrophobic and hydrophilic solvents and enables it to be drawn out in the form of thin films. Since metal surfaces are hydrophilic, if squaraine is coated on them, its hydrophilic end interacts with the metal surface and the hydrophobic end hangs out in air and thus repelling corrosive molecules.

For their experiment, the researchers filled a petridish with distilled water up to three-fourth of its height and the upper water surface was cleaned multiple times with small strips of lint free tissue to ensure that there was no contamination. One drop of squarine solution in chloroform was released over the water surface. A blue circular floating film was formed at the air-water interface within seconds. The film was then carefully lifted on to a copper strip and washed gently with a stream of distilled water followed by vacuum drying. The researchers kept depositing layer after layer and after adding every layer tested the anti-corrosion behavior of the layer.

"Though we have used squaraine in this work, we can also use many other cheap materials coated via floating film transfer method for corrosion prevention," said team leader, Prof Rajiv Prakash, while speaking to *India Science Wire*.

Besides Prakash, the team included Rajiv Kumar Pandey, Richa Mishra and Gopalji. The study results have been published in journal *Scientific Reports*.

(India Science Wire)

Indus Dictum

New health warning: beware of weight-loss smartphone apps

October 11, 2019

Food, nutrition and health-related decision making in urban areas is increasingly becoming digital. People order food through apps, seek health related advice online, keep a track of their physical activity via digital devices and so on.

But not all health and nutrition information being dished out on digital platforms and mobile apps may be reliable, as scientists at the Hyderabad-based National Nutrition Institute (NIN) have found in the case of calorie-counting or weight loss apps available on smartphones.

A scientific assessment of the quality of information provided in 20 top ranking weight management apps available in Google Play store and their use by a set of volunteers revealed that most of these apps did not provide authentic information and had no significant impact on weight or eating behaviour of those participating in the study.

The apps selected for the study claimed to calculate both calorie intake and expenditure, were available in English language, and were free to download. The apps were ranked according to their popularity in the app store, based on the number of downloads and user ratings. The first three most popular apps – S Health, MyFitnessPal and Calorie Counter – were selected for the first phase of the study. The effectiveness and user perceptions of these apps were noted.

In the second phase, the quality of information provided by all 20 apps was examined using a 55-point scale which was modified for Indian conditions. Of them, 13 apps scored below 70 percent on this scale. It was found that practices such as consumption of high fibre fruits and vegetables, and limiting saturated fatty acids were encouraged by only 40 percent of the apps. Regular physical activity was promoted by only half the apps ranked in the study. While all of them kept track of weight change, waist-to-hip circumference was included in just 25 percent.

A set of 30 healthy, young adults with a body mass index (BMI) of 23 kg/m2 or above, willing to reduce weight but not undergoing weight loss programme was included in the study. They were told to download an app of their choice and track food intake and

physical activity on a regular basis for eight weeks. Another set of healthy adults with a similar BMI followed their routine lifestyle.

At the end of the study period, no significant change was noted in both the groups in terms of weight and other parameters, but those using the apps indulged more in intentional physical activity and ate fewer sweets and deep fried snacks.

"Participants mentioned confusion with portion sizes, unavailability of data of commonly consumed foods or burden of manual entry as major deterrents for usage of the apps. The only positive impact seen was an increasing trend of physical activity which was probably an effect of motivation to be active because of the 'pedometer' feature. It does not require manual entry and can automatically track exercise of users," pointed out researchers in their study published in *Health Informatics Journal*.
"If a person uses all the 20 apps, he or she will get 20 different kinds of suggestions which might be highly confusing. This is because these apps do not use authentic and scientifically approved data and do not take into consideration important determinants of calorie requirement such as the user's activity levels," pointed out SubbaRao M Gavaravarapu, who led the study, while speaking to *India Science Wire*.

The study team included Paromita Banerjee, Damayanthi Korrapati, SubbaRao M Gavaravarapu (National Institute of Nutrition, Hyderabad); and Vishnu Vardhana Rao Mendu (National Institute of Medical Statistics, New Delhi).

The author, Dinesh Sharma, is Managing Editor at India Science Wire.

राष्ट्रीय संस्करण

दैनिक जागरण

चींटियों की तरह होती है ततैया की सामाजिक व्यवस्था

'इंडियन पेपर वास्प' पर शोधकर्ताओं ने किया अध्ययन, मिल बांटकर काम करने की होती है इनकी प्रवृत्ति

नई दिल्ली, आइएसडब्ल्यू : चींटियों की तरह ततैया की भी अपनी सामाजिक व्यवस्था होती है। हर जगह बसने की बजाय वे अपने छत्ते के चुनिंदा स्थानों पर व्यवस्थित रूप से रहना पसंद करते हैं, जहां सबका काम बंटा होता है। ततैया की यह व्यवस्था समूह के सभी सदस्यों एवं लार्वा तक कुशलतापूर्वक भोजन पहुंचाने और उन्हें संक्रमण से बचाने में मदद करती है। इंडियन पेपर वास्प ततैया पर भारतीय शोधकर्ताओं के एक ताजा अध्ययन में यह बात सामने आई है।

चींटियों, मधुमक्खियों और ततैया के बारे में माना जाता है कि इन कीटों के पास अपने आवास में पसंदीदा स्थान चुनने और व्यवस्थित रूप से रहने के सीमित विकल्प होते हैं। हालांकि, शोधकर्ताओं ने रोपालिडिया मार्जिनटा प्रजाति के ततैया के छत्ते में ऐसे क्षेत्रों की पहचान की है, जहां वे 50 प्रतिशत से अधिक समय बिताते हैं। ततैया द्वारा अधिकतम समय बिताए जाने वाले स्थान की पहचान के लिए एक गणितीय तकनीक का उपयोग किया गया है। यह तकनीक पारिस्थितिकीविदों द्वारा खुले में रहने वाले बड़े जानवरों के आवास क्षेत्रों के सीमांकन के लिए उपयोग की जाती है।

चींटियों की कॉलोनी और मधुमक्खियों के छत्ते में रहने वाले जीवों को गैर-यादृच्छिक रूप से स्थान के उपयोग के लिए जाना जाता है। इनकी कॉलोनी में भीड़ होने के बावजूद सबकुछ व्यवस्थित रूप से चलता है, जो इन कीटों की सामाजिक प्रवृत्ति को दर्शाता है। इससे समूह के कीटों को अपने कार्य कुशलता से करने में मदद मिलती है, क्योंकि इनके काम बंटे रहते हैं। उदाहरण के लिए, नर्सों को वहां होना चाहिए, जहां अंडों की देखभाल की जानी है, गार्ड ऐसी जगह तैनात होने चाहिए जहां खतरा है, और बिल्डरों को जहां मरम्मत की आवश्यकता है। बेंगलुरू स्थित भारतीय विज्ञान संस्थान के शोधकर्ताओं द्वारा किया गया यह अध्ययन शोध पत्रिका प्रोसीडिंग्स ऑफ द रॉयल सोसायटी बी में प्रकाशित किया गया है। इस अध्ययन के शोधकर्ताओं में प्रोफेसर राघवेंद्र गडगकर और शोध छात्र निकिता शर्मा शामिल थे।

ऐसे करते हैं काम : प्रोफेसर राघवेंद्र गडगकर ने बताया, 'अपने छत्ते में व्यवस्थित रूप से रहने से भोजन पहुंचाने वाले ततैया परस्पर एक-दूसरे के करीब रहती हैं, जिससे भोजन के वितरण में आसानी होती है। भोजन लाने वाले ततैया बाहर से संक्रमण भी साथ ला सकते हैं। ऐसे में भोजन वितरण के साथ पूरी कॉलोनी में संक्रमण फैलने का खतरा रहता है। गैर यादृच्छिक रूप से स्थान को प्रयोग करने से संक्रमण फैलने का खतरा कम हो जाता है। इस तरह, क्रमिक विकास बनाए रखने वाली रानी मक्खी भोजन लाने वाले ततैया सदस्यों के संपर्क में आने से बच जाती है।'

इंडियन पेपर वास्प के छत्ते के कोशों में अंडे और ततैया। आइएसडब्ल्यू

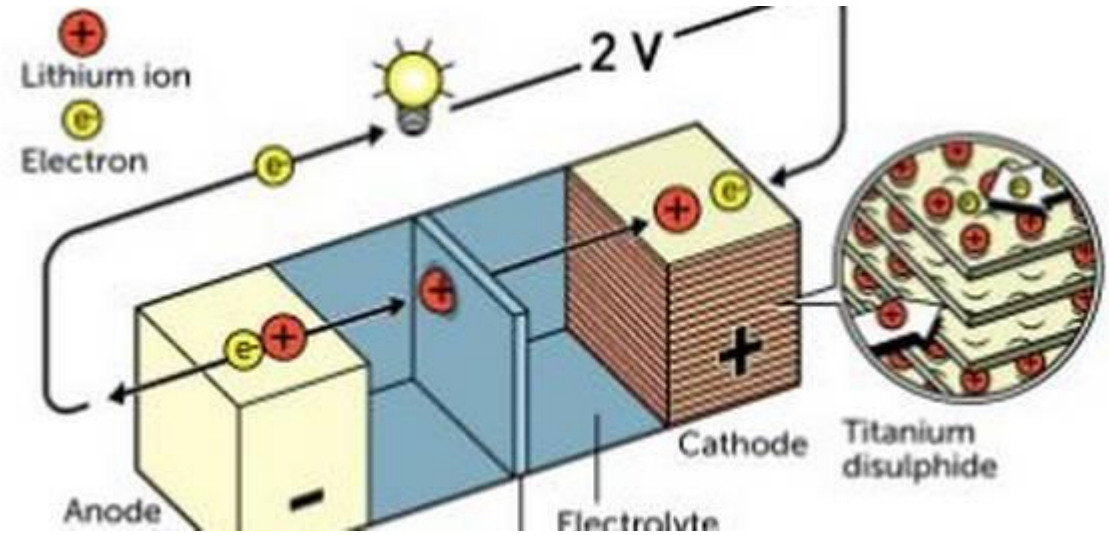
भोजन का नहीं करते भंडारण

चींटियां एवं मधुमक्खियां कॉलोनी में भोजन का भंडारण करती हैं। इनमें से कुछ सदस्य नर्सों के रूप में कार्य करती हैं, जिनका काम भोजन को लार्वा तक पहुंचाना होता है। हालांकि, पेपर वास्प ततैया भोजन का भंडारण नहीं करते और वे मकड़ियों एवं दूसरे कीटों को खाते हैं। भोजन लाने वाले ततैया भोजन लाते हैं, जिसे अन्य सदस्यों द्वारा छत्ते में उतारा जाता है। इसके बाद, भोजन समूह में वितरित कर दिया जाता है और कुछ हिस्सा लार्वा के लिए पहुंचा दिया जाता है।

THE HINDU BusinessLine

Pocket power gets Nobel for chemistry

Dr T V Venkateswaran New Delhi | Published on October 11, 2019



John Goodenough, M. Stanley Whittingham and Akira Yoshino have been awarded the Noble Prize in Chemistry for "creating the rechargeable world" by developing lithium-ion batteries. Interestingly, an Indian scientist Samar Basu, played a crucial role in the development of viable lithium-ion batteries. After retirement, he returned from the US to India and motivated research on Lithium batteries in Indian institutions.

Storing electricity

Otto von Guericke's static electric generator and Michael Faraday's dynamo showed how electricity can be generated. The generated electrical energy had to be transmitted through a wire and consumed as soon as it was produced. Until Alessandro Volta invented the battery, there was no way of storing or transporting it.

There are three essential elements in any battery - anode, the negative end of the battery; cathode the positive end of the cell; and electrolyte a gel-like substance with chemical

energy. Apart from this, some have a fourth component, a separator that keeps the anode and cathode apart to prevent short circuit. The electrical power in the battery is stored in the form of chemical energy and released when the electrochemical reaction takes place.

The electrolyte liquid or paste-like substance contains electrically charged particles or ions. When in contact with the anode, the electrolyte undergoes oxidation reaction. Two or more ions combine with the anode to form a compound, and one or more electrons are released. Simultaneously, the cathode undergoes a reduction reaction with the electrolyte. Ions and free electrons combine with cathode and form compounds.

During the oxidation-reduction (redox) electrochemical reaction, free electrons congregate around the anode. As a result, the anode and cathode are negatively and positively charged, respectively. A potential difference between the two ends is generated. The electrons from the anode are itching to move towards the cathode. The separator keeps the electrons at bay, and the reaction is under stalemate.

However, once you place this battery, in a flashlight and flip the switch on, a new pathway between the positive and the negative terminal of the battery is established. The electrical charge moves through the wire, from one terminal to the other in the cell completing the circuit. On its way around, the current passes through the filament in the bulb. The resistance of the filament makes it heat up and radiate heat and light. Once the circuit is complete, the redox reaction continues to take place until the electrodes run out of reagents for their respective reactions. Once the stored chemical energy is used up, the electric current stops and the battery is ‘dead’.

Rechargeable batteries

Unlike ‘use and throw’ batteries used in a flashlight, typically the battery used in an automobile is rechargeable. The rechargeable batteries have unique materials as anode, cathode and electrolyte. When you plug such rechargeable battery into a power source,

electrical current supplies electrons to the anode. Further, the electrons from the cathode are removed. The reverse chemical reaction restores the anode, cathode and the electrolyte to the near-original state, which we call as researching. Recharge is reverse of discharge of a battery.

One of the very widely used rechargeable batteries is lead-acid battery. In this battery the negative and positive plates are made of lead and lead dioxide respectively. The electrolyte, sulphuric acid, reacts with the plates to form lead sulfate. As more lead sulfate is produced, the charge in the battery goes down. When the battery connected to the power supply in the reverse direction, lead sulfate reverts to lead, lead dioxide and sulphuric acid and once again it is recharged.

Dynamos, dry cells, rechargeable lead-acid batteries were all adequate for the Industrial Revolution until the 1950s until the emergence of the semiconductor electronic devices. Electrical power was used typically in motor, electromagnet and vintage radio receivers made with bulky valves. The development of electronic devices required electrical power devices that are compact, potent and durable.

'Use and throw' zinc carbon battery will do for a flashlight. The rechargeable lead-acid batteries are excellent, to give a punch of energy at the turn of the ignition key to kick off the starter motor and crank the engine spring to life.

But think of a battery sitting inside a pacemaker, prodding the heart to tick. You don't want that to stop forever. Nor the battery unit can be bulky. Consumer electronics devices such as electronic watches, toys, cameras, mobile phones and laptops also require robust, enduring batteries that pack more power in lightweight package.

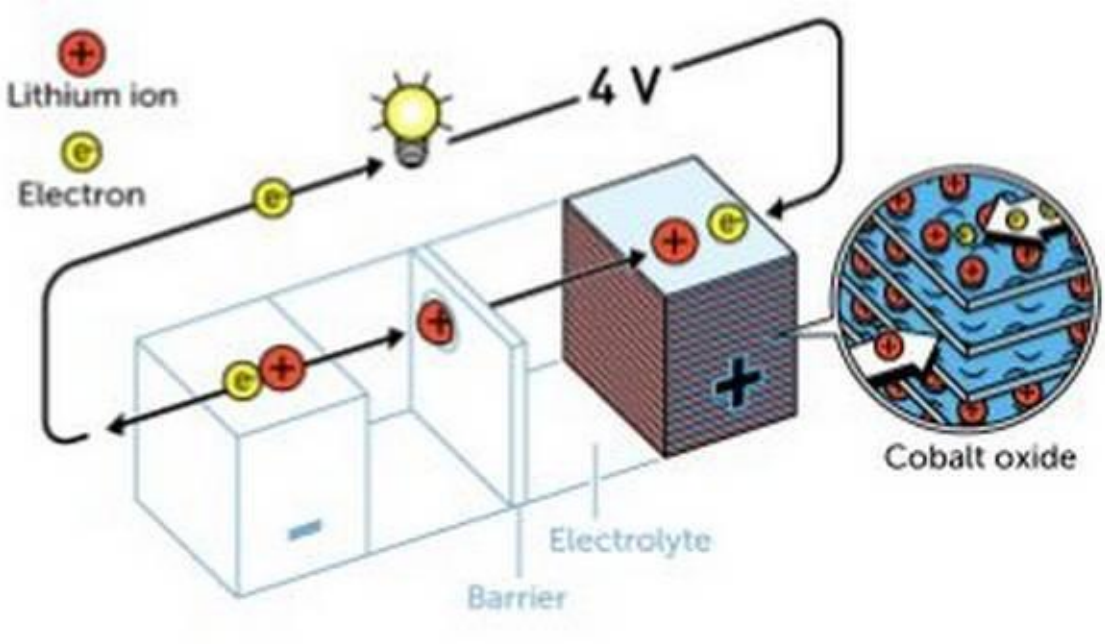
Distinct chemistry of various types of batteries results in voltage output ranging from 1.0 to 3.6 V. By serially stacking cells, voltage can be multiplied and by parallel connection current can be increased.

By suitable combination, we can get the desired output. The problem was to find a battery that is light in weight, yet gives more punch of energy per kilogram of mass. Whittingham, Goodenough and Yoshino found the way. They share this year's Noble chemistry prize for this radical discovery that made the mobile revolution possible. Compared to the energy density of 0.13 of zinc copper flashlight batteries, and the 0.14 of lead acid batteries, the lithium-ion batteries have a density of 0.70 Mj/Kg. While the lead-acid batteries can be recharged typically 500 times, the lithium ion batteries can be cycled 500–1000 times.

Lithium magic

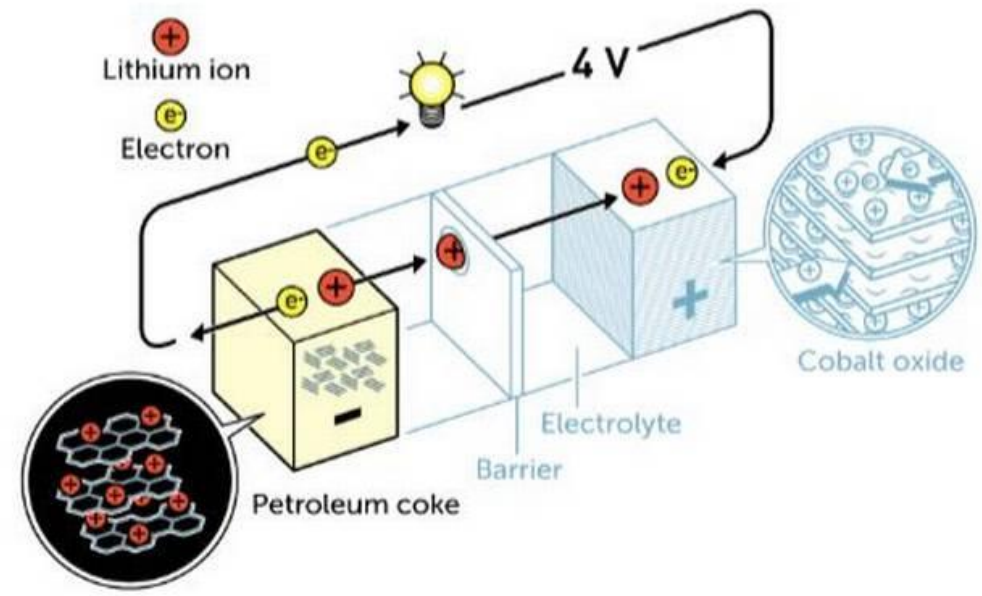
With just three electrons and three protons, lithium is the third lightest of all elements. With two of the three electrons making a pair, lithium happily lets the third one wander away as a free electron. What's more, the electron peels off easily compared to other elements. The energy needed to knock off one electron of lithium is almost half that of Zinc or Cadmium, other typical anode metals. Lithium-ion can store about 10 times as much energy as lead-acid or 5 times as much as nickel-cadmium. It is an excellent material for battery, but for the fact that it is dangerously reactive. Pure lithium burst into flames when it comes in contact with water.

M. Stanley Whittingham began experimenting with lithium as an anode material during the 1970s. Along with lithium anode, he used titanium disulfide as the cathode. In the discharge phase, when the battery was connected to a device, the lithium atom released an electron to become an ion. The positive lithium-ion moved towards the cathode. Titanium disulfide has a lattice structure and the ions snuggled between the layers. The circuit was completed, and the battery produced a 2 volts current. When the battery was recharged, the lithium ions flew back across the electrolyte to their starting position at the anode. Cathode and anode returned to its original state.



But there were two challenges. As lithium reacted violently, the anode had to be isolated from water and air. The electrolyte had to be a non-aqueous solution. Whittingham was able to identify a suitable organic electrolyte from other researches to overcome this hurdle. But the second one was serious. As the battery discharged and recharged, lithium crystals grow into a wispy, needle-like structure known as dendrites connecting anode and cathode. This was disastrous. Once such a defect forms, the battery short-circuited and at times even exploded.

Meanwhile, John Goodenough at Oxford was studying properties of metal oxides. He realized that a metal oxide can soak up more electrons than metal sulfide. He found that the cobalt oxide and the titanium disulfide both had similar lattice structure. Goodenough figured that like the titanium disulfide, cobalt oxide can also capture lithium ions during battery discharge and release it during recharge. In addition, cobalt oxide could house more ions than titanium disulfide. Energy potential doubled with this swap. Goodenough's design generated 4 volts, double that of Whittingham. Yet the problem of naked lithium remained.



Meanwhile, Samar Basu at Bell Labs in the US showed that lithium ions could embed in graphite. He developed a new battery with niobium selenide as cathode host and graphite as the anode host. The electrolyte was salt of lithium dissolved in an organic solvent. Both the anode and cathode could implant lithium-ion. Once the external circuit was switched on, the lithium ions were drawn from the graphite towards the niobium selenide, and the free electrons moved in the reverse direction. During the charging, the electrons could push the lithium ions back to graphite host. This was the first lithium-ion rechargeable battery where the lithium ions swung back and forth between anode and cathode during discharge and charge. As there was no free lithium, the battery was safer.

The next big step came when Akira Yoshino tried to use petroleum coke, a by-product of oil production, as an anode. The layers of carbon in petroleum coke could soak up lithium ions efficiently when charged. Goodenough's metal oxide cathode, Yoshino's carbon layer anode were combined to produce yet another version of the lithium-ion batteries. In the absence of pure lithium, the concerns of safety and dendrites formation

vanished. The voltage was still just 4, but the new cocktail was safe, durable, lightweight and rechargeable. It could withstand hundreds of cycling. The lithium-ion battery technology matured. The new batteries hit the market around 1991.

(India Science Wire)

Twitter handle: @TVVen

[Images ©Johan Jarnestad/The Royal Swedish Academy of Sciences]

Published on October 11, 2019

Boost to biofuel research at IIT Madras

By **Sunderarajan Padmanabhan** -October 14, 2019

Indian Institute of Technology Madras has signed an agreement with ExxonMobil Research and Engineering Company for conducting collaborative research on energy and biofuels.

The five-year agreement is focused on data analytics, gas conversion and transport, and is aimed towards finding low-emission solutions. One of the projects being taken up is for developing novel approaches to convert agro residue biomass to sugars and high value chemicals.

"The objectives of this program are three-fold. We aim to effectively deconstruct rice straw, bagasse and other biomass varieties of Indian origin to produce sugars, which will directly feed into Exxon Mobil's bioconversion platform. Secondly, we intend to convert the lignin present in biomass to valuable phenols using novel catalysts, and finally, we aim to evaluate the environmental and economic implications of performing such conversions at scale," said Dr. R. Vinu, Associate Professor of Department of Chemical Engineering, who is leading the project at IITM.

The current trend is to develop fuels and fine chemicals from non-food lignocellulosic biomass and agricultural residues, known as second-generation biomass. Lignocellulosic

biomass is the only source of renewable carbon with the ability to maintain carbon neutrality in the environment by reducing the net greenhouse gas emissions.

India is the third highest producer of agro-residues globally with surplus potential of over 230 million tons annually, after China and Brazil. The biofuel potential is expected to get realized in the near future with the new biofuel policy of the government.

"This agreement expands our commitment to research at the university level. We work with over 80 universities around the world. This pact gives us a position in the Indian academia," Dr. Vijay Swarup, a senior official of ExxonMobil.

(India Science Wire)

JNU to establish new centre for research in natural products

By **BioVoice News Desk** - October 15, 2019

By Jyoti Singh

New Delhi: A National Centre for Screening of Natural Products for Parasitic Diseases will soon start working at the Jawaharlal Nehru University (JNU).

The main objective of the center is to screen natural products to identify potential candidates for further optimization and preclinical and clinical development as new drugs against parasitic diseases.

"We propose to use a multi-directional, multidisciplinary drug discovery approach for parasitic diseases such as leishmaniasis, amoebiasis and malaria. The centre will bring under one roof all parasitologists working in JNU to discover new lead molecules against tropical parasitic diseases that are the second leading cause

of deaths globally," said Prof Rentala Madhubala, principal investigator of the project.

The centre is being funded by the Department of Science and Technology (DST) under its Technology Development and Transfer (TDT) Division. The centre will get a grant of Rs 5 crore over three years.

The new centres will conduct cell-based phenotypic screening wherein natural product compound libraries will be screened against three protozoan parasites most relevant to human disease – *Leishmania donovani*, *Plasmodium falciparum* and *Entamoeba histolytica* – to identify compounds with desirable physicochemical properties.

The other objective is to conduct target-based screening. The available natural products compound libraries will be screened through a battery of validated enzymes targets. And there will be a preclinical evaluation of leads for products identified through phenotypic and targets-based screening. "Lead compounds will be tested for suppressive, curative and prophylactic actions," said Dr Madhubala.

The centre will build alliance with academia and pharmaceutical industries to integrate research, development and commercialization of potentially useful natural products. The natural products libraries will be obtained from CSIR-IICT, Hyderabad in collaboration with Dr. Debendra Mohapatra. The center will be collaborating with Pune-based Emcure Pharmaceuticals for developing and commercializing lead compounds.

In addition to JNU, Post Graduate Institute of Medical Education and Research, Chandigarh; National Institute of Pharmaceutical Education and Research, Guwahati; and Khalsa College, Mumbai, have been selected according to Dr Krishna Kanth Pulicherla, Scientist at DST. The programme is designed to harness knowledge of traditional medicinal system and biodiversity of the country for the advantage of drug industry.

(India Science Wire)

DownToEarth

Technology summit focuses on India-Netherlands cooperation

India has nurtured 40,000 start-ups in the last few years and 31 of them have achieved the 'unicorn' status, said Minister for Science and Technology Harsh Vardhan

By Sunderarajan Padmanabhan Last Updated: Tuesday 15 October 2019

A two-day technology summit between India and the Netherlands began in New Delhi on October 15, 2019. It saw Minister for Science and Technology Harsh Vardhan call upon researchers and the industry in the two countries to work together towards finding solutions to not only problems of the two countries but also to address global issues such as climate change.

Noting that the two countries had flourishing ties in science, technology and innovation, he said, "Today we not only mark one decade of collaboration in research, but also celebrate 400 years of friendship and 72 years of diplomatic ties with the Netherlands."

He pointed out that the summit held promising opportunities particularly for young entrepreneurs in either country as both of them lay lot of emphasis on promoting start-ups. India has nurtured 40,000 start-ups in the last few years and 31 of them have achieved the 'unicorn' status, according to him.

Inaugurating the conference, King of the Netherlands Willem-Alexander emphasised the need to share knowledge between the two countries in agriculture, water, climate action and other areas of mutual interest. "India and the Netherlands complement each other in terms of technology and taken together, they make a great team," he said.

Secretary, Department of Science and Technology Ashutosh Sharma noted that India has been using technology to try and achieve its aspirational goals and said the research collaborations with the Netherlands played a vital role in this.

The summit was organised by the Department of Science and Technology (DST) and Confederation of Indian Industry (CII) in collaboration with the government and industry of the Netherlands. CII President Vikram Kirloskar pointed out that the two countries were collaborating in several highly important projects such as the cleaning of the Ganga river and the Barapullah drain in Delhi.

This is the 25th edition of the technology summit. The aim of the exercise is to provide for a platform for subject experts, senior government officials and industry representatives to engage in a dialogue with their counterparts in the partner country.

The programme is designed to celebrate existing STI partnerships between India and the Netherlands, with the participation of a delegation of about 200 Dutch companies, knowledge institutions, thought leaders, innovators and start-ups, and stimulate new opportunities by providing a platform for potential partners from the two countries.

(India Science Wire)

राष्ट्रीय संस्करण

दैनिक जागरण

चिंताजनक

भारत, अमेरिका और कोरिया के वैज्ञानिकों ने किया शोध, कहा-देश में ग्रामीण और शहरी दोनों क्षेत्रों में रह रहे लोगों को नहीं मिल रहा पर्याप्त पोषण

बदलावों के बाद भी बनी हुई है पोषण की समस्या

वास्को-द-गामा (गोवा), आइएसडब्ल्यू : पर्याप्त पोषण को अच्छे स्वास्थ्य और देश के विकास का एक महत्वपूर्ण सूचक माना जाता है। हालांकि, भारत में पिछले दो दशकों में सामाजिक और आर्थिक स्थितियों में बदलाव के बावजूद लोगों के पोषण की स्थिति में सुधार देखने को नहीं मिला है। भारत, अमेरिका और कोरिया के वैज्ञानिकों के एक शोध में यह बात सामने आई है। शोधकर्ताओं ने पाया कि ग्रामीण और शहरी दोनों क्षेत्रों में बड़ी संख्या में परिवार न्यूनतम वांछित कैलोरी से वंचित हैं। अलग-अलग सामाजिक-आर्थिक स्थितियों के अनुसार प्रति व्यक्ति औसत कैलोरी उपभोग के साथ अपर्याप्त पोषक आहार के स्तर में भी विविधता देखी गई है।

इस अध्ययन में राष्ट्रीय नमूना सर्वेक्षण के आंकड़ों का उपयोग किया गया है। वर्ष 1993-94 तथा 2011-12 के दौरान किए गए इस अध्ययन में एक लाख से अधिक शहरी एवं ग्रामीण परिवारों को शामिल किया गया है। इसमें परिवारों की संपन्नता, परिवार के मुखिया की शिक्षा, जाति एवं व्यवसाय जैसे सामाजिक-आर्थिक आधारों के साथ-साथ उपभोग किए जाने वाले खाद्य पदार्थों और उनकी मात्रा की जानकारी शामिल की गई है।

यह शोध पब्लिक हेल्थ न्यूट्रिशन जर्नल में प्रकाशित हुआ है। साभार : आइएसडब्ल्यू

यह अध्ययन दिल्ली स्थित आर्थिक विकास संस्थान और अंतरराष्ट्रीय खाद्य नीति अनुसंधान संस्थान के शोधकर्ताओं ने अमेरिका की वेंडरबिल्ट यूनिवर्सिटी और हार्वर्ड टी.एच. चैन स्कूल ऑफ पब्लिक हेल्थ तथा दक्षिण कोरिया के सियोल नेशनल यूनिवर्सिटी कॉलेज ऑफ मेडिसिन के शोधकर्ताओं के साथ मिलकर किया है।

प्रमुख शोधकर्ता प्रोफेसर एस.वी. सुब्रमण्यन ने बताया कि भारतीय लोगों में अभी भी पर्याप्त कैलोरी की कमी की समस्या है। पोषण संबंधी नीतियों और शोधों में वृहत पोषक तत्वों के आंकड़ों को एकत्रित करने और उनकी कमी को दूर करने की जरूरत है।

ग्रामीण और शहरी परिवारों में प्रति व्यक्ति औसत पोषक ऊर्जा उपभोग में काफी समानता पाई गई है। शोधकर्ताओं का कहना है कि बीस वर्षों में दोनों क्षेत्रों में सामाजिक आर्थिक विकास के बावजूद प्रति व्यक्ति औसत ऊर्जा उपभोग में कमी आई है। वर्ष 1993-94 में ग्रामीण परिवारों में प्रति व्यक्ति औसत पोषक ऊर्जा उपभोग 2280 किलो कैलोरी तथा शहरी परिवारों में 2274 किलो कैलोरी था, जबकि 2011-12 में यह गांवों में 2210 किलो कैलोरी तथा शहरों में 2202 किलो कैलोरी हो गया।

पब्लिक हेल्थ न्यूट्रिशन जर्नल में प्रकाशित हुए शोध में बताया गया है कि भारत में प्रतिदिन प्रति व्यक्ति को औसत कैलोरी आवश्यकता ग्रामीण क्षेत्रों के लिए 2400 किलो कैलोरी और शहरी क्षेत्रों के लिए 2100 किलो कैलोरी तय की गई है। इससे 80 प्रतिशत से कम उपभोग को अपर्याप्त ऊर्जा की श्रेणी में रखा जाता है। यह पाया गया है कि ग्रामीण क्षेत्रों में लगभग 33 प्रतिशत और शहरों में लगभग 20 प्रतिशत परिवार अपर्याप्त ऊर्जा का उपभोग करते हैं।

दि ओपिनियन पॉइंट
नजर हमारी नजरिया आपका

This bio-brick can help cut pollution

October 17, 2019

Traditional brick kilns dotting countryside are a source of air pollution, though they are essential for supplying bricks to the country's growing construction industry. Another source of pollution is burning of crop stubbles or agro-waste. A new type of brick – made from bio-waste – promises to address both the problems.

Researchers from Indian Institute of Technology Hyderabad and KIIT School of Architecture, Bhubaneshwar, have developed bricks from agricultural waste products. They have developed a process to use dry waste like paddy straws, wheat straws and sugarcane bagasse to make bricks. It involves chopping the waste to desired size and adding it to lime- based slurry to make homogenous mixture. The mixture is poured into moulds and rammed with a wooden block to make a compact brick.

These moulds are left to dry for a day or two, after which the sides of the moulds are removed, and the brick is allowed to dry for fifteen to twenty days. It takes almost month for the bricks to attain working strength by air drying.

However, researchers said, bio-bricks are not as strong as burnt clay bricks and cannot be used directly to build load-bearing structures, but they can find use in low-cost housing in combination with wooden or metal structural framework. In addition, these bricks can bricks provide insulation against heat and sound and help in maintaining humidity of the
buildings.

“This material can also be used for making panel boards or insulation boards. We hope designers could explore such applications for this sustainable material,” researchers Priyabrata Rautray and Avik Roy observed in their study presented recently at the International Conference on Engineering Design.

The researchers said the new material is eco-friendly and sustainable. The team used 900 grams of sugarcane bagasse to make a single block. Burning this amount of the waste bagasse instead of repurposing it, would have released 639 grams of carbon dioxide. Not only can such much carbon be prevented from getting released in the environment, lime used in each brick absorbs 322.2 grams carbon dioxide from the air during curing, which makes it a carbon-negative or environmentally sustainable.

(India Science Wire)

This is article is written By Dinesh C Sharma via India science wire

Indus Dictum

Winners of Dr. APJ Abdul Kalam IGNITE Competition announced

October 17, 2019

A total of 21 students from different parts of the country have been declared winners of the Dr. APJ Abdul Kalam IGNITE competition held by the National Innovation Foundation (NIF), an autonomous body of the Department of Science and Technology.
The Foundation holds the national competition every year in which children up to Class 12 or those out of school up to the age of 17 years are invited to present original technological ideas and innovations.

Over 60,000 entries of students from 544 districts across the country were received during the IGNITE 2019 competition, which ran from September 1, 2018, to August 31, 2019. Of them, 18 ideas and innovations proposed by 21 students from nine states and Union Territories have been selected for the award. NIF announced the winners on Tuesday to mark the birth anniversary of Dr. Kalam, which the Foundation celebrates as Children's Creativity and Innovation Day.

Former President of India, Pranab Mukherjee, will present the awards at a function at the Foundation's campus at Gandhinagar, Ahmedabad, on November 30. An exhibition showcasing award winning ideas will also be held on the occasion.

Education departments and agencies of Andhra Pradesh, Gujarat, Haryana, Himachal Pradesh, Kerala, Maharashtra, Nagaland, Telangana, Meghalaya, Mizoram, West Bengal, Rajasthan, Karnataka, Punjab, Tamil Nadu, and Chhattisgarh actively promoted the IGNITE 2019 campaign.

The winners are: Vinisha Umashankar, A.J. Surya, S. Venkateswaran and R.R.Venuram (Tamil Nadu); Baibhav Parida, Tanmay Kumar Sethi, Swastik Subham, and Devjit Prasad Majhi (Orissa); Padmashri, Swadha Krishn, and Suyash Patel (Karnataka); Vishwa Goswami and Kishan H. Thakor (Gujarat); Archit Aryaman and Raktim Das (Assam); Anuj Mishra (Uttar Pradesh); Siddhant Kumar and Shivam Amritesh (Bihar); Yash Pramod Jadhav (Maharashtra); Asim Sikandar Mir and Sayeeda Banoo (Jammu and Kashmir).

NIF has been actively engaged in promoting creativity and innovation in the country. It is majorly focussed on bringing out the creativity of knowledge-rich but economically poor in the country. Among other things, it aims to document, add value, and protect the intellectual property rights of technological innovators and traditional knowledge-holders in the informal sector.

Sunderarajan Padmanabhan is a contributor at India Science Wire.

दि ओपिनियन पॉइंट
नजर हमारी नजरिया आपका

Bringing the best out of waste

October 17, 2019

Water recycling is as important as water conservation. For recycling drainage water and making it useful for daily use, the second phase of the Local Treatment of Urban Sewage streams for Healthy Reuse (LOTUS-HR) program was jointly launched by Minister for Science & Technology and Earth Sciences Dr. Harsh Vardhan and King Willem-Alexander and Queen Maxima of the Kingdom of the Netherlands.

The project, initiated in July 2017, aims at demonstrating a novel waste water management approach that will produce clean water which can be reused for various purposes. The pilot scale modular plant upon commissioning will treat 10,000 liters of sewage water per day.

Dr. Harsh Vardhan said “Dutch and Indian companies are contributing to the project by sharing their existing technologies and the project will showcase how one can treat urban waste water into clean water for various purposes. We are also in the process of emulating this in projects across the country”.

This pilot scale facility will employ multiple technologies so that the data generated becomes a tool-box of treatment technologies for replication in Delhi and elsewhere where similar drains exist. The rationale is that the mixing and matching of technologies from this tool-box will depend on the quantity (flow rate) and quality (pollutant load) of drain water, land availability, site accessibility as well as topography.

Wetlab, a design challenge jointly supported by DBT-BIRAC and Netherlands Enterprise Agency is also being demonstrated. The intent of Wetlab is focused on making best ideas becoming an input for the realisation of the Water Experience Center that may further lead to turning the project site into an attractive center for education and technology demonstration for students, young professionals and creating opportunities for startups.

In the first phase after selection process on both sides, the project had been finalized for setting up a demonstration plant for cleaning the Barapullah drain. Barapullah is a 12.5 km long drain responsible for about 30% of pollution in the Yamuna river, collecting mainly domestic sewage and waste from small industry. The call supports high quality research and development programmes aiming at 'new' wastewater management to ensure good quality fresh water free of risk-causing contaminants and promote productive, safe reuse of water, thereby enhancing human and environmental health conditions.

The LOTUS-HR project is jointly supported by Department of Biotechnology and Netherlands Organization for Scientific Research.

(India Science Wire)

***This article is written* By Jyoti Singh via India science wire**

प्रभा साक्षी

बच्चों में विज्ञान में रुचि पैदा करने के लिए विज्ञान मंथन यात्रा

अक्टूबर 18,2019

मध्य प्रदेश के 52 जिलों से चयनित 625 मेधावी स्कूली बच्चों को इस यात्रा में शामिल होने का मौका मिल रहा है। यात्रा में शामिल छात्रों को हैदराबाद, लखनऊ, अहमदाबाद, चंडीगढ़ और दिल्ली में स्थित वैज्ञानिक एवं औद्योगिक अनुसंधान परिषद (सीएसआईआर) की राष्ट्रीय प्रयोगशालाओं और अन्य वैज्ञानिक संस्थानों का भ्रमण करने का अवसर भी मिलेगा, जहां छात्र वैज्ञानिकों से सीधा संवाद कर सकेंगे।

नई दिल्ली। (इंडिया साइंस वायर): स्कूली बच्चों को विज्ञान से जोड़ने और उनमें वैज्ञानिक दृष्टिकोण को बढ़ावा देने के लिए मध्य प्रदेश में इन दिनों विज्ञान मंथन यात्रा चल रही है। मध्य प्रदेश विज्ञान एवं प्रौद्योगिकी परिषद द्वारा आयोजित यह यात्रा 11 से 20 अक्तूबर तक चलेगी, जिसमें आठवीं से बारहवीं के विज्ञान के छात्र शामिल हो सकते हैं।

इस बार मध्य प्रदेश के 52 जिलों से चयनित 625 मेधावी स्कूली बच्चों को इस यात्रा में शामिल होने का मौका मिल रहा है। यात्रा में शामिल छात्रों को हैदराबाद, लखनऊ, अहमदाबाद, चंडीगढ़ और दिल्ली में स्थित वैज्ञानिक एवं औद्योगिक अनुसंधान परिषद (सीएसआईआर) की राष्ट्रीय प्रयोगशालाओं और अन्य वैज्ञानिक संस्थानों का भ्रमण करने का अवसर भी मिलेगा, जहां छात्र वैज्ञानिकों से सीधा संवाद कर सकेंगे।

यात्रा में शामिल विद्यार्थियों को प्रतिदिन अपने अनुभवों को डायरी में दर्ज करना होता है, जिसका मूल्यांकन समापन के पहले किया जाएगा। दस-दिवसीय विज्ञान मंथन यात्रा का समापन 20 अक्तूबर को भोपाल में होगा। समापन के पूर्व एक लिखित परीक्षा होगी, जिसमें फैलोशिप के लिए 100 उत्कृष्ट विद्यार्थियों का चयन किया जाएगा।

वर्ष 2008 में शुरू हुई विज्ञान मंथन यात्रा का यह 13वां संस्करण है। अब तक आयोजित 12 यात्राओं में करीब सात हजार बच्चे देश के विभिन्न वैज्ञानिक संस्थानों का भ्रमण कर चुके हैं। किसी भी देश के विकास में विज्ञान की भूमिका अहम होती है। इसलिए भावी पीढ़ी को विज्ञान से जुड़ने और वैज्ञानिक बनने के लिए प्रेरित किया जाना जरूरी है, जिसमें विज्ञान मंथन यात्रा महत्वपूर्ण हो सकती है।

विज्ञान मंथन एक शैक्षणिक यात्रा है, जिसमें स्वस्थ मनोरंजन और विज्ञान दोनों का समावेश किया गया है। विगत वर्षों में यात्रा पर गए बच्चों को जिन विख्यात वैज्ञानिकों से आमने-सामने बातचीत का अवसर मिला है, उनमें रसायनशास्त्र के नोबेल पुरस्कार विजेता वी.रामकृष्णन, डॉ. विजय भटकर, प्रोफेसर यशपाल, जयंत विष्णु नार्लीकर, प्रो. गोविंद स्वरूप, डॉ किरण कुमार और माधवन नायर जैसे वैज्ञानिकों के नाम शामिल हैं।

(इंडिया साइंस वायर)

THE HINDU BusinessLine

This new finding may help in developing treatment for age-related macular degeneration

Sunderarajan Padmanabhan New Delhi | Published on October 17, 2019

Dr Debasish Sinha with his colleagues at their lab. Special Arrangement - Special Arrangemen

A team of scientists has unraveled the molecular mechanism behind the development of age-related macular degeneration (AMD). It has found that it develops because of abnormal activity of a set of white blood cells called neutrophils and that it can be stopped, and even reversed, by targeting it.

AMD is associated with retinal degeneration and loss of central vision and is the leading cause of blindness in the elderly. The new finding could help develop a treatment for the disease in future.

The journey of discovery began with a finding that people suffering from the disease had a significant accumulation of neutrophils in the retina of their eyes. The finding was

unusual as the main role of neutrophils is to help the body in its fight against bacterial and other infections and it had nothing to do with the functioning of the retina.

The researchers probed further only to find that the patients also had high levels of an inflammatory molecule called interferon lambda. This was intriguing as it is also mainly produced in the case of an infection. Puzzled, they delved deeper and found that the retina and a set of cells called RPE on the retina's surface in the eyes of the patients were transformed into an inflammatory state: a state that should normally occur only in the case of an infection.

Connecting the dots, the researchers thought that perhaps there were some abnormalities in an inflammatory pathway regulated by AKT2, which plays a role in the transformation of retina and RPE cells. They conducted tests in mice and found that their hypothesis was on the dot. "We injected into our mouse model an inhibitor of the AKT2 pathway. It neutralized interferon- lambda signals, reduced neutrophil infiltration, and reversed age-related macular degeneration-like changes in the mouse. Thus, AKT2 inhibitors may have therapeutic potential," said Dr Debasish Sinha, leader of the study team.

It is well known that inflammation plays a key role in the pathogenesis of various age-related diseases including age-related macular degeneration and that dysregulation of the body's immune system is critical for its onset. Several studies have shown that activation of various chemicals called cytokines/chemokines could be responsible for the condition. However, the role of neutrophils had remained largely unexplored. In addition, the molecular mechanisms involved in immune system activation and regulation in the condition had remained unknown.

To add to the problem, there was also lack of a comprehensive animal model of the disease. This limited the understanding of the cellular mechanisms in the critical early disease stages. The new study fills the gap. The researchers have developed a genetically

engineered mouse model that exhibits a slow progressive early, dry AMD-like pathology. Scientists from several institutions were involved in the study, with the majority of the work performed at University of Pittsburgh School of Medicine, USA and the Narayana Nethralaya Foundation, Bengaluru, India. They have published a report on their work in Communications Biology.*(India Science Wire)*

Indus Dictum

New software tool to help make better nanoscale semiconductors

October 18, 2019

Advanced two-dimensional graphene-like materials are proving to be exceptionally useful in miniaturising electronics, with the potential to replace bulky devices made from silicon or germanium. Because of this, understanding the material's electrophysical properties before fabricating the device is of prime importance, and hence there is a high demand for such tools.

An international team of interdisciplinary scientists led by researchers from the Indian Institute of Science (IISc), Bengaluru, have developed a computational tool to evaluate the performance of advanced graphene-like two dimensional (2D) materials. It can assess the effects of electron-phonon scattering on current through electronic devices in integrated circuits. By using this code, one can peek into the quantum lattice vibrations of the crystal, pre-evaluate the performance of the advanced material, and check its suitability for a device, before manufacturing them.

The study offers one such model to evaluate the electron-phonon interactions in the material. In a semiconductor, at the quantum level, there exist two systems: the electron-hole charge carriers and another called phonon that originates from the lattice vibrations.

"In the semiconducting channel of a device such as a transistor, electrons/holes carriers transport the charge (and information encoded within the charge) from the input to the output end. The phonons interact with carriers during this transport and create 'resistance', which affects the performance such as drive current and speed of operation. Strength of such interaction is material-specific, and thus it is crucial to understand the interaction when we plan to design transistors fabricated with the 2D materials," explained Dr Santanu Mahapatra, team lead of the study and professor at IISc, while speaking to *India Science Wire.*

The electron-phonon coupling limited transport is a complex process, and in this study, the low-energy two-band model was used for the computation.

The team employed a software tool called VASP to analyse the energy band structure of different materials. They developed the extensive software code by using Hybrid C and MATLAB programming style.

Using the simulated model, the team has demonstrated the performance of a phosphorene based MOSFET (building blocks of ICs). The atomic structure of the material has a web-like distribution where the atoms are patterned in a sequential form (called the armchair format) and also in a zig-zag fashion. They observed that for phosphorene, electron-phonon scattering is more pronounced in the zigzag direction.

Dr Bhaskaran Muralidharan, associate professor, Indian Institute of Technology, Bombay, who was not involved in the study, commented, "This work provides a method to understand the microscopic mechanism of 'backscattering' that impedes the transfer of information in devices. The study shows potential as a sophisticated tool to know along what direction some 2D materials can actually show minimal scattering, thereby improving the performance of such nanoscale devices."

The research was supported by Department of Science and Technology, and by the Council for Scientific and Industrial Research. The project was carried out under collaboration with CNRS, Marseille (France), which was initiated through Raman-Charpak fellowship program.
The team included Madhuchhanda Brahma, Arnab Kabiraj and Santanu Mahapatra from IISc, Bengaluru, and Marc Bescond from the University of Tokyo. The results were published in the *Journal of Applied Physics*.

Susheela Srinivas is a contributor at India Science Wire.

ICMR Award to 46 scientists for excellence in biomedical research

The ICMR awards recognize the contributions of Indian biomedical scientists undertaking pioneering work in various fields of health sciences and finding solutions for the health problems of the country

October 21, 2019

By Umashankar Mishra

New Delhi: Union Minister for Health & Family Welfare, Dr. Harsh Vardhan conferred the Indian Council of Medical Research (ICMR)'s awards for excellence in biomedical research last week on 16th October.

The ICMR awards recognize the contributions of Indian biomedical scientists undertaking pioneering work in various fields of health sciences and finding solutions for the health problems of the country.

A total of 39 awards were presented to 46 scientists including 14 women scientists for 2017 and 2018.

The awardees belongs to institutions of ICMR, CSIR, AIIMS, PGI, Chandigarh, SGPGI, Lucknow, IITs, JIPMER, Puducherry, SCTIMST, Thiruvananthapuram, Lady Hardinge Medical College, New Delhi, State and Central Universities and other reputed Institutions across the country.

Dr Harsh Vardhan congratulated the awardees for their contribution in the area of health research that will provide new ways and means to solve various health issues.

He said, “It is a need of hour to strengthen innovation for developing new technologies as well as to carry out research to reduce out of pocket expenditures and help in reducing disease burden.”

He appreciated ICMR’s efforts in tackling emerging and re-emerging infections like ZIKA and NIPAH in the country.

Secretary Department of Health Research and ICMR Director General, Prof. Balram Bhargava, said, “It has been ICMR’s endeavour for over a century now to promote scientific research as well as provide scientists with the necessary platform and tools to find solutions to the most difficult health challenges. It is heartening to see the talent pool available in our country today. It gives us immense hope for the future. It will be our constant endeavour to create an enabling environment for the next generation scientists to help them achieve their full potential and serve the nation.”

The Minister also released a book titled ‘’*Gandhi and Swasthya*’’, which is the Hindi version of the special issue of Indian Journal of Medical Research brought out to mark the 150th birth anniversary of Mahatma Gandhi and a special stamp to mark the centenary of National Institute of Nutrition (NIN), Hyderabad .

He also gave away the ICMR-NIN Centenary Award, which was posthmously awarded to former DG ICMR, late Dr. C. Gopalan, who passed away earlier this year. The award was presented to late Dr Gopalan’s son Dr Sharad Gopal.

(India Science Wire)

An app that can detect distress speech and trigger SOS

By **Dinesh C Sharma** - October 21, 2019

Just imagine a smartphone app that can 'listen' to distress calls and automatically trigger an alert to your home or the police.

This is what Rakshak – a new Adroid app developed by innovators from Delhi-based Bharti Vidyapeeth College of Engineering, does. It is designed to detect speech patterns via a phone's microphone and generate an SOS. The audio snippets with speech commands requesting help or saying "stop" in distressed tones can be detected by the app and message is automatically sent to emergency contact specified by the use, along with the location of the user.

The innovation won the first prize in a national contest organized in India by the US-based Marconi Society under its Celestini Program. The winning team of Piyush Agrawal, Subham Banga, Aniket Sharma and Ujjwal Upadhyay presented their work at a function held at Indian Institute of Technology Delhi on Monday.

For developing the app, the team started with publicly available speech command datasets, and added speech commands specific to the scenario

of women's safety. They also collected additional speech data through crowd-sourcing. This enabled them to detect emotion, background noise, and Indian accents in the audio with improved precision. At present, the app can handle two languages – Hindi and English.

The app can 'listen' when it is on and track keywords like help or bachao. It uses the machine learning algorithm to judge emotional state from sound, pitch etc. and triggers an automatic alarm. There is a 30 second delay in case the owner wants to cancel a false alarm. The developers claim that the app can differentiate a real cry for help from a casual conversation with similar words.

The team winning the second prize – also from Bharti Vidyapeeth College of Engineering – developed an app for air quality measurement. Its members – Harshita Diddee, Shivam Grover, Shivani Jindal and Divyanshu Sharma – have developed an app called VisionAir which uses photos of the horizon to estimate air quality. It builds on the work done by last year's prize winners which showed that machine learning model can be built to estimate air quality by extracting image features like haziness and combining them with meteorological and past air quality data.

The new app uses a concept called 'federated learning' to train the machine learning model so that it only uploads features extracted from images without uploading the smartphone images themselves.

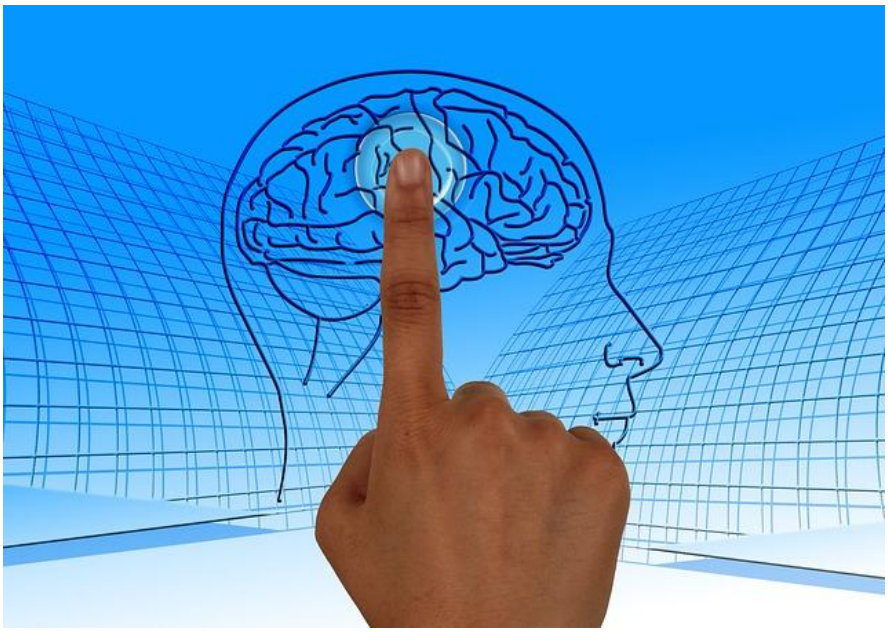
"The programme is a unique and impactful way to help us create the next generation of technical innovators," said Professor Brejesh Lall, head of Bharti School of Telecom Technology and Management and Celestini Program partner at IIT Delhi. "Students become deeply engaged when they are defining important problems that technology can solve and creating proof-of-concept applications that will make a difference in the world." The winning team get cash prize of 1500 dollars and the second-place team receives 500 dollars.

(India Science Wire)

Anti-oxidant level in specific brain region indicates early signs of Alzheimer's: study

Indian scientists have found key indicators of this disease in the brain environment, and suggest that this knowledge may help in early detection by identifying the role of protective form of antioxidant involved in the Alzheimer's

By **BioVoice News Desk** - October 22, 2019



By Dinesh C Sharma

New Delhi: Alzheimer's is a slowly progressing brain disorder that affects millions of people globally and is emerging a major illness in the ageing populations in India. Since currently there is no treatment available, its early diagnosis may help in better management.

Now, Indian scientists have found key indicators of this disease in the brain environment, and suggest that this knowledge may help in early detection by identifying the role of protective form of antioxidant involved in the Alzheimer's.

By peeping into the brains of patients suffering from Alzheimer's as well as mild cognitive impairment (MCI) – which precedes Alzheimer's – and those of healthy senior citizens, using powerful imaging methods, scientists have zeroed in on the exact role of an anti-oxidant brain chemical known as glutathione.

Dr Pravat Mandal and team of researchers at NBRC, Manesar

While it is known that glutathione protects the brain from stress and is significantly depleted in brains of Alzheimer's patients compared to normal people, new research has shown that it is not mere lack or smaller quantities of glutathione that matters, but also its levels and type in different parts of the brain. There are two forms of glutathione – one which is protective and the other which has no protective role, researchers said.

"Glutathione exists in two forms and different brain regions have different amounts of the two forms. The good form is always more than the other one. There may be two persons of the same age but one may get Alzheimer's and other may not. This is because micro environment of their brains is different and they have different amounts of protective glutathione," explained Dr Pravat Mandal, who led the study at the Manesar-based National Brain Research Centre (NBRC).

"We have discovered that protective form of glutathione is different for different persons. It depends on the person's background, habitiuation, food habits, brain stress etc.," he added.

The research group has found that there are alterations of glutathione levels, along with associated chemicals like choline, creatine and N-acetylaspartate in the cingulate cortex of the brain containing anterior and posterior regions. This was seen in a total of 64 humans including 18 persons suffering from the Alzheimer's and 19 from mild cognitive impairment, while the rest were healthy individuals. Researchers used imaging technique called 'MEscher–GArwood-Point-RESolved spectroscopy sequence.'

"The popular theory that the Alzheimer's is caused due to amyloid beta plaques is not true anymore. The current thinking is that oxidative stress is responsible for it because free radicals are generated due to stress and neuronal damage happens. Amyloid plaques will be there in the brain of any senior citizen whether he or she is cognitively stable or unstable. In the same way, those suffering from Alzheimer's too will have it. So there is no specificity related to amyloid plaque," Dr Mandal explained.

The study, he said, probed the role of glutathione conformer in the cingulate cortex as a potential biomarker for distinguishing mild cognitive impairment and the Alzheimer's from healthy brains. More clinical trials are needed to develop an early detection test.

The research findings have been published in journal *Human Brain Mapping*. The research team included Deepika Shukla, Pravat Kumar Mandal, Ritwick Mishra and Kanika Sandal (NBRC, Manesar); Manjari Tripathi (All India Institute of Medical Sciences, New Delhi) and Gayatri Vishwakarma (Indian Spinal Injuries Centre, New Delhi).

(India Science Wire)

THE HINDU BusinessLine

New guidelines released for peritoneal dialysis services

Sunderarajan Padmanabhan New Delhi | Published on October 21, 2019

In a new development in the care of patients with kidney disease, the Ministry of Health and Family Welfare has come out with a set of guidelines for establishing peritoneal dialysis services under the Pradhan Mantri National Dialysis Programme.

The guidelines aim to serve as a comprehensive manual to states that intend to set up peritoneal dialysis services and for providers of peritoneal dialysis as a `best practice' document to ensure delivery of high quality and cost effective services.

It also aims to achieve equity in patient access to home-based peritoneal dialysis, reduce the overall cost of care to the system by focusing on efficient leveraging of resources, and bring in consistency of practice, pricing and a full range of product availability.

The guidelines are a result of a consultative process coordinated by the National Health Systems Resource Centre and an experts' committee chaired by Dr Vivekanand Jha, Executive Director of the George Institute for Global Health, India and consisting of nephrologists from around the country, as well as health systems and policy experts.

"This is good news for about two lakh Indians who develop end-stage kidney failure every year in India. They now have another treatment option that allows them to perform dialysis at home with potential flexibility in lifestyle. Mass-based peritoneal dialysis programmes also have the potential to substantially bring down the cost of treatment," said Dr Jha, who is also the president of the International Society of Nephrology.

The government had announced the National Dialysis Program in 2016. Its first phase envisaged setting up of haemodialysis centres in all districts. Now, it has been expanded to include peritoneal dialysis considering that it offers patient autonomy and would help reduce the demand on healthcare system and avoid substantial costs on infrastructure, maintenance and staffing.

The new guidelines, among other things, envisage providing training to community health workers to provide support to persons on peritoneal dialysis at home or in primary health care settings.

"Our evaluation of the implementation of the haemodialysis programme in Andhra Pradesh shows that it is critical to make quality dialysis services affordable for people living in rural areas. Establishing peritoneal dialysis services under proper supervision of trained manpower can go a long way in making this a reality," pointed out Dr Jha.

Prof Arvind Bagga, Professor and Head of the department of Paediatric Nephrology at the All India Institute of Medical Sciences and a member of the Expert Committee, said, "Children with kidney failure were particularly disadvantaged due to the exclusion of peritoneal dialysis from this programme. This modality is particularly suited to children who need dialysis because of biological and lifestyle reasons. Further, paediatric haemodialysis facilities are scarce in India."

Twitter handle: @ndpsr

(India Science Wire)

Published on October 21, 2019

Indus Dictum

Indian engineers develop software for world's largest telescope (TMT)

October 23, 2019

The Thirty Meter Telescope (TMT), slated to be the world's largest ground-based telescope operating at optical and infrared wavelengths, is an international *Big Science* project with participation from institutions in the US, Canada, China, Japan and India. About 70 percent of Indian contribution will be in the form of both hardware and software for the telescope. Indian entities are engaged in developing observatory software as well as a telescope control system.

This week, a key milestone of software development for TMT was reached with pre-shipment review of the Telescope Common Software (CSW), which has been under development for the past two years. This means the software is consistent with original requirements and design and now is ready for its future integration within TMT's software infrastructure.

The software has been developed by *ThoughtWorks Technologies* based in Pune. This team is also developing another software component for the telescope – Executive Software product.
"It is the first TMT software component to be completed and ready for shipment. This achievement successfully shows that working with our India-partner and India-based vendor development team, we can develop software remotely following the formal preliminary and final design reviews, while under the management of the project office," said Kim Gillies, TMT Lead Software Architect.

The CSW package will be the software communication backbone with necessary elements for observatory-wide configuration, command, control, and status reporting. It will be layered on top of the IT infrastructure network provided by the future communications and information sub-system. The package includes a number of services, each providing a single required function needed for integrating the subsystems. Its design made use of open-source resources and provided astronomy-oriented interfaces. This approach will speed up the development process.

"We have built an effective tri-partite collaboration between the main Project Office in Pasadena, the India TMT Coordination Center (ITCC) in Bangalore, and the ThoughtWorks Company," said Francisco Delgado, TMT Observatory Software Project Manager, in a press statement. "All these teams have cooperated very effectively. Passing the pre-shipment review is a very powerful demonstration that the software team will be capable of delivering the other software components in the future."

Work on another set of software – the Telescope Control System (TCS) – has entered the final design phase following a recent final design review. It will provide and maintain high-quality stable images to the science instruments located at the telescope's Nasmyth focal planes.

Though Hawaii remains the favoured site for setting up TMT, the project has been delayed due to opposition from a section of native Hawaiians. Following this, the TMT International Observatory Board has decided to develop a secondary Northern Hemisphere site on which to construct the observatory. This is at La Palma, Canary Islands, Spain.

The author, Dinesh Sharma, is Managing Editor at India Science Wire.

DownToEarth

IIT-Madras to increase intake in data science course

The programme was introduced in 2017 as part of an exercise to provide undergraduate students an opportunity to do courses across disciplines

By Sunderarajan Padmanabhan Last Updated: Tuesday 22 October 2019

Enthused by the response from students and industry, the Indian Institute of Technology-Madras is planning to almost double the number of seats in its Inter-Disciplinary Dual Degree programme on data science.

The programme was introduced in 2017 as part of an exercise to provide undergraduate students an opportunity to do courses across disciplines and build towards expertise in modern interdisciplinary areas that will define the future of engineering and technology. The students in their third year were given an option to upgrade to it.

It is designed to give basic background on data science to students from different disciplines and provide them opportunity to specialise in any particular aspect of data science through electives and projects. The curriculum has a core component spanning across theory and lab courses, covering theoretical concepts as well as programming tools. The student is then allowed to choose three to four electives from a mix of algorithmic or theoretical courses and applied data science such as computational genomics.

Depending on their interest, students can choose to specialise in a specific application area or acquire a deeper grounding in the fundamentals of data science. The first batch of students has recently completed the course. The first two batches had 30 students each. The plan is to increase the capacity to 50, according to a press release from the institute.

“By virtue of their interdisciplinary training, the students undergoing the course are well equipped to be leaders in a digital world,” said B Ravindran, course coordinator.

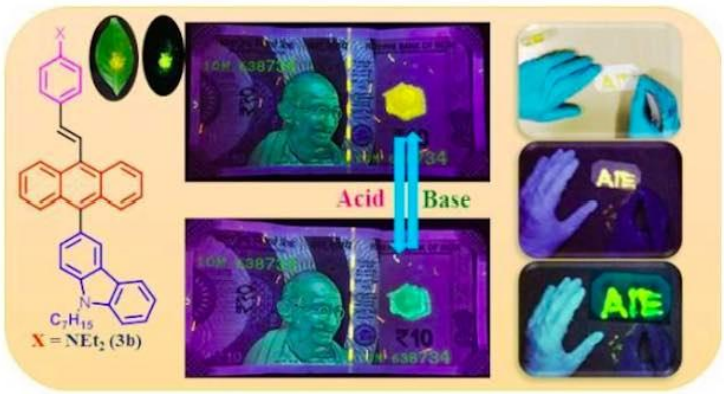
Nandan Sudarsanam, one of the instructors, said: “In addition to equipping students with tools that would be more impactful in their respective domains, the programme allows them to make lateral shifts in their prospective careers.”

(India Science Wire)

the India saga

A color-changing ink that can expose the fakes from the original

By Susheela Srinivas 22 Oct 2019



In a boost to the fight against the menace of counterfeiting, two researchers at the Hyderabad campus of the Birla Institute of Technology and Science have developed an ink that changes colour when exposed to acid vapours and reverts to its original colour when exposed to base vapours.

The ink contains small amounts of what are called fluorophore particles made from a chemical called 'mono-carbazole-linked anthranyl p-conjugates.' Fluorophore particles are invisible under normal light but light up with a yellow colour when exposed to a commercial ultraviolet light torch. The ink is found to be stable under ambient conditions and up to a temperature of 300 degrees C.

"We tested our yellow coloured fluorophore along with many other conventional yellow fluorophores used in many applications such as currency. However, upon exposure to acid vapour, the colour change (yellow to green) happens only for our fluorophores. Therefore, even if the counterfeiters use any fake yellow fluorophores, the 'acid key' will quickly reveal the original," said Dr Manab Chakravarty, lead researcher, while speaking to *India Science Wire*.

The ink was tested on plastic, paper, currency notes and leaves. It was found to be highly effective on paper and currency.

The team demonstrated the efficacy of the ink on currency note by making a small mark using a quill (pigeon feather). When exposed to acid vapours, the mark changed colour from yellow to green. The pattern could be retrieved again by placing the note over base vapours, indicating the recoverability of the design.

Dr Chakravarty said the novelty of the ink lies in its ability to change its colour quickly, thereby providing a better way of detecting the original from the fake. Further, it was synthesised adopting simple organic methods using readily accessible laboratory chemicals and at room temperature."We were able to eliminate use of costly chemicals and complex procedures that are normally adopted to make anti-counterfeiting inks", he added.

The team has planned to take the research forward by transferring the ink on to an adsorbent material of a marker pen.

Manab Chakravarty conducted the study with his student Banchhanidhi Prusti. The results were published in the journal ACS Omega

(India Science Wire)

दि ओपिनियन पॉइंट
नजर हमारी नजरिया आपका

Triphala rich in polyphenolic content: study

October 24, 2019

Several Ayurvedic formulations, which have been in use for ages, are being subjected to modern methods of drug development in order to make out the exact mechanism of their action. A group of Indian scientists has done detailed chemical study of herbal preparation known as triphala and found it to be rich in polyphenolic content.

Scientists at the UM-DAE Centre for Excellence in Basic Sciences, University of Mumbai and the Tata Institute of Fundamental Research (TIFR) subjected triphala to detailed chemical characterization and found abundance of polyphenols. They also tested its action on molecules involved in development of neurodegenerative disorders such as Parkinson's disease to study its mechanism of action, according to findings published in journal RSC Advances.

Triphala is known to possess a range of medicinal properties such as free radical scavenging, antioxidant, anti-inflammatory, antimutagenic, anti-stress, hypoglycaemic and radioprotective. Some of these properties are attributed to its polyphenolic constituents.

“Alpha-syn is an amino acid which is expressed in neuronal cells. Its accumulation in the form of fibrillar aggregates is a characteristic of neurodegenerative diseases like Parkinson’s. Earlier studies had shown that alpha-syn fibrillization can be addressed by small organic molecules, particularly polyphenols. So we wanted to test if herbal preparations containing such molecules could be useful,” explained Ramakrishna V Hosur, who led the research team, while speaking to India Science Wire. He said it was a preliminary study and more work needs to be done.

However, other experts have sounded a note of caution. “Triphala has been shown to stop fibril formation of alpha-syn in test tube study using NMR. But I do not see clinical relevance of this work. A-syn is in the brain and it is not clear how triphala will reach the brain that too at intracellular level. There are many entities like beta -syn and gamma-syn to protect alpha-syn from fibril formation as previous studies have shown. The ratio of beta or gamma -syn is also important. The dose of triphala needs to be tested in varied concentrations range even in test tube studies,” pointed out Dr Pravat Mandal, a scientist at the Manesar-based National Brain Research Centre (NBRC).

The study team included Mandar Bopardikar, Sri Rama Koti Ainavarapu, Lalit C Borde (TIFR, Mumbai); Anusri Bhattacharya, Veera Mohana Rao Kakita, Kavita Rachineni, Sinjan Choudhary and Ramkrishna V Hosur (University of Mumbai).

(India Science Wire)

This article is written by Dinesh c sharma via India Science Wire

THE HINDU BusinessLine

Study offers new insight on deaths due to malnutrition in infants

Monika Kundu Srivastava New Delhi | Published on October 23, 2019

In a finding that could have an impact on the strategies for dealing with malnutrition in children, a new study has found that the number of infants dying due to malnutrition after six months of age is only around 1.2 % in India, much lower than global estimates of the World Health Organization.

The study, conducted in 120 geographical clusters in rural Jharkhand and Odisha, followed up children diagnosed with moderate and severe categories of malnutrition from the age of six months and until they were 18 months old. The results revealed a very low rate of death, 1.1% and 1.2% for children with moderate and severe malnutrition respectively as against WHO estimates of 10%–20%. **WHO study**

Pointing out that case fatality rates below six per cent have been recorded in three other Indian studies also, the researchers noted that the study added to the growing evidence that although acute malnutrition among children aged over six months was high in India, it was not accompanied by as high a case fatality rate as estimated by WHO.

The researchers said the discrepancy between WHO estimate and the Indian data could be largely because of the fact that WHO estimate was based on a study conducted 15 years ago among African children. Also, it had mostly covered hospitalized infants who were more likely to have other medical complications as well, thus increasing the chances of death. Further, they pointed out that the Infection rates in Africa are higher than in India.

Indian infants have a small amount of fat hidden in their bodies that may give a survival advantage by acting as a form of energy reserve available to maintain body temperature and brain development when they are nutritionally deprived. The new study also considered only infants above six months of age, unlike the WHO study that considered newborns also, they added.

Commenting on the findings, Dr. Arun Gupta (Breastfeeding Promotion Network of India) said: “given that the risk of mortality is lower than expected among children older than 6 months, outpatient treatment for severe malnourished children over six months may be too late to avert a substantial number of deaths from under-nutrition in Indian children. Rather, the study further strengthens the case for prioritizing prevention through known health, nutrition and multi-sectoral interventions in the first 1,000 days of life."

The study results have been published in journal PLOS. It was done jointly by researchers from the University College London, Public Health Foundation of India and Jharkhand-based Ekjut.

(India Science Wire) Twitter handle: @monikaksrivast1

DownToEarth

Scientists seek global action on reactive nitrogen

‘Current lack of policy coherency risks nitrogen trade-offs, while failing to harvest synergies at local, regional and global scales’

By Sunderarajan Padmanabhan Last Updated: Wednesday 23 October 2019

About 200 scientists from 44 countries have called upon United Nations Secretary-General Antonio Guterres to take global level action on reactive nitrogen and address the crisis being caused by unregulated release of nitrogen across the world.

A UN Environment Programme on ‘Sustainable Nitrogen Campaign’ is slated for October 23-24 in Colombo.

“If we want to beat climate change, air pollution, water pollution, biodiversity loss, soil degradation and stratospheric ozone depletion, then a new focus on nitrogen will be vital,” the scientists wrote. The signatories represented the International Nitrogen Initiative (INI) and its regional offices.

“Nitrogen poses a threat to the health of humans, animals and plants, and to livelihoods globally. It has many forms: Ammonia and nitrogen dioxide are dangerous air pollutants; nitrate is devastating ecosystems in our rivers, seas and soils; and nitrous oxide is a greenhouse gas 300 times more powerful than carbon dioxide,” they wrote.

“The current lack of policy coherency risks nitrogen trade-offs, while failing to harvest synergies at local, regional and global scales,” they added.

INI Chair N Raghuram, also a biotechnologist at Guru Gobind Singh Indraprastha University, New Delhi, said: “Nitrogen is not just another problem, but must be part of

the solution. Sustainable nitrogen management would help prevent millions of premature deaths, help ensure food security, and simultaneously help protect wildlife and the ozone layer."

The appeal by the scientists also noted that: "Nitrogen losses from crop, meat and dairy production, transport, energy and wastewater represent a massive resource waste of $200 billion annually. An ambitious goal to 'Halve Nitrogen Waste' from all sources globally by 2030 would save $100 billion per year, while mobilising innovation to beat pollution globally. We are committed to support work on this goal. We now call on UN Member States to wake up to the challenge."

(India Science Wire)

DownToEarth

Guidelines released for evaluation of nano drugs

Nano-pharmaceuticals are expected to be of great use particularly in cancer treatment

By Sunderarajan Padmanabhan Last Updated: Thursday 24 October 2019

The Minister for Science and Technology, Earth Sciences and Health and Family Welfare, on October 24, 2019, released guidelines for evaluation of nano-pharmaceuticals, which are emerging as more potent tools for treating various diseases.

The document, which covers all the aspects of evaluation from the definition and categorisation of nano-pharmaceuticals to pharmacovigilance of the new set of therapeutics, has been prepared as a joint project by the Department of Biotechnology (DBT) in the Union Ministry of Science and Technology, and Indian Council of Medical Research and Central Drugs Standard Control Organisation in the Union Ministry of Health and Family Welfare.

Nano-pharmaceuticals, which are derived by application of nanotechnology in medical therapeutics are expected to bring about a revolution in treatment strategies as they would enable targeting specific delivery of drugs and therapeutic molecules and thus offer higher efficacy and lower toxicity in many disease conditions. They are expected to be of great use particularly in cancer treatment.

Every year several new nano-pharmaceuticals are being developed and marketed across the world. India too has a sizable pool of nano-scientists generating large number of scientific publications in this domain. However, regulatory approval is the most important factor for translating laboratory research into bedside medicine. The new set of guidelines is designed to facilitate this process.

Noting that the document has been prepared by domain experts in consultation with representatives of the industry, Harsh Vardhan expressed confidence that it will give a big boost to innovators and drug manufacturers to optimise their research and come out with medicines that would be safer and more affordable.

Vardhan also announced that a three-day international conference will be organised by Department of Biotechnology and Confederation of Indian Industry here from November 21 to 23 in collaboration with the Association of Biotech-Led Enterprises and Biotechnology Industry Research Assistance Council, which is a public sector undertaking under DBT to showcase India’s prowess in the area of biotechnology and help build new partnerships and investment opportunities.

Titled Global Bio-India 2019, the meet will deliberate on opportunities and challenges in the areas of bio-agriculture, bio-industry, bio-energy, bio-services and bio-pharma sectors. It will have several components including policy dialogues, an investors round table, a meeting of regulators across the world and an exhibition.

Secretary, DBT, Renu Swarup, Secretary, Department of Health Research and Director General, Indian Council of Medical Research, and Balram Bhargava, and Drugs Controller General of India, VG Somani, hoped that the Indian pharmaceutical sector would make the best use of the guidelines in their work.

(**India Science Wire**)

DownToEarth

भारत में दूध में मिले एंटीबायोटिक तत्व, सेहत के लिए बन सकता है खतरा

एक नए अध्ययन में पता चला है कि बाजार में मिलने वाले खुले दूध में भी एंटीबायोटिक दवाओं की मात्रा लगातार बढ़ रही है

By Umashankar Mishra **Last Updated: Thursday 24 October 2019**

एंटीबायोटिक्स के बढ़ते दुरुपयोग से खाने-पीने की वस्तुओ में भी दवाओं के अवशेष मिलने का खतरा बढ़ रहा है। एक नए अध्ययन में पता चला है कि बाजार में मिलने वाले खुले दूध में भी एंटीबायोटिक दवाओं की मात्रा लगातार बढ़ रही है। इसका असर पशुओं के स्वास्थ्य, दूध की गुणवत्ता और दूध का सेवन करने वाले लोगों की सेहत पर पड़ सकता है।भारतीय शोधकर्ताओं के एक ताजा अध्ययन में यह खुलासा हुआ है।

इस अध्ययन के दौरान गाय के दूध में एजिथ्रोमाइसिन और टेट्रासाइक्लिन नामक एंटीबायोटिक दवाओं के अवशेष सामान्य से अधिक मात्रा में पाए गए हैं। गाय के प्रति लीटर दूध में भी 9708.7 माइक्रोग्राम एजिथ्रोमाइसिन और 5460 माइक्रोग्राम टेट्रासाइक्लिन की मात्रा पायी गई है। इन दवाओं का उपयोग आमतौर पर पशु चिकित्सा में किया जाता है। शोधकर्ताओं ने इस अध्ययन मेंदोनों एंटीबायोटिक दवाओं की स्थिरता को प्रभावित करने वाले तापमान और पीएच मान के स्तर का भी मूल्यांकन किया है।

एंटीबायोटिक दवाओं की अत्यधिक मात्रा गाय की आंतों में पाए जाने वाले बेसिलस सबटिलिस नामक बैक्टीरिया की वृद्धि को बाधित कर सकती है। यह बैक्टीरिया जुगाली करने वाले पशुओं और मनुष्यों की आंतों में प्राकृतिक रूप से पाया जाता है। इस बैक्टीरिया की वृद्धि बाधित होने का असर गाय के स्वास्थ्य एवं उसके दूध की गुणवत्ता पर पड़ सकता है।

शोधकर्ताओं ने दूध के 13 नमूने कर्नाटक के धारवाड़ के विभिन्न डेयरी फार्म से एकत्रित किए हैं और फिर उनका सूक्ष्मजीव परीक्षण किया गया है। दूध में मौजूद तत्वों का पता लगाने के लिए लिक्विड क्रोमैटोग्राफी विश्लेषण किया गया है। क्रोमैटोग्राफी का उपयोग जटिल मिश्रण में प्रोटीन, न्यूक्लिक एसिड या छोटे अणुओं को अलग करने के लिए किया जाता है।

एजिथ्रोमाइसिन और टेट्रासाइक्लिन एंटीबायोटिक की स्थिरता का पता लगाने के लिए इन दोनों दवाओं पर तापमान और पीएच मान के प्रभाव का मूल्यांकन किया गया है। एजिथ्रोमाइसिन को 70 से 100 डिग्री सेल्सियस तापमान पर 24 घंटे रखने पर उसकी स्थिरता एवं सूक्ष्मजीव गतिविधियों में महत्वपूर्ण रूप से कमी देखी गई है। यह प्रक्रिया टेट्रासाइक्लिन पर दोहराए जाने पर उसकी स्थिरता में भी कमी दर्ज की गई है, पर सूक्ष्मजीव गतिविधि में उल्लेखनीयगिरावट नहीं देखी गई। हालांकि, अम्लीय पीएच मान 4-5 पर दोनों एंटीबायोटिक दवाओं की स्थिरता में गिरावट दर्ज की गई है।

दूध में मिले दोनों एंटीबायोटिक्स का उच्च स्तर सार्वजनिक स्वास्थ्य के लिए खतरा बन सकता है। अध्ययन में यह बात भी सामने आई है कि उपभोक्ताओं के लिए दूध और उससे बने उत्पादों की सुरक्षा सुनिश्चित करने के लिए उचित कार्रवाई से एंटीबायोटिक दवाओं की स्थिरता को कम किया जा सकता है। इसके अलावा अध्ययन का निष्कर्ष है कि एंटीबायोटिक्स अवशेषों के लिए दूध की स्क्रीनिंग से पहले इसे उपभोक्ताओं तक पहुंचाने की सख्त आवश्यकता होती है क्योंकि यह खाद्य श्रृंखला के अवशिष्ट संदूषण के खतरे को कम करने में मदद करेगा।

कर्नाटक विश्वविद्यालय, धारवाड़, टोटोरी विश्वविद्यालय, जापान, हज्जाह विश्वविद्यालय, यमन और उम अल-कुरा विश्वविद्यालय, सऊदी अरब के शोधकर्ताओं द्वारा संयुक्त रूप सेयह अध्ययन किया गया है। अध्ययन के निष्कर्ष शोध पत्रिका प्लॉस वन में प्रकाशित किए गए हैं।

शोधकर्ताओं का कहना है कि “इस अध्ययन में पाए गए एंटीबायोटिक का स्तर सार्वजनिक स्वास्थ्य के लिए खतरनाक हो सकता है। , यह बात भी पता चली है कि उपभोक्ताओं के लिए सुरक्षित दूध और दूध उत्पादों

को सुनिश्चित करने के लिए एंटीबायोटिक दवाओं की स्थिरता को कम किया जा सकता है। इसके अलावा, उपभोक्ताओं तक दूध पहुंचने से पहले उसमें मौजूद एंटीबायोटिक अवशेषों का पता लगाया जाना बेहद अहम होता है क्योंकि यह खाद्य श्रृंखला में हानिकारक संदूषण के खतरे को कम करने में मदद कर सकता है।"

शोधकर्ताओं में कर्नाटक विश्वविद्यालय के माहनतेश कुरजोगी, प्रवीण सतपुते एवं सुदिशा जोगैया, हज्जाह विश्वविद्यालय के यसर हुसैन इस्सा मोहम्मद और टोटोरी विश्वविद्यालय के मोस्तफा अब्देलर्रहमान शामिल थे।

(इंडिया साइंस वायर)

Genome sequencing data to help in predictive and preventive medicine

The genomic data will help scientists understand genetic diversity of the Indian population and make available genetic variant frequencies for clinical applications

October 29, 2019

By Dinesh C Sharma

New Delhi: Research laboratories working under the Council of Scientific and Industrial Research (CSIR) on 25th October announced completion of whole genome sequencing of 1008 Indian individuals representing diverse ethnic groups in the country. The data will act as baseline information for developing various applications in predictive and preventive medicine.

The genomic data will help scientists understand genetic diversity of the Indian population and make available genetic variant frequencies for clinical applications. The data and knowhow are expected to produce evidence and help in development of technologies for clinical and biomedical applications, scientists explained.

The project called IndiGen was implemented by Delhi-based Institute of Genomics and Integrative Biology (IGIB) and Hyderabad-based Centre for Cellular and Molecular Biology (CCMB). The whole genome sequencing of individuals drawn from across the country has been completed, enabling benchmarking the scalability of genome sequencing and computational analysis at population scale, said Minster for Science and Technology Dr Harsh Vardhan, while making the announcement at an event here.

Dr Harsh Vardhan said "the genome data would be important for building the knowhow, baseline data and indigenous capacity in the emerging area of precision medicine." He said the outcomes of the IndiGen would find applications in a number of areas including faster and efficient diagnosis of rare genetic diseases. It will further lead to cost effective genetic tests, carrier screening applications for expectant couples, enabling efficient diagnosis of heritable cancers and pharmacogenetic tests to prevent adverse drug reactions are some of the other benefits of this initiative.

Scientists have also developed IndiGenome card and mobile application for researchers and clinicians to access clinically actionable information. The minister said that it will ensure privacy and data security, which is vital for personal genomics to be implemented at large scale.

CSIR has been engaged in genomic studies in India and its "Indian Genome Variation" has made major contributions in understanding genetic makeup of Indian population. It has also pioneered the application of genomics in clinical settings in the area of rare genetic diseases by means of DNA and genome based diagnostics and interaction with large number of clinical collaborators.

(India Science Wire)

नैनोफार्मास्युटिकल के मूल्यांकन के लिए दिशा-निर्देश जारी

October 25, 2019

दिनेश सी शर्मा (Twitter handle: @dineshcsharma)

नई दिल्ली, अक्टूबर 24 (इंडिया साइंस वायर) : भारत में नैनोफार्मास्युटिकल के मूल्यांकन के लिए दिशा-निर्देश जारी किए हैं ।

इन दिशा-निर्देशों को जैव प्रौद्योगिकी विभाग, भारतीय चिकित्सा अनुसंधान परिषद और केन्द्रीय दवा मानक नियंत्रण संगठन ने मिलकर विकसित किया है और इसके लिए जैव प्रौद्योगिकी विभाग ने अंतर-मंत्रालय सहयोग और समन्वय किया ।

नैनो-आधारित ड्रग डिलीवरी एक उभरता हुआ क्षेत्र है और यह बाजार में नैनोफार्मास्युटिकल के प्रचलन से संबंधित है। नैनोफार्मुलेशन अधिक दक्ष, कम हानिकारक और पारंपरिक दवाओं से अधिक सुरक्षित माने जाते हैं ।

भारतीय अनुसंधानकर्ताओं को नियामक दिशा-निर्देशों के अनुरूप अनुसंधान करने में सहायता मिलेगी और उत्पाद विकास और वाणिज्यीकरण में भी इससे सहायता मिलेगी । इसके अलावा, नियामक प्रणाली को इन दिशा-निर्देशों से मजबूती मिलने के कारण निजी निवेश भी आकर्षित किया जाएगा।

केन्द्रीय विज्ञान और प्रौद्योगिकी, पृथ्वी विज्ञान तथा स्वास्थ्य और परिवार कल्याण मंत्री डॉ. हर्ष वर्धन ने नई दिल्ली में एक समारोह में बताया कि ये दिशा-निर्देश नवीन नैनोफार्माक्युलेशन की गुणवत्ता, सुरक्षा और कुशलता के मूल्यांकन को निरुपित करने के अत्यंत महत्वपूर्ण कदमों में से एक । उन्होंने कहा कि इन दिशा-निर्देशों का उद्देश्य भारत में नोफार्मास्युटिकल के लिए पारदर्शी, सतत और संभावित नियामक मार्ग दिखाना है।

इन दिशा-निर्देशों से नैनो टेक्नोलॉजी पर आधारित नए उत्पादों की स्वीकृति देने के समय नियामक प्रणाली को निर्णय लेने में आसानी होगी और इसी तरह अनुसंधाकर्ता भी अपने उत्पाद को बाजार में शुरू करने के लिए स्वीकृति ले सकेंगे। इनसे उत्पादों का उपयोग करने वालों को भी फायदा होगा क्योंकि उन्हें दिशा-निर्देशों के अनुरूप बाजार में गुणवत्ता आश्वस्त उत्पाद मिल सकेंगे। इन दिशा-निर्देशों से कृषि उत्पादों, सौंदर्य प्रसाधनों, नैनो टैक्नोलॉजी के माध्यम से प्रत्यर्पित किए जाने वाले उपकरणों जैसे क्षेत्रों में भी सुरक्षा सुनिश्चित की जा सकेगी। ***(इंडिया साइंस वायर)***

स्वस्थ भारत .in
स्वास्थ्य समाचार एवं विचार का राष्ट्रीय मंच

पहले ग्लोबल बॉयो इंडिया शिखर बैठक की मेजबानी करेगा भारत

October 25, 2019

भारत में पहली बार नई दिल्ली में जैव प्रौद्योगिकी से संबंधित पक्षों का विशाल सम्मलेन-ग्लोबल बायो इंडिया, 2019 का आयोजन 21-23 नवंबर, 2019 के बीच किया जा रहा है।

दिनेश सी शर्मा Twitter handle: @dineshcsharma

नई दिल्ली, अक्टूबर 24 (इंडिया साइंस वायर)
केन्द्रीय विज्ञान और प्रौद्योगिकी, पृथ्वी विज्ञान तथा स्वास्थ्य और परिवार कल्याण मंत्री डॉ. हर्ष वर्धन ने इसकी घोषणा करते हुए कहा कि भारत पहली बार जैव प्रौद्योगिकी से संबधित समुदाय के लिए विशाल आयोजन की मेजबानी कर रहा है ताकि निवेश, हमारी स्वदेशी शक्ति का प्रदर्शन और स्वदेशी प्रतिभा पूल की आकांक्षाओं और आशाओं के प्रेरक फ्यूल को आकर्षित किया जा सके। इस अवसर पर डॉ. हर्ष वर्धन ने वैज्ञानिक अनुसंधान, इसके रूपांतर और वाणिज्यीकरण के प्रति भारत की वचनबद्धता जारी रखने की बात कही और इस विशाल आयोजन से किस प्रकार भारत की शक्ति का प्रदर्शन किया जा सकेगा और नई भागीदारियों का विकास होगा और निवेश के अवसर बढ़ सकेंगे, इन सभी बिन्दुओं पर विचार व्यक्त किए।

जैव प्रौद्योगिकी विभाग की सचिव डॉ. रेणु स्वरूप ने कहा कि मेक इन इंडिया 2.0 में जैव प्रौद्योगिकी चयनित प्रमुख क्षेत्रों में से एक है। "इस आयोजन के माध्यम से इस क्षेत्र की हमारी क्षमता और शक्ति का

प्रदर्शन करने की इच्छा है और हम चाहते हैं कि समूचा विश्व यह जान जाए कि निवेश के लिए भारत उत्तम विकल्प है।"

भारत सरकार के विज्ञान और प्रौद्योगिकी मंत्रालय के अंतर्गत जैव प्रौद्योगिकी विभाग अपने सार्वजनिक क्षेत्र के उद्यमों, जैव प्रौद्योगिकी उद्योग अनुसंधान सहायता परिषद के साथ मिलकर इस शिखर बैठक का आयोजन कर रहा है। इस शिखर बैठक में 30 देशों से संबंधित पक्ष, 250 स्टार्ट-अप, 200 प्रदर्शनी आयोजक केन्द्र और राज्य सरकार के मंत्रालय, नियमाक संस्थाएं, निवेशक यानी सब मिलकर 3500 लोग शामिल होंगे। आशा है कि इससे स्वदेशी अनुसंधान क्षमताओं, जैव उद्यमशीलता, निवेश तथा समूचे ग्रामीण भारत और दूसरी और तीसरी श्रेणी के शहरों तक प्रौद्योगिकी पंहुचाने को बढ़ावा मिलेगा।

DownToEarth

कैंसर जैसी बीमारियों का इलाज और पहचान होगी आसान, भारत ने की जीनोम सीक्वेंसिंग

अध्ययन से प्राप्त आंकड़ों का उपयोग दुर्लभ आनुवांशिक बीमारियों के निदान, कैंसर जैसी जटिल बीमारियों के उपचार, नई दवाओं के विकास और विवाह पूर्व भावी जोड़ों के अनुवांशिक परीक्षण में किया जा सकेगा

By Umashankar Mishra **Last Updated: Sunday 27 October 2019**

एक नई परियोजना के तहत देश के विभिन्न समुदाय के लोगों की संपूर्ण जीनोम सीक्वेंसिंग की गई है। भारतीय शोधकर्ताओं द्वारा शुरू की गई इस पहल के अंतर्गत 1008 लोगों के जीनोम का अध्ययन किया गया है। इस अध्ययन से प्राप्त आंकड़ों का उपयोग दुर्लभ आनुवांशिक बीमारियों के निदान, कैंसर जैसी जटिल बीमारियों के उपचार, नई दवाओं के विकास और विवाह पूर्व भावी जोड़ों के अनुवांशिक परीक्षण में किया जा सकता है।

इंडिजेन नामक यह परियोजना इस वर्ष अप्रैल में वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद (सीएसआईआर) द्वारा शुरू की गई थी। इस परियोजना का संचालन सीएसआईआर से संम्बद्ध जीनोमिकी और समवेत जीव विज्ञान संस्थान, नई दिल्ली एवं कोशकीय और आणविक जीव विज्ञान केंद्र, हैदराबाद के वैज्ञानिकों ने किया है।

विज्ञान और प्रौद्योगिकी, पृथ्वी विज्ञान तथा स्वास्थ्य एवं परिवार कल्याण मंत्री डॉ हर्ष वर्धन ने इस परियोजना के बारे में बताते हुए कहा कि "प्रिसिजन मेडिसिन के उभरते क्षेत्र में तकनीकी

जानकारी, आधारभूत आंकड़ों और घरेलू क्षमता के विकास में संपूर्ण जीनोम सीक्वेंसिंग महत्वपूर्ण हो सकती है।यह पहल बीमारियों की सटीक एवं त्वरित पहचानव उपचार के लिएआनुवांशिक लक्षणों तथा संवेदनशीलता आदि का निर्धारण करने में बेहद उपयोगी साबित हो सकती है।"

जीनोमिकी और समवेत जीव विज्ञान संस्थान के वरिष्ठ वैज्ञानिक श्रीधर शिवा सुब्बु ने बताया कि "इस परियोजना के अंतर्गत देश के अलग-अलग समुदायों के करीब 1400 लोगों के नमूने एकत्रित किए गए थे। इनमें से 1008 नमूनों का जीनोमिक विश्लेषण किया गया है।"

आणविक जीव विज्ञान केंद्रके निदेशक डॉ राकेश मिश्रा ने बताया कि "एक पीढ़ी से दूसरी पीढ़ी में हस्तांतरित होने वाली अनुवांशिक बीमारियों के कुशल एवं किफायती परीक्षण और दवाओं के प्रतिकूल प्रभाव से बचाव के लिए फार्माकोजेनेटिक परीक्षण इस परियोजना के अन्य लाभों में शामिल हैं।"

विश्व स्तर पर, कई देशों ने बीमारी के लिए अद्वितीय आनुवंशिक लक्षण, संवेदनशीलता (और लचीलेपन) का निर्धारण करने के लिए अपने नागरिकों के नमूने के जीनोम सीक्वेंसिंग का कार्य किया है। यह पहली बार है कि भारत में इतने बड़े स्तर पर संपूर्ण जीनोम विस्तृत अध्ययन किया गया है।

डॉ हर्ष वर्धन ने इस मौके पर इंडीजीनोम कार्ड और उसके साथ संलग्न इंडिजेन मोबाइल ऐप के बारे में भी बताया। उन्होंने कहा कि इसकी मदद से प्रतिभागी और चिकित्सक दोनों चिकित्सीय दृष्टि से उपयोगी जानकारी का उपयोग कर सकते हैं। उन्होंने जोर दिया कि यह ऐप गोपनीयता और डेटा सुरक्षा को सुनिश्चित करता है, जो वैयक्तिक जीनोमिक्स को बड़े पैमाने पर लागू करने के लिए महत्वपूर्ण हो सकता है।

सीएसआईआर के महानिदशेक डॉ. शेखर सी. मांडे ने कहा कि "यह सुनिश्चित करना महत्वपूर्ण है कि भारत अपनी अनूठी मानव विविधता के जीनोमिक डेटा का पर्याप्त रूप से प्रतिनिधित्व करता है। यह भी कम अहम नहीं है कि भारत बड़े पैमाने पर जीनोम डेटा उत्पादन, प्रबंधन, विश्लेषण, उपयोग और उसके संचार में स्वदेशी क्षमता विकसित कर सकता है।"

(इंडिया साइंस वायर)

Research Stash

This Is How Drug Resistance Spreads in Urban Environment

Research Stash News October 29, 2019

Chemical residues released from pharmaceutical and personal care products are not only becoming a major contaminant of water bodies in urban areas but are also becoming a source of drug resistance in the environment, a new study has warned.

The study, which evaluated the vulnerability and resilience of urban water bodies in Guwahati city, found the presence of viruses and multidrug-resistant E. coli in samples collected from the Brahmaputra. Deepor Beel – a freshwater wetland – was found to be the least polluted in comparison to the Brahmaputra river and Bharalu, the tributary turned urban drain.

Researchers analyzed the occurrence of pharmaceuticals and personal care products, intestine occurring virus, antibiotic-resistant bacteria, metal, fecal contamination, and antibiotic resistance genes, as well as the long term changes in precipitation and temperature of the water. Some microbes displayed 100% resistance to major antibiotics – levofloxacin, ciprofloxacin, norfloxacin, kanamycin monosulphate, and sulfamethoxazole.

Telemedicine useful for HIV treatment: study

A new study has shown that it can be used for treatment of HIV patients as well. Anti-Retroviral treatment of HIV affected children through telemedicine is better than conventional method in terms

By **BioVoice News Desk** - October 31, 2019

By S Suresh Ramanan Jammu: Telemedicine, which involves consultation of patients by doctors remotely, is being used in many parts of the country. A new study has shown that it can be used for treatment of HIV patients as well. Anti-Retroviral treatment of HIV affected children through telemedicine is better than conventional method in terms of average cost, treatment compliance, follow up visit and number of patients treated.

The Pediatric Centre for Excellence for HIV care at Sion Hospital, Mumbai with the collaboration of UNICEF and National Health Mission established the Pediatric HIV Telemedicine Initiative in 2013. Some of the centres providing anti-retroviral therapy (ART) treatment were connected to the Mumbai centre through video links. This enabled expert opinion and services, nutritional counselling, care and treatment adherence motivation to HIV infected children and adolescents easily.

For mid-term evaluation of the initiative, researchers selected three out of 35 telemedicine-based ART centres functioning in Maharashtra, and another three that were not linked with Mumbai via telemedicine link.

At the end of the two-year study period, the team reported that the per-visit cost in telemedicine linked centre was about Rs 1803, while it was Rs 3412 for conventional centres.

The most critical part of ART treatment is timeliness of visit. Usually patients are required to revisit ART centres within 32 days of their first visit for subsequent checkup and prescriptions. The study showed that that the timeliness of visit was better in the telemedicine-based treatment.

Overall, the success of ART centres can be computed based on the decrease in the loss to follow-up. Any person failing to access the ART services for three consecutive months after the first visit are accounted as loss to follow-up. There was 5% decrease in the loss to follow-up cases in the telemedicine linked centres.

“In remote areas, doctors in ART centres are getting exposed to expert advice through telemedicine initiative. As it is done on a regular basis, it gives an opportunity to discuss the clinical significance of cases in depth. This has a large scope to improve access to advanced care for the rural population with less cost,” pointed out Dr Sarit Kumar Rout, a member of the research team.

He said “our findings will help policymakers to scale up these initiatives as it reduces the cost per visit. As a proof of concept, telemedicine linkage leads to improves compliance and reduces loss to follow up.”

There are other cost studies undertaken in Indian condition but they did not provide a complete picture due to certain lacunae. For instance, a study in 2009 reported that average cost per patients for ART services was Rs 1287. It computed the cost of ART services without accounting for capital cost. Thus the findings of the new study provide evidence needed for the expansion of telemedicine services in India, researchers said.

The research team included Yashwant R. Gabhale, Mamatha M. Lala, Mamta V. Manglani (LTM Medical College and General Hospital, Mumbai); Ambarish Dutta (Indian Institute of Public Health, Odisha); Sudha Balakrishnan (UNICEF India); Maninder Singh Setia (Karanam Consultancy, Mumbai) and Khanindra Bhuyan (UNICEF state office, Maharashtra). The findings of the study have been published in the *PlosOne* journal.

(India Science Wire)

राष्ट्रीय संस्करण

दैनिक जागरण

चिंताजनक

हार्वर्ड यूनिवर्सिटी और हार्वर्ड टीएच चैन स्कूल ऑफ पब्लिक हेल्थ के शोधकर्ताओं ने किया अध्ययन, कहा-लोगों में बचपन से लेकर किशोरावस्था तक रहती है यह समस्या

भारतीय बच्चे शारीरिक वृद्धि की समस्या के शिकार

वास्को-द-गामा (गोवा), आइएसडब्ल्यू : बच्चों की शारीरिक वृद्धि में रुकावट होना एक वैश्विक समस्या है। एक नए तुलनात्मक शोध से पता चला है कि भारतीय बच्चे पेरू, वियतनाम और इथोपिया की तुलना में इस समस्या से अधिक ग्रसित हैं। शोध में पाया गया कि इन चारों देशों में औसतन 43 फीसद बच्चे एक से पांच साल की उम्र में ही वृद्धि अवरोध (स्टंटिंग) से ग्रस्त हो गए थे। इन बच्चों में से लगभग 32-41 फीसद बच्चे किशोरावस्था तक ठीक नहीं हो पाए। हालांकि लगभग 31-34 फीसद बच्चों में सुधार हुआ लेकिन वयस्क होने के पहले वे इससे फिर से ग्रसित हो गए। यह भी देखा गया कि पांच साल तक सामान्य वृद्धि कर रहे बच्चों में से भी 13.1 प्रतिशत बच्चों की वृद्धि 8 से 15 साल के बीच रुक गई।

यह अध्ययन अमेरिका की हार्वर्ड यूनिवर्सिटी और हार्वर्ड टीएच चैन स्कूल ऑफ पब्लिक हेल्थ के शोधकर्ताओं ने किया है। वर्ष 2002 तथा 2016 के बीच भारत, इथोपिया, पेरू और वियतनाम के कुल 7,128 बच्चों को लेकर पांच चरणों में सर्वेक्षण किए गए। इनमें ग्रामीण एवं शहरी तथा गरीब और अमीर सभी तरह के बच्चे शामिल किए गए थे। सर्वेक्षण में पेरू, इथोपिया और वियतनाम में पूरे देश से जबकि

प्रतीकात्मक

भारत में सिर्फ आंध्र प्रदेश के बच्चों को लिया गया था। इन बच्चों के एक, पांच, आठ, बारह और पंद्रह साल के होने पर उनकी वृद्धि में रुकावट संबंधी आंकड़ों का व्यापक विश्लेषण किया गया।

उम्र के हर पड़ाव में देखी गई समस्या : शोधकर्ताओं ने पाया कि अधिकांश बच्चे कई कारणों से बचपन और प्रारंभिक किशोरावस्था के बीच अपनी उम्र के अनुरूप बढ़ नहीं पाते हैं। भौगोलिक स्तर पर बच्चों में वृद्धि अवरोध, उसमें सुधार तथा दोबारा वृद्धि रुकने की प्रवृत्तियों में उल्लेखनीय भिन्नता दिखी। एक साल वाले बच्चों को छोड़कर शेष सभी चरणों में भारतीय बच्चों में वृद्धि में रुकावट का प्रतिशत सबसे अधिक देखा गया है। एक साल के बच्चों में वृद्धि में रुकावट का प्रतिशत इथोपिया में सर्वाधिक 41 प्रतिशत पाया गया, जो भारत में 30 प्रतिशत था। इथोपिया को छोड़कर बाकी तीनों देशों में एक वर्षीय बच्चों की तुलना में पांच वर्षीय बच्चों में वृद्धि अवरोध ज्यादा दिखा।

वियतनाम के हालात भी चिंताजनक : शोधकर्ताओं के अनुसार, हालांकि उम्र बढ़ने के साथ साथ वृद्धि अवरोध की समस्या में उल्लेखनीय कमी दिखी। लेकिन भारत में बाकी देशों की तुलना में पांचों चरणों में बच्चों और किशोरों में वृद्धि अवरोध की समस्या लगभग एक जैसी ही रही। भारत में किशोरों में वृद्धि अवरोध सबसे ज्यादा 27 फीसद वहीं वियतनाम में सबसे कम 12.3 प्रतिशत था।

इन वजहों से होती है समस्या : मैटरनल एण्ड चाइल्ड न्यूट्रिशन नामक जर्नल में प्रकाशित हुए अध्ययन के प्रमुख शोधकर्ता प्रोफेसर एस.वी. सुब्रमण्यन ने बताया कि बच्चों में वृद्धि अवरोध एक प्रतिवर्ती क्रिया है, जो कई परिस्थितियों जैसे आनुवांशिक, आर्थिक और भौगोलिक पर निर्भर होती है। वैसे तो बच्चे बचपन से लेकर किशोरावस्था तक कभी भी इसके शिकार हो सकते हैं लेकिन अनुकूल परिस्थितियां मिलने पर उनमें सुचारु रुप से पुनः वृद्धि हो सकती है।

Research Stash

IIT Madras Develops Software to Solve Engineering Problems

Research Stash October 28, 2019

Researchers at the Indian Institute of Technology Madras have developed software which they say can help solve engineering problems in fields from thermal management and semiconductors to automobile, aerospace, and electronics cooling applications much faster than existing methods.

For a few years now Artificial Intelligence, machine learning and deep learning are being used in areas such as signal processing, speech recognition, image reconstruction, and prediction, but few attempts have been made to use them to solve engineering problems.

Assistant Professor at IIT Madras and leader of the research team, Dr. Vishal Nandigana, said that the software has been found to be nearly million-fold faster compared to existing solutions for thermal management problems.

"Our software works on any generalized rectilinear and curvilinear input geometry. Our research saves computational time, which is the bottleneck to solve most engineering problems," he explained.

"We utilized data-driven AI and deep learning to arrive at solutions for engineering problems after training AI with data sets. These prior data sets can be from existing big data in the relevant engineering industry, where a lot of experimental data are available.

Also, if data is not available for training the AI, it can be generated using commercially-available CFD (Computational Fluid Dynamics) software on small independent pieces of the full-blown problem," he said. The team, he said, used a novel Recurrent Neural Network (RNN) and a Deep Neural Network (DNN).

Researchers are working on establishing a start-up named `Alsoft' to offer solutions for various engineering problems based on the new software, according to an institute press release. (ISW)

the India saga

Indian scientists find a way to enhance fat-burning capacity of chilli

By Kollegala Sharma 29 Oct 2019

Capsaicin, an active ingredient of chilli, is known to have anti-obesity or fat reducing properties. Now Indian scientists have figured out how this property of capsaicin can enhance the effect of obesity-related hormones.

Researchers of CSIR-Central Food Technological Research Institute (CFTRI) here have found that capsaicin - the hot factor present in chillies - could increase the effect of obestatin and thus help reduce fat in the body. Obestatin is a hormone that sends 'stop eating' signals.

The hormone, produced in the digestive system, affects food intake by signaling through the brain. It affects accumulation of glycerolipids through what biochemists term as PPAR-gamma signaling. It is one of the many satiety factors that send messages to the brain saying the belly is full. The capsaicin seems to increase the effect of obestatin, explained Dr. Uma V. Manjappara, the lead scientist.

Capsaicin helps reduce fat by goading cells to increase secretion of catecholamines, which bind to the proteins called beta-adrenergic receptors that trigger higher rate of metabolism. This triggers browning of adipose tissue, thus

reducing the obesity. Hence, it is also considered a nutraceutical or a beneficial drug in the food.

“We thought that if both the hormone and nutraceuticals are fed together, the latter can act in unison with obestatin and enhance the fat digestion further,” said Dr. Manjappara. This premise was tested in cultured fat cells called 3T3-L1 cells which are generally used in studying obesity.

The team cultured 3T3-L1 cells in the presence of either obestatin or obestatin along with capsaicin and genistein. Genistein is another nutraceutical that is present in soya bean and that affects fat accumulation. The team compared the effects of capsaicin and genistein with or without obestatin after 14 days for various parameters like proportion of cells completing their growth to adipocytes and accumulation of triglycerides.

“Fourteen days are required for the immature fat cells to grow and become mature fat cells,” says Dr. Uma. The team also studied activity of lipases, a class of enzymes that is involved in the digestion of fats. Capsaicin and genistein are known to increase the production of hormone sensitive lipase, lipoprotein lipase and the production of the PPAR-gamma proteins.

“In all the experiments, the ability of both capsaicin and genistein to increase the production of hormone sensitive lipase, lipoprotein lipase and the upregulation of the PPAR-gamma receptor were seen. This means effect of both additives is beneficial. But when capsaicin or genistein were added along with obestatin, the amount of triglycerides produced in the cells were 20-25 percent lower than when obestatin alone is used,” explained Dr Manjappara.

The combination seems to work better than obestatin alone or either of the nutraceuticals. Why is it so is still a not well understood? However, ‘that the capsaicin and genistein could still increase the level of lipases in the cells could be the reason that extra fat was metabolized in cells with these two additives’, says Dr. Manjappara.

The research findings were published in a recent issue of journal *Cell Biochemistry and Biophysics*. The team consisted of Dr. Uma Manjappara and her student Musunuru Suneel Kumar Reddy.

(India Science Wire)

Indus Dictum

Scientists develop new nanocomposite for bone implants using microwave energy

October 29, 2019

Bone scaffolds are porous structures that are used to sustain bone grafting procedure. Biopolymers are widely used in place of metals in making bone implants. Although they are strong and lightweight, polymers lack sufficient porosity to provide a scaffold for the new bone tissue to grow on.

Now researchers at the Indian Institute of Technology-Mandi have developed a novel technique to fabricate a porous nanocomposite which shows potential as a bone scaffold. They used microwave energy to fuse the polymer – nanoparticles of hydroxyapatite and salt. The salt crystals created required gaps or pores.

Preliminary laboratory tests with osteoblast (bone regrowth cells) cultures reveal that the cells readily used the pores to grow on.

"Scanning electron microscopy revealed that our processing technique yields a porosity of about 70 percent with pores of about 90-250 micron sizes. These pore sizes are adequate for cell growth. Also, mechanical assessment of the material revealed that our nanocomposite shows a manifold increase in tensile, flexural and hardness properties indicating its prospects as a bone implant material," explained Dr Sunny Zafar, who led the study team, while speaking to *India Science Wire*.

The research team (L to R): Nishant Verma, Dr Mohammed Talha and Dr Sunny Zafar

Researchers used a matrix material called *polycaprolactone* (PCL), which is a biodegradable polymer widely used in packaging, acoustics, and bone-implant industries. PCL was reinforced with nanoparticles of hydroxyapatite — a chief component of bones which imparts strength to them. To this, sodium chloride or salt crystals were introduced.
All three were combined using 'microwave-assisted composite fabrication' technique to derive the nanocomposite. Later, the salt was removed by leaching in distilled water, leaving behind holes in the composites.

According to the researchers, this process may be cost-effective as the use of microwave for heating is rapid and will reduce manufacturing time. "We are also working to understand the physics and insights of this manufacturing process to make it adaptable for Indian industries," added Dr Zafar.

Besides Sunny Zafar, the team included Nishant Verma and Mohammed Talha from IIT, Mandi. The study results have been published in the journal Materials Research Express.

B V Sreekantan (1925-2019): Bhabha protégé and institution builder

By **Dinesh C Sharma** -October 30, 2019

Professor B.V. Sreekantan, former director of the Mumbai-based Tata Institute of Fundamental Research (TIFR), who passed away in Bangalore on Sunday, was a protégé of Homi Jehangir Bhabha and is widely credited with establishing field stations of TIFR which subsequently became independent research centres. He was 94.

Badanaval Venkatasubba Sreekantan was born in Nanjangud in the former Mysore state. After obtaining bachelor and master degrees in physics and wireless respectively from the Central College, he joined as a research scholar in the Department of Communication Engineering at the Indian Institute of Science, Bangalore. A year later, he was recruited as a research student by Bhabha who had set up TIFR in Mumbai. There he rose to become a professor in 1963 and its director in 1975. He held the post till 1987.

With support from Bhabha and his successor, MGK Menon, Sreekantan built a research group to study characteristics of high energy cosmic rays using a variety of detectors at ground level, mountain altitude as well as in deep underground mines. Early experiments by him at the Kolar Gold Field (KGF) led to studies of energetic muons at a depth of up to 2760 meters. This paved the way for the famous experiment to search for proton decay later on. He was also key to setting up of research groups dedicated to x-ray astronomy and gamma ray astronomy in TIFR.

Under his leadership, TIFR decided to join high energy physics research at accelerator facilities of CERN. He played a key role in the creation and nurturing of new facilities and centres of TIFR in different parts of the country. During the Firth Plan period, he

proposed setting up of the Homi Bhabha Centre for Science Education, National Centre for Biological Sciences, National Centre for Radio Astrophysics and TIFR Centre for Applicable Mathematics.

His involvement with the Indian Institute of Astrophysics was also notable. Till 1985, the institute functioned under the Department of Meteorology in the Ministry of Civil Aviation. He helped bring IIA under the Department of Science and Technology (DST) as an autonomous institution.

Prof Sreekantan was known for simplicity and human values. "I never saw him coming to institute using his official car. He used to always walk from his residence to the institute, but before going to his office he would make a round in the institute. During these rounds, he would visit places like workshops, basement labs, garden, talking to tradesman in the workshop, sometime enquiring about problems the gardener and then reach his office at the end. Through this process he made himself available to everyone in the institute," recalled Prof Naba Mandal, former scientist who had joined TIFR in 1977.

"Prof. Sreekantan was a champion of science and academia in the country. When asked for his advice on going abroad, he encouraged us to do so but asked us to make sure we eventually return and contribute to the development of science in India. It was his continuous support and encouragement that gave us the confidence to conceptualize the India-based Neutrino Observatory project," Prof Mandal added.

(India Science Wire)

DownToEarth

वैज्ञानिकों ने बनाया सस्ता माइक्रोस्कोप, फफूंद की होगी पहचान

भारतीय शोधकर्ताओं के एक नए अध्ययन में चाय की पत्तियों में फफूंद रोगजनकों की पहचान के लिए कागज जैसी सामान्य सामग्री से बने फोल्ड स्कोप नामक एक बेहद सस्ते माइक्रोस्कोप को कारगर पाया गया है

By Umashankar Mishra **Last Updated: Wednesday 30 October 2019**

चाय भारत की एक प्रमुख नकदी फसल है। भारतीय शोधकर्ताओं के एक नए अध्ययन में चाय की पत्तियों में फफूंद रोगजनकों की पहचान के लिए कागज जैसी सामान्य सामग्री से बने फोल्ड स्कोप नामक एक बेहद सस्ते माइक्रोस्कोप को कारगर पाया गया है।

सिक्किम के चाय बागानों में मुख्य रूप से 14 प्रकार के पादप रोगजनक पाए जाते हैं। फफूंद रोगजनकों के कारण पत्तियों में धब्बे पड़ जाते हैं, जिससे चाय की गुणवत्ता प्रभावित होती है और उत्पादकों को नुकसान उठाना पड़ता है। शोधकर्ताओं का कहना है कि सस्ता होने और सरल उपयोग के कारण फोल्डस्कोप का उपयोग फसलों में रोगों की पहचान करने के लिए आसानी से कर सकते हैं।

इस अध्ययन में क्लेडोस्पोरियम क्लेडोस्पोरोइड्स, जाइलेरिया हाइपोक्सिलीन, कलेक्टोरिकम कॉफिएनम, अल्टरनेरिआ अल्टेनाटा समेत कई फफूंद प्रजातियों की पहचान और पृथक्करण किया गया है। इन फफूंद नमूनों को चाय में लीफ स्पॉट और लीफ ब्लाइट रोगों के लिए जिम्मेदार पाया गया है।

नर बहादुर भंडारी डिग्री कॉलेज, सिक्किम विश्वविद्यालय के शोधकर्ताओं ने फोल्डस्कोप का उपयोग चाय की पत्तियों में कवक रोगजनकों के सर्वेक्षण और उनकी पहचान करने में किया है। शोधकर्ताओं का कहना है कि सस्ती और पोर्टेबल तकनीकें दूरदराज के इलाकों में आसानी से पहुंचाई जा सकती हैं, जिसका लाभ स्थानीय लोगों को मिल सकता। फोल्डस्कोप ऐसी ही एक सामान्य-सी तकनीक है, जो फसलों में रोगों पहचान करने में उपयोगी हो सकता है।

फोल्डस्कोप एक पोर्टेबल फील्ड माइक्रोस्कोप है। शोध कार्यों में उपयोग होने वाले पारंपरिक अनुसंधान सूक्ष्मदर्शी की तरह इसे ऑप्टिकल गुणवत्ता देने के लिए विशेष रूप से डिजाइन किया गया है। इसे कागज की पट्टी पर लेंस लगाकर बनाया जा सकता है और कैमरा फोन से जोड़कर बेहतर रिजॉल्यूशन प्राप्त की जा सकती है। फोल्डस्कोप में 140X की वृद्धि और 2 माइक्रोन के इमेजिंग रिजॉल्यूशन के साथ वस्तुओं की छवि प्रस्तुत कर सकता है।

शोधकर्ताओं में शामिल लांजे पी. वांगडी ने इंडिया साइंस वायर को बताया कि "अच्छी गुणवत्ता की चाय का उत्पादन बागान मालिकों के लिए एक चुनौती है। उत्पादन की मात्रा और गुणवत्ता कई कारकों पर निर्भर करती है। कवक रोगों के कारण होने वाला फसल नुकसान उनमें से एक है। बीमारियों की रोकथाम के लिए रोगों एवं रोगजनकों की पहचान के साथ-साथ रोगजनकों को पृथक करना महत्वपूर्ण होता है। इसमें फोल्डस्कोप को उपयोगी पाया गया है।"

लांजे पी. वांगडी ने बताया कि "सिक्किम के चाय बागानों में एकीकृत कीट प्रबंधन (आईपीएम) और रोगजनकों का जैविक पद्धति से प्रबंधन विशेष रूप से प्रभावी साबित हो सकता है। हम इन रोगों के कृत्रिम रूप से नियंत्रण के लिए अध्ययन कर रहे हैं।" यह अध्ययन शोध पत्रिका करंट साइंस में प्रकाशित किया गया है। शोधकर्ताओं में लांजे पी. वांगडी के अलावा अर्पण प्रधान और श्रीजना मंगर शामिल थे।

(इंडिया साइंस वायर)

the India saga

With training and incentive, ASHAs can help address lifestyle diseases : study

By Sunderarajan Padmanabhan 30 Oct 2019

A new study has highlighted that Accredited Social Health Activists (ASHAs), the grassroots level health workers, can deliver care for non-communicable diseases also if they were provided with appropriate training and were paid adequately.

At present, though ASHAs are identified as part of the National Program for Cardiovascular Diseases, Diabetes, Cancer, and Stroke at the policy level, they are not recognized as part of its formal service delivery team on the ground.

The study found that ASHAs feel overburdened, as they are work as part-time volunteers in the health system and deliver several activities under the programme on top of their routine primary care workload, without receiving remuneration for the non communicable disease - related activities. The George Institute for Global Health conducted the study in Andhra Pradesh.

Lead author of the study, Marwa Abdel-All, said the study has also highlighted the importance of monitoring and support, with evaluation and career development options for ASHAs. “We found adequate recognition and integration of the community health workers into the health system, functional infrastructure, and clear role description to be key enablers to optimize their efficiency. The central government should commit itself towards the development and capacity building of ASHAs for non-communicable disease control”, she added.

Prof Vivek Jha, Executive Director of The George Institute India said, “as the range of services provided by ASHAs expands, there will be a debate on whether to increase their numbers or to create a separate cadre specific to non-communicable diseases. However, in empowering ASHAs for more responsibilities, knowledge, and skills, it is important that they get remunerated for the services a nd continue to be embedded in the community so that they leverage the strong relationship that is necessary to effectively provide healthcare across the life course”. The study results have been published in the journal *Human Resources for Health*.

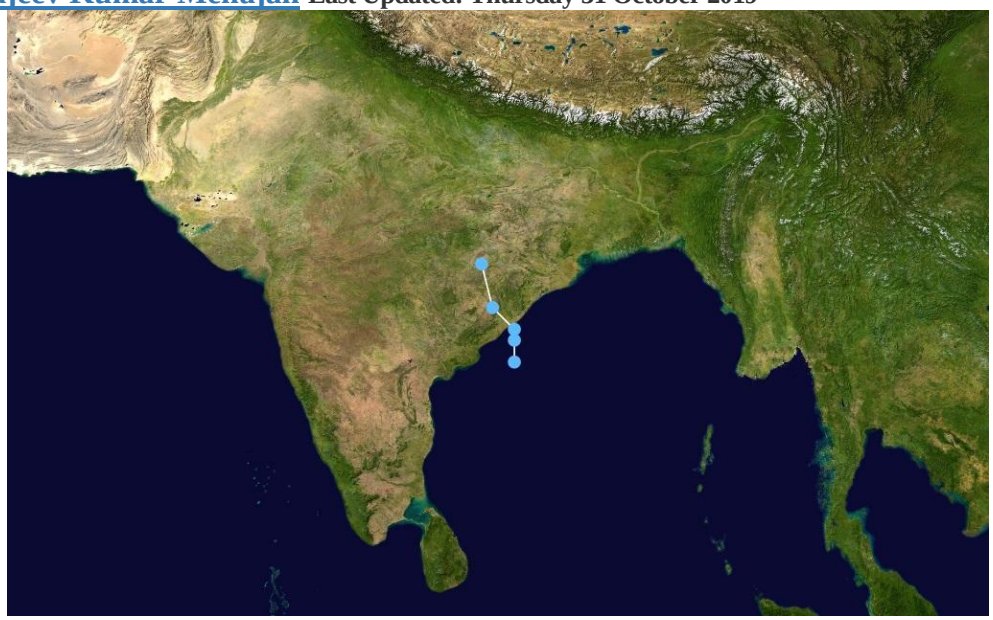
(India Science Wire)

DownToEarth

Here is why India needs effective climate services

A new study has examined what it will take for IMD to transform itself from being a weather-ready to a climate-smart organization

By Rajeev Kumar Mehajan **Last Updated: Thursday 31 October 2019**



The climate change discourse and climate science have made it clear that impacts of climate change are imminent. The IPCC has highlighted that an increase in temperature of 1.5 degree C would result in large multi-sector impacts especially in regions with vulnerable populations such as South Asia, including India. In such a scenario, the need to build climate resilience cannot be overemphasised.

Provisioning of climate services is vital to build climate resilience. Taking this into cognisance, the World Meteorological Organization and its partners formulated the Global Framework for Climate Services (GFCS) in 2009. The framework is focused on "enabling better management of the risks of climate variability and change" through provisioning of climate services at global, regional and national scale.

At the national level, the National Meteorological and Hydrological Services (NMHS) serve as the nodal implementing agency. NMHSs are the repositories of the observational networks and metadata, and possess technical skills to convert metadata into customized products, applications and services. So they are best placed to provide climate services. In India, the role of NHMS is played by India Meteorological Department (IMD).

A new study, published in *Current Science*, has examined what it will take for IMD to transform itself from being a weather-ready to a climate-smart organization.

Since its establishment in 1875, IMD has come a long way from measuring gauges to supercomputers, and being the first among developing countries, to have its own satellite system. As far as weather services are concerned, IMD is already at par with international standards.

However, in the realm of climate services, IMD has been providing climatological data services to numerous users through its National Data Centre (NDC) at Pune. The NDC is the repository of all observational data, covering over a century. Under the GFCS, IMD established Climate Research and Services Division in 2017 to enhance the quality of climate services. The major services currently provided by this division are operational Long-range forecast and its verification; climate monitoring and annual climate statement; and supply of meteorological data.

For effective climate services, the distinction between 'weather' and 'climate' services needs to be understood clearly. The distinction lies in time scale and customising the information to end user's specific requirements. Weather services deal with imminent weather, whereas climate services deal with seasonal, decadal and much longer time frames. They further highlight that the end user product of climate services is generally in the form of tools, products, websites, or bulletins.

Another step is not to misread ‘climate research’ as ‘climate service’. Whereas climate research comprises of systematic investigation to enhance understanding of the subject, climate services are meant to provide usable information tailored to end user needs.

The GFCS framework has five interdisciplinary and integrated pillars that support the development and delivery of climate services to users namely - observations and monitoring; research, modelling and prediction; climate services information system; user interface platform; and capacity development. The framework focuses on five major priority areas - agriculture and food security, disaster risk reduction; energy, health and water.

An analysis of IMD’s work shows that it has been performing considerably well in the first three technical aspects of GFCS. However, more needs to be done in user interface platform and capacity development. In the context of climate services, IMD has a robust infrastructural capacity, but there is a gap between what information domain experts consider ‘useful’ and what information the end user considers as ‘usable’ in its decision making. To address this gap, interdisciplinary and social sciences skills of the technical staff need to be strengthened.

As regards strategy for dissemination of this information, IMD is already using communication and outreach methods through public service announcements, web portal and mobile apps. There is, however, need for public education initiatives like climate clearinghouses, map interfaces, podcasts, webinars, structured decision tools, graphical info systems to enable availability of right information to the right user to make right decisions.

Similarly, of the five priority areas in GFCS, IMD has been actively engaged in agriculture and food security, disaster risk reduction and water, and needs to expand its portfolio to include energy and health.

A successful transformation from a traditional NMHS to a weather-ready and climate smart organization is possible through a dynamic vision at apex level, which strengthens its capacity, consolidates its infrastructure, develops partnerships and further enriches the visibility of the organisation. Investing in procurement and promotion of human resources and experts from other cross-cutting domains would supplement its needs.

The study has proposed convergence of all knowledge resources on climate change, to holistically cover the entire spectrum of climate services, beyond a single department of the government. Such convergence may be convened by MoES, which is the repository of advanced research on climate change and should include MoEFCC, which is responsible for "international negotiations and domestic policies and actions" related to climate change.

This could be a national initiative through necessary legislation, to translate knowledge into action and wide-ranging research guiding climate change policy design.

The study has been done by Rajeev Kumar Mehajan (Science and Engineering Research Board); Abha Tewary (independent researcher) and Shreekant Gupta (Delhi School of Economics).

(**India Science Wire**)

BioTech Times™

ICAR researchers produce coconut palm plantlets using tissue culture

October 31, 2019

By Biju Dharmapalan

New Delhi, October 31: Over the years, several economically important plants have been multiplied and conserved using tissue culture technique in which whole plants are re-generated from parts of plants. However, the technique has not been very successful with palms like coconut palm or toddy palm.

Now researchers from the regional station of ICAR-Central Plantation Crops Research Institute (CPCRI) at Kayamkulam in Kerala have developed tissue culture plants of coconut palm.

The coconut palm is an important cultivated palm in the world, and is popular for its industrial and commercial applications. In India, it is cultivated mainly in the coastal tracts of Kerala, Tamil Nadu, Karnataka, Andhra Pradesh, Orissa, West Bengal, Pondicherry, Maharashtra and the islands of Lakshadweep and Andaman and Nicobar.

At present, coconut palm is propagated through seeds. However, it takes five to 10 years for a plant to produce the first harvest. Consequently, crop improvement programmes in coconut is time consuming and tedious. A scientist has to wait for 20 to 30 years for releasing a new variety by conventional breeding approaches. Tissue culture can help overcome this. Even though many people have developed protocols using various parts of plant like tender leaf, immature inflorescence, shoot tip, and immature embryo. However, they lack reliability and repeatability.

ICAR CPCRI researchers used tissues from immature inflorescence. The team were able to re-generate rooted plants. The plantlets were similar to the mother plant from which they have taken the tissue. This has been confirmed by advanced molecular biology techniques.

"Even though there are reports of in vitro production of coconut plantlets from parts of seeds and embryo, they were genetically not similar to the mother plant. In contrast, all the plantlets produced by our team were similar to the mother plant. Our study will have applications in germplasm conservation and also in the large scale production of cultivars for the farming community, though it needs few more refinements," explained Dr. Regi J. Thomas, who led the research team, while speaking to India Science Wire.

Dr. Thomas, the team included M. Shareefa, J. S. Sreelekshmi , M. K. Rajesh and Anitha Karun. The study results have been published in the journal *Current Science*.

(India Science Wire)

the India saga

Poor air quality lowering life expectancy: study

By Sunderarajan Padmanabhan 31 Oct 2019

A new analysis based on the Air Quality Life Index (AQLI) developed by the Energy Policy Institute at the University of Chicago (EPIC) has shown that an average citizen living in the Indo-Gangetic Plain (IGP) region could lose about seven years of life expectancy because the air quality in the area failed to meet the World Health Organization's (WHO) guideline for fine particulate pollution.

Announcing the findings, researchers associated with the study said the huge impact on life expectancy was due to a 72 percent increase in pollution from 1998 to 2016 in the region. In 1998, the impact on people's lives would have been half of what it is today, with residents losing a lower 3.7 years of life expectancy.

"Air pollution is a challenge through much of India. However, the high levels of particulate pollution in the Indo-Gangetic Plain region, which includes Bihar, Chandigarh, Delhi, Haryana, Punjab, Uttar Pradesh and West Bengal, stand out," researchers said. In 1998, citizens living outside of the region would have seen their lives cut short by 1.2 years relative to what it would have been if air quality met the WHO guideline. That number has grown to 2.6 years—also worsening but much more modest than what has happened in the IGP, they said.

The findings were announced at a programme here today where the full platform of the Index was made accessible in Hindi.

The researchers have also found that if India succeeded in meeting its goals under the National Clean Air Programme (NCAP) and achieved sustaining pollution reductions of about 25 percent, it could help extend the life expectancy of an average Indian by 1.3 years and those living in the IGP by about 2 years.

(India Science Wire)