

CSIR in Media



A Daily News Bulletin
13th to 20th April 2018



CIMFR help for pollution report

CSIR-CIMFR

20th April, 2018

Dhanbad: The civic body here has asked Central Institute of Mining and Fuel Research (CIMFR) to help it prepare a report on land, air and water degradation to form the basis of a sustainable waste management plan for the coal town to be prepared by the Japan International Cooperation Agency (JICA). JICA is a government agency of Japan that provides support for economic and social development. Dhanbad is plagued by land, air and water pollution due to mining and related activities.

The report, which will mainly focus on air pollution, is being prepared as an outcome of the recent talks between DMC authorities and JICA representatives during a global meet of urban local bodies held in Indore from April 9 to 12. Speaking to this correspondent on Thursday, Dhanbad mayor Chandra Shekhar Agarwal said, "JICA representatives took interest in the issues of land, air and water degradation due to mining and allied activities raised by me at the mayoral session of the Indore meet and offered their assistance," said Agarwal.

"We spoke to a panel of CIMFR scientists, which included V.K. Singh (business development and industrial liaison department) and Abhay Singh, Rajshekhar Singh, D.P. Singh, Shailendra Singh and Shantanu Bhattacharya (all from CIMFR's natural resources and environmental division) on Wednesday and told them about the requirement of the report. They agreed to prepare it as soon as possible. If everything goes right we will forward the report to JICA by next week. It will help JICA prepare a sustainable waste solution for Dhanbad," said Agarwal. Sources in CIMFR said the DMC also sought its suggestions on the detailed project report for the upcoming mine pit water supply project jointly prepared by the civic body and utilities major Jamshedpur Utilities and Services

Company (JUSCO). The report has already been approved by DMC and forwarded to the government for cabinet approval. "The mine pit water supply project was widely appreciated by over 700 representatives of more than 106 local bodies from 41 countries who took part in the Indore meeting. Many of them also expressed their desire to implement the same in their respective areas," said Agarwal.

Published in:

[The Telegraph India](#)

CSIR-IIIM holds awareness programme under Aroma Mission

CSIR-IIIM

20th April, 2018



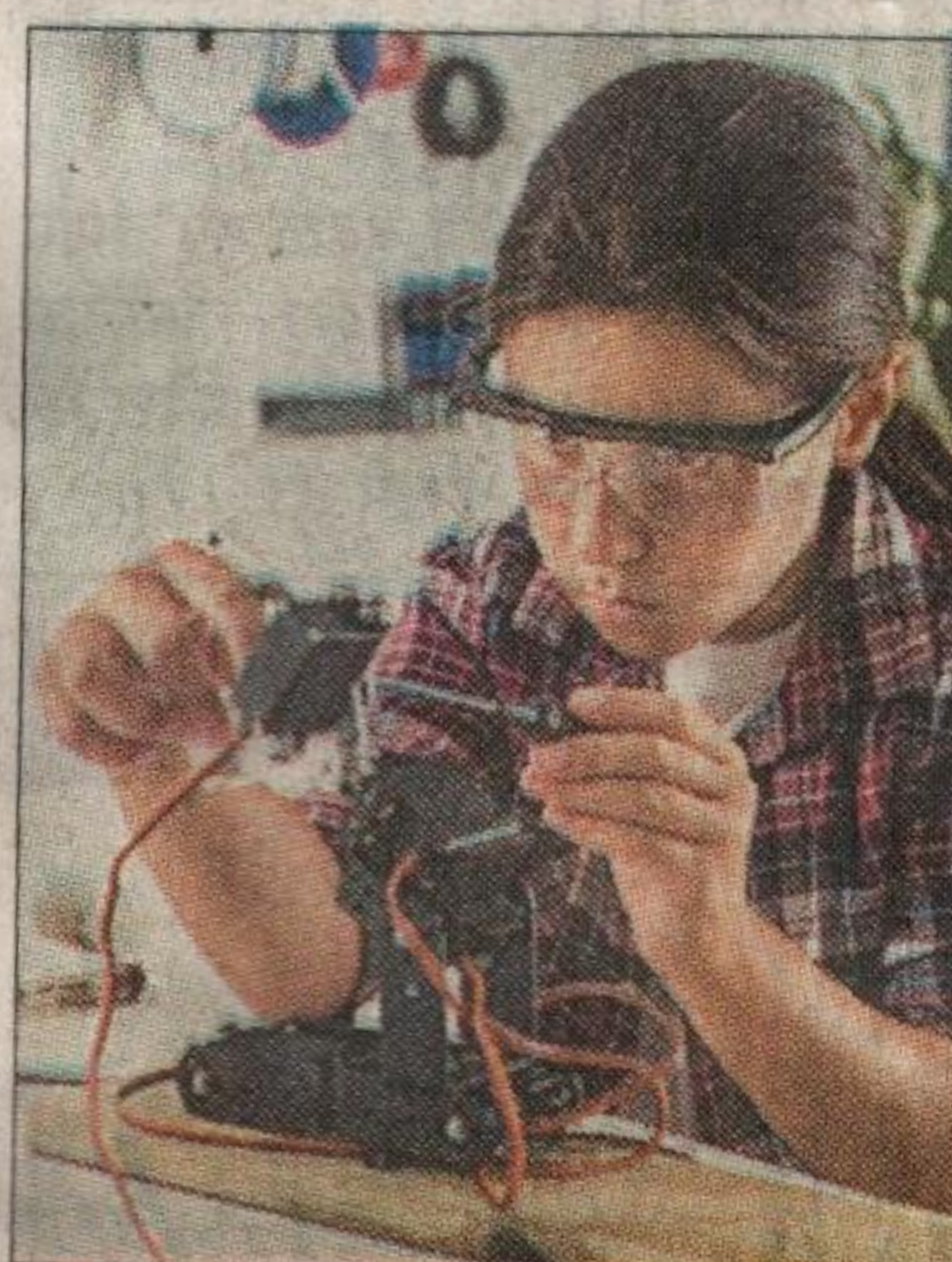
KISHTWAR: CSIR-Indian Institute of Integrative Medicine (IIIM), Jammu in collaboration with J&K Senior Citizens Council and Youth for Peace, Kishtwar on Thursday conducted an awareness programme 'Catalysing Rural Employment through Cultivation, Processing, Value Addition and Marketing of Aromatic Plants' under CSIR-Aroma Mission at Dak Bunglow, here. A team of scientists comprising of Dr. Parvaiz Qazi (IIIM Nodal, CSIR-Aroma Mission), Dr. Sumeet Gairola (IIIM Co-Nodal, CSIR-Aroma Mission), Dr. V.P Rahul, Dr. P. Sultan, Dr. Naveed Qazi and Dr. Vikas Babu interacted with a group of 300 farmers, 200 students and over 200 other participants.

Dr. Naved Qazi welcomed the guest and provided introduction to CSIR-IIIM. Dr. Sumeet Gairola gave detailed introduction about CSIR- Aroma Mission to the participants and thanked them on behalf of Director, CSIR-IIIM, Dr. Ram Vishwakarma. Dr. Parvaiz Qazi shared the details of aromatic crops suitable for Kishtwar District and said that Kishtwar is very suitable for temperate aromatic crops like Lavender, Rosemary, Salvia, etc. He said that Director, CSIR-IIIM, Dr. Ram Vishwakarma is keen to see the cultivation of these crops in Kishtwar and adjacent areas at the earliest. Dr. V.P Rahul, Dr. P. Sultan and Dr. Vikas Babu discussed about the agro technologies developed by CSIR-IIIM. Research scholars from CSIR-IIIM, Anil Raina, Kanwaljeet Singh, Amit Kumar and Shahnawaj Khaki also helped farmers to understand about the CSIR-Aroma Mission. Abdul Majeed Bichoo, State President, J&K Senior Citizens Council facilitated the awareness programme and

informed participants about CSIR-Aroma Mission. Chief Guest of the programme Abrar Ahmad Choudhary, SSP Kishtwar pressed for the need of adopting new systems of farming with latest scientific interventions. Other dignitaries who attended programme were Abdul Salam Bhat, Manmohan Gupta, Riyaz Ahmad Zargar, Jagdish Raj, Ramesh Chandra Sen, Dr. Ashiq Hussain, Advocate N.D Qazi and Showket Ashai.

19th April, 2018

CSIR इनोवेशन अवॉर्ड फॉर स्कूल चिल्ड्रेन-2018



यदि तुम्हें भी नई-नई चीजें खोजने का शौक है, तो इस प्रतियोगिता में भाग ले सकते हो। सीएसआईआर की तरफ से 'सीएसआईआर इनोवेशन अवॉर्ड फॉर स्कूल चिल्ड्रेन-2018' का आयोजन किया जा रहा है। इसमें विद्यार्थियों को विज्ञान और तकनीक पर आधारित अपने विचार और डिजाइन्स को सीएसआईआर के साथ साझा करना होगा। इसमें भाग लेने के लिए प्रतिभागी को हिंदी या अंग्रेजी भाषा में अपने द्वारा की गई नई खोज के बारे में 1000 शब्दों में लिखकर आवेदन करना है। अपना आवेदन 31 मई 2018 तक ciasc.ipu@niscair.res.in पर ईमेल करना होगा अथवा इस पते, हेड इनोवेशन प्रोटेक्शन यूनिट-सीएसआईआर, एन आई एससीआईआर बिल्डिंग, 14, सत्संग विहार मार्ग, स्पेशल इंडस्ट्रियल एरिया, नई दिल्ली-110067 पर पंजीकृत डाक या कोरियर के माध्यम से भी भेज सकते हैं। प्रतिभागी को अपना नाम, पता, कक्षा, जन्मतिथि, खोज का नाम आदि को स्कूल से प्रमाणित कराकर ही आवेदन करना है। प्रतिभागी की उम्र 18 वर्ष से अधिक नहीं होनी चाहिए। इसमें प्रथम 16 विजेताओं को पुरस्कृत किया जाएगा। इसमें प्रमाणपत्र के साथ प्रथम विजेता को 1 लाख रुपये, द्वितीय विजेता को 50 हजार रुपये और तृतीय विजेता को 30 हजार रुपये प्रदान किए जाएंगे। अतिरिक्त जानकारी के लिए <http://www.csir.res.in> देखें।

Published in:

Amar Ujala, Page no. 20

Young innovators display projects the future

CSIR-CSIO

18th April, 2018



CHANDIGARH: The two-day annual Open House organised by the PEC career Development and Guidance Centre began on Tuesday. The Open House serves as a platform for college students to showcase their technical projects. It also aims at offering Tricity school students exposure to possible career paths. Besides, they get an overview of college life, as they visit the college campus to observe and learn from students. As many as 28 technical projects created by final year students from the branches of engineering and 23 projects created by students of various technical societies of the college were displayed near the auditorium and in various departments on the second floor of the college. The projects included driver assisted autonomous vehicles, thought recognition using BCI, bone conduction hearing system, design and fabrication of low speed water tunnel, human powered nebulizer and thin film coating for absorbance beyond visible spectrum, among others. The evaluation panel comprised Dr Navneet Singh Aulakh, senior scientist CSIR-CSIO and Inderdeep Aulakh, faculty member at UIET. Lalit Singla of the [Infosys](#) was part of the circuital branch evaluation team while Udey Kumar, CMD; Owner Essel Sanitary Fittings, Vikas Singla, entrepreneur and Inderpal Sandhu constituted the non-circuital branches evaluation team. The projects categorised under technical societies were evaluated by a separate panel comprising Lalit, Infosys and Inderpal Sandhu. Winners will be honoured with cash prizes worth Rs 83,000. School students will visit the campus to get a

glimpse of college life. Technical projects will also be showcased and students would be given a campus tour. A series of performances exhibiting the cultural side of the college have also been lined up. Students from different branches of engineering developed seven projects.

Published in:
[Times of India](#)

Vice President addresses Scientists of CSIR-North East Institute of Science And Technology

CSIR-NEIST

17th April, 2018



The Vice President of India, Shri M. Venkaiah Naidu has said that science and technology interventions should improve the nutritional status of women and children in underserved areas. He was addressing the scientists and other staff of the CSIR – North East Institute of Science And Technology, in Jorhat, Assam today. The Governor of Assam, Shri Jagadish Mukhi, the Minister for Agriculture, Assam, Shri Atul Bora and other dignitaries were present on the occasion. The Vice President said that Science and Technology can make farmers get more income and enable them to optimally utilize resources like soil and water.

Technology can also help protect forest wealth, reduce pollution and help us lead healthier lives, he added. The Vice President said that one must strive to be among the leaders in the field, accessing applying and adding to the wealth of scientific knowledge. We need to continuously draw inspiration from this lineage and forge ahead in the current world which is witnessing phenomenal changes mediated by science and technology, he added.

Following is the text of Vice President's address: "I am delighted to be with all of you at the CSIR – North East Institute of Science and Technology in Jorhat. I am glad to note the tremendous work done by this Institute right from its inception in 1961 as a multi-disciplinary laboratory harnessing science for development. Glancing at the 120 technologies developed by you, I am impressed at the wide range of activities taken up by you in the fields of biological sciences, material sciences, geo-sciences, engineering sciences and chemical sciences.

You have researched and come up with healthcare herbal formulations like anti-lung cancer, anti-arthritis and anti-fungal products as well as mosquito repellents. I am happy that your research findings have great relevance to farmers. The bio-organic fertilizer and bacterial formulations for crop enhancement and yield improvement as well as bio-remediation of hydrocarbon contaminated soil can contribute to enhanced farm productivity. I am equally impressed by the 'Aroma Mission' you have undertaken since 2017. This will bring significant value addition to the existing agricultural practices in the region and augment farmers' incomes. This is an initiative that holds great promise and needs to be pursued with great zeal and devotion in the next few years. Your research into seismicity of the north east region and your networking of 27 seismic stations is generating valuable data that will be most useful for hazard communication and disaster preparedness. Institutes like yours have a vital role in ensuring that science and technology brings tangible benefits to the people of our country. You have undertaken a challenging mission and you are doing a commendable job. I notice that you are not only focussing on research and product development but also on training and skill development. Your training programmes on mushroom cultivation, vermin compost production, weaving and textile products manufacturing and banana fibre extraction can transform the agrarian economy in many ways. In keeping with the spirit of 'Antyodaya' you have taken up science and technology interventions to improve the nutritional status of women and children in underserved areas. I congratulate the Director and the entire team for making significant progress in your mission. The north eastern region has vast natural resources and incredible bio-diversity. If we can tap into the power of science and technology, we can add considerable value to existing occupation and processes. Science and technology has a powerful transformational potential. It can make farmers get more income, it can enable us to optimally utilize the scarce natural resources like soil and water, it can help protect forest wealth, it can reduce pollution, it can make us lead healthier lives. I am happy that scientists like you are working hard to push the frontiers of science and technology still further. We are a country with long, illustrious scientific heritage. We need to continuously draw inspiration from this lineage and forge ahead in the current world which is witnessing phenomenal changes mediated by science and technology.

We must strive to be among the leaders in the field, accessing applying and adding to the wealth of scientific knowledge. I wish you all success in this noble endeavour. The new India we are dreaming of will be built in the laboratories like yours which connect science with societal development. So as long as you keep this connection alive, you will stay relevant, you will stay energized and take up newer challenges with each passing day.

My greetings to each one of you on your achievements and best wishes for your continued success.

Published in:
[The Education Diary](#)

PEC's open house begins on a high note

CSIR-CSIO

17th April, 2018

The two-day annual open house, organised by the Career Development and Guidance Centre, Punjab Engineering College (PEC), took off on Tuesday. The open house serves as a platform for college students to showcase their technical projects. Around 28 technical projects created by final year students and 23 projects created by students of various technical societies were displayed near the auditorium and in various departments. Some of the projects included Driver-assisted autonomous vehicles, Bone conduction hearing system, Design and fabrication of low speed water tunnel, Human-powered nebuliser and Thin film coating for absorbance beyond visible spectrum.

Dr Navneet Singh Aulakh, senior scientist, CSIR-CSIO, Er Inderdeep Aulakh, faculty member, UIET, Er Lalit Singla, Infosys, are constituting the circuital branch evaluation team while Er Udey Kumar, CMD and owner Essel Sanitary Fittings, Er Vikas Singla, entrepreneur and Er Inderpal Sandhu are constituting the non-circuital branches evaluation team. The projects categorised under the technical societies were evaluated by a separate panel consisting of Lalit, Infosys and Er Inderpal Sandhu.

After a careful consideration by the panel of experts, winners will be announced. They would be honoured with cash prizes worth Rs 83,000, sponsored by Verka and PECOSA, during the prize distribution, which is scheduled for Wednesday. The second day of the open house will begin on Wednesday where students from schools across the tricity would be visiting the campus to get a glimpse of the college life that lies ahead of them. Technical projects would be showcased and the students would be given a campus tour. A series of performances exhibiting the cultural side of the college has been lined up.

Robot to detect flaws on rail tracks

An autonomous robot prepared by final year students of electrical engineering, Kanish Bajaj and Yatharth Ved Bajaj, has been on display. The robot is designed in a way to detect flaws or cracks on railway tracks using infrared and ultrasonic sensor. The major motivation behind the project is the derailments in the past few months.

Projects to help special persons

This project is developed by second year students Jatin, Palak, Ashmeet, Aman and Mukul. It is a wheelchair which can be operated using an application which uses gyro sensor of the phone to move in the desired direction. The robot is designed for physically challenged persons to move and can try to be independent as much as they can. Along with this, they prepared an automated home system to enable better usage to the differently abled.

Published in:
[Research Matters](#)

Kashmir Highly suitable for aromatic plants

CSIR-IIIM

16th April, 2018



In order to improve the farmers' income and also utilize their undulated land, government of India has launched 'Aroma Mission' for the cultivation of aromatic plants in Kashmir Valley. According to experts, Kashmir is highly suitable for growing aromatic plants especially lavender and rose. Muhammad Abu Bakar Siddique, Dean Students Welfare SKUAST-K said to promote the cultivation of aromatic plants in the Kashmir valley, Government of India has launched 'Aroma Mission'. He said Kashmir Valley is highly suitable for plants like rose and lavender. "Kupwara district has been chosen for

cultivation of aromatic plants. SKUAST-K has placed 20 candidates who have done their graduation and post-graduation, working for aroma mission as project assistant," he said. The project belongs to IIIM (Indian Institute of Integrative Medicine) headquartered in Jammu and it has its branch at Sanat Nagar in Srinagar. SKUAST collaborates with the IIIM for its success. Siddique said SKUAST-K runs on farm on 1300 kanals of land at Pulwama for aromatic crops mainly rose and lavender. "Rose, Lavender, Clary Sage, Tagetus are main crops which are indigenous to the Kashmir. We have large number of flowers which emanate aroma but they have not been thoroughly worked out on. We need to explore and find out aromatic crops which can be commercialized in the Kashmir valley. It can prove to be beneficial in increasing the livelihood security of the people in the valley," he said. He said that aromatic plants can be grown under rain fed conditions so they don't need

much more irrigation process and also can be grown on waste land which is abundantly available in Valley. “Nearly 100 farmers are associated with the aroma farming. We obtain 2 kg of aroma oil out of 1 kanal of cultivated land is worth RS 20000.” He said Lavender is in high demand and does not contract any sort of disease. “Lavender is not consumed by any animal so it can be grown easily in any place,” he added. Budgam, Pulwama, Kupwara, Manasbal and Anantnag are the dominant places where aromatic plants grow. He added the oils extracted from these crops are used in detergents, soaps, perfume industries, rose water, in medicines and especially in aroma therapy. “The products we get from aromatic plants are also exported to other states of India and abroad.” He said cultivation of aromatic plants can generate lot of employment as its products like oils can be exported to others places. “We have the potential to start our small scale units. We can use these plants to generate employment and create the final product.”

Published in:
[Rising Kashmir](#)

Dr B.R. Ambedkar Jayanti celebrated at CSIR-IMMT

CSIR-IMMT

15th April, 2018



Bhubaneswar: 127th Dr. B R Ambedkar Jayanti has been celebrated at CSIR-Institute of Minerals and Materials Technology, Bhubaneswar with 350 participants, among them, 100 students from different Schools of Bhubaneswar were attended the function. Prof. S. Basu, Director of CSIR-IMMT, Bhubaneswar has given welcome address and Chief Guest of the function Padmashree Tulasi Munda has addressed the gathering on Dr. B.R. Ambedkar and also motivated the school children by presenting study materials to them, donated by this Institute with SC/ST Employees Welfare Organization. Chief Speaker, Shri. Dilip Kumar Behera,

President, Human Resource Development & Power Centre, New Delhi, National general secretary all India confederation of SC/ST organization, New Delhi has delivered the key note address on “Life history of Dr. B.R. Ambedkar and need for development of weaker section” and distributed prizes for the toppers of the U.P. School and winners of different competitions.

Director has felicitated the SC/ST employees and their children for their significant achievement in different field – Dr. S.K. Behera, for receiving the Ph.D degree and Mr Satya Sourav Dhal s/o Dr N.K.Dhal qualified in medical entrance conducted by NEET and took admission in SCB Medical College, Cuttack during the year 2017. Shri B D Mahalik, COA is also address gathering on Dr B. R. Ambedkar.

R. Sakthivel, Principal Scientist & President of SC/ST Employees Welfare Organization. has reported the various activities of welfare

organization and at the end vote of thanks has been given by Dr. Santosh Kumar Behera, Scientist & General Secretary of SC/ST Employees Welfare Organization.

Published in:
[Orissa Diary](#)

NASI organises Medical Camp at Chrugora

CSIR-NML

15th April, 2018



Jamshedpur, April 15 : In an attempt to take the fruits of science and technology to the grass root population of the state, Jharkhand State Chapter of National Academy of Sciences, India (NASI) in association with Faith in India and CSIR NML organized a health checkup camp at village Chirugora of Gorabandha Block of East Singhbhum district. Natives of the village participated in the camp with great interest. Preliminary health screening of about 80 people was carried out in the camp, majority of them being women. The camp offered free blood tests including sugar and hemoglobin along with weight,

blood pressure and respiration test. Basic medicines were also distributed to the patients. Dr Arvind Kumar Arya, Senior Medical Officer, CSIR NML, Sister Francy Jacob, CSIR NML and a team of paramedical personals from FAITH in India under the leadership of Mrs AnamikaMajumdar organized all the camp related activities. Dr ArvindSinha, Chairman of Jharkhand State Chapter of NASI, expressed his view on higher frequency of such camps and a plan for follow-up action. This cam was organized under the NASI sponsored project, entitled “Health-Hygeine and Nutrition Solutions to tribal of Jharkhand”.

Published in:
[Avenue Mail](#)

Akola River cleaned, set for facelift after 92-day hard work

CSIR-NEERI

15th April, 2018



NAGPUR: The ‘Clean Morna River’ campaign, a citizen’s initiative that began three months ago, will culminate in Akola on Sunday. Almost seven out of eight kilometre stretch has already been made free of solid waste and weeds, and remaining one kilometre patch of the heritage river, which had been rotting for the last over 50 years, will be cleaned of the garbage on Sunday. The first-of-its kind campaign started on January 13 when more than 6,000 people of Akola and nearby places took the pledge of reviving the river. “Magnetically attracted” to the initiative, Prime Minister Narendra Modi lauded the effort on his ‘Mann Ki Baat’

programme. Till now, around 35,000 people, including senior citizens, housewives, NGOs, schoolchildren, youngsters and professionals from various fields, have been a part of the campaign. Around 5,000 people are expected to turn up on Sunday to witness the community reaping the benefit of their hard work. “This will be the last day of public participation. After this, work of riverfront development will continue from May onwards,” Akola district collector Astik Kumar Pandey, the torchbearer of the campaign, said. As part of the development plan, over 10 ghats will be constructed on the lines of Sabarmati riverfront project. Apart from this, two gardens, walking path, restaurants and a chaupati will also be made. “Till now, we have received donations of Rs20 lakh. We also plan to install LED street lights alongside the river,” Pandey said. To ensure continuous cleaning of the lake, the authorities have prepared a special garbage cleaning boat.

“We have modified an old paddle boat, a JCB and a crane. As water weeds have a tendency to grow again, we will use these machine for cleaning the lake regularly,” Pandey said. At the eight major drains which were polluting the river, solid waste is being trapped. To further ensure that only clean water enters Morna, the administration will be using the phytorid wastewater treatment plant which is the patented technology of Nagpur-based National Environmental Engineering Research Institute (Neeri). Another technology called ‘bio-sanitiser’ will also be used.

The district administration is also aiming at finding a place in the Golden Book of World Records. “We are applying for three categories — maximum number of citizens’ participation on a single day, women’s participation and overall citizens’ participation in large numbers,” sub-divisional officer Sanjay Khadse, who is also the project’s nodal officer, said.

As reported by TOI earlier, the success of Akola’s ‘Clean Morna River’ campaign has prodded the state government to take up rejuvenation of rivers. In its fourth budget presented in the assembly last month, the state government has allotted Rs27 crore for cleaning and beautification of the state’s water resources.

IGIB shows how fat cells protect TB bacteria from oxidative stress

CSIR-IGIB

14th April, 2018



The team studied fat cells and their precursors which have relatively less fat content

Dormant and actively dividing TB bacteria form distinct groups with very different susceptibility to anti-TB drugs. Now, researchers from the Institute of Genomics and Integrative Biology (CSIR-IGIB), Delhi, have found that even among the actively dividing bacteria, the essentiality of TB genes varies depending on whether the bacteria reside in fat-rich environment or not. The team led by Dr. Sheetal Gandotra also found inherent synergy between fat and iron in host cells providing the bacteria resilience to oxidative stress.

Tuberculosis bacteria are known to also reside in lipid-rich environments, both within and outside the cells, where they end up once they multiply within and bring about cell death. To better understand the physiology of the bacteria in such an environment, the researchers studied fat cells (adipocytes) and their precursors (preadipocytes) which have relatively less fat content.

Besides thriving and multiplying inside both cell types and killing them, the bacteria also thrives on dead cellular environment. “This is similar to the extracellular environment that supports bacterial growth in TB lesions,” says Dr. Gandotra who is the corresponding author of a paper published in the journal *Infection and Immunity*.

Since the fat content in both the cell types (adipocytes and preadipocytes) are very different, the researchers questioned whether pathways that bacteria employ to survive in these cell types are also different. They undertook gene-expression studies to answer this question. Their analysis showed that

genes responsible for iron intake were less expressed in bacteria found in adipocytes than in preadipocytes, suggesting higher iron concentration in fat cells. High fat and iron A series of investigations showed that indeed the high fat content is associated with higher iron also. “But as high iron also induces oxidative stress, we hypothesised that bacteria in the adipocyte environment might be making the bacteria resilient to oxidative stress,” says Dr. Gandotra. The researchers experimentally tested their hypothesis by using TB mutant bacteria which are sensitive to iron-mediated oxidative stress. “We found the mutants growing unhindered in adipocytes though they are rich in iron but unable to grow in preadipocytes which are not iron-rich. This proved that the adipocyte environment was providing protection to TB bacteria from iron-mediated oxidative stress,” says Ananya Nandy from IGIB and first author of the paper. The researchers do not yet know the complete mechanism by which TB bacteria mitigates oxidative stress. “But fat from the adipocytes may be involved in providing resistance to oxidative stress,” says Dr. Gandotra. When there is excess cell necrosis (death of cells) there is accumulation of lipids within the granuloma. The researchers carried out mouse infection studies to test the link between lipid accumulation and iron storage in the granuloma. “The mouse infection studies showed that when there is excess fat there is excess accumulation of iron-storage protein in the granuloma. This provided a clue to the link between lipid accumulation and iron storage,” says Nandy. Nutrients “Our work sheds light on the link between macro (fat) and micro (iron) nutrients in a tissue. And different regions of a tissue will have different levels of availability of these nutrients. Tuberculosis bacteria have the ability to adapt to each condition,” says Dr. Gandotra. “This probably is the reason why it is difficult to treat tuberculosis because the genes essential for survival of the bacteria in one environment will not be essential in another region of the granuloma.” Also, anti-tuberculosis drug isoniazid, which kills TB bacteria by inducing oxidative stress, is not effective against bacteria that grow in fat cells (adipocyte). So inhibiting the pathways essential for reducing oxidative stress in fat-rich environment can possibly make isoniazid drug more efficacious.

Published in:
[The Hindu](#)

CSIR-CSIO

13th April, 2018

Optical metrology unit inaugurated at CSIO

CHANDIGARH: CSIR-CSIO director RK Sinha inaugurated the state of art optical metrology facility at Central Scientific Instruments Organisation here on Thursday. CSIO has equipped itself with contemporary optical fabrication facilities such as CNC optical grinding and polishing machines, two and three axis diamond turning machines and magneto-rheological finishing machine.

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Hindustan Times

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