CSIR IN MEDIA

सीएसआईआर
CSIR
भारत का नवाचार इंजन
The Innovation Engine of India

NEWS BULLETIN
11 TO 15 OCTOBER 2024

Compiled by Science Communication and Dissemination Directorate (SCDD), CSIR, Anusandhan Bhawan, New Delhi

International Training program on Deep Sea Minerals at CSIR-IMMT, Bhubaneswar

CSIR-IMMT

15th October , 2024

The International Training Program on Deep Sea Minerals was officially launched today at SS Bhatnagar Hall, CSIR-IMMT, Bhubaneswar. Dr. Ramanuj Narayan, Director of CSIR-IMMT, inaugurated the program, joined by Dr. Kali Sanjay, Head of the Hydro & Electrometallurgy Department, CSIR-IMMT, Mr. P.K. Dash, Administrative Officer, CSIR-IMMT along with esteemed participants and guests.

Speaking on this occasion, Dr. Ramanuj Narayan, Director of CSIR-IMMT, said, CSIR-Institute of Minerals and Materials Technology (CSIR-IMMT) plays a crucial role in advancing metallurgical technologies for seabed minerals, in collaboration with the Ministry of Earth Sciences (MoES), Government of India. Fifteen international participants from countries including Kenya, Tanzania, Ghana, Nigeria, Sri Lanka, Madagascar, and Jamaica are attending this training, which will be conducted by scientists from CSIR-IMMT. Representatives from the Geological Survey of India (GSI), Indian Bureau of Mines (IBM), National Institute of Ocean Technology (NIOT), and National Centre for Polar and Ocean Research (NCPOR) are also part of the program, which runs until 26th October 2024.

The seabed resources are vital for extracting critical elements like nickel, cobalt, and tellurium, as well as commercial metals such as copper and manganese, which are essential for various industries, particularly in the clean energy sector. The deep sea minerals, Polymetallic Nodules (PMN), Polymetallic Sulphides (PMS) and Polymetallic Cobalt Crusts (PCC) are important for future technological demands.

Under the Ministry of Earth Sciences, India holds exploration contracts with the International Seabed Authority (ISA) for 75,000 sq. km of Polymetallic Nodules and 10,000 sq. km of Polymetallic Sulphides in the Indian Ocean. This necessitates the development of advanced technological capabilities for sustainable extraction processes. CSIR-IMMT is at the forefront of this initiative, focusing on PMN extraction and processing methodologies for PMS.

Aligned with its commitments to the ISA, CSIR-IMMT, in partnership with MoES, provides training to international candidates from developing nations. Coordinated through NIOT in Chennai and NCPOR in Goa, the program covers key topics such as characterization, mineral processing, and extractive metallurgy. These sessions are specifically focusing on mineral processing, equipping participants with essential knowledge and practical skills.

This international training initiative highlights CSIR-IMMT's strategic role in bolstering India's exploration efforts and fostering global collaboration in resource extraction. By building capacities and sharing expertise, CSIR-IMMT, through MoES, continues to enhance India's position as a leader in seabed mineral exploration and metallurgy.

Published in:
Indiaeducationdiary

Studies zero in on biology TB bacteria use to evade immune response

CSIR-CCMB

15th October , 2024

Tuberculosis (TB) is a major focus in India's healthcare goals. The country is steadily improving its ability to diagnose and track TB patients and help them adhere to the long course of antibiotics required to treat it. But with increasing antimicrobial resistance in Mycobacterium tuberculosis (Mtb), the pathogen that causes TB, many existing antibiotics aren't working as effectively to kill it. So researchers are studying Mtb to identify its important proteins and then design new drugs that can act against them.

A companion over millennia

This is not an easy problem to solve. The pathogen has co-evolved with humans for millennia. Researchers have found the Mtb complex was present as long as 70,000 years ago. Such a long relationship between the two species has allowed the microbe ample time to evolve and trick the human immune system in many ways.

One of them is its ability to grow in macrophages. The first line of human immune cells that destroy many other invading microorganisms are actually Mtb's home. Macrophages are designed to engulf foreign particles, including microbes. They can initiate a plethora of chemical reactions involving peroxides, free radicals, and other compounds that break down the engulfed particle or microbe. These reactions often collectively induce a state called oxidative stress and alter the chemical nature of molecules, including the DNA, the RNA, and/or the proteins of life-forms, rendering them dysfunctional or even literally broken up. Macrophages also use diverse strategies to starve the engulfed microbes of essential nutrients, eventually killing them.

But these techniques don't work against Mtb. Mtb keeps itself protected in clusters called tubercles (hence the name of the disease) surrounded by lipids (fatty substances) in the lungs. Though it's a respiratory pathogen, it has been known to spread to various other tissues. It

can also stay dormant in the cells for a long time, up to a few decades, without causing disease or spreading to other people.

Enzymes of particular interest

Researchers believe Mtb's many survival abilities are a result of its large genome, consisting of 4.4 million base pairs. To compare, the respiratory bacteria Staphylococcus aureus has 2.8 million base pairs and Streptococcus pneumoniae, 1.9 million to 2.7 million. A larger genome means more proteins. Scientists are yet to understand the role of many Mtb proteins — but they believe Mtb's genetic and protein machinery allows it to lead an independent life once it finds a home inside the macrophages.

Scientists are intrigued by whatever allows Mtb to survive and persist in the macrophage's hostile environment and are on the lookout for proteins that shield it. One category of proteins called the cysteine synthase enzymes is of particular interest. They help cells synthesise cysteine, a sulphur-containing amino acid. Cells use cysteine to make antioxidants, whereby the sulphur disrupts the reactions that cause oxidative stress.

Where there's a Cys, there's a way

A study published on August 29 in the journal eLife by researchers at the CSIR-Centre for Cellular and Molecular Biology (CCMB), Hyderabad, explored the role of different cysteine synthases in Mtb. The researchers grew Mtb in a bacterial growth medium and restricted its access to nutrients. Then they created oxidative stress conditions in the dish (by adding certain compounds) and looked for genes whose expression patterns changed as a result. This is how they found Mtb's cysteine synthase genes are expressed more during oxidative stress.

Mtb has at least three cysteine synthase enzymes. They make cysteine in cells through different chemical reactions. The scientists found that two of the enzymes, called CysK2 and CysM, significantly influenced the microbe's survival during nutritional deficiency and oxidative stress. They also found Mtb's ability to produce various antioxidants was impaired when the researchers knocked out the genes used to make either of the two synthases.

It is nearly impossible to get human lung tissue to infect for an experiment. Instead, the researchers infected mice with the wild-type Mtb and mutant Mtb. After allowing the bacteria time to infect the mice and for the mice immune systems to respond, they measured the amount of bacteria in the two groups. They found the wild-type Mtb survived better in the mice than the mutant Mtb. They also found similar effects when they infected just macrophages from the lungs and the spleen. (The spleen is the first organ after the lungs organ Mtb infects, by moving through the bloodstream.)

When the research team checked the pathogen's survival in mice mutated to not develop oxidative stress, they found it didn't matter if Mtb had the cysteine sythases. That is, Mtb with and without the cysteine synthases grew equally well in such mice.

Undermining Mtb's survival

A study in 2017 by researchers at the Karolinska Institute, Stockholm, had reported a list of 71 compounds that could inhibit the cysteine synthases. Researchers at Vinay Nandicoori's lab at CCMB tested these compounds against Mtb and found they all inhibited Mtb to some extent. Fortuitously, these inhibitors also made isoniazid, a known bacteria-killing drug, more potent against Mtb and together made for a strong antibiotic cocktail. Humans don't have cysteine synthase enzymes, so these inhibitors could be promising targets for new antibiotics.

The study was conducted together with Luiz Pedro Sorio de Carvalho's lab at the Francis Crick Institute, London.

In addition to cysteine synthases, scientists around the world are studying other ways Mtb survives the macrophage environment. For example, they are examining the roles of phosphates and carbon metabolism, which are central to Mtb's life-cycle. Some are exploring how Mtb develops a cell wall strong enough to withstand oxidative stress. Some groups are unearthing details about how Mtb stops the production of molecules that lead to oxidative stress; trick a host macrophage into secreting damage-repair molecules (which macrophages produce to protect and revive immune cells from oxidative stress) sooner; or stay in the

macrophages without activating its immune responses.

Through many doors at once

Some interesting new studies have also revealed how the bacteria erase the epigenetic memory of macrophages, i.e. healthy macrophages' ability to make chemical changes to their genomes and pass it on to their daughter cells. This ability allows the new cells to identify an ongoing or a past infection and get rid of it faster. Without this memory, newly formed macrophages aren't preconditioned to face an Mtb infection.

All these studies are together demystifying Mtb, like keeping many doors open through which to chase out the TB menace. For these possibilities to actually translate into treatments in the market, there are many unfulfilled steps — including finding ways to perform these studies with human cells — and India needs to focus on them.

Published in:
The Hindu

CSIR-CIMAP practices helping menthol mint farmers boost yield

CSIR-CIMAP

14th October , 2024

Practices promoted by the Council for Scientific and Industrial Research – Central Institute of Medicinal and Aromatic Plants (CSIR-CIMAP) are helping farmers combat the threat posed by synthetic menthol to menthol mint farmers.

Menthol mint is a specific breed of mint which is rich in menthol oil. The country is a global leader in menthol mint production.

Synthetic menthol is made after utilising fossil fuels and is cheaper than the natural menthol. Menthol is cultivated over more than 3,50,000 hectares in the Indo-Gangetic plains and over 6 lakh families are involved in growing menthol mint.

“Over 40,000 tonnes of menthol mint worth about ₹3,000 crore is produced in the country every year, of which 28,000 tonnes is produced in Uttar Pradesh and 11,000 tonnes in Lucknow and nearby districts including – Barabanki, Sitapur and Hardoi,” said scientist Alok Kalra.

In the past, the institute has evolved various varieties like - Saksham, Kushal, Saryu, CIM-Kranti, and CIM-Unnati which has an increased amount of menthol oil than other varieties and at the same time these varieties can be cultivated early.

These days, the CSIR-CIMAP, as part of Aroma Mission, is working to create a sustainable cluster in Barabanki. The sustainable clusters will be further increased with time, said CSIR-CIMAP director Prabodh Trivedi.

“We are promoting technologies that are economically, socially and environmentally sustainable among farmers so that they continue to produce menthol mint and compete with

the prices of sustainable mint in the market while making money through different activities in their farms. We have introduced a high-yielding variety of menthol mint CIM Unnati along with Early Mint Technology among farmers which involves planting of saplings of ridges, use of UAV and hyperspectral camera for vigilance over fields and drones for sprinkling fertiliser and pesticides," said Trivedi.

When the plants are planted on ridges the water can easily be distributed in the field which at the same time helps in preserving water.

Early mint technology promotes faster plant growth and can help farmers achieve two harvests before the monsoon. While the technological intervention through UAV and hyperspectral cameras helps farmers estimate the time for harvest and application of liquid fertiliser and pesticides through drones helps in saving time and reduces the use of chemicals, he said.

"Farmers can obtain 20% more oil using the technologies promoted by CSIR-CIMAP. The farmers are taught ways to distill the menthol using solar energy and use the waste generated to produce mushrooms which can help in additional income generation, and later, the remaining waste for making vermicompost. They are also promoted to practise apiculture and later use beeswax to make candles," said Trivedi.

Published in:
Hindustantimes

सीएसआईआर
CSIR
भारत का नवाचार इंजन
The Innovation Engine of India

नवजात में गंभीर पीलिया के इलाज के लिए विश्व में पहली बार पीजीआई ने सीएसआईआर-सीएसआईओ के साथ मिलकर बनाई खास डिवाइस

CSIR-CSIO

13th October , 2024

नवजात में गंभीर पीलिया के इलाज को आसान बनाने के लिए पीजीआई के विशेषज्ञों ने पहली बार सीएसआईआर-सीएसआईओ (सेंट्रल साइंटिफिक इंस्ट्रूमेंट्स आर्गेनाइजेशन) के साथ मिलकर एक विशेष डिवाइस बनाई है। इन बच्चों में खून बदलने की प्रक्रिया के लिए तैयार डबल वॉल्यूम एक्सचेंज ट्रांसफ्यूजन डिवाइस से अब ढाई घंटे का काम 45 मिनट में पूरा हो सकेगा। वहीं, इसमें गलती की गुंजाइश भी नहीं रहेगी। पीजीआई और सीएसआईओ के 5 वर्षों के शोध को विश्वभर ने सराहा है। डिवाइस के पेटेंट के बाद ट्रांसफर ऑफ टेक्नोलॉजी की प्रक्रिया पूरी कर इंडस्ट्री पार्टनर के साथ बाजार में उतारने की प्रक्रिया शुरू कर दी गई है। पीजीआई के एडवांस पीडियाट्रिक सेंटर के प्रो. सौरभ दत्ता और सीएसआईओ के वैज्ञानिक डॉ. संजीव वर्मा ने बताया कि मैनुअली चार स्टेप में की जाने वाली प्रक्रिया को दो स्टेप में पूरा किया जा सकेगा। अगर किसी भी स्तर पर चूक हुई तो तत्काल सेंसर आगाह करेगा। जैसे-जैसे प्रक्रिया पूरी होगी डिवाइस पर डिसप्ले होगा। प्रो. सौरभ दत्ता ने बताया कि मैनुअली इस प्रक्रिया में लगभग ढाई घंटे का समय लगता है। प्रक्रिया के दौरान कम से कम एक डॉक्टर और एक नर्स तैनात रहते हैं। एक-एक प्रक्रिया को लगातार चार्ट पर लिखना होता है कि कितने साइकिल हो गए। इस दौरान गलती होने का खतरा रहता है। इस जटिलता को देखते हुए स्थिति को ऑटोमैट करने पर विचार किया गया। जिसमें एक मशीन में ये सारी प्रक्रिया फीड की गई कि कितने देर में खून निकालना है, कोई एयर बबल अंदर न जाए, क्लॉट न हो, ब्लड सेल ब्रेक न हो। क्योंकि नवजात के लिए एयर बबल बेहद खतरनाक साबित हो सकता है। ये नवजात के हृदय के अंदर बने कनेक्शन के माध्यम से ब्रेन तक पहुंच जाता है। उस स्थिति में अगर वो बबल फंस गया तो खून जम सकता है। इससे तत्काल स्ट्रोक हो सकता है। इस डिवाइस को बनाने में सीएसआईआर-सीएसआईओ के डॉ. अरिंदम चटर्जी का भी योगदान रहा।

Published in:
Amarujala

IIIM inks pact with HAPICO Industries, IGC for joint products development

CSIR-IIIM

12th October , 2024

The CSIR-Indian Institute of Integrative Medicine (IIIM) Jammu, and M/s HAPICO Industries Private Limited, IGC, have entered into a Memorandum of Understanding (MoU) to collaborate on products testing/quality control, quality assurance, and the joint development of novel healthcare and nutraceutical products. According to a CSIR-IIIM spokesperson, this collaboration aims to leverage CSIR-IIIM's expertise in quality control and quality assurance and HAPICO's proficiency in the development of agri and nutraceutical products. Farmers in the local region of UT of J&K may also benefit from this collaboration, as it will contribute to the growing agri-economy of the UT.

During the MoU signing event, Dr Zabeer Ahmed, Director of CSIR-IIIM, expressed keenness about the new partnership with HAPICO. "This collaboration perfectly aligns with CSIR-IIIM's mission to translate scientific discoveries into practical applications," he remarked, adding: "By leveraging HAPICO's industry expertise, we aim to harness the full potential of our resources, fostering both economic growth and environmental sustainability." He further emphasized that this innovative partnership will significantly benefit local farmers by empowering them to enhance the value of their crops, develop new products, and access larger markets.

HAPICO, recognized for its pioneering efforts in the industry, views this collaboration as a strategic step towards expanding its product portfolio and accelerating growth in the sector. "With the scientific expertise of CSIR-IIIM, HAPICO is positioned to create innovative and

sustainable solutions that cater to the evolving needs of the market," said Shabir Ahmed, Managing Director of HAPICO.

The signing ceremony was attended by key officials and researchers from both organizations, underscoring their mutual commitment to fostering scientific collaboration and driving innovation in the aromatic industry. The event was organized by the CSIR-IIIM Aroma Mission Team, under the supervision of Er Abdul Rahim, Chief Scientist & Head, RMBD&IST, and BDG, and Nodal Scientist, and Dr Love Sharma, along with Er Ankush Varma, Coordinator, IIIM-TBI.

Published in:
Dailyexcelsior

IIIM celebrates 83rd CSIR Foundation Day

CSIR-IIIM

11th October , 2024

The CSIR-Indian Institute of Integrative Medicine (IIIM) today marked the 83rd Foundation Day of the Council of Scientific and Industrial Research (CSIR) with enthusiasm. CSIR, India's largest research and development organization, boasts a network of 38 national laboratories. A statement said that Dr Jitendra Sharma, Managing Director and Founder CEO of Andhra Pradesh MedTech Zone (AMTZ), Hyderabad, delivered the keynote lecture on "Medical Technology and Universal Health Coverage."

He stressed the importance of affordable healthcare technologies and the need for collaborative research between CSIR-IIIM and AMTZ in the fields of medical devices and drug discovery. CSIR-IIIM Director Dr Zabeer Ahmed introduced Dr Sharma and highlighted AMTZ's rapid establishment as a key player in the medical devices sector. He noted that AMTZ was set up in just 342 days under Dr Sharma's leadership. During the event, employees who retired in the past year and staff members who completed 25 years of service were honoured with Samman Patra and mementoes. Additionally, saplings were planted at the institute as part of the "Ek Ped Maa Ke Naam" (Plant4Mother) campaign. The event was attended by prominent scientists and officials, including Dr Asha Chaubey, Dr Sumit Gandhi, Dr Qazi Naveed Ahmed, Dr Shashank Singh, and others. Dr Gurleen Kaur hosted the proceedings, and Abdul Rahim delivered the formal vote of thanks.

Published in:

Dailyexcelsior

सीएसआईआर
CSIR
भारत का नवाचार इंजन
The Innovation Engine of India

Please Follow/Subscribe CSIR Social Media Handles

CSIR INDIA

CSIR_IND

CSIR India

CSIR India

csirindia

CSIR India