SOUVENIR

Golden Jubilee Celebrations

1965 2015 स्वर्ण जयन्ती

50 Years of Service to the Nation

सीएसआईआर-भारतीय विषविज्ञान अनुसंधान संस्थान

CSIR-INDIAN INSTITUTE OF TOXICOLOGY RESEARCH

Souvenir

Golden Jubilee Celebrations

CSIR-Indian Institute of Toxicology Research
(Council of Scientific & Industrial Research)

Vishvigyan Bhavan, 31, Mahatma Gandhi Marg
Post Box No. 80, Lucknow-226001, India

Messages

शमीमा सिद्दिकी
SHAMIMA SIDDIQUI
भारत के राष्ट्रपति की उप प्रेस सचिव
Deputy Press Secretary
to the President of India

राष्ट्रपति सचिवालय,
राष्ट्रपति भवन,
नई दिल्ली-110004.
PRESIDENT'S SECRETARIAT,
RASHTRAPATI BHAVAN,
NEW DELHI - 110004.

संदेश

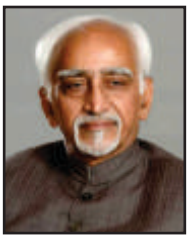
भारत के राष्ट्रपति, श्री प्रणब मुखर्जी को यह जानकर प्रसन्नता हो रही है कि सीएसआईआर- भारतीय विषविज्ञान अनुसंधान संस्थान, लखनऊ 4 नवंबर, 2015 को अपना स्वर्ण जयंती समारोह आयोजित कर रहा है तथा इस अवसर पर स्मारिका का प्रकाशन भी किया जा रहा है।

राष्ट्रपति जी स्वर्ण जयंती समारोह तथा स्मारिका के सफल प्रकाशन के लिए अपनी शुभकामनाएं प्रेषित करते हैं।

राष्ट्रपति की उप प्रेस सचिव

Tel. (O) : 91-11-23793528 (Direct), 91-11-23015321 Extn. 4442 , Fax : 91-11-23010252
E-mail : message-rb@rb.nic.in

भारत के उप-राष्ट्रपति के विशेष कार्य अधिकारी
OFFICER ON SPECIAL DUTY
TO THE VICE-PRESIDENT OF INDIA
नई दिल्ली/NEW DELHI - 110011
TEL.: 23016422 / 23016344 FAX : 23012645



संदेश

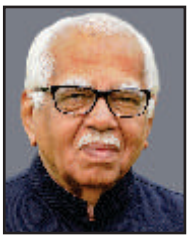
महामहिम उपराष्ट्रपति जी को यह जानकर प्रसन्नता हुई है कि वर्ष 1965 में प्रो. सिब्ते हुसैन ज़ैदी, संस्थापक निदेशक के कुशल नेतृत्व में स्थापित सीएसआईआर-भारतीय विषविज्ञान अनुसंधान संस्थान, लखनऊ द्वारा दिनांक 04 नवंबर, 2015 को अपने "स्वर्ण जयंती समारोह" का आयोजन किया जा रहा है तथा इस अवसर पर एक "स्मारिका" का प्रकाशन भी किया जा रहा है जो निश्चय ही एक प्रशंसनीय कार्य है।

उपराष्ट्रपति जी सीएसआईआर-भारतीय विषविज्ञान अनुसंधान संस्थान, लखनऊ के सभी पदाधिकारियों, प्राध्यापकों और कर्मचारियों को अपनी हार्दिक शुभकामनाएँ प्रेषित करते हैं तथा आयोज्य "स्वर्ण जयंती समारोह व स्मारिका" की सफलता हेतु अपनी शुभकामनाएँ संप्रेषित करते हैं।

(अंशुमान गौड़)

नई दिल्ली
23 अक्तूबर, 2015

राम नाईक
राज्यपाल, उत्तर प्रदेश



राज भवन
लखनऊ 226 027

19 अक्टूबर, 2015

सन्देश

मुझे यह जानकर अत्यन्त प्रसन्नता हुई कि भारतीय विष विज्ञान अनुसंधान संस्थान, लखनऊ द्वारा 04 नवम्बर, 2015 को अपना स्वर्ण जयंती समारोह आयोजित किया जा रहा है। इस अवसर पर एक स्मारिका भी प्रकाशित की जा रही है।

मुझे खुशी है कि भारतीय विष विज्ञान अनुसंधान संस्थान द्वारा व्यावसायिक, औद्यौगिक और पर्यावरिक विष विज्ञान के साथ-साथ मानव स्वास्थ्य के सुधार हेतु महत्वपूर्ण योगदान किया जा रहा है। संस्थान ने कई राष्ट्रीय चुनौतियों का सामना किया है।

मैं संस्थान के सभी अधिकारियों एवं कर्मचारियों को स्वर्ण जयन्ती की बधाई देता हूँ। इसके साथ ही स्वर्ण जयन्ती समारोह के सफल आयोजन की कामना करता हूँ।

(राम नाईक)

दूरभाष : 0522-2620494-95, 2236497-98, 2236992, 2620331, 2620316, 2236093, फैक्स : 0522-239488
ई-मेल : hgovup@nic.in वेबसाइट : www.upgovernor.gov.in

डॉ. हर्ष वर्धन
DR. HARSH VARDHAN

सत्यमेव जयते

मंत्री
विज्ञान और प्रौद्योगिकी एवं पृथ्वी विज्ञान
भारत सरकार
नई दिल्ली - 110001

MINISTER
SCIENCE & TECHNOLOGY AND EARTH SCIENCES
GOVERNMENT OF INDIA
NEW DELHI - 110001

संदेश

यह हर्ष तथा गौरव का विषय है कि सीएसआईआर - भारतीय विषविज्ञान अनुसंधान संस्थान, लखनऊ दिनांक 4 नवंबर, 2015 को अपना स्वर्ण जयंती समारोह आयोजित कर रहा है। राष्ट्र की प्रगति में समर्पित संस्थान के सभी सदस्यों को स्वर्ण जयंती के अवसर पर बधाई देता हूँ।

"पर्यावरण एवं स्वास्थ्य की सुरक्षा तथा उद्योग की सेवा" के अपने उद्देश्य को संस्थान सार्थक कर रहा है। समकालीन विज्ञान के क्षेत्र में अद्यतन विकास को समाहित कर अपने अनुसंधान और विकास को वैश्विक विज्ञान के समतुल्य करने में संस्थान का प्रयास सराहनीय है। राष्ट्र के औद्योगिक, पर्यावरण संबंधी, व्यवसायिक एवं जन- स्वास्थ्य की सुरक्षा के प्रमुख राष्ट्रीय कार्यक्रमों में संस्थान की अग्रणी भूमिका से देश उन्नति के पथ पर अग्रसर है। देश में जल एवं वायु प्रदूषण की समस्या के निराकरण में संस्थान ने महत्वपूर्ण योगदान दिया और यह प्रयास निरंतर जारी रहना चाहिए।

संस्थान ने विषविज्ञान, पर्यावरण, खाद्य तेल, स्वच्छ पेयजल, गंगा, यमुना जैसे सभी राष्ट्रीय मिशनों में सराहनीय योगदान दिया है। भोपाल गैस, लातूर, उड़ीसा चक्रवात जैसी राष्ट्रीय आपदा के समय संस्थान के वैज्ञानिकों ने उल्लेखनीय भूमिका निभाई है। मुझे आशा है कि भारत सरकार के स्वच्छ भारत, मेक इन इंडिया, डिजिटल इंडिया, नमामि गंगे जैसे राष्ट्रीय कार्यक्रमों में संस्थान का बहु-विषयक योगदान होगा।

आने वाले समय में बदलती खाद्य प्रवृति एवं खाद्य पदार्थों में मिलावट एवं संदूषण के कारण स्वास्थ्य की समस्याओं पर संस्थान को विशेष बल देना होगा। नैनो टेक्नोलॉजी के विविध उत्पादों की सुरक्षा हेतु एक अग्रणी सुविधा के केंद्र का सृजन किया जाना चाहिए, जो देश को नए दिशा-निर्देश उपलब्ध कराएगा।

मुझे ज्ञात है कि विषविज्ञान के क्षेत्र में भारत और दक्षिण - पूर्व एशिया में यह एकमात्र अग्रणी संस्थान है। मैं संस्थान के स्वर्ण जयंती समारोह की सफलता एवं स्मारिका के उद्देश्यपरक प्रकाशन हेतु हार्दिक शुभकामनाएं देता हूँ।

हर्षवर्धन

(डॉ. हर्ष वर्धन)

209, अनुसंधान भवन, 2, रफी मार्ग, नई दिल्ली 110001 दूरभाष : +91-11-23316766, 23714230, फैक्स : +91-11-23316745
209, Anusandhan Bhawan, 2, Rafi Marg, New Delhi-110001 Ph.: +91-11-23316766, 23714230; Fax: +91-11-23316745

अखिलेश यादव

मुख्य मंत्री
उत्तर प्रदेश

लाल बहादुर शास्त्री भवन
लखनऊ

दिनांक : 16 अक्टूबर, 2015

संदेश

हर्ष का विषय है कि सी0एस0आई0आर0-भारतीय विषविज्ञान अनुसंधान संस्थान, लखनऊ द्वारा दिनांक 4 नवम्बर, 2015 को स्वर्ण जयन्ती समारोह का आयोजन किया जा रहा है। इस अवसर पर एक स्मारिका का प्रकाशन किया जाएगा।

संस्थान की स्थापना पर्यावरण एवं स्वास्थ्य की सुरक्षा तथा उद्योग की सेवा के उद्देश्य से की गई थी, जिसके परिप्रेक्ष्य में संस्थान द्वारा किए जा रहे प्रयास सराहनीय हैं। मुझे विश्वास है कि संस्थान भविष्य में भी समाज हित से जुड़े कार्यों में तत्पर रहेगा। मैं आशा करता हूँ कि स्मारिका में ऐसी सामग्री का समावेश किया जाएगा, जो सभी के लिए उपयोगी साबित होगी।

समारोह की सफलता एवं स्मारिका के उद्देश्यपरक प्रकाशन हेतु मेरी हार्दिक शुभकामनाएं।

(अखिलेश यादव)

Message

डॉ0 दिनेश शर्मा
महापौर
Dr. Dinesh Sharma
MAYOR

लखनऊ नगर निगम,
लखनऊ
LUCKNOW NAGAR NIGAM,
LUCKNOW

पत्रांक 385/महापौर/15

दिनांक 15.10.2015

सन्देश

यह जानकर हार्दिक प्रसन्नता हो रही है कि सीएसआईआर–भारतीय विषविज्ञान अनुसंधान संस्थान अपने स्थापना दिवस का स्वर्ण जयन्ती समारोह आयोजन कर रहा है। इस अवसर पर एक स्मारिका का प्रकाशन भी प्रस्तावित है।

सीएसआईआर–भारतीय विष विज्ञान अनुसंधान संस्थान की स्थापना का उद्देश्य ''पर्यावरण एवं स्वास्थ्य की सुरक्षा तथा उद्योग की सेवा'' रहा है। लखनऊ में 1965 से स्थापित यह संस्थान अपने उददेश्यों को प्राप्त करने में सफल रहा है। संस्थान में मृदा, वायु, जल, खाद्य पदार्थ में मिलावटी तत्वों की जाँच कर भारतीय समुदाय को लाभान्वित कर रहा है। संस्थान द्वारा राष्ट्रीय सामाजिक मिशन कार्यक्रमों में राष्ट्रीय पेयजल मिशन, तेल के बीजों, दालों, प्रौद्योगिकी मिशन, गंगा एक्शन प्लान, गोमती, यमुना जैसी अनेक नदियों के जल की गुणवत्ता का अनुवीक्षण होता रहा है। ''नमामि गंगे'' योजना के अन्तर्गत संस्थान के वैज्ञानिकों ने कार्य प्रारम्भ कर दिया है। भारतीय विषविज्ञान अनुसंधान संस्थान के कार्य राष्ट्रहित में रहे हैं। इसके लिए संस्थान के वैज्ञानिक बधाई के पात्र हैं।

स्वर्ण जयन्ती समारोह की सफलता एवं स्मारिका के सफल प्रकाशन हेतु कृपया मेरी शुभकामनाएं स्वीकार करें।

भवदीय,

(डॉ0 दिनेश शर्मा)
महापौर

कार्यालय : नगर निगम, त्रिलोक नाथ रोड, लालबाग, लखनऊ उ०प्र०
Office: Nagar Nigam, Trilok Nath Road, Lalbagh, Lucknow, U.P. (India)

आवास : 52, विश्वविद्यालय मार्ग, लखनऊ, उ०प्र०
Resi. Address : 52, University Road, Lucknow, U.P. (India). Ph. 2740409, 9415003929
Fax No. : 0522-2740235, e-mail:profdineshsharma@gmail.com

Message

डॉ. गिरीश साहनी
महानिदेशक एवं
सचिव, वै.औ.अ.वि., भारत सरकार
वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद्
अनुसंधान भवन, 2, रफी मार्ग, नई दिल्ली - 110 001

Dr. Girish Sahni
Director General &
Secretary, DSIR, Govt. of India
COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH
Anusandhan Bhawan, 2, Rafi Marg, New Delhi-110 001

I am happy to know that CSIR- Indian Institute of Toxicology Research (CSIR-IITR) Lucknow is completing five decades of its existence and celebrating its Golden Jubilee on November 04, 2015.

CSIR-IITR is one of the pioneer institutions dealing in toxicology research in the Asia Pacific region. The Institute was founded with the motto *"Safety to environment and health and service to industry"* and has since been instrumental in serving the society not only in India but also in South-East Asia and other developing countries. This Institute, one of its kind in India and among a few in the world, has been contributing immensely to occupational, industrial and environmental toxicology as well as for improving human health. The critical mission programmes, viz. National Drinking Water Mission, Technology Mission on oilseeds, Pulses and Maize, and monitoring of the Ganga, Yamuna and Gomti rivers, the institute has undertaken are noteworthy.

On this occasion, I convey my best wishes to TEAM CSIR-IITR for a promising future.

[Girish Sahni]

October 19, 2015

New Delhi

Telephone: +91-11-23717053 Fax : +91-11-23710618 E-mail : dgcsir@csir.res.in; dg@csir.res.in

Message

सत्यमेव जयते

प्रो. आशुतोष शर्मा
Prof. Ashutosh Sharma

स्वच्छ भारत
एक कदम स्वच्छता की ओर

सचिव
भारत सरकार
विज्ञान और प्रौद्योगिकी मंत्रालय
विज्ञान और प्रौद्योगिकी विभाग
Secretary
Government of India
Ministry of Science and Technology
Department of Science and Technology

I am extremely delighted that CSIR-Indian Institute of Toxicology Research (CSIR-IITR) is celebrating its Golden Jubilee. Over the last five decades the Institute has undertaken noteworthy services in diverse areas of toxicology. The scientist of IITR have played a pivotal role at the time of Bhopal Gas tragedy and during epidemic dropsy in Delhi. With GLP accreditation in place, it is striving to be a global leader in toxicology.

I extend my best wishes to the Director IITR and his team for a bright future.

(Ashutosh Sharma)

Technology Bhavan, New Mehrauli Road, New Delhi - 110016
Tel: 00 91 11 26511439 / 26510068 · Fax: 00 91 11 26863847 · E-mail: dstsec@nic.in · website: www.dst.gov.in

Message

सी.एस.आई.आर. राष्ट्रीय भौतिक प्रयोगशाला
CSIR - NATIONAL PHYSICAL LABORATORY
(वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद्)
(Council of Scientific & Industrial Research)
डा0 के . एस. कृष्णन् मार्ग, नई दिल्ली 110012, (भारत)
Dr. K. S. Krishnan Marg, New Delhi - 110012, (INDIA)

I am happy to know that the Indian Institute of Toxicology Research is celebrating its Golden Jubilee. The function is planned on November 04' 2015. The Institute during the five decades of its existence has contributed to the safety of the environment and has participated in many national societal mission programs like National Drinking Water Mission. Very few countries in the world have an Institute like IITR. The Institute is well equipped for toxicity testing as per global standards.

The Institute should prepare a Strategy for the coming Decade. New approaches should be developed for toxicity testing which are based on recent developments in systems biology, bioinformatics, toxicogenomics and computational toxicology.The Institute should join and work vigorously towards " Namami Gange" mission.

The Golden Jubilee is the right time for the IITR fraternity to introspect, get inspired by the past achievements to overcome the tendency to maintain the status quo. IITR has to rededicate itself to pioneer some new test systems which cost less but are not less reliable.

I send you my Greetings and Good Wishes on this Great

Occasion.

S K Joshi

फैक्स/Fax : 91-11-45609310
Director Office : 45609201 / 45609301
COA's Office : 45609203
COSP's Office : 45608367
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Message

प्रो० राघवेंद्र गदगकर
अध्यक्ष
Prof. Raghavendra Gadagkar
President

भारतीय राष्ट्रीय विज्ञान अकादमी
बहादुर शाह जफर मार्ग, नई दिल्ली-110 002
INDIAN NATIONAL SCIENCE ACADEMY
Bahadur Shah Zafar Marg, New Delhi-110 002

No. PR/INSA/2015
19 October 2015

I am extremely delighted to note that the CSIR-Indian Institute of Toxicology Research (CSIR-IITR) is celebrating its Golden Jubilee on 4 November 2015.

CSIR-IITR is one of the leading laboratories of the Council of Scientific and Industrial Research which was founded with the object of Environment and Health Safety and Service to industry. This has immense role in industrial and environmental toxicology and also improvement of human health. The role in Indian mission programmes such as National Drinking Water Mission, Technology Mission on Oil seeds, Pulses and Maize and more recently "Namami Gange", the Ganga action plan has placed CSIR- IITR at a high societal pedestal. The research and development activities of your institute are not only sought after nationally but also globally.

I am very confident that with your youth and zeal, leadership qualities and scientific acumen, CSIR-IITR will achieve further laurels. I sincerely wish all the success to the Golden Jubilee celebrations of your institution.

With my best regards,

Your sincerely,

(Raghavendra Gadagkar)

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इन्सा एस.एन. बोस अनुसंधान प्रोफेसर और जे.सी. बोस राष्ट्रीय अध्येता, पारिस्थितिक विज्ञान केन्द्र
भारतीय विज्ञान संस्थान, बेंगलुरू- 560 012 भारत
INSA SN Bose Research Professor & JC Bose National Fellow, Centre for Ecological Sciences,
Indian Institute of Science, Banglore-560 012, INDIA
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Professor Brian Cantor CBE FREng
Vice-Chancellor

I should like to take this opportunity to wish you and your staff well on celebrating your Golden Jubilee on November 04, 2015 at the CSIR-Indian Institute of Toxicology Research.

I admire the wide ranging contribution that IITR has made to improving environmental, occupational, and general human health in South East Asia and other developing countries over the last 50 years.

I am particularly aware of your work towards national challenges relating to drinking water, the Bhopal Gas disaster, water quality in various rivers including bacteriophages in the Ganges water for self-purification, and the technology mission on maize, pulses and oilseeds.

I know India well having worked there at an early stage of my career and been a frequent visitor ever since. I appluad the contribution you have made to Indian society and offer my warmest congratulations of your 50th anniversary.

Brian Cantor

UNIVERSITY of BRADFORD
Faculty of Life Sciences

I should like to take this opportunity to wish you all at the CSIR –Indian Institute of Toxicology Research to have an excellent celebration on your Golden Jubilee. I first came to your organisation 31 years ago in 1984 at the request of the then Director, Dr PK Ray, to set up some facilities for Genetic and Reproductive Toxicology and have continued with regular visits. Over the last many years, I have worked mostly with Professor Alok Dhawan. IITR is a very necessary CSIR Research Institute providing "safety to environment and health and service to industry". This it has done diligently for half a century both in South East Asia and other developing countries. It operates to globally acceptable scientific standards, has helped the Indian Government with its regulatory framework and been there for major national disasters and major societal mission programmes. Having seen the Institute evolve and having got to know many of its staff and students, some of whom have come to work in the various laboratories where I have worked in the UK, I feel really confident that IITR will continue to evolve even further over the next half century.

Diana Anderson

Professor Diana Anderson
BSc MSc PhD DipEd FSB FATS FRCPath FIFST FBTS FRSM FHEA FRSC
Established Chair of Biomedical Sciences

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Message

King George's Medical University
Uttar Pradesh, Lucknw, - 226003, India

Prof. Ravi Kant,
FRCS (Eng) FRCS (Edin) FRCS (Glasg) FRCS (Irel)
FAMS MS DNB FACS FICS FAIS
Vice Chancellor

I am pleased to know that CSIR-Indian Institute of Toxicology Research, Lucknow is going to celebrate its Golden Jubilee on November 04, 2015. The importance of this pivotal institution is remarkable in Industrial India. CSIR-IITR is known for research activities, awareness program & safety criterion for water, food & Environment. Indeed CSIR-IITR is doing admirable work.

I congratulate the entire team of CSIR-IITR & wish grand success.

Ravi Kant

(Prof. Ravi Kant)
Vice Chancellor

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Message

सत्यमेव जयते

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स्वास्थ्य एवं परिवार कल्याण मंत्रालय
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Government of India
Food Safety and Standards Authority of India
Ministry of Health and Family Welfare
FDA Bhawan, Kotla Road, New Delhi-110002
Website : www.fssai.gov.in

अध्यक्ष
Chairperson

Telefax : 011-23220991
Email : chairperson@fssai.gov.in

I congratulate Indian Institute of Toxicology Research, Lucknow on its contribution to occupational, industrial and environmental toxicology as well as for improving human health.

I am confident that the toxicity/safety studies conducted by the Institute would continue to be instrumental in the development of our regulatory framework and guidelines.

I convey my best wishes for the success of the Golden Jubilee celebrations of the Institute.

(Ashish Bahuguna)

Message

M S Valiathan
Ch.M., FRCS, FRCS (C), FRCP, D.Sc (h.c.)
National Research Professor

October 13, 2015

I had the privilege to serve the CSIR-Indian Institute of Toxicology Research, Lucknow for many years as Chair of the RC and appreciate the importance of its mission in the context of rapid developmental changes in India. Looking back, one cannot but admire the visionary founders of this Institute who foresaw the growing spectre of pollution in our environment and the heavy shadow of adulteration and toxicity in our food and other consumables. Today the pollution of our soil, rivers, air and even mountain snow has become a matter of grave concern and added to the pressure for prescribing safety standards - as much for air, water and soil as for food and consumables. This would be indispensable for the enforcement of standards, which would be the obligation of the Government. In this endeavor, the role of CSIR-IITR would be pre-eminent for developing and updating standards and designing protocols for enforcement as it has unrivalled experience in a number of National Programmes such as National Drinking Water Mission; Technology Mission on oilseeds, pulses and maize; Bhopal Gas Tragedy; Ganga Action Plan; impact assessment of chemical spillage in Kandla port and so on.

The CSIR-IITR has been in the forefront of the movement to detoxify the environment and consumables in India and its role is certain to grow in the years of rapid development ahead. I have great pleasure in sending my best wishes for a glorious future of the Institute on the occasion of its Golden Jubilee. I hope to see the CSIR-IITR emerge as a powerhouse for research which would provide guidelines for monitoring the quality of our environment as well as the food we consume so that India's safety standards would catch up with those of developed countries even as we strive to meet the Sustainable Development Goals.

M S VALIATHAN
National Research Professor

Manipal University
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Message

Dr. P.S. Chauhan
[Formerly, Head, Cell Biology Division
& Manager, MSP (Low-Level Radiation
Research Lab, Kollam)]
BARC, Mumbai 400 085

House No. 99, Sector 18A
Nerul (W)
Navi Mumbai 400 706

October 10, 2015

I am happy to know that CSIR-Indian Institute of Toxicology Research (CSIR- IITR), formerly Industrial Toxicology Research Centre (ITRC) is celebrating its Golden Jubilee and feel honoured to be associated with this landmark event in the golden history of fifty years of scientific endeavour of the Institution. It is also time to pay homage and gratitude to the vision of the Founder Director Dr. S.H. Zaidi who nurtured the institution and charted out a plan conceptualizing the role of toxicology as a major contributor to ensure industrial and occupational safety as a partner to national development.

Having been professionally associated with this institution for almost three decades, I am proud to say that IITR has been incorporating the latest developments at par with the global science and playing the pivotal role by contributing to all the major national programmes of relevance to the country, industrial, environmental, occupational and publice health safety.

I congratulate the staff and the leadership for their devotion and commitment and wish them to continue to follow the path of professional excellence.

P.S. Chauhan

Message

R. Kumar
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With a record of conducting R&D which has been both relevant and excellent for the past fifty years, Indian Institute of Toxicology Research, Lucknow, has reason to be proud at the time of its Golden Jubilee for its many achievements . When the country is concerned about the indifferent quality of research from its scientific establishments, this Institute has shown a steep growth in the quality of its research. It has become a front runner in delineating mechanism based toxicity of various chemical entities and the physical forms [like nano] in which they are present. The expertise it has accumulated over the years has found ready application whenever the country faced any difficult situation where the Institutes areas of interest happened to be involved. Thus it has contributed to various Government Missions like Drinking Water, Oilseeds, Pulses & Maize, Bhopal Gas Tragedy , to mention a few. Most of the time, the Institute not only analyses the problem but also becomes a part of the solution providing necessary technology for the purpose.

There is no doubt that this Institute will provide even more innovative solutions in the years to come. Thanks to the mechanism based approaches being developed by its Scientists, not only the use of animals will decrease significantly with time, but also it will become possible to map the effect on cell lines to that on tissues and organs. In this endeavor, I hope that this Institute will take a lead and make many contributions which will enhance our safety, purify our rivers and improve our environment.

I congratulate the Institute over its many sterling contributions up to this time on the one hand and wish it a grand future through doing path breaking research work on the other.

R. Kumar
Chairman
Research Council

Message

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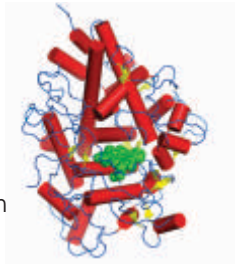

T. P. Singh
Ph.D., D.Sc.(hc)

I am delighted that CSIR-Indian Institute of Toxicological Research, Lucknow has completed 50 glorious years. Thus it is fair to celebrate its Golden Jubilee for renewing the determination to achieve greater heights in research and services.

In recent years, IITR has made outstanding contributions in research and attained a prominent place in the comity of CSIR institutes. I congratulate the new Director for assuming the charge of IITR during the Golden Jubilee year. I am very sure that the current team of scientists led by him will achieve a greater success.

I am glad to have been associated with IITR-Lucknow for more than three decades as part of several committees including the current Research Council. On this occasion, I wish all the best to Scientists and Staff of IITR-Lucknow.

15 - 10 - 2015

T.P. Singh
R.C. member

भारतीय विज्ञान संस्थान
बैंगलूर, भारत
INDIAN INSTITUTE OF SCIENCE
BANGLORE, INDIA

Prof. K.P. Gopinathan
FNA,FASc,FNASc
INSA Honorary Scientist and Former Chair
Department of Microbiology and Cell Biology
Indian Institute of Science, Bangalore

My heartiest congratulations to the CSIR-IITR on the occasion of its Golden Jubilee. This unique institution of India has been successfully addressing the most relevant societal challenges in relation to the safety to environment and health, and providing services to industries. CSIR-IITR is the only multidisciplinary research institute in the whole of SE Asian region covering all areas of toxicology from environment and health risk assessment to nanotherapeutics and nanomaterial toxicology. It gives me immense pleasure to compliment IITR for its seminal contributions to the nation in the past and wishing it many more years of outstanding research on nationally and internationally relevant problems and issues.

Prof. K.P. Gopinathan
FNA, FASc, FNASc
INSA Honorary Scientist and Former Chair
Department of Microbiology and Cell Biology
Indian Institute of Science, Bangalore

NATIONAL INSTITUTE OF NUTRITION, Hyderabad, INDIA
राष्ट्रीय पोषण संस्थान, हैदराबाद, भारत

It is indeed a proud moment for any institution to celebrate its Golden Jubilee and CSIR-IITR has achieved this milestone with the dedication of several staff members and many eminent leaders. A toxicology research Institution is an asset to any country. It was with great vision that ITRC was set up and it has now risen to an international status. Toxicology has changed from something of a lesser science to one of a multi disciplinary and highly sophisticated branch which is an inherent part of safety, efficacy and security studies. Your scientists and their capabilities are world class. You have also setup a GLP accredited testing facility, which is only the second in the country in the public sector. Several novel and challenging protocols have been developed by IITR and scores of PhD scholars have passed through your portals and thus you contributed to human resources too.

You have every reason to celebrate and feel proud that you have served the nation with purpose and zeal and lived up to the vision with which IITR was setup 50 years back.

I am glad to be a small part of this and I congratulate you and wish you many more years of good work and glory.

With Good wishes to you and your colleagues- past and present

12th October, 2015

B. L.
(B. SESIKERAN)

Dr B Sesikeran MD
Member RC of IITR
Former Director
National Institute of Nutrition (ICMR)
Hyderabad

Message

अखिल भारतीय आयुर्विज्ञान संस्थान
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प्रो० महेश चन्द्र मिश्र
निदेशक

Prof. M. C. Misra
MS, FRCS, Hon. FRCS (Glasg.) FCLS, FAMS, FACS
DIRECTOR

Dated : 19th October, 2015

I am delighted to know that CSIR- Indian Institute of Toxicological Research, Lucknow is celebrating its Golden Jubilee on 4th of November this year. This Institute, a constituent laboratory of CSIR, began in 1965 as the Industrial Toxicology Research Centre with the motto 'Safety to Environment and Health and Service to Industry'. Since then it is addressing the problems critical to human health and environment

CSIR- IITR occupies a unique position among the Toxicology Institutes in the world. As a leading and one of its kind Institution, it has contributed immensely to occupational, industrial and environmental toxicology as well as their impact on human health not only in India, but also in South-East Asia and other developing countries. The Institute has gained national importance by addressing the health problems of our industrial work force in the growing economy.

Pioneering work was done in its initial years linking respiratory illnesses to occupational health of miners. The institute played a pivotal role in investigating national challenges like the Bhopal gas tragedy of 1984, the epidemic dropsy outbreak in Delhi during 1998, and the chemical spillage incident at Kandla port following the Gujarat earthquake in 2001. Other notable activities of the Institute include the Ganga Action Plan, monitoring of water quality of the Gomti and Yamuna rivers, and the National Drinking Water Mission to mention a few.

On this momentous occasion when the institute completes 50 years of its existence, I congratulate all those who have been connected with this prestigious institute in any capacity since its inception. There cannot be many institutions in the country which can look back to their past achievements and the national service rendered by them with that feeling of satisfaction which the CSIR- IITR can.

I have great pleasure in congratulating the CSIR- IITR, and I am sure the Institute will not only maintain the high traditions of the past, but also to strive to raise further the general standard of research and teaching in the discipline of toxicology.

I am confident that CSIR-IITR will reach newer heights and contribute towards Nation Building in the current millennium.

(M.C. Misra)

Message

Sanjay Gandhi Postgraduate Institute of Medical Science
Raebareli Road, Lucknow-226 014 (U.P.) INDIA

Prof. Rakesh Kapoor
M.S., M.Ch. (Urology), F.A.M.S., F.N.A.Sc.
Director

It is a matter of great pleasure that CSIR-Indian Institute of Toxicology Research, Lucknow is celebrating its Golden Jubilee on November 04, 2015. This Institute, one of its kind in India and among a few in the world, has been contributing immensely to occupational, industrial and environmental toxicology as well as for improving human health.

I hope large number of delegates from India and abroad will attend the Golden Jubilee celebrations and the interaction with eminent national and international faculties will provide an ideal platform for the budding scientists to improve their skills.

I wish a grand success to the Golden Jubilee Celebrations.

(Prof. Rakesh Kapoor)
Director

NCCS

राष्ट्रीय कोशिका विज्ञान केन्द्र

जैवप्रौद्योगिकी विभाग, भारत सरकार का स्वायत्त संस्थान

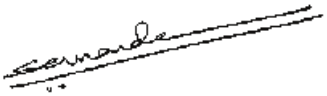
National Centre for Cell Science

(an autonomous institution aided by the Department of Biotechnology, Government of India)

Dr. Shekhar Mande
Director

I am happy to learn that the CSIR-Indian Institute of Toxicology Research is celebrating its Golden Jubilee in November, 2015 and would like to congratulate the entire team on crossing this milestone with flying colours.

CSIR-IITR has played a pivotal role in successfully addressing diverse, and often difficult, national challenges related to occupational, industrial and environmental toxicology, in keeping with its noble mission of promoting safety and improving human health. Its contribution to the betterment of society through key mission programmes has also been valuable and praiseworthy. Appreciating its continued efforts towards further progress in these areas, I wish CSIR-IITR every success for many more years to come.



Dr. Shekhar C. Mande
Director
National Centre for Cell Science,
NCCS Complex, Ganesh Khind,
Pune 411007, India

Message

राष्ट्रीय औषधीय शिक्षा एवं अनुसंधान संस्थान

NATIONAL INSTITUTE OF PHARMACEUTICAL EDUCATION AND RESEARCH (NIPER)

(औषध विभाग, रसायन एवं उर्वरक मंत्रालय, भारत सरकार)
(Deptt. of Pharmaceuticals, Ministry of Chemicals & Fertilizers, Govt. of India)
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Sector 67, S.A.S. Nagar (Mohali) - 160 062, Punjab, India

S.A.S. NAGAR

प्रो. के. के. भूटानी
कार्यवाहक निदेशक
Prof. K.K. Bhutani
Director (Offg.)

I am delighted to know that the CSIR-Indian Institute of Toxicology Research, Lucknow is celebrating its Golden Jubilee on November 04, 2015. On behalf on National Institute of Pharmaceutical Education and Research, S.A.S. Nagar, I congratulate faculty, scientists, students and staff of CSIR-IITR on the Golden Jubilee celebration.

It is heartening to know that IITR has made noteworthy progress in the area of toxicology. IITR's role in serving the society and contribution to regulatory framework is greatly appreciated. Participation of IITR in societal mission programmes like "Namami Gange" program is highly commendable. I believe that contribution of IITR scientists in the field of nanotoxicology, environmental toxicology, food-drug & chemical toxicology, regulatory toxicology and health risk assessment would have significant impact not only in India but throughout the world. Significant numbers of technology transfers, patents and publications in high impact factor national and international journals provide a glimpse of their achievements.

It also gives me great pleasure to learn that IITR in 2014 has also joined the league of GLP certified toxicity testing facility. NIPER, S.A.S. Nagar was the only government institute having GLP certification since 2009 and now your institute is the second one. This clearly indicates the progress made by IITR in achieving centre of excellence in the field of toxicology. I hope that in future IITR would strive with its noble objectives with great zeal. I wish that under the new leadership IITR will receive remarkable recognition and would become a global player in toxicological research. Lastly, I congratulate again for the Golden Jubilee Celebration of IITR and I wish sincerely this celebration to be a great success.

(K. K. Bhutani)

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Message

राष्ट्रीय मत्स्य आनुवंशिक संसाधन ब्यूरो
(भारतीय कृषि अनुसंधान परिषद्)
National Bureau of Fish Genetic Resources
(Indian Council of Agricultural Research)

डा. जे.के. जेना, निदेशक
Dr J.K. Jena, Director

I am indeed delighted to know that CSIR-Indian Institute of Toxicology Research (IITR) is celebrating its Golden Jubilee this year. In these years, the institute has demonstrated its commitment for toxicological research for protection of human health and environment. I would like to compliment the Director and the staff of CSIR-IITR for having planned to commemorate the Golden Jubilee of their institute. In doing so, the institute is reaffirming its commitment to maintain the high standards of toxicological research in the country.

On the occasion of the Golden Jubilee, I extend my heartiest greetings to all who have been instrumental in its growth and progress and sincerely wish the institute will continue to contribute for the safe and healthy environment for all in the years to come.

(J.K. Jena)

October 17, 2015

Lucknow

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Message

Birbal Sahni Institute of Palaeobotany
(An Autonomous Institute under Department of Science & Technology, Government of India)
1946

Prof. Sunil Bajpai
Director

It gives me immense pleasure to know that CSIR-Indian Institute of Toxicology Research (IITR), Lucknow is celebrating its Golden Jubilee on November 04, 2015. The issues of pollution of air, water, soil and even the edibles, continue to cause concern in our country, and the toxins in our surroundings have become a major health hazard for all those who care for life- their own or others'. These issues are at the core of IITR's mandate and have been addressed by the institute for half a century. As a matter of fact, IITR has assumed a critical and pivotal role in our efforts at a national level to study and conserve our environment. The institute has already set rigorous standards in monitoring the environment and I am sure that the bar will be raised further in the coming years.

On behalf of BSIP and on my own behalf, I compliment the entire CSIR-IITR staff for their glorious record spanning the past half a century. On this important occasion, I wish the institute all success under the dynamic leadership of its Director.

(Sunil Bajpai)

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Zydus dedicated to life

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CIN No: L24230GJ1995PLC025878

Pankaj R. Patel
Chairman and Managing Director

16th October, 2015

At the outset let me extend my heartiest congratulations to CSIR – Indian Institute of Toxicology Research, Lucknow, on the Golden Jubilee celebrations. Over the last 50 years the institute has been extending yeoman's service in the area of occupational, industrial and environmental toxicology with a mission to create a safe environment and improve human health parameters. The fact that the institute is one-of-its kind in India and perhaps amongst the very few across the world, underlines the important service that scientists from the institute have been able to extend in this highly specialized field. The mission-critical programmes that the institute has undertaken over the years and the impact that it has had not just in India but also in other South–East Asian countries, is noteworthy. Environment safety, health and well being of communities are going to be the overriding concerns in the years to come. I am sure that CSIR-IITR will continue to play a stellar role in the field of toxicology research and serve communities in India and across the world. I extend my best wishes to the team once again.

Pankaj Patel

Message

सी.एस.आई.आर. - राष्ट्रीय पर्यावरण अभियांत्रिकी अनुसंधान संस्थान
CSIR - National Environmental Engineering Research Institute
(वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद् / Council of Scientific & Industrial Research)
NEERI ISO 9001:2008

डॉ. सतीश आर. वटे
निदेशक
Dr. Satish R. Wate
Director

CSIR-IITR Lucknow is a proud family member of CSIR laboratories and I am delighted to know that CSIR-IITR will be celebrating its Golden Jubilee on November 4, 2015. The Institute founded in 1965; with a vision "safety to environment, health and service to the nation"; created a niche through its high end R&D in the field of toxicology. CSIR-IITR is a leader to carry out research in toxicology to mitigate problem of human health and environment and accomplish goal through its mission and vision. CSIR-IITR has been instrumental in contributing to the regulatory framework and guidelines for the Government of India. I am very confident that CSIR-IITR under the leadership of present Director General and Director, IITR would reach to greater heights in the field of R&D as well as service to the nation. I on my own and on behalf of CSIR-NEERI family wish Director and staff of CSIR-IITR for reaching a milestone and also a grand success to Golden Jubilee celebration.

September 16, 2015

(S.R. Wate)

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Message

सीएसआईआर–केन्द्रीय इलेक्ट्रॉनिकी अभियांत्रिकी अनुसंधान संस्थान
CSIR - CENTRAL ELECTRONICS ENGINEERING RESEARCH INSTITUTE
(विज्ञान तथा प्रौद्योगिकी मंत्रालय, भारत सरकार / MINISTRY OF SCIENCE & TECHNOLOGY, GOVT. OF INDIA)
पिलानी, राजस्थान (भारत) / Pilani, Rajasthan - 333031 (INDIA)

डॉ. चन्द्रशेखर
Dr. Chandra Shekhar
निदेशक

अशा पत्र सं. DO Letter No. 13-1(4)/2015/CSIR-IITR
दिनांक Date October 16, 2015

I am delighted that CSIR-Indian Institute of Toxicology Research, Lucknow is celebrating its Golden Jubilee this year. This premier R&D institute was established in 1965 with the motto of "Safety to Environment & Health and Service to Industry". It is a matter of great pride that for the past five decades, CSIR-IITR has done commendable R&D work in the area of occupational, industrial and environmental toxicology for improving human health. In the new millennium the institute also initiated major programmes in multidisciplinary areas and developed newer methods for understanding the mechanisms of toxicity of chemicals, materials and safety assessment of products.

On this occasion, I would like to congratulate the Director and staff of CSIR-Indian Institute of Toxicology Research, Lucknow for having planned a series of programmes to commemorate the Golden Jubilee of their Institute. In doing so, CSIR-IITR, Lucknow is reaffirming its commitment to maintain high standards of R&D in the area of Toxicology Research for which it is renowned and also to serve the society through their research.

(Chandra Shekhar)

Message

सीएसआईआर-राष्ट्रीय वनस्पति अनुसंधान संस्थान
CSIR-National Botanical Research Institute
(वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद, नई दिल्ली)
राणा प्रताप मार्ग, लखनऊ - 226 001, उ.प्र., भारत
(Council of Scientific & Industrial Research, New Delhi)
Rana Pratap Marg, Lucknow - 226 001, U.P., India

डॉ. चन्द्र शेखर नौटियाल
जे.सी. बोस नेशनल फैलो, एफएनए, एफएनएएससी, एफएनएएएस
निदेशक

Dr. Chandra Shekhar Nautiyal
J. C. Bose National Fellow, FNA, FNASc, FNAAS
Director

It is a matter of immense pleasure to know that the CSIR-Indian Institute of Toxicology Research (formerly, Industrial Toxicology Research Centre). Lucknow is celebrating its Golden jubilee. My heartiest congratulations to the present and previous Directors, Scientists and all other staff members of the Institute. It is beacuse of their cumulative and dedicated efforts that the Institute has attained a place amongst the best toxicology and chemical research institutes in the wold.

The magnificent journey started with small steps during its formative years soon took a leap of progressive and evolutionary path and grew from strength to strength and matching its steps with time and the rapid changes in science at the global scenario.

In the recent years CSIR-IITR has made a paradigm shift in its research from the classical studies to state of art omic and post-omic technologies in interdisciplinary areas of biology and chemistry. Today the institute is thriving to make an impact in understanding the mode of action of new chemical entities, engineered nanomaterials and genetically modified products on living systems for safe use of new technologies and sustainable development. CSIR-IITR's study on biomarkers for disease conditions to identify susceptible population among the Indian ethnic group is commendable.

With a young and dynamic Director at the helms of affair I am sure CSIR-IITR will achieve great heights and will keep on serving the nation. I wish CSIR-IITR and all its staff members a very bright future.

Date: 30.09.2015

(C.S. Nautiyal)

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Message

सीएसआईआर-केन्द्रीय औषधीय एवं सगंध पौधा संस्थान
(वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद्)
कुकरैल पिकनिक स्पॉट रोड, पी. ओ.-सीमैप, लखनऊ-२२६ ०१५, उ.प्र., भारत

CSIR-Central Institute of Medicinal and Aromatic Plants
(Council of Scientific & Industrial Research)
Kukrail Picnic Spot Road, P.O. CIMAP, Lucknow-226 015, U.P., India

प्रो. अनिल कुमार त्रिपाठी, एफएनए, एफएनएएससी, एफएनएएएस
निदेशक

Prof. Anil K. Tripathi, FNA, FNASc, FNAAS
Director

October 21, 2015

I am very happy to learn that CSIR-IITR, Lucknow, a multidisciplinary pioneering research institute in the field of toxicology, will be celebrating its Golden Jubilee on November 4, 2015. The CSIR-IITR is playing a very important national role through its R&D efforts related to occupational and industrial hazards for ensuring human health in our country. I am also happy to know that as a part of Golden Jubilee celebration an International Toxicology Conclave is also being organized during November 5-6, 2015. I extend my heartiest greetings to the Director and staff of CSIR-IITR on this occasion and wish a grand success with the hope that International Toxicology Conclave will be a milestone towards health and safety of the people of India.

(Anil Kumar Tripathi)

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Message

सी.एस.आई.आर.- केन्द्रीय औषधि अनुसंधान संस्थान

(वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद्)

सेक्टर 10, जानकीपुरम विस्तार, सीतापुर रोड, पोस्ट बाक्स नं. 173, लखनऊ-226 031 (भारत)

CSIR-Central Drug Research Institute

(Council of Scientific & Industrial Research)

Sector 10, Jankipuram Extension, Sitapur Road, Post Box No.-173 Lucknow 226 031 (India)

CSIR-Central Drug Research Institute, Lucknow

डॉ. मधु दीक्षित, एफएनए, एफएनएएससी, एफएएससी

निदेशक

Dr. Madhu Dikshit, FNA, FNASc, FASc

Director

It is indeed a joyous matter that our sister laboratory CSIR-Indian Institute of Toxicology Research (IITR), Lucknow has completed 50 years and is celebrating its Golden Jubilee. The Institute was founded with the motto "Safety to environment and health and service to the Nation" and has since been instrumental in serving the society.

It is remarkable that this Institute is one of its own kind in India and among a few in the world, which has contributed immensely to occupational, industrial and environmental toxicology as well as for improving human health. CSIR-IITR undertakes research in niche areas of toxicology such as the impact of industrial and environmental chemicals on human health and ecosystem, and environmental monitoring of pollutants in air, water & soil. The institute also helps regulatory bodies to formulate/amend guidelines for safe use of chemicals/products for benefit to the common man.

I must compliment the CSIR-IITR for effectively utilizing its resources to develop a viable infrastructure and human resources base. I take this occasion of Golden Jubilee to accolade the scientific and administrative staff of the institution and express my best wishes to them for all the future undertakings.

I extend my best wishes to the CSIR-IITR family, and also to all the members of Golden Jubilee ceremony committee for grand success of this function.

M. Dikshit

(Madhu Dikshit)

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Message

सीएसआईआर – केन्द्रीय काँच एवं सिरामिक अनुसंधान संस्थान
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CSIR-Central Glass & Ceramic Research Institute
(Council of Scientific & Industrial Research)
196, Raja S C Mullick Road, Jadavpur, Kolkata 700 032
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डॉ. के. मुरलीधरन
निदेशक

Dr. K. MURALEEDHARAN
DIRECTOR

I am delighted to learn that the CSIR-Indian Institute of Toxicology Research, Lucknow is celebrating its Golden Jubilee on November 04, 2015. The Institute ever since its inception has been making exemplary contribution to promote healthcare through safety assessment studies of environment, material and products. CSIR-IITR has developed several new methods to enrich the field of toxicology research in the country.

I am confident that the brochure being brought out on this occasion will reflect the contributions that CSIR-IITR has made to the society over last fifty years.

I extend my sincere greetings to all the staff of CSIR-IITR and wish the celebrations all success.

के. मुरलीधरन

(K. Muraleedharan)

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BIOTECH CONSORTIUM INDIA LIMITED

Dr. V.P. Kamboj, Ph.D, D.Sc., FNA, FNASc.
Chairman

Former Director, Central Drug Research Institute, Lucknow
Former Chairman, Bharat Immunologicals & Biologicals Corp. Ltd., Bulandshahr,
Former President, National Academy of Sciences, India
INSA Hon. Scientist, Biotech Park, Lucknow
Hon. Professor, BBAU, Lucknow & Panjab Univ., Chandigarh

It gives me great pleasure to write my impressions on the growth of your institute and its contributions for the welfare of society on the occasion of Golden Jubilee Celebrations of CSIR-Indian Institute of Toxicology Research, Lucknow.

I have seen its development from inception in 1965 as Industrial Toxicology Research Centre located in Experimental Medicine Division of the Central Drug Research Institute, Lucknow to present premier position in the country and may be South East Asia. It is the brain child of the first Director, Prof. Sibte Hasan Zaidi who was the Head of above Division of CDRI. The Institute shifted to its current location in mid-1976. The focus of the institute from beginning has been on the effect of occupational hazards and industrial chemicals on health and environment.

The Institute over the years has done outstanding research in delineating effects of chemicals and work-site hazards on health and environment and providing remedial solutions. It has played a pivotal role in identifying pollution of different water bodies in India, particularly rivers Ganga and Yamuna, and developed a simple and cheap technology for drinking water for home use. It has also been deeply involved in the missions on Ganga River, Drinking Water and Oil Seeds. The nation is a witness to the important role played by the institute in mitigating the sufferings of people affected by Bhopal cyanide gas tragedy. The Institute again played a leading role in identifying the toxic chemical in edible oil samples during the epidemic dropsy in Delhi and developed monitoring markers for the guidance of people and regulator.

I have seen this Institute growing from strength to strength in identifying the effect of occupational and industrial hazards on health and environment based on well planned laboratory studies and providing solutions for guidance and welfare of society.

I am confident that CSIR-Indian Institute of Toxicology Research will continue to play a dominant role in not only mitigating occupational and industrial hazards but also in the area of regulatory toxicology. I wish CSIR-IITR grand success and a great future in excellent scientific achievements and in the service of our nation.

Dr. V.P. Kamboj
Ph.D, D.Sc., FNA, FNASc.
Chairman

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INSTITUTE OF BIOINFORMATICS & APPLIED BIOTECHNOLOGY

Biotech Park, Electronics City, Phase I, Bengaluru-560100

DR. C.M. GUPTA FTWAS, FNA, FASc, FNASc, FAMS

Distinguished Professor & Infosys Chair

(formerly Director CDRI, Lucknow & IMTech, Chandigarh)

Date: 22/10/2015

I am pleased to learn that CSIR-IITR, Lucknow shall be completing its 50 years of eventful journey on November 04, 2015. I would like to greet on this occasion all the past and present staff members as well as Directos of CSIR-IITR for their sustained hard work in transforming this institute in to a unique institution which has served the nation in various ways in the areas of health and environment. I am confident that under your dynamic and visionary leadership CSIR-IITR will be able to attain world class status in the field of Toxicology Research. My best wishes to you and your staff on this occasion.

C.M. Gupta

Message

Prof. Prasanta Kumar Ray
Ph.D., D.Sc., FNASc, FIBIOL (Lond)

Formerly-
Emeritus Medical Scientist, ICMR, NICED, Govt. of India, Calcutta;
Director, **Bose Institute**, DST, Govt. of India, Calcutta;
Director, **Industrial Toxicology Research Centre, CSIR**, Govt. of India, Lucknow;
Director, **Chittaranjan National Cancer Research Institute**, Ministry of Health,
Govt. of India, Calcutta; Research *Director,* **Bengal Immunity Research Institute**, Calcutta;
Senior Scientist, Biomedical Group, **Bhabha Atomic Research Centre**, Trombay, Govt. of India, Bombay,
Director, **ADM Laboratory of Surgical Immunobiology**, The Medical College of Pennsylvania and Hospital, Philadelphia, USA,
Director, **Preclinical Biopharmaceutics Laboratory**, Rutgers University, NJ, USA
Sr. Visiting Scientist, **Albert Einstein College of Medicine**, New York, USA
Consultant / Advisor / Task Force Member- WHO, UNDP, IPCS, IRPTC, USEPA, UNEP, UNESCO, USFDA

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It gives me great pleasure to learn that CSIR-Indian Institute of Toxicology Research is celebrating its Golden Jubilee on November 04, 2015.

CSIR-IITR is one of its kind in India, and amongst a few in the world, which has contributed immensely to occupational, industrial and environmental toxicology as well as for improving human health. The institute which started as Industrial Toxicology Research Centre in 1965 has diversified and now has expertise for the detection and quantification of various analytes from different matrices and identifying biomarkers for disease conditions in the Indian population.

I convey my best wishes to the IITR family for the success of the event.

Prof. P.K. Ray
Ex- Director, ITRC (IITR)

Message

DR R.C. SRIMAL
MD, FAMS, FNASc, FNA
Former Director, Indian Institute of Toxicology Research Lucknow

B-4 Sarita Vihar
New Delhi-110076, India
September 26, 2015

I am happy to know that you are organizing a "Toxicology Conclave" on November 5-6, 2015 as part of the Golden Jubilee Functions of IITR on November 4, 2015. Golden Jubilee is an important landmark in the life of any Institute and I very much appreciate the way you are organizing it this year. Your programme includes scientific discussion of the most important current problems in Toxicology. I am sure it will help in identifying and incorporating some new areas in future research programme of the Institute.

I would have very much like to participate in this Conclave but due to may rather indifferent health, it may not be possible. I with the Conclave and all other functions grand success. I would personally like to congratulate you and your team for this great idea.

(R C Srimal)

Email: rcsrimal@hotmail.com, rcsrimal@yahoo.com **Phone: +91-9899193701 (M0, 011-41402719 (R)**

Message

Biotech Park in Biotechnology City, Lucknow

Where Cutting Edge Science Prospers

(Promoted by Department of Biotechnology, Government of India and Department of Science & Technology, Government of U.P.)

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Prof. P.K. Seth, Ph.D.
FNASc, FNA, FAMS
Chief Executive Officer
Biotech Park, Lucknow &
Former Director, IITR

Sector-G, Jankipuram, Kursi Road
Lucknow - 226021 (U.P.), India

Date-14-10-2015

I am extremely delighted that CSIR-Indian Institute of Toxicology Research where I had the privilege to spend the prime time of my academic life, is celebrating its Golden Jubilee. The institute has 50 years of glorious and eventful history and it was an honour to be associated with it. IITR, founded as Industrial Toxicology Research Centre (ITRC) moved with the times and built infrastructure and capabilities to meet the toxicology related challenges. It is among one of the laboratories which provides encouragement & ecosystem to researchers to dream and carry out innovative research. I cannot resist sharing some of the major events with which I was associated. I vividly remember, that Founder Director late Dr. S.H Zaidi, a great visionary, just when I was stepping into IITR, told me to set up a facility for carrying out research on plastics & polymers, which prepared the institute to undertake the toxicity testing of plastic material at national level and could test the first heart valve and cardiotomy reservoir developed in the country and evaluate safety evaluation of blood bags & plastic linings of tea containers for export. My students and colleagues were able to introduce concepts of mechanistic toxicology for assessing the risk to toxic substances and the need to identify target molecules which could be used as markers of exposure and prediction of adverse impact of chemicals, translating research to bed side. A neurotransmitter receptor binding screen to identify the neuronal circuits affected by chemicals was introduced, which got converted into a high throughput screen test and was used by several institutions and programs of CSIR. Along with colleagues and Ministry of Environment and Forests, we provided leadership to two important UN funded projects- Regional Coordination of UNEP project entitled "Regionally Based Assessment of Persistent Toxic Substances" aimed to assess the sources and extent of release and hot spots and the GEF-UNIDO project entitled "Preliminary Assessment to identify the requirements for developing a national implementation plan in India as a first step to implement the Stockholm convention on persistent organic pollutant (POPs)" IITR had the privilege to plan and lead the implementation of the Toxicogenomics project of CSIR.

IITR is among the most glittering jewels of CSIR crown, and I am sure its glittering golden light will keep guiding the academia, industry and regulatory agencies nationally and internationally for safe guarding the environment & health as per its motto. On the occasion of the 50th Birthday of IITR, I wish that this only institute of toxicology in South East, grows leaps and bounds under the leadership of young dynamic Director, Dr. Alok Dhawan & his colleagues and serve as the watch dog for toxicology for the country.

P.K. Seth

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Message

सी.एस.आई.आर..जीनोमिकी और समवेत जीवविज्ञान संस्थान
(वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद्, भारत सरकार)
दिल्ली विश्वविद्यालय परिसर, माल रोड, दिल्ली–110007 भारत
CSIR-Institute of Genomics & Integrative Biology
(COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH, GOVT. OF INDIA)
DELHI UNIVERSITY CAMPUS, MALL ROAD, DELHI-110007, INDIA

Dr KC Gupta, *PhD, FNA, FNASc, FST*
Director-CSIR-IITR, Lucknow (March 2009-July 2014)
Distinguished Scientist Chair (ICMR) at IGIB, Delhi-7
Visiting Professor, IIT Kanpur, Kanpur

October 16, 2015

It has been both an honor and a privilege for me to have served this premiere Toxicology Institute, CSIR-Indian Institute of Toxicology Research in the capacity of a director for over five years (March 2009-July 2014). Having an age old association with CSIR I was warmly welcomed and embraced into the CSIR-IITR family. As a head of this CSIR-IITR family my whole soul ambition was to take the institute towards greater achievements and heights although the sky was the limit. Consistent efforts of the scientists as well as students led us to publishing research papers in some of the best acknowledged scientific journals of the world with high impact factors. My tenure witnessed a new era of Nano bio-safety and nanotherapeutics and I feel a great sense of gratification to have been associated with the research endeavors throughout. A long foreseen dream came true when CSIR-IITR received a certificate of GLP Compliance for toxicity and mutagenicity studies in June 2014 and became the first laboratory of the CSIR family to have received this International accreditation in the area of regulatory toxicology. The creation of "Vishaktata Parikshan: GLP Anuroop Suvidha" at our Gheru campus was a feather in our cap. This achievement, not only added laurels to the prestige of the institute, but also strengthened our position on the world map. SCImago Institution's Rankings (SIR) report of 2014 also reflected CSIR-IITR's progress as top rankings in all the CSIR Laboratories (Current Science.2014; 107;8,1221-22). Ever since its establishment in 1965, CSIR-IITR has shown immense potential as not only an institute which caters to core research and development but also as an epitome of societal welfare.

As the institute celebrates its 50th Golden Jubilee Anniversary this year I wish the entire CSIR-IITR family all the very best. If we look way back the last 50 years have witnessed a surge in toxicological research that has unleashed a myriad of practical applications in all facets of life, including health care, pharmaceutics, agriculture, agro-food system, chemistry, environmental protection, occupational health, etc. Alas, the percolation of generating knowledge to the masses is a great challenge. This necessitates regular scientific meetings and gathering of scientists and stakeholders to brainstorm and exchange knowledge and experience, and to get some sort of cooperation of common benefits. Therefore, I do trust that this "International Toxicology Conclave 2015" will be an opening move to enrich ourselves as comfortably as to our new budding toxicologists, which will further become the torch carrier for some other generation. I assure you that this conclave sought to create an occasion for the discussion in order to analyze the most crucial and contemporary issues in toxicology. Hope the future holds great promise for the institute as it continues to progress and achieve magnum heights. I wish to see the institute at its zenith one day and emerge as one of the most powerful and prestigious toxicology research institutes of the world. It gives me an immense sense of pride to have been a part of the CSIR-IITR family and on an emotional note, I wish my incumbent and the entire CSIR-IITR family all the success and achievements.

K.C. Gupta

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Message

सीएसआईआर-भारतीय विषविज्ञान अनुसंधान संस्थान
CSIR-INDIAN INSTITUTE OF TOXICOLOGY RESEARCH

वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद्
COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH

प्रोफ़ेसर आलोक धावन
एफएनए एएससी, एटीएस, एफएफईबी, एफआईएनएस
निदेशक

Professor Alok Dhawan
FNASc, ATS, FAEB, FINS
Director

I extend my heartfelt greetings to all the stakeholders of CSIR-Indian Institute of Toxicology Research, Lucknow on the occasion of its Golden Jubilee Celebrations.

I salute the Founder Director, Padmashri Professor S.H. Zaidi who visualised the need for such a unique organization which made pioneering contributions in safeguarding the health of miners and industrial workers. This is an occasion to celebrate scientific achievements of an organization which has been involved in providing scientific inputs towards protecting environment and human health for the past 50 years. In the course of its development, under the leadership of successive directors, the Institute aligned itself to meet national and global needs. As newer chemicals, materials and products were introduced, our scientists generated safety data on these. The Institute has been at the forefront to address issues related to food and herbal safety, quality of drinking water, environmental monitoring, predict hazards due to chemical exposure and suggest preventive measures as well as participate in formulating regulatory guidelines.

Team CSIR-IITR is grateful for the guidance and support received over the years from Presidents, Vice-Presidents and Director Generals of CSIR; Members of the IITR Research Councils, sister laboratories and various stakeholders. I am grateful to all the well wishers of CSIR-IITR who have sent messages on this occasion which we all shall cherish for times to come.

Alok Dhawan

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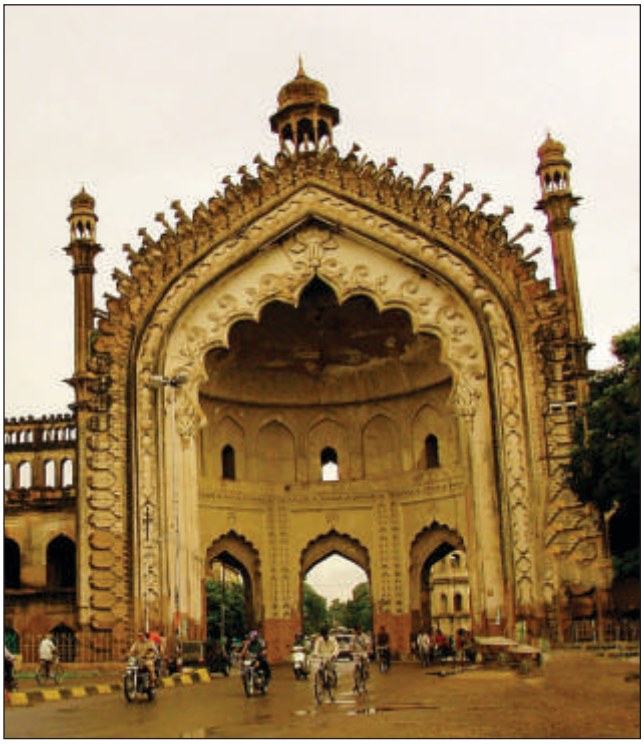
About Lucknow

About Lucknow

On the eve of the great mutiny of 1857, Lucknow, the capital of the kingdom of Avadh, was indisputably the largest, most prosperous and most civilised pre-colonial city in India. Situated on the banks of the river Gomti, it dates back to the time of the Suryavanshi dynasty. Lucknow, now the capital of Uttar Pradesh, was founded by Nawab Asaf-ud-Daula. With its spectacular skyline-- its domes and towers and gilded cupolas, palaces and pleasure gardens and wide maidans Lucknow was rightly named, the Constantinople of India, Golden City of the East and Shiraz-e-Hind. Under the nawabs, Lucknow experienced a renaissance that represented the last great flowering of Indo-Islamic genius. The city is replete with the most striking architecture, the Bara Imambara, built as a famine-relief project in 1784 by Asaf-ud-Daula. It has one of the largest vaulted galleries in the world, an amazing labyrinth and 'Bawli' a bottomless well; the imposing Rumi Darwaza, an impressive replica of an entrance gate built in Istanbul. Nearby is the Hussainabad Imambara, which was built in 1837 by Muhammed Ali Shah to serve as his own mausoleum. The city's most evocative remnant is the Residency. Built in 1800, it became the stage for the siege of Lucknow, the most dramatic event of the Mutiny.



The cultural heritage of Lucknow was influenced by the Mughal era which is still palpable in almost everything that relates to the culture of Lucknow.

Patronized by the Persian-loving Shia Nawabs of the city, the era gifted courtly manners, the 'Ganga-jamni tehzeeb', lip-smacking cuisine, rich literature, the language, music, dance, arts and crafts forms.

Infact, it was in the streets of this city that the musical instruments 'Tabla' and 'Sitar' were born. Urdu, the mellifluous language is synonymous with Lucknow and is often referred to as Lucknawi Urdu. During those times Urdu flourished and turned into one of the most refined languages. Hindu and Muslim poets took Urdu poetry to dizzying heights. The Nawabs considered the palate as a distinct form of art and the cuisine shows

strong influences from central Asia, the Middle East and Northern India.

The realm of fine arts is kept alive through the traditional Hindustani classical music and dance forms such as 'Kathak', being taught at a dedicated 'Bhatkhande Music University.

Along with the historical richness, Lucknow is also abreast of modern developments in science, arts and medicine. It is an abode of a number of world-class universities, management and technology institutes, and national level research centres. The hospitals

are well-equipped for primary, secondary and tertiary health care. The city is the only one in our country that harbors four important institutes of the Council of Scientific and Industrial Research with Indian Institute of Toxicology Research being one of them. The city is a hub of educational activities with institutions like Lucknow University, Babasaheb Bhimrao Ambedkar University, CSM Medical University, Sanjay Gandhi Post Graduate Institute of Medical Sciences, Biotech Park and several engineering

colleges.

Even though high-rise buildings have replaced many a 'kothis' of the erstwhile nawabs and 'zamindars', Lucknow still has the old world charm which blends with today's modern architecture. Through the cold winter's morning and ground mist one can see the gilded domes of the city's remaining mosques and Imambaras--a spectacular panorama.

The warmth in hospitality and the 'tehzeeb' of the city has not yet been lost and can be experienced in the bylanes of the old city. The culture and the language, though, have suffered due to the continuous onslaught by the influx of multilingual culture coming from all over the country, exposure to the electronic media and in the name of modernization of the society. However, Lucknow still remains “the land of poetry."

Team CSIR

Map of India indicating locations of CSIR institutes

CSIR-Indian Institute of Toxicology Research

CSIR-Indian Institute of Toxicology Research (CSIR-IITR), was established on 4th November 1965 as Industrial Toxicology Research Centre (ITRC). The institute is located on Mahatma Gandhi Marg in Lucknow, facing the famous historical building of Chattar Manzil Palace, overlooking river Gomti. The ITRC was formally dedicated to the nation on 27 July, 1976 by the then President of India, His Excellency Sri Fakhruddin Ali Ahmad.

Gheru Campus of CSIR-IITR

To expand the capabilities for safety evaluation of pesticides and chemicals, another campus of the laboratory was developed in 1978 at Gheru village on the Lucknow-Kanpur highway. The institute was renamed as Indian Institute of Toxicology Research in 2008 to encompass the new emerging areas of toxicological research rather than concentrating only on industrial toxicology. CSIR-IITR is one of the pioneer institutions dealing in toxicology research in Asia-Pacific region. It has played a crucial role since 1965 in assessment and prediction of toxic effects of chemicals to which industrial workers, miners, farmers and even the common man may get exposed.

Mandate

The objectives of CSIR-IITR symbolize the country's commitment towards sustainable industrialization and development. The objectives are to:

- Identify occupational health hazards due to exposure to chemicals in industries, mines, agricultural fields and general environment by undertaking health and environmental surveys.
- Determine the mode of action of toxic chemicals / pollutants.
- Conduct safety evaluation of chemicals used in industry, agriculture and everyday life.

- Suggest remedial / preventive measures to safeguard health and environment from pollutants.
- Collect, store and disseminate information on toxic chemicals.
- Develop human resource for dealing with industrial and environmental problems.

CSIR-Indian Institute of Toxicology Research (CSIR-IITR), Lucknow has the health of the nation at the core of its agenda. Technologies developed at CSIR-IITR have served to fulfill the nation's needs such as pure drinking water to setting standards for food additives, dyes and chemicals along with environmental risk assessment.

The data generated in the institute's laboratories help in formulating guidelines for regulating the use of chemicals and prescribing their limits. The institute has also developed test systems for evaluation of effluents using biological species and for screening of the dermal, reproductive, immunotoxic, genotoxic, carcinogenic and mutagenic potential of chemicals. It has carried out extensive toxicity studies on dyes, pesticides, heavy metals, plastics, polymers, food colours, herbal products, dust and fibre leading to newer diagnostic, preventive and interventional strategies

Achievements

CSIR-IITR provides a unique platform for the public and entrepreneurs to answers all their queries and concerns regarding the safety and toxicity of chemicals/ products. The institute with five decades of existence has expanded its activities in diverse areas of toxicology and has undertaken several studies, including problems of miners inhaling dust and fibres to toxicity of dyes, pesticides, heavy metals, plastics, polymers, solvents, food additives, adulterants and contaminants.

Simultaneously, the institute also worked on diagnostic, preventive and interventional toxicology. It has participated in multicentric programmes for development of pharmacopoeial standards for drugs used in the Indian system of medicine. The laboratory enhanced its capabilities for analysis of new class of pollutants like Polychlorinated Biphenyls (PCBs), Polycyclic Aromatic Hydrocarbons (PAHs); and also introduced state-of-the-art tools for toxicity assessment e.g. Comet assay, FISH, ELISA, image analysis-based methods for neuronal injury, gene expression and quantification of the histopathological lesions. The institute has made significant progress in establishing facilities and developing assays for rapid assessment of toxicity of chemicals using *in-vitro/ex vivo* models and small invertebrate animal and plant models, thereby reducing the use of animals in toxicological studies. Currently, the research at CSIR-IITR is focused on understanding the mechanism of toxicity at the molecular level also involving proteomics, genomics and bioinformatics approaches towards development of biomarkers for risk assessment of human exposure to chemicals.

At the time of the Bhopal Gas tragedy due to the leakage of Methyl Isocyanate in 1984, the institutesent a team of experts as a relief team to treat the gas exposed victims. The institute played an active role in providing clean drinking water during the Odisha cyclone disaster. Water purification devices like 'Amrit Kumbh' and ‘Bact-O-kill' developed at CSIR-IITR for water purification have successfully increased access to safe drinking water throughout the country.

CSIR-IITR scientists played a vital role in the expeditious analysis of edible oil samples during the epidemic dropsy that hit Delhi in August 1998 involving over 2500 victims with more than 60 deaths. Dropsy is caused due to consumption of mustard oil adulterated with argemone oil and could even lead to death in extreme cases. CSIR-IITR was also in the forefront during assessment of the impact of spillage of chemicals at Kandla port as a consequence of Gujarat earthquake in 2001.

The laboratory remained at the forefront in

addressing the human health and environmental problems of the country and participated actively in National Mission and societal programmes such as National Drinking Water Mission, Technology Mission on Oilseeds, Pulses and Maize (TMOP&M), and monitoring of the Ganga, Yamuna and Gomti rivers.

Scientists of the institute provide inputs in the formulation of guidelines for toxicity evaluation of chemicals and products; setting permissible limits forvarious additives and contaminants in food and packaging material; management of hazardous wastes and evaluation of pesticides that should be continued, restricted or banned. The laboratory expanded its capabilities in new areas of concern such as safety evaluation of biotechnological products, nanomaterials, analysis of food and water contaminants. CSIR-IITR also rendered its services and expertise to industry and government agencies.

Repositioning as Global Leader

The five decades of expertise and knowledgebase in toxicology research has empowered the institute to conduct research in the contemporary areas of:

- Food, Drug and Chemical Toxicology
- Nanotherapeutics & Nanomaterial Toxicology
- Systems Toxicology & Health Risk Assessment
- Environmental Toxicology
- Regulatory Toxicology

Food, Drug and Chemical Toxicology

Food is of paramount importance as it is required in sufficient quantity for leading a healthy life. There is increasing concern about contamination of food either through environmental pollution or adulteration throughout the globe. To ensure an adequate food supply during non-agriculturally productive periods, it has become necessary to find methods to preserve and process the food. With the fast growth of food processing industries, the trend towards the use of various food additives for better shelf life has also increased. New chemical entities are being exploited as additives in food. The adulteration of food due to deliberate mixing of inferior grade agents for disguising and to earn undue profits is also a serious problem. Furthermore, unintentional contaminants may appear during field production or processing and storage. Recombinant DNA technology for production of GM food has to be exploited for adequate food supply or else the crisis shall keep on increasing. However, the safety of this GM food/crop has to be established before commercialization. Based on our traditional knowledge, evaluation of the beneficial effects of herbs is a promising area for encountering several toxic manifestations. Thus, toxicity/safety data for these chemical moieties along with GM food and traditionally used herbs needs to be generated. The scientists working in this group are utilizing state-of-the-art technology & research endeavours include unraveling of methodologies to quantify the potential toxic agents in food; mechanism of toxicity of food additives, contaminants, adulterants; detection of GM food/crops and their safety / allergenic assessment; identification of phytochemicals / herbal preparations, which can modify the toxicity of above chemical moieties in food.

Nanotherapeutics & Nanomaterial Toxicology

Technological innovations have led to the emergence of nanotechnology as a new field that will revolutionize industrial development. In fact, manufacture of nanomaterials of various shapes and compositions has increased in the last few years, with a vast potential of use ranging from diagnostic imaging to molecular construction. With the realization of entirely new dimensions of safety of nanomaterials, CSIR-IITR initiated work in the area of safety/toxicity evaluation of nanomaterials. The team of scientists working

at CSIR-IITR has the experience both in synthesis as well as safety / toxicity evaluation and impact assessment of engineered nanomaterials (ENMs). Some of the most critical issues that need to be addressed for safety/toxicity assessment of ENMs include: 1) effect of shape and size; 2) dosimetry; 3) route of delivery and tracking; 4) development and validation of test models; 5) in vitro vs. in vivo extrapolation; 6) ecotoxicity including aquatic toxicity; 7) environmental monitoring and 8) life cycle analysis. CSIR-IITR has published a document on the "Guidance for safe handling of Nanomaterials"

The mission and goals of the nanomaterial toxicology group are to investigate health and environmental effects of nanomaterials to delineate their toxicity and assure safe usage in consumer products and therapeutics. The scientists in the group have competence in synthesis and detailed characterization of nanoparticles, in vitro and in vivo toxicity assays addressing issues of cytotoxicity, genotoxicity, immunotoxicity, dermal toxicity, neurotoxicity, reproductive toxicity, aquatic toxicity, biodistribution and metabolism, elimination and ecotoxicological impact of ENMs.

Systems Toxicology & Health Risk Assessment

Humans are exposed to many chemicals not only in the form of drugs but also through the environment. In order to understand the risk to human health of drug and chemical exposure, it is necessary to understand how these xenobiotics may affect normal cellular processes and lead to toxicity. The advent of high throughput genomic screens has led to the possibility of much greater breadth of understanding of the effect of xenobiotics in biological systems. Furthermore, there has been interest in the possibility of using the output of these genomic assays as a signature of xenobiotic exposure, and thus as a test procedure for the recognition of toxicological hazard. The Systems Toxicology and Health Risk Assessment group aims to study the perturbation of biological systems by chemicals and stressors, monitoring changes in molecular expression and conventional toxicological parameters, iteratively integrating data to achieve a mechanistic understanding of the specific toxicity. Particular focus has been placed on the development, assessment and application of methods for assessing the adverse effects of environmental chemicals. This includes the development and evaluation of Integrated Testing Strategies to describe all the toxicological interaction that occur within a living system under stress and use our knowledge of toxicogenomic responses in one species to predict the modes of action of similar agents in other species. The group also attempts to integrate the traditional methods of experimental toxicology with high throughput systems and with data analysis and modeling tools to allow for a more sensitive and early identification of adverse effects for use in risk assessments as well as in the development of novel biomarkers of exposure and effect.

Environmental Toxicology

Environmental toxicology refers to the scientific study of the potential effects of anthropogenic compounds on organisms released into the natural environment. A large variety of chemicals, synthetic products and NCEs, GMOs and engineered nano-materials are released into the environment every year. The challenge is to create ways to efficiently predict toxic potential and exposure levels for chemicals that lack toxicological and exposure data in environmental settings. Hence, to improve the test design and field monitoring in ecotoxicity testing alternative animal models as well as alternate to animal models are being explored Therefore, the development, validation and application of high throughput terrestrial and aquatic invertebrate test methods for ecotoxicity studies have high priority in ecotoxicology. The use, exposure and effects information obtained from quantitative structure–activity relationships "OMIC" approaches, read-

across methods, thresholds of toxicological concern and in vitro tests prior to in vivo testing are being explored for more rapid, efficient, and cost effective risk assessment of chemicals. The development of diagnostic capabilities impaired ecosystems will help in determining the extent to which existing remediation strategies/technologies are effective, and the refinements needed in risk management.

The mission and goals of the environmental toxicology group are to explore cellular, genetic and organismal approaches for detection and mitigation of environmental pollutants. The scientists in the environmental toxicology group have competence in the areas of mechanism of toxicity of environmental pollutants; sensors and probes for detection of biological contaminants; remediation of soil, water and industrial wastes; ecotoxicity and environmental impact assessment.

Regulatory Toxicology

Safety of human health and environment is the primary concern of the world. The adequacy and quality of safety data allows regulatory decisions for the production, marketing, transport, storage, categorization/labeling and usage of a vast variety of industrial chemicals, agro-chemicals, pharmaceuticals, cosmetic products and food/feed additives, etc that have an overriding influence on the sustainment and quality of our life and environment. Creation of a GLP- compliant competent and competitive facility for regulatory toxicology studies is, therefore, the most desirable application of scientific knowledge for service to society, service to industry and sustainable development around the world.

CSIR-IITR is the only institute in the CSIR family to have international accreditation in the form of Toxicity Testing: GLP Test facility. The facility can carry out Toxicity studies (acute and sub-acute toxicity) and mutagenicity studies (micronucleus assay and chromosomal aberration assay) in rat, mice, guinea pigs and rabbits. Toxicological evaluation done under this facility as per GLP norms is acceptable by the regulatory bodies of 34 member countries and 58 associate non-member countries of OECD. Thus, this facility is doing great service to the nation as small and medium entrepreneurs can get their products tested at a reasonable price within the country to generate pre-clinical data.

Regulatory toxicology is, therefore, to assure the well-being of our populace, validating the product specifications and helping regulatory decisions to support Indian industry in global positioning of their equally credible products.

The mission of the group is to formulate strategies and guidelines for regulatory bodies of the country and protection of human health and environment. To accomplish this, the goals are: Develop and demonstrate the capability to address contemporary challenges and answer future emergencies through R&D and application of new knowledge in regulatory toxicology; to harness the full potential of scientific and technological revolution and economic benefits of **Individual Ventilated Case System (IVC)** India becoming a preferred destination of safety evaluation of industrial and environmental chemicals/products; offer technologically up-to-date and economically competitive services (safety evaluation, analytical characterization, hazard identification, risk assessment and remediation, and knowledge-based consultancy) for chemicals, biological and environmental pollutants.The scientists in the group have competence in various analytical techniques, short and long term toxicity studies, genotoxicity studies, reproductive toxicity studies, inhalation studies, genetic characterization of laboratory animals, toxico-pathological evaluation of multiple organs from various species of laboratory animals and exploratory and predictive modeling

Endeavours to meet new challenges

To reposition itself globally as a leader in toxicology the institute is addressing emerging

toxicological challenges like indoor pollution, nanomateial toxicology and *in silico* toxicology that are relevant and imperative to protect human health.

Indoor air pollution is recognized as a significant source of potential health risk to exposed populations throughout the world. The major sources of indoor air pollution worldwide include combustion of fuels, cleaning products; and construction materials. Exposure to indoor pollutants is a significant cause of health problems such as acute respiratory infections in children, chronic obstructive lung diseases, lung cancer and pregnancy-related outcomes. Global estimates show that about 2.5 million deaths each year result from indoor exposures to particulate matter in rural and urban areas in developing countries, representing 4-5% of the 50-60 million global deaths that occur annually. Smoke exposure affects mainly women, and young children who accompany their mothers during cooking and other household activities. Hence, effective indoor air pollution monitoring and prevention strategies are being addressed by CSIR- IITR.

Safety/toxicity assessment of chemicals using conventional methods is very expensive, resource intensive, and time consuming. *in silico* analysis enables toxicologists to screen and predict toxicity of compounds, generate appropriate experimental strategies and formulate new safety and regulatory framework.

At CSIR-IITR the *in silico* facility is currently being used to predict the toxicity of environmental chemicals using quantitative structure toxicity relationships (QSTR) as well as understanding the mechanism of toxicity using molecular docking studies.

Outreach programmes

The outreach activities related to environmental pollution, health risks and mitigation of such problems are regularly made available to the scientific community and also to the public. CSIR-IITR holds exhibitions displaying its technologies and organises public awareness programmes and medical camps in urban as well as in rural areas. A concerted effort is being made to sensitize the general public and students in particular towards environmental issues and ethics.

Every year the institute celebrates World Environment Day, National Science Day and CSIR Foundation Day by opening its laboratories for the general public and also by organizing lectures of eminent personalities for creating scientific awareness. To popularize science among students the institute has adopted two local schools under a special programme of CSIR.

Rich Knowledge Resources

The S&T Knowledge Resource Centre of CSIR-IITR serves as an excellent information resource of books, journals, databases and reference material in the field of toxicology in the country. Documents from IARC, WHO, FAO, EPA, OECD, IRPTC, IPCS, ILO, BIS; reference sources like handbooks, encyclopedia and directories, and databases on CD-ROM such as POISINDEX and CHEMBANK are available in the library. The Environmental Information System (ENVIS) provides information related to toxic chemicals, industries, government agencies and NGOs. The institute is doing value addition to Comprehensive Traditional Knowledge Digital Library by incorporating information on toxic potential of medicinal plants and their use as antidotes.

Recognition of Expertise

In December 2000, CSIR-IITR received accreditation from NABL as a biological and chemical testing laboratory for air quality, environmental impact, chemical and bacteriological quality of water and effluents, chemical and biological safety of plastics, residue analysis for pesticides, metals and toxicity/safety evaluation of a vast variety of chemicals/products. This accreditation is an assurance of quality management, testing

services and expertise in toxicological sciences at CSIR-IITR.

Based on its expertise, CSIR-IITR has been recognized by agencies such as the U.P. Pollution Control Board, Lucknow, Central Pollution Control Board, New Delhi, and Bureau of Indian Standards (BIS), New Delhi.

The institute has always remained in the forefront for generating trained human resource in the area of industrial and environmental toxicology. CSIR-IITR provides summer training post-graduate, doctoral and post-doctoral training to students. It also provides consultancy based on national and international guidelines (OECD, USEPA, BIS, ISO) to industry, academia and public and private sectors, agencies, and companies.

CSIR-Central Drug Research Institute

fI think it is quite essential, especially from the national point of view, to promote drug research and manufacture of important drugs to treat epidemics, to improve public health. I think that by our research work, we can find new drugs for curing diseases not only for ourselves but for the world≈

These words of Pt. Jawaharlal Nehru, spoken during Inauguration of the CSIR-Central Drug Research Institute, Lucknow on 17th February 1951, hold the hope, expectations of free India and ring true even today in the national context. Formally inaugurated on that day, seventh in the chain of National Laboratories set under the aegis of the Council of Scientific & Industrial Research, the Institute was mandated to carry out drug research in all its aspects and to build a strong scientific & technological base for the development of Pharmaceutical & Drug Industry in the country.

Today, it has become a unique model for drug research in India – having everything under one roof from synthesis, screening, development studies, process up-scaling to clinical studies. Since inception, the institute has provided leadership in all fronts of drug R&D, namely, development of quality research manpower, new molecules, novel products, cost-effective indigenous process know how for institute's candidate drugs and generic drugs/drug intermediates and trainings in use of sophisticated tools and techniques in drug research. Several of the institute products and process know how have been successfully commercialized leading to treatment of diseases, products availability for indigenous and international markets, and generation of foreign exchange. Besides, the Institute has played a critical role in putting the country on the international scene in drug R&D.

The Institute has made significant accomplishments in the pursuit of its mandate to strengthen and advance the field of biomedical research in India towards affordable healthcare for all. Accomplishments include 13 New Drugs, >100 Process Technologies, >10000 Research Publications, >160 Patents in Force, >1000 Ph.D.'s, >2000 Sponsored Trainings, >5000 Post Graduate Trainings. The Institute has made significant accomplishments in the pursuit of its mission-

"New Drugs & Technologies for affordable healthcare for all, generation of knowledge base and nurturing future leaders for healthcare sector. Today, it has become a unique model for modernized drug research in India – having everything under one roof, from synthesis, screening, development studies, process up-scaling to clinical studies. Unique achievements of the Institute include discovery and development of 12 new drugs, of which, Arteether (Brand Name: E-mal), BESEB (Brand Name: Memory Sure), Centchroman (Brand Name: Saheli) are currently in market; transferred more than 130 indigenous technologies to the pharmaceutical companies, a significant contribution in the metamorphosis of the Indian Pharma Industry. So far, more than 10,000 research articles have been published by the Institute in peer reviewed journals. Obtained more than 400 Indian patents and 160 foreign patents; and produced more than 1000 Ph.D's. Several of its Alumni have occupied highest positions in national and international academic institutions, biotech and pharma industries.

R&D programme

Research activities of CDRI are aimed at developing drugs, diagnostics and vaccines to cure and get rid of the ailments confronted by mankind in general and Indians in particular. With an aim to carry out focused works in various disease areas, the R & D activities of CDRI have been categorised into various research areas. Each Research Area focuses on the design and development of drugs, diagnostics/vaccines related to the concerned disease group right from the synthesis of compounds up to regulatory studies and clinical trials. Scientists and technical manpower attached to a particular project area work in cohesion as per the guidelines adopted by each project coordination group, even though they are administratively attached to their individual divisions.

THRUST AREAS OF RESEARCH

Malaria and other Parasitic Diseases

- Development of new drugs/drug combinations as therapeutic interventions for malaria, leishmaniasis and filariasis;
- Establish novel target based drug assay protocols for identification of new leads;
- Knowledge generation on parasite biology and host parasite interactions.

Reproductive Health Research, Diabetes & Energy Metabolism

- Development of novel agents for fertility regulation (male/female) and management of endocrine disorders through modern drug design, scientific validation of traditional remedies and generation of new knowledge

Tuberculosis and Microbial Infections

- Simplification and shortening of treatment for drug-sensitive tuberculosis and search for new treatments for MDR-TB
- Development of new drugs for bacterial, fungal and viral (HIV and JEV) infections and tuberculosis.

CVS, CNS and Related Disorders

- Development of new target based drugs to alleviate CVS, CNS and related disorders;.
- Carry out basic research to delineate the molecular mechanisms of these pathologies so as to identify suitable targets for drug discovery, as well as to analyze the possible mechanism(s) of action of the candidate drugs.

Cancer and Related Areas

- Creation of appropriate platform for interdisciplinary collaborative research;

- Creation of knowledge base in cancer biology;
- Lead identification/optimization to obtain drug-like molecules.

Safety & Clinical Development

- Pre-clinical, clinical development and commercialization of new generation affordable drugs for diseases of national importance and international relevance.
- Creation of centre of excellence in the field of Clinical trials, Regulatory toxicology, Safety pharmacology, Pharmaceutics and Pharmacokinetics & metabolism and catering to the needs of pharmaceutical industries.

Business Opportunities

Over the last six decades, CSIR-CDRI has built a unique model for drug research in India having everything under one roof, from synthesis, screening, development studies, process up-scaling to clinical studies. Taking a clue from globalization and paradigm shift in R&D approaches in last couple of decades, Institute is incessantly upgrading its facilities and integrating novel approaches in its new drug R&D and biomedical research. Modernization has resulted in the increase in the number of collaborations with world class academic & research institutions and pharma companies, as well as cutting down the cost and time of new drug discovery and development. In continuation to the modernization program, a new world class drug research laboratory equipped with all the modern facilities and modalities as per the national and international regulatory guidelines has been built. Institute collaborates with pharma industries/academic institutions/funding agencies for development of new drugs, drug targets, new pharmaceutical technologies and new models. Some of the opportunities and services available are as follows:

Opportunities:

- Joint R&D with IPR and Financial benefit sharing;
- Licensing of hit/lead molecules;
- Licensing of R&D area;
- Contract R&D in some specific areas;
- Consultancy Services;
- Licensing of some facilities.

Services available on payment basis

- Modern Drug Discovery Facilities: Proteomics, High throughput screening, Laboratory animals, Structural biology, Medicinal chemistry.
- Sophisticated Analytical Instrumentation facility.
- Biological Screening: In vitro & in vivo tests of compounds and natural products against various disease models
- Information Services: Current information, current awareness / document delivery / technical query services on drugs & pharmaceuticals.
- Human Resource Development: Hands on training courses for employees of Industries / Institutions / Academics; Short term training for post graduate students.

The present set of state-of-the-art facilities

- QSAR, Molecular Modelling, Multiple Organic Synthesizer, HTS and HCS
- Proteomics, Genomics, Bioinformatics and Computational Facility
- NMR, Mass Spectrometry and X-ray Crystallography
- Flow Cytometry, Electron Microscope, and Confocal Microscope
- National Facility for Regulatory Pharmacology & Toxicology
- National Centre for Pharmacokinetic and Metabolic Studies
- BSL-3 Facility
- Laboratory of Functional Genomics & Molecular Toxicology

- Neurobehavioral Laboratory
- Knowledge Resource Centre.

OSDD Chemistry Outreach Program

On the occasion of the International Year of Chemistry 2011, under the aegis of Open Source Drug Discovery initiative, CSIR has launched a **Chemistry Outreach Program with CSIR-CDRI as Nodal Laboratory.**

The major objectives of the program are:

- Create an Open Chemical Library of diverse organic compounds synthesised mainly by the M.Sc. and Ph.D. students working at universities/institutes/ colleges across the length and breadth of the country.
- Impart practical training to large number of M. Sc. students specializing in Organic Chemistry toward synthesis and spectroscopic characterization of organic compounds
- To set up OSDD OUTREACH CENTRES in some of the CSIR labs like CSIR-CDRI (Lucknow), CSIR-NEIST (Jorhat), CSIR-IICB (Kolkata), CSIR-NIIST (Trivandrum), CSIR-IICT (Hyderabad), CSIR-NCL (Pune), CSIR-IIIM (Jammu) where students from nearby places can carry out short duration projects
- Screen and archive the compounds generated from the exercise to be submitted to the repository.
- To investigate the bioactivity of the compounds in antitubercular and antimalarial assays;
- To archive the compounds in state of the art storage facility for other biological assays & future usage.

For further details, please visit: http://crdd.osdd.net/osddchem

OSDD Malaria

OSDD*m* is an open source platform for drug discovery programmes involving both computational and experimental approaches. It is designed to implement focused projects ranging from investigation of drug targets, evaluation of leads from synthetic molecules and natural products, and development of candidate drugs. OSDD*m* aims to bring together diverse experience and interests to expedite the search for new anti-malarial drugs by working as a consortium with international partnerships.

The project aims to:

- Identify pathways and novel targets using bioinformatics and systems approaches.
- Identify chemical entities of interest and use open source for wide participation in chemical synthesis of compounds, lead optimization and cross validation of data.
- Set-up and validate *in vitro* and *in vivo* screening systems, evaluate drug kinetics and drug-drug interaction.
- Search for anti-malarial compounds from plants under traditional use.
- Drug development (toxicity profiling, pharmacokinetics, evaluation in monkeys (*P. cynomolgi*), take candidate drugs through Phase I and early efficacy studies.

For further details, please visit: http://malaria.osdd.net

Future Programs

The institute's research focus has been in disease areas relevant to national needs. Resurgence of infectious diseases like malaria and tuberculosis with new dimensions of complexities like drug resistance and compromised immunity are new challenges that CDRI will address during the XII Five Year Plan Period through a network project on Emerging and Re-emerging Challenges in Infectious Diseases: Systems Based Drug Design for Infectious Diseases. Project entitled Anabolic Skeletal Targets in Health and Illness has been taken up which is mainly aimed towards

establishment of centre of excellence in the area of bone biology. Through a network project entitled Factors Governing Competent Gamete Production and Reproductive Dysfunction, it is proposed to elucidate molecular level events associated with fertility and infertility. Another network project on Towards Holistic Understanding of Complex Diseases: Unraveling the Threads of Complex Diseases is aimed towards Development of molecular cues toward cardiometabolic diseases with special reference to redox regulations in energy homeostasis. A cross cluster network project New Approaches towards Understanding of Disease Dynamics and to Accelerate Drug Discovery aimed to establish several newer alternate models for new drug development programs and toxicity evaluation. Further, Institute has networked with several other CSIR laboratories and formulated network projects in cutting edge areas.

Candidate Drugs/New leads under development

Candidate Drugs/Leads	Efficacy	Current Status	Licensees & Collaborators
Compound 97-78	Antimalarial	Phase I Clinical Trial	IPCA Labs., Mumbai
Compound 99-373	Antiosteoporotic	Phase I Clinical Trial	Open for licensing
CDR134D123	Anti-hyperglycemic	Phase I Clinical Trial	TVC sky Shop Ltd., Mumbai
CDR134F194	Anti-hyperglycemic	Phase I Clinical Trial	
Compound 99-411	Antimalarial	IND Filing	IPCA Labs., Mumbai
CDR1020F147 (OsteoJuvenate)	Anti-osteoporotic	Being developed as neutraceutical and dietary supplement	Natural Remedies, Bangalore
Compound S006-830	Antituberculosis	Pre-clinical studies	OSDD
CDR914K058	Osteogenic	Pre-clinical studies	Kemxtree, USA
Compound S007-1500	Rapid fracture healing	Pre-clinical studies	Under negotiations
Compound S007-867	Antithrombotic	Pre-clinical studies	Under negotiations
Compound S002-333	Antithrombotic	Pre-clinical studies	Under negotiations
CDR267F018	Antidyslipidemic	Pre-clinical studies	Open for licensing
Compound S007-1235	Antileukemic	*In vivo* studies are in progress	Open for licensing
Compound S010-1255	Spermicidal & anti-trichomonal	*In vivo* studies	Open for licensing

CSIR-CDRI Drugs Currently in Market

Centchroman (Ormeloxifene) as Contraceptive
Marketed by HLL Lifecare Ltd., Tirvandrum in India & Peru

Bacosides Enriched Standardized Extract of Bacopa as Memory Enhancer
Marketed by Lumen Marketing Company, Chennai in India, Malaysia, Australia, New Zealand, Philippines, Singapore, Thailand

α-β Arteether as Antimalarial
Marketed by Themis Medicare Ltd., Mumbai in India, Nigeria, Kenya, Uganda, Zambia, Ghana, Congo

Artemether (Antimalarial) Larither
Marketed by IPCA Labs., Mumbai in India & African countries

CSIR-Central Drug Research Institute

CSIR-Central Drug Research Institute, the premier drug research institute of nation was established on 17th Feb 1951 with mission to strengthen and advance the field of drug research and development in the country

Thrust Areas of Research

Malaria & Other Parasitic Diseases
Reproductive Health Research,
Diabetes & Energy Metabolism
Tuberculosis & Microbial Infections
CVS, CNS & Related Disorders
Cancer & Related Areas
Safety & Clinical Development

State of the Art Facilities

Sophisticated Analytical Instruments Facility National Facility for Laboratory Animals Knowledge Resource Centre Regulatory Pharmacology & Toxicology
Other facilities: QSARX-ray Crystallography, Multiple Organic Synthesizer

Business Opportunities

Advisory Consultancy Services, Contract Research
Product/Technology Licensing
Modern Drug Discovery Facilities
Biological Screening Facilities
Biomedical Information Services

Career Opportunities

CDRI trains a large number of students and has a robust Ph.D. program in different areas of Life sciences/Biotechnology/Chemical/Pharmaceutical sciences, directed towards Biomedical Research. Under the Advance Training Courses for Postgraduate Students and for the employees of R& D Institutions/ Pharmaceutical Industry/ Government Laboratories etc., the institute conducts different kinds of training of short duration in various disciplines. CDRI provides a vibrant academic atmosphere enabling inter-disciplinary and cross-disciplinary areas of research to flourish.

सी.एस.आई.आर.–केन्द्रीय औषधि अनुसंधान संस्थान, लखनऊ
(वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद)
CSIR-Central Drug Research Institute, Lucknow
(Council of Scientific & Industrial Research)
Post Box No. 173, Sector 10, Jankipuram Extension, Sitapur Road, Lucknow-226031 (INDIA) Phone-off. : +91-522-2772450, 2772550(PABX),
Fax: +91-0522-2771941, T-Fax: 2771942, 2772793,Gram: CENDRUGWeb:www.cdriindia.org

CSIR- National Botanical Research Institute

Where plant-based research touches life through innovation

CSIR- National Botanical Research Institute (CSIR-NBRI) is a front ranking plant based multi-disciplinary national centre of excellence promoting both classical and cutting edge research in Plant Biodiversity & Systematics, Conservation Biology, Environmental Biology, Molecular Biology & Genetic Engineering, Bio-prospection of plant and microbial resources, Plant Microbe Interaction and Floriculture. It has excelled in herbal biotechnologies, genetic engineering, bio pesticides, bio fertilizers, organic cultivation, conservation and biodiversity, bio informatics and industrial products. The institute is providing leadership by way of consultancies to industry, national and international organizations; participating in policy development.

Conservation, Prospection of Plant Biodiversity & Systematics

The institute carries out surveys, collection, identification and documentation of the floral wealth of the country, makes biodiversity assessment and also monitors the RET plants. Very few institutions work on conservation of lower plants such as Lichen, Bryophytes and Pteridophytes etc. CSIR-NBRI has made extensive surveys and developed inventories of lower as well as higher plants. It is one of the few institutions in the world to have a herbarium of lichens, apart from large herbarium of higher plants. NBRI has a unique distinction of being a pioneer in digitizing herbaria for electronic academic exchanges and Bar coding the plants.

Exploitation of Microbial Diversity for Enhanced Plant Growth & Environment Health

The institute has developed a powerful blend of consortium consisting of novel microbes (*Pseudomonas*, *Rhizobium, Bacillus* and *Trichoderma*) which constitute a synergistic, stable blend of inoculants along with synergistic fermented plant growth promoting bio-control composition which can be applied to agronomic crops, flowers, vegetables, to

digest organic wastes such as press mud and to recover degraded ecosystems. Most of these technologies have been transferred to industry. Training and demonstrations to U.P. State Government employees and farmers for the extension of biofertilizers to field level has also been undertaken by CSIR-NBRI

Designing Plants for future

NBRI possesses knowledge base and technical expertise in the area of plant molecular biology and genetic engineering of crop plants for basic research and industrial applications. The group has advanced expertise in the designing and chemical synthesis of genes and plant expression systems. Present activities aim at the development of genetically engineered plants for agronomically improved transgenic cultivars, industrially valuable proteins and basic studies on gene expression, metabolic engineering, plant development, environment responses and phytodiversity. The institute has developed know-how for promoting shelf life by delayed ripening in crops like mango and banana. Institute also aims to use biotechnological approaches for development of flowers that could show delayed senescence or abscission leading to longer vase lives.

Phytoremediation for Clean Environment

The Institute has developed expertise on phytoremediation, eco restoration, eco auditing, environmental toxicology, and abatement of pollution in polluted aquatic and land sites. It has developed models that are technologically and economically feasible for remediation of polluted soils and waters. Institute has also undertaken research in Plant responses to atmospheric pollution and climate change. An arsenic-free rice variety has been developed jointly by CSIR-NBRI and Rice Research Station, Chinsurah (WB). It will contain safer levels of arsenic even if produced in areas with high levels of arsenic in ground water or soil

Improved Varieties of Medicinal and Industrial Crops

NBRI is leader in promoting poppy cultivation by developing high yielding varieties and developing its agro technology. It works in collaboration with Department of Narcotics under a major national programme. The institute traditionally is known for R&D on ornamental plants. Its leadership in promoting Gladiolus cultivation is well known. It has developed many new varieties of chrysanthemum and other ornamentals by inducing mutation, genetic selections, tissue culture, and breeding.

Agro-Technology for Rural Development & Wasteland Utilization

CSIR-NBRI has been working on development of appropriate agro-technology for economic plants in diverse cropping systems, aiming at economic utilization of partially reclaimed sodic lands. Over the years the scientists have developed competencies in the area of sodic soil reclamation in diverse land use systems, monitoring soil improvement, plant growth, yield and quality, agronomical and horticultural management. Institute is also conducting Training programmes for farmers and school children on medicinal, aromatic and other economic plants, their use, propagation and cultivation, followed by plantation in farmer's wasteland and/or in their existing cropping systems. Dry flower/cut flower technologies are also being disseminated for rural women empowerment.

Plants and plant-based products for human health

Institute has expertise for standardization and quality evaluation of the herbal drugs/ formulations and develop scientifically validated standardized herbal products. In the recent past CSIR-NBRI has developed Herbal technologies for Lip Balm; lipstick; Sindoor; Gulal; Chew a nicotine free herbal formulation; fermented drink; Anti-cough formulation; Soft health drink; Ointment for wounds; Antiulcer formulation etc.

State of Art Research Facilities & Services

The Botanic Garden spread over an area of above 25 hectares has a rich collection of indigenous, exotic and threatened plants totaling above 5,000 taxa. The Garden houses conservatories with a collection of Bougainvillea, Gladioli, Roses, Cacti, Succulents, Palms, Canna, Chrysanthemum, Orchids and many bulbous plants. It also has a small garden with a collection of aromatic and plants with foliage of different architecture for the visually challenged. The Botanic Garden is open for teachers and students from schools and institutes of higher learning to enhance their knowledge of plant life and take up challenging researches to unravel the mysteries of plant growth, development and utilization. CSIR-NBRI houses a Herbarium with about 300,000 plant specimens. Acts as a Knowledge Resource Centre by providing more than 55,000 volumes; subscription to online and print versions of about 350 foreign and Indian periodicals.

NBRI has state of art laboratories in the field of Genetic Engineering, Molecular biology, Pharmacognosy, Tissue Culture, Microbiology, Environmental sciences, Natural products, Eco toxicology, Plant physiology and Bio-informatics. During the last decade there has been a tremendous upsurge in the study of plants as source of medicines, nutraceuticals, dietary supplements, cosmoceuticals, biopesticides and several secondary metabolites. In view of this, the institute has recently, established a CIF (Central Instrumentation Facility) with high tech and sophisticated instruments to cater the services to the institutes/ organizations/ individuals and developing projects in public private partnership (PPP) mode. CIF is a National Accreditation Board for Testing and Calibration Laboratories (NABL) accredited laboratory and well equipped for pysico-chemical and analytical analysis of various plant based products. Institute also has a Free Air Concentration Enrichment facility (FACE) for conducting research under elevated CO_2 concentrations.

वै.आ.अ.प.–राष्ट्रीय वनस्पति अनुसंधान संस्थान, लखनऊ
(वैज्ञानिक एवं औद्योगिक अनुसंधान परिषद्)

जानकारियाँ / प्रौद्योगिकियाँ

सूक्ष्मजीवी आधारित प्रौद्योगिकियाँ: कृषि हेतु बैसिलस, ट्राइकोडर्मा, राइजोबियम फास्फेट घोलक जीवाणुओं आधारित प्रौद्योगिकियाँ

जैव प्रौद्योगिकियाँ: पारजीनी बी टी कपास तथा शोभाकारी व औशधियों हेतु ऊतक संवर्धन प्रौद्योगिकी

हर्बल प्रौद्योगिकियाँ: होली खेलने हेतु सुरक्षित रंग, हर्बल लिपस्टिक, स्वास्थ्य हेतु हर्बल पेय, कफ रोधी, दर्द निवारक, सिगरेट की लत निवारक व आर्थ्राइटिस निवारक हर्बल उत्पाद

सामाजिक उत्थान हेतु जानकारियाँ व प्रौद्योगिकी : फूलों की जैविक खेती, उच्च तकनीकी नर्सरी प्रौद्योगिकी, जैवभार उत्पादन प्रौद्योगिकी, औषधीय, शोभाकारी, पोपी, रामदाना, पान व अन्य महत्वपूर्ण पौधों की उन्नत व जैविक खेती

हमारा संकल्प

पादप आधारित शोध एवं अभिनव खोजों द्वारा जीवन को सुखद बनाना

- जैव विविधता का प्रलेखन, संरक्षण एवं पूर्व क्षेपण
- पौधों की वृद्वि एवं स्वस्थ पर्यावरण हेतु पादप सूक्ष्मजीव का प्रक्षेपण
- ग्रामीण विकास एवं ऊसर सुधार हेतु कृषि तकनीक
- राष्ट्रीय सुविधाएँ – पादपालय एवं वनस्पति उद्यान
- पुष्प कृषि एवं लैण्डस्केपिंग
- स्वच्छ पर्यावरण हेतु पादपों द्वारा प्रदूषण नियंत्रण
- कृषि एवं उद्योगों हेतु ट्राँसजेनिक (परजीनी) पौधों का विकास
- मनव स्वास्थ्य हेतु पादप एवं पादप आधारित उत्पाद का विकास

विस्तृत जानकारी हेतु सम्पर्क करें:
निदेशक,
वै.औ.अ.प.–राष्ट्रीय वनस्पति अनुसन्धान संस्थान,
राणा प्रताप मार्ग, लखनऊ
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CSIR-Central Institute of Medicinal & Aromatic Plants

Central Institute of Medicinal and Aromatic Plants, popularly known as CIMAP, is a frontier plant research laboratory of Council of Scientific and Industrial Research (CSIR). Established originally as Central Indian Medicinal Plants Organisation (CIMPO) in 1959, CIMAP is steering multidisciplinary high quality research in biological and chemical sciences and extending technologies and services to the farmers and entrepreneurs of medicinal and aromatic plants (MAPs) with its research headquarter at Lucknow and Research Centres at Bangalore, Hyderabad, Pantnagar and Purara. CIMAP Research Centres are aptly situated in different agro-climatic zones of the country to facilitate multi-location field trials and research.

CSIR-CIMAP's contribution to the Indian economy through its MAPs research is well known. Mint varieties released and agro-packages developed and popularised by CSIR-CIMAP has made India the global leader in mints and related industrial products. CSIR-CIMAP has released several varieties of MAPs, their complete agro-technology and post harvest packages which have revolutionised MAPs cultivation and business scenario of the country.

Role of the lab and positioning

CSIR-CIMAP is a unique lab of its kind in the entire globe, way ahead of its time even at the time of its establishment. As a ripple effect of CSIR-CIMAP's success and contribution, other research establishments have now started seriously considering MAPs in their portfolio. While conserving the plant genetic resources systematically and undertaking world class research work in plant science, CIMAP is equipping the nation with high-tech agriculture linked to industrial processing of MAPs. CIMAP is equipped with state-of-the-art multidisciplinary laboratories, ultra-modern instrumentation facilities and scientific expertise in agriculture, genetics and plant breeding, molecular taxonomy, molecular and structural biology, plant biotechnology, biochemistry, microbiology, bio energy and chemical sciences, apart from development of herbal products. CIMAP, Lucknow houses the National

Gene Bank of medicinal and aromatic plants, in addition to seed gene bank, tissue and DNA bank. Further, Field Gene Bank of different varieties of MAPs is maintained at CSIR-CIMAP Lucknow and its four research centres situated across the country.

Major research areas and flagship research programmes

CSIR-CIMAP is focusing on research projects which include gene bank utilization strategies, conservation, evaluation and cataloging of selected high value medicinal and aromatic plants (MAPs), conservation of bio-prospecting genes/molecules/products; new molecules of therapeutic significance, metabolic pathway studies in selected MAPs, genetic enhancement of obligate asexual and sexual medicinal and aromatic plants, process and synthetic chemistry technology for phytomolecules and plant products; enabling high value agriculture in low value underutilized lands and cropping systems, anti-malarials from MAPs, prospecting bioresources of commercial potential, development of standardized herbal formulations for better health, development of analytical processes and diagnostic tools, survey, inventorisation and technology dissemination of MAPs, genotype designing for speciality/opportunity crops in MAPs and basic research towards path breaking MAPs science..

CSIR-CIMAP is also involved in two national network projects as nodal laboratory under XII Five Year Plan that include i) pathway engineering and system biology approach towards homologous and heterologous expression of high-value phytoceuticals (artemisinin, picrosides, morphine, withanolides, podophyllotoxin) and ii) biological and chemical transformations of plant compounds for production of value added products of therapeutic/aroma value. Besides, CSIR-CIMAP is a participating laboratory in several national network projects on i) exploitation of India's microbial diversity; ii) remediation/eco-restoration and cleanup of contaminated ground water and water resources; iii) discovery, development and commercialization of new bioactive and traditional preparations; iv) comprehensive traditional knowledge digital documentation and library; v) project on neem and vii) artemisia. CSIR-CIMAP is successfully running a flagship rural development program on strategic rural income enhancements by Medicinal and Industrial Plant based technologies with special focus on North-East, women and tribals. Establishment of Artemisia annua bio-village by CSIR-CIMAP involving farmers and industries has emerged as a replicable model of public-private partnership (PPP) in MAPs and other industrial crops.

From lab to market

CSIR-CIMAP has been documenting and creating scientific knowledge base relevant to MAPs for its efficient utilisation, facilitating the lab to market journey of medicinal and aromatic crops (MACs) through several important publications. Farm bulletins on various economically important MACs (e.g. Mint, Lemongrass, Palmarosa, Geranium, Withania, Artemisia, etc.) in Hindi, English and regional languages, Training manuals - 'Aus Saathi' and 'MAPs Companion', Crop calendars, a composite research journal 'Journal of Medicinal and Aromatic Plants Sciences (JMAPS)' covering research papers, and trade related information on MACs are published by CSIR- CIMAP. Major impact making patents which resulted in major marketable technologies from CIMAP are Artemisia cultivation method (US 6,39,376), CIM-Arogya herb processing for artemisinin (IN 176679), development of arteether (IN 173947), artemisinin extraction process (US 5,955,08), CIM-Arogya - genetically tagged high yielding variety of Artemisia annua and its cultivation technology (US 6,393,763), cultivar Himalaya and Kosi of menthol mint (PP 10935, PP 12426) and method of producing mint plant Kushal (US 6,420, 174).

Sharing of expertise, knowledge and national facilities

CSIR-CIMAP Gene Bank established in 1993 as a follow up action taken in the summit of G-15 countries held at Caracas is one of the three National Gene Banks of the country that focuses on the conservation of MAPs of India in the form

of seed, field, tissue and DNA banks. CSIR-CIMAP has been designated by PPV&FRA (Protection of Plant Varieties and Farmer's Rights Authority) as Nodal laboratory for developing National Test Guidelines for plant varieties protection and DUS (distinctiveness, uniformity and stability) testing of medicinal and aromatic plants and seed species. CIMAP Bio-village Mission is currently expanding the industrial cultivation of appropriate medicinal and aromatic plants nationwide from North to South India, and in Uttar Pradesh, from Lucknow in all directions.

National Biodiversity Authority of India has recognized CIMAP as a Designated National Repository (DNR) under the Biological Diversity Act, 2002, to keep in safe custody, specimens of different categories of biological material.

Patent profile (in-force patents only)

CSIR-CIMAP has an IP portfolio of more than 135 foreign and Indian patents granted in major medicinal and aromatic plants including molecules and bioactives (17), improved new processes (52), new methods and techniques (13), formulations and compositions (36) plants varieties (23) and cell cultures/ enzymes/strains (06).

National and international linkages

CSIR-CIMAP has been recognized as Focal Point for South East Asia by International Centre for Science and High Technology- United Nations Industrial Development Organization (ICS-UNIDO). CIMAP has scientific collaboration with Bulgarian Academy of Science for Rose oil technology. At National level CIMAP has established alliances with Indian Institute of Agriculture Research (IIAR), Gandhinagar (Gujarat) and North East Institute of Science & Technology (NEIST), Jorhat (Assam) for multiplier effect for its endeavour in western and North East Region,respectively.

Academic alliances – mentoring young minds

To share a common desire to explore, extend and strengthen the functional relationship between Universities and National Scientific Institutes/ Laboratories of CSIR, CIMAP has signed MoUs with several universities including JNU, GB Pant University of Agriculture & Technology (GBPUAT), Pantnagar, Chandra Shekhar Azad University of Agriculture & Technology (CSAUAT), Kanpur, Banaras Hindu University (BHU), Universities of Allahabad and Lucknow among others.

Towards the mission of bringing scientific excellence through University-Research Institution joint efforts, CIMAP has been recognized by Jawaharlal Nehru University (JNU), New Delhi, as its centre for research and academic activities in the field of Life Sciences.

Other programs conducted regularly towards human resource development include entrepreneurship development programs, CIMAP Winter School (CWS), CIMAP Summer Training (CST), CIMAP Winter Training (CWT) on techniques and tools of biotechnology and bioinformatics, CIMAP Summer School (CSS) on molecular technologies in bio-prospection and biodiversity analysis, CIMAP training on Advanced Instrumentation and Analytical Techniques (AIAT), etc. CIMAP, Lucknow and its Research Centres regularly organize training programs, entrepreneurship building programs, need based industrial trainings and awareness programs all over the country.

For Further details, please contact :

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CSIR-Central Electronics Engineering Research Institute

CSIR-CEERI, Pilani, is a constituent laboratory of CSIR and a premier research institute of the country. It was established in 1953 for advancement of Research and Development (R&D) in the field of Electronics. The institute has played significant role in the advancement and growth of R&D in the field of Semiconductor Devices, Microwave Tubes and Electronic Systems. The institute has excellent R&D facilities and dedicated research staff to carry out state-of-the-art research in the above three areas of Electronics Science and Engineering. During the new millennium CSIR-CEERI has launched ambitious programs in Very High Power Microwave Tube Design and Development, Advanced Micro-sensors and Microsystems, Opto-electronic devices, Nano-electronics, VLSI Architectures and Reconfigurable Systems, MEMS Processing and Fabrication, LTCC Technology and Advanced Embedded Electronic Systems. The institute constantly endeavours to be a leading source of knowledge and technologies in frontier areas of electronics for the benefit of society.

The institute is spread over more than 72 hectares housing the laboratory and a residential campus accommodating 400 employees and 400 research fellows, project fellows and students. The campus is self-sufficient in all civic amenities. The institute conducts post graduate and research programs under AcSIR in Advanced Semiconductor Electronics, Advanced Electronic Systems and High Power Microwave Devices, Dehi and Systems Engineering.

Semiconductor Devices Area (SDA):

Semiconductor Devices Area of the institute has five research groups, namely

(i) MEMS and Microsystems Group:

Working in the areas of MEMs based microsensors including pressure sensors, accelerometers, gyroscopes, micro hot plate based gas sensors,

ISFETs, EGFETs, acoustic sensors, ultrasonic transducers, magnetic sensors, RF MEMS switches, phase shifters, resonators, micromirrors, fluid FETs, micro-fluidic devices, lab-on-chip, and nano-wire and nano-gap based nano-sensors.

(ii) Sensors and Nano-technology Group:

Working on the design and development of carbon nanotube based humidity and gas sensors, pressure sensors, diamond detectors (for sub-atomic particles) and silicon carbide Schottky diodes for sub-atomic particle detection and nano-technology based advanced solar cells.

(iii) Optoelectronic Devices Group:

Working on the design and development of white light emitting diodes (LEDs) based on GaN/InGaN material, design and development of optoelectronic /photonic sensors, and GaAs based magnetic sensors.

(iv) VLSI Design Group:

Working in the area of high performance VLSI architectures for real time image processing, and video processing for security applications as well as assistance for differently abled people, mixed signal IC designs for signal-conditioning and temperature compensation of MEMs based microsensors. This group is also responsible for program implementation of DeitY's flag ship program "Special Man-power Development Program – from Chips to Systems".

(v) Hybrid Micro-circuits Group:

Working in the area of LTCC technology for packaging of MEMs based microsensors, multi-sensor packaging, sensor-circuit integration, LTCC micro-hot plates and gas sensors based on them.

Electronic Systems Area (ESA):

Working in the field of sensor networks for smart structures, signal & image processing for medical diagnostics, systems for assisted living, electronic control and communication for under-water vehicles, clean-coal technologies, non-destructive testing of fruit, quality assessment and adulteration detection in foods and beverages, power electronics for solar photo voltaic applications; including grid tied inverters, and solar pump drives, and, specialized power supply systems for high power microwave tubes and plasma tubes.

Microwave Tubes Area (MWTA):

Works on the design and development of very high power microwave tubes including Magnetrons, Klystrons, Gyrotrons, Travelling Wave Tubes (TWTs) high emission density cathodes, plasma tubes including Thyratrons, Pseudo-spark switches, Plasma electron guns, Pasotron and DBD-based UV/VUV lamps for water disinfection.

CSIR-CEERI Chennai Centre:

Working on process control instrumentation for fruit and agro processing, steel rolling, NIR-based instrumentation and automation for plastic waste sorting, Tera Hertz and UV-based integrated technological solution for security feature incorporation in various packages and products and innovative renewable energy technologies and technologies for on-line medical diagnostics.

Central Electronics Engineering Research Institute
Pilani (Rajasthan)

Serving the Country since 1953 through:

* Technology Development
* Sponsored/Contract R&D
* Consultancy
* Specialised Training

In the areas of

* MEMS and Microsensors
* Optoelectronic Devices
* Microelectronic Processing & Fabrication
* VLSI Design
* LTCC Technology
* Nanoelectronics/Nanostructures
* Microwave Tubes
* Power Electronics
* Industrial Process Control
* Agrielectronics & Instrumentation
* Embedded Systems

DEVICES AND TECHNOLOGIES DEVELOPED

* C-band High-power GaAs MESFETs and Amplifiers, 980nm Pump Laser diode, InP-InGaAs based PIN Photo Detectors, Bulk Micro-machined Double Ring Capacitive Pressure Sensor, Surface Micro-machined Poly Capacitor Pressure Sensor, -MOSFET Gamma-ray Dosimeter, 16/32-bit Microprocessor Design, Application Specific Instruction-set Processor Design, Re-configurable System Design, Hybrid Microcircuits (HMCs) for SROSS and INSAT series of Satellites, ISFET based PH Sensor, Selective Ion sensors, Biosensors, MEMS Acoustic Sensors, MEMS Ultrasonic Transducers, Silicon Carbide Schottky Diode Detectors, MEMS Hotplate, Low Temperature Co-fired Ceramic Technology based Microwave Circuits
* S-band 400 W Carcinotron, S-band 500 kW Magnetron, S-band 1 MW Magnetron, 2 MW S-band Tunable Pulsed Magnetron, 3 MW Pulsed -Band Magnetron,C -band 75 kW CC-TWT, Broadband 40 W Mini Helix TWT, S-band 30 W Helix TWT, 60 W Space TWT, 6 GHz 20 W Helix TWT, 5 MW Pulsed S-band Klystron, 6 MW Pulse 24 kW Average Power S-Band Klystron, Design and Technology Development for Gyrotron Devices, 25 kV 1 kA Thyratron, 40 kV 3 kA Thyratron, Long-life Dispenser Cathodes, High-power Microwave Window Technology, Related Infrastructure & Technologies, Software packages
* High-power ac and dc Drives, Converters/PWM Actuators, Withering Controls for Tea Processing, Process Control Instrumentation for Sugar Industry, Electronic System for Composting and Cropping Processes of Mushroom, Monitoring and Control System for Paper and Pulp Industry, DIGIMAP, Machine Vision Systems for On-line Sorting and Grading of Fruit, NICAM Receiver, Machine Vision Systems for Bakeries and Steel Mills, Controlled Atmosphere Storage Chambers for Horticultural Produce, Electronic Instrumentation for Fresh Water Acqua-culture and RO Systems, NIR-based Instrumentation for Chemometrics, Electronic Tongue, Electronic Nose, Wired and Wireless Communication Network for Underground Mines, Sensor Networks, Specialised Power Supplies and Pulse Power Systems for High Power Microwave Tubes

SERVICES OFFERED

* Mask making, Semiconductor/MEMS Technology Development and Device Prototyping, Semiconductor and MEMS Unit Process Development and implementation,
* Consultancy/Industrial Training/Training for Academic Faculty and PG Students in the areas of Semiconductor Technology, VLSI Design (digital, analog and mixed signal), MEMS Technology, Mechatronics and Embedded System Design
* ME/M Tech project work and doctoral thesis work for highly motivated university students in all the above areas of electronics

For further details please contact:

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CSIR-Central Glass and Ceramics Research Institute

Brief History

The concept of the formation of Central Glass and Ceramic Research Institute grew out of the emergent need for glass and silicate materials for the Second World War under British India in the early forties of the twentieth century. CSIR- CGCRI was initially conceived as Central Glass and Silicate Research Institute. The Institute began to function in 1944 in limited manner and on December 24, 1945, the foundation stone of the Institute, the oldest in CSIR, was laid. The Institute was formally inaugurated on August 26, 1950. Dr. Atma Ram who later became DG-CSIR became Director of the new born Institute.

Early decades and Milestones

CSIR-CGCRI was initially engaged mainly in the benefaction and characterisation of minerals that were of interest to the nascent glass & ceramic industry in India. The work on glass forming machines and glass-lined equipment received major priority. A notable technological breakthrough as a result was the indigenous development and production of optical glass which is a strategic material used as lenses and prisms in a wide class of instruments. This breakthrough gave CGCRI international visibility. In another development those days CGCRI became the first to obtain a patent on coloured glass and could transfer its technology to the Indian Railways for making signals. Besides these achievements, the Institute contributed primarily to the manufacture of high alumina refractory bricks from indigenous materials for application in the steel plant refractories in the early phases.

Core Strengths

Major R&D Areas:

CSIR-CGCRI is the only organisation in India pursuing R&D in glass and only one among a very few doing R&D in ceramics. The main achievements of the Institute have been in the areas of Strategic Glasses and Optical Communication Fiber, Functional Ceramic Coatings, Ceramic Implants for Affordable

Healthcare , Refractories for Steel Industry, Ceramic Membranes for Safe Drinking Water, Low Cost Pottery for Rural Development, SOFC for Clean Energy , Sensors for Detection of Tea Aroma, LPG, Trace Moisture and Toxic Gases. Of late the Institute is aligning its R&D priority in line with CSIR's "Dehradun Declaration" along country's mission driven programmes such as Swachch Bharat , Swasthya Bharat, Skill India, Smart Cities, Digital India and Namami Ganga to cater to aspirations of common man.

Target Clients :

The Institute has been serving various sectors in the country with a view to deliver public, private, social and strategic goods for inclusive growth of the nation. Besides financial assistance from parent body CSIR, the Institutes receives major sponsorships from Government Departments and PSUs, Private Sector and Overseas agencies

Notable Contributions:

CSIR-CGCRI is the only Institute in India to innovate, develop and supply high precision glasses to serve India's strategic sector. CSIR-CGCRI has made significant contribution towards Floor Tiles Making industry in Gujarat by replacing imported Ukraine clay by locally available raw materials. The Institute's scientific intervention could save the dying art of Blue Pottery of Jaipur from near extinction.

Some of the major beneficiaries of the Institute's products and processes have been DAE, DRDO, ISRO, DST, DeIT, MNRE and other central ministries, State Governments of Gujarat, Uttar Pradesh, West Bengal and a large number of industries in the public and private sectors.

Unique Facilities:

It has state–of–the-art infrastructure facilities in the country for the processing and characterization of glass & ceramics and allied materials. Some of the unique facilities are : Optical Fiber Drawing Tower, SOFC Stack Testing Facility, Glass Melting Furnace with Tilting Facility, Photoelectron Spectrometer, , Inductively Coupled Plasma Spectrometer, Field Emission Scanning Electron Microscopy, Grid Connected Solar Power Plant etc.

HRD Portfolios :

The Institute has two outreach centres at Khurja in Uttar Pradesh and Naroda in Gujarat to cater to the problems of local pottery industries. These outreaches regularly conduct T&D programmes for skill development for rural artisans and the industry personnel.

CSIR-CGCRI's outreach at Khurja is the only organization in India to offer training courses in glass beads making to serve ceramic jewellery / glass beaded product driven industries to promote exports.

The outreach of CSIR-CGCRI at Naroda is approved and listed by Intrek, an international inspection agency in its international directory for providing testing services for ceramic raw material and products prior to export. The Naroda outreach is also a ISO 9001:2008 certified R&D centre.

The Institutes offers M.Tech Degree in Glass & Ceramics besides PhD degrees in Science and Engineering streams under Academy of Scientific and Innovative Research.

The Institue also houses the CSIR Technology Faciliation Centre at Kolkata to disseminate low cost CSIR knowhows among Micro, Small and Medium Industries in the region.

Dr K Muraleedharan is presently the Director of CSIR-CGCRI.For further details visit website: http://www.cgcri.res.in

CSIR - Central Glass & Ceramic Research Institute

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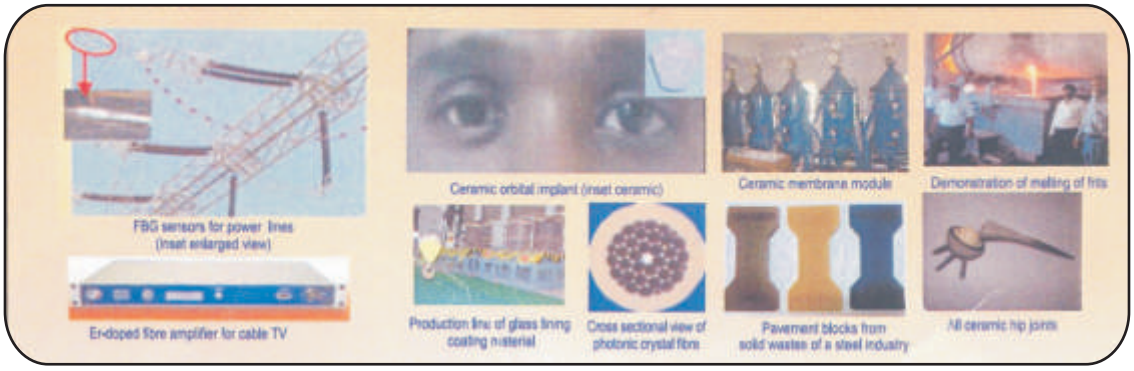
Fax: +91 33 2473 0957; Web: http://www/cgcri.res.in

Major Areas of Activities at CSIR-CGCRI

- Special Glasses &Fibre Optics
- Sensor & Actuators
- Soi-gel processing
- Whiteware & Rural Pottery
- Engineering Ceramics
- Bioceramic & Coatings
- Solid Oxide Fuel Cell & Battery
- Ceramic Membrane Filters
- Refractory & Tiles from Industrial waste
- Nanostructured Coatings

Recently Transferred Technologies

- Ceramic based sensors for combustible gases
- Antiscratch coating on plastic ophthalmic lenses
- Ceramic membrance based water purification systems
- Glass nodules for nuclear waste immobilization
- Coated medical implants
- Bioceramic hip & orbital implants
- Optical amplifier for cable TV network
- Glass lining material for reactor



CSIR-CGCRI is devoted to achieving excellence and providing leadership in the niche areas of specialty glass and advanced ceremics covering frontier science, viable technology and societal empowerment.

Outreach Centres

Naroda Centre
168 & 169, Naroda Industrial Estate
Ahmedabad 382 330, Gujarat
Te.: 079 2282 3345, Fax: 079 2282 2052
Email: siccgcrinc@cgcri.res.in

Khurja Centre
G T Road, Khurja 203 131, Uttar Pradesh
Tel.: 05738 245433, Fax: 05738 245081
Email: lksharma@cgcri.res.in

CSIR- National Environmental Engineering Research Institute

CSIR-National Environmental Engineering Research Institute (NEERI), Nagpur is a constituent of Council of Scientific & Industrial Research (CSIR), New Delhi and has a nation-wide presence with its five zonal laboratories at Chennai, Delhi, Hyderabad, Kolkata and Mumbai. The mandate of NEERI is:

- To conduct research and developmental studies in environmental science and engineering
- To render assistance to the industries of the region, local bodies, etc. in solving the problems of environmental pollution by S&T intervention
- To interact and collaborate with academic and research institutions on environmental science and engineering for mutual benefit
- To participate in CSIR thrust area and mission projects

R & D Thrust Areas

Environmental Monitoring, Environmental Modelling, Optimisation, Environmental Impact & Risk Assessment, Environment Policy, Environmental Biotechnology, Genomics and Virology, Environmental Health, Water and Wastewater Technologies, Solid and Hazardous Waste Management and Environmental Materials. The clientele involves Industries, Central Government Ministries/Boards, State Government Ministries/Boards, Judiciary.

Current Activities:

CSIR-National Environmental Engineering Research Institute (CSIR-NEERI) has initiated various R&D activities under 12th Five Year Plan for effective environmental monitoring in the country, which include mission projects such as “National Clean Air Mission”, “Clean Water: Sustainable Options”, “Waste Utilization and Management (COE)”

and “Quantification and Mitigation of Persistent Organic Pollutants (PoPs) under Stockholm Convention”. Also various R&D activities are in progress to deliver environmental solutions through development of cost-effective and resource recovery based technologies suitable to socio-economic conditions prevailing in the country.

CSIR-NEERI also initiated vital outcome-driven R&D activities under CSIR-800 programme to benefit rural people of India in terms of water pollution control, air pollution control and waste to wealth. The Institute is attempting to develop environmental materials which will be instrumental in preventing environmental pollution. The Institute has taken up R&D activities related to carbon dioxide sequestration and valorization for reducing the increased concentration of CO_2 in the atmosphere. As part of paradigm shifts, CSIR-NEERI is committed to shift from conventional environmental impact and risk assessment to carrying out capacity based developmental planning to ensure sustainable development in the country.

The Institute will continue to provide solutions to various environmental problems faced by government, industry and the society. The Institute will also continue its output driven R&D activities in terms of technology development and transfer, research publications, patents, networking with academic and R&D Institutions in India and abroad.

Achievements

CSIR-NEERI has successfully transferred two technologies, viz. Phytorid wastewater treatment technology to 15 MSME entrepreneurs and Solar Electrolytic Defluoridation technology of water to 9 MSME entrepreneurs. CSIR-NEERI entered into several agreements with various Agencies/Organizations for technology transfer/ implementation of R&D projects / academic collaboration.

CSIR-NEERI developed indigenous “Electronic Nose (e-nose)”, in association with C-DAC Kolkata, which has a potential to substitute imported “e-nose”. This e-nose consisting of 8 array of sensors (metal oxide) is useful in monitoring of sulphurous odorants in pulp & paper industry, tannery and distillery. The Institute provided a technological solution to M/s Mahindra Vehicle Manufactures Limited (MVML), Pune for treatment and safe disposal of its effluent using high rate transpiration system. The HRTS model designed by the Institute was implemented in the field at M/s MVML, Pune. The HRTS design consists of filter media which provides more surface area for interaction of pollutants and also removes the suspended solids present in the wastewater. Hand pump attachable Iron Removal (IR) plants based on the CSIR-NEERI's technology were installed at 66 locations by Public Health Engineering Department, Chhattisgarh in Rajnandgaon, Durg and Kanker districts. These plants helped to bring down the iron concentrations in water from 3-8 mg/L to less than 0.1 mg/L. Capacity of each plant is about 1000 L/hr. Backwash of the sand filter after choking is carried out by lifting total sand with nylon mesh kept below sand, washing sand and again placing sand in the filter. Electro-oxidation technology developed by CSIR-NEERI was implemented at Nandesari Industries Association, Vadodara on pilot scale for effective treatment of recalcitrant chemical industry wastewater. The first ever CETP scale electro oxidation plant has been designed in India for treatment of highly recalcitrant chemical industry effluents, based on the technology developed by CSIR-NEERI. This technology helps to meet the effluent discharge norms (COD of 250 mg/l) with low foot print area (4m x4 m per reactor) and is easy to install, operate and is cost-effective. As part of paradigm shift from conventional environmental impact and risk assessment studies to carrying capacity based developmental projects CSIR-NEERI has taken up projects such as “carrying capacity based planning for proposed development in Sambalpur-Jharsuguda region, Odisha”; “tourist impact assessment and carrying

capacity study for environmental protection of world heritage sites – Taj Mahal, Agra and Ajanta Caves, Aurangabad". The Institute sent 100 units each of NEERI-ZAR water filters for the Uttarakhand and J&K flood affected people to provide safe drinking water. A multi-fuel domestic cook stove has been developed and tested for its high thermal efficiency and reduced emissions. A Mobile Toxic Emission Monitoring & Control Laboratory for Fuel gas treatment of Small and Medium Scale Industries was developed. Field demonstration of the low cost water recycle and reuse Nawatech Natural Water Technologies (Field demonstration two in Pune and two in Nagpur) and Phytoremediation technology (Three Field Demonstration) under Water 4crops project are under implementation.

Exceptional publications of global impact

- Fluoride in drinking water and defluoridation of water a review Jagtap S., Yenkie M. Labhsetwar N., Rayalu S. IF 9.464
- Perspectives of Plant-associated microbes in heavy metal phytoremediation- RajkumaM., Sandhya S, Orasad M. N. V., Freitas H – IF 6.828
- Rao N.N., Masid S, Benzoylation for the recovery of structure directing agent (di-n-propylamine) from the process effluent of a luminophosphate synthesis, *Green Chemistry*, V.15, p.1526-29 (2013) –IF 6.828
- Orthorhombic/Cubic Cd_2SnO_4 Nanojunctions; Enhancing solar water splitting efficiency by suppression of charge recombination –Deshpande A, Kelkar S., Rayalu S., Ogale S. -IF-6.626
- Throwing light on Platinized Carbon nanostructured composite for hydrogen generationPriti A Mangrulkar, Abhay V. Kotkondawar, Sumanta Mukherjee, Meenal V Joshi, Nitin Labhsetwar, D. D. Sarma and Sadhana Suresh Rayalu *Energy & Environmental Science*, 2014, DOI: 10.1039/C4EE02444C –IF 15.49.

Technologies Developed, Transferred and Commercialised.

- Phytorid Technology for wastewater treatment.(Licensed to 14 Vendors)
- Electrolytic De-fluoridation Process. (Licensed to 9 Vendors including 4 MSMEs)
- CSIR approved IP Licensing of "Hydroplume- Clarifloculator" to national and international licensees.

Other Demonstrated Technologies

- Electro-oxidation technology implemented at Nandesari Industries Association, Vadodara on pilot scale for effective treatment of recalcitrant chemical industry wastewater.
- Technological solution to M/s Mahindra Vehicle Manufactures Limited (MVML), Pune for treatment and safe disposal of its effluent using high rate transpiration system.

Other Noteworthy Scientific Output

- Shape controlled nano-catalysis
- Novel downstream processing using pervaporation System for separation of bioethanol and biobutanol
- Studies related to carrying capacity based developmental projects
- Evaluation of waste management processes using engineering and omics tool
- Building block chemicals from renewable resources
- Development of Combustion type improved sensor
- Feasible MSW management options, applicable for Indian subcontinent
- Environmental analysis of emerging pollutants conforming to NABL requirements
- Improved materials and microbes for waste management and pollution control

Societal Projects

- As a part of societal missions, based on the technology developed at the Institute, solar energy based electrolytic defluoridation plant has been constructed and commissioned at a fluorite mine of Mharashtra State Mining Corporation, located near village Dongargaon, about 100 km away from Nagpur city. The plant with a designed capacity of 600 L / batch is providing fluoride free safe water to the workers of the fluorite mine.
- The Institute has evolved US EPA assisted water safety plan for Hyderabad city and demonstrated UNIDO assisted full scale grey water recycle in Madhya Pradesh. NEERI has developed a process for recovery of essential oils from waste peels of citrus fruits for rural community.
- Several low-cost catalysts have been designed and synthesized for the control of CO, VOCs and PM emissions from the solid fuel combustion. These catalysts have been characterized and evaluated for their catalytic activity towards CO, VOCs and PM oxidation with a view to control indoor air pollution in rural areas.
- NEERI has designed and developed sustainable remediation process for mitigation of fluoride contamination in groundwater and its field application for domestic use. Hand pump attachable iron removal plants were developed and installed at various places in the country.

Biotech Park, Lucknow

A frontier of Science, Biotechnology, offers enormous possibilities of its use as a premium precision tool for the welfare of society and creation of wealth for sustainable commercial and socio- economic development. The Department of Biotechnology, Government of India and several state governments have set up Biotech parks to support the growth of biotech industries by providing common shared facilities, ready to use laboratories and other infrastructure. There are different models of the Biotech Park depending upon the resources, needs and priorities. The parks have been set up by state governments in partnership with industries, totally by industries or partnership between Central and State governments. DBT in most cases has provided funds for setting up technology incubators in parks.

Biotechnology has become a household name in the state of Uttar Pradesh, with the declaration of Lucknow as "Biotechnology City" on January 03, 2002 during 89th Annual Session of the Indian Science Congress held at Lucknow.

Biotech Park set up by the Department of Biotechnology Govt. of India & Department of Science and Technology, Government of Uttar Pradesh, brings an enabling environment for upcoming entrepreneurs to set up their R& D units in Park. It serves as the nucleus for promotion and growth of biotech industry in the state and partnership with the centers of excellence of the city.

The Park plays an important role in the initial establishment of the startup companies by providing information about possible business avenues; facilities and incentives available under the Government of India and State Government biotech policies, availability of special grants, schemes and loans as well as information about requirements for registration and obtaining IPR. It also provides state-of-art plant tissue culture and biofertilizer facilities which it operates in public private partnerships. It has high capacity solvent extraction plant for obtaining phytochemicals and lead molecules from high value medicinal plants and their purification; molecular biology and analytical quality control laboratories and other common

support facilities like bioinformatics, conference hall, cafeteria, effluent treatment plant, storage, etc. The Park also extends expertise to its incubatees from scientists of Local CSIR and ICAR institutions apart from other institutions, universities and par excellence centers of learning in the town and not far away from the famous Indian Institute of technology at Kanpur.

The focus of the Park is on challenges and opportunities surrounding the current biotechnology issues related to technology development which would ultimately result in the development of the State and generate rural employment and social upliftment.

The park has leased out space to 18 carefully selected entrepreneurs which has led to creation of number of new jobs. The Biotech Park's incubator II building has become functional and three companies have leased out space to set up their R&D laboratories. Besides the wet lab space, the incubator II has multipurpose meeting rooms / conference hall to accommodate 300 – 325 persons, offices and other related facilities.

The entrepreneurs at Biotech Park are going to pursue innovative research and produce innovative products. In the Biopharma Sector, ABC Genomics, technically supported by a US based company, is developing a hand held microarry for detection of pathogens and a WHO GMP complaint facility for R&D and production of Liposome based delivery fungisome, a drug for kalazar treatment, and R&D center for diagnostics are coming up at Park.

The Park through its Plant tissue culture facility reduced the price of banana plantlets by about 30% leading to increase in banana cultivation in the State. The Park has made substantial contributions to the National Mission on Biofuels by developing four high yielding and oil rich varieties of *Jatropha curcas* and providing technical know-how for development of good nurseries and quality planting material.

The Park is providing consultation to the companies in the field of biofuel and necessary technical guidance, planting material and monitoring of the plants and is helping Department of Rural Development in Jatropha plantation in 1000 hectares and has also helped farmers to set up 10 Nurseries. Biotech Park has the Quality Management System Certificate ISO 9001:2008/ISO 14001:200 Certificate jointly accredited by System of Australia and New Zealand. The Tissue Culture facility at the Biotech Park has been recognized under national certification of Tissue Culture raised plants (TCS- TCP) by the accreditation panel from BCIL. More than 5000 students from about 40 schools / colleges and more than 1800 farmers have visited the Park.

The Park is playing an important role in generating much needed human resource. It imparts training to young students and farmers from remote areas. The park is actively involved in organizing awareness programmes for farmers and stake holders. Recently Biotech Park has started a finishing school for the graduates and post graduates with the objective to make students employable in Biotech Industry by imparting additional skills through hands on exposure.

The park has changed the paradigm of how science, biotechnology and entrepreneurship can be clubbed for the benefit of stakeholders and the society. The Biotechnology Park, Lucknow has also been a trend-setter since it became fully functional in a span of three years from inception to maturity. It is a showcase of innovation industries and a model of active collaboration between industries, research institutes and academia. Besides holding hands of the start up companies, the Biotech Park has motivated local scientists to venture into Biotechnology.

The setting up of Biotech Park has made Lucknow a new hub of biotechnology in North India and Biotech Park is a happening address in the city.

सीएसआईआर-भारतीय विषविज्ञान अनुसंधान संस्थान
CSIR-INDIAN INSTITUTE OF TOXICOLOGY RESEARCH

CSIR-IITR, Lucknow is the only multidisciplinary research institute in the field of toxicology in South East Asia with the motto:

"Safety to environment & health and service to industry".

R&D Areas

- Food, Drug & Chemical Toxicology
- Environmental Toxicology
- Regulatory Toxicology
- Nanotherapeutics & Nanomaterial Toxicology
- Systems Toxicology & Health Risk Assessment

Services Offered

- GLP certified for pre-clinical toxicity studies
- NABL accredited
- Safety / toxicity evaluation of NCEs
- Water quality assessment and monitoring
- Analytical services
- Environmental monitoring and impact assessment
- Epidemiological studies
- Information on chemicals / products

Recognitions

- Scientific & Industrial Research Organizations (SIROs)
- UP Pollution Control Board (Water & Air)
- Indian Factories Act (Drinking Water)
- Bureau of Indian Standards (Synthetic Detergents)
- Food Safety & Standards Authority of India (FSSAI)

Technologies Developed / Available

- Water Analysis Kit
- Mobile Laboratory Van for on spot water quality analysis
- Argemone Detection Kit for rapid screening of Argemone in mustard oil
- CD-Strip for detection of butter yellow, an adulterant in edible oils
- Arsenic Detection Kit

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