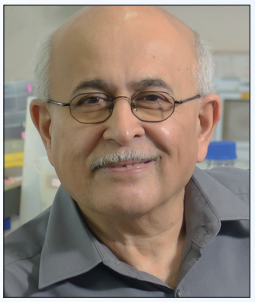
JAWAHARLAL NEHRU CENTRE
FOR ADVANCED SCIENTIFIC RESEARCH

Bi-annual Newsletter

JNC News

ISSUE 51 • NOVEMBER 2018 www.jncasr.ac.in

Message from the President



This has been a year with several achievements coming our way, thanks to our collective efforts. I am glad to announce that with the UGC's approval of JNCASR as Category-I Deemed to be University, we will now be able to add many more facets to our academic and outreach activities, including admissions of international students. We have also been granted DBT-JNCASR project on "*Life science research, education and training at JNCASR*" by Department of Biotechnology (DBT), Government of India with a fund of about Rs.30 crore to foster more collaborative research in the interface of biology, chemistry, physics and other areas.

I congratulate faculty who have been honored for their academic achievements, beginning with Prof. CNR Rao who received the Honorary Causa Doctorate from Presidency University, Kolkata (80th Hon. Causa Doctorate) and Honorary Doctorate from University of Manchester, UK. He along with Prof. Umesh Waghmare also received top-cited author award 2018 by the Institute of Physics (IOP). Prof. Maneesha S. Inamdar was awarded Dr. Kalpana Chawla Award for Women Scientist in the field of Science & Technology for 2017 by KSCST, Govt of Karnataka. You will find the achievements of other faculty on page no. 6.

A computational facility comprising of 500 terraflop CPU power and 150 terraflop of accelerator power is being installed in the Centre funded by National Supercomputing Mission. In our efforts towards translating our discoveries to commercialization, 7 patents have been granted in addition to 8 Technology/IP were licensed this year. The Centre has also set up JNC Translational Research Foundation, a Section 8 company to boost our translational research. Our startup ventures also appear to be moving ahead on the right track.

Our science outreach programme continues to make an impact across the country with the lectures of Prof CNR Rao and multimedia presentations on General Science, Chemistry and Nanoscience by Dr. (Mrs) Indumati Rao benefitting thousands of students and teachers of various schools and universities. Under our Fellowships and Extension Programmes from this year we plan to increase the intake of summer research fellows and also start more training programmes.

With best wishes,

V. Nagaraja

President, JNCASR

What's Inside ?

Proud Moment!

Prof. CNR Rao received the Honorary Causa Doctorate from Presidency University, Kolkata (80th Hon Causa Doctorate)

UGC has graded JNCASR as Category-I Deemed to be University.

With this, JNC will now be eligible for the benefits stipulated under clause-4 (Dimensions of Autonomy for Category-I Universities) of UGC Regulations.

Leading News

From the Editor

In August, our campus welcomed another new batch of young members to its fold. This was marked by several departments hosting academic and informal orientation events. The Centre is set to acquire an infrastructural boost in terms of its computational facilities with the signing of an MoU with IISc and the recent approval of an interdisciplinary grant awarded by the DBT, to the JNCASR, should enable an upsurge in cross-campus collaborations in the broad area of Biology. Recent publications from our laboratories have garnered attention in the media and several students have won prizes at meetings, a few have been highlighted on the following pages. It is also heartening to note that the JNCASR community generously contributed towards aid for victims of the recent ravages of rain in Kerala and Kodagu.

Sheeba Vasu, Ph.D.
Associate Professor, Neuroscience Unit
JNCASR

JNCASR was rated as the best institution from research productivity point of view, as per recent studies on performance (per capita) of different Indian Institutions – Current Science, June 10, 2018 https://goo.gl/TFK6Kj.

DBT-JNCASR project on "**Life science research, education and training at JNCASR**" was granted by Department of Biotechnology (DBT), Government of India with a project grant of Rs. 28.56 cr.

Memorandum of Understanding: The Centre signed MoUs with Centre for Human Genetics, Bengaluru, and International Iberian Nanotechnology Laboratory (INL), Portugal.

Best Maintained Garden Trophy: JNCASR bagged the "*Best Maintained Garden*" Trophy for 6th consecutive year from the Mysore Horticultural Society. The Chamundi Campus also received the same for the first year.

NSM - National Supercomputing Facility, an MoU signed with IISc to set up this facility comprising of 500 terraflop CPU power and 150 terraflop of accelerator power of computational infrastructure at JNCASR.

Research Highlights

Synthetic mimic for critical biomolecular process

In biological systems many tiny machines come together to maintain cellular structure and functions. The self-assembly process involved in these tiny machines requires biological fuel to become operational. We show that synthetic molecules can grow and be controlled using similar stimuli as biological systems. "*the stimulus in our case is one of the most ubiquitously present chemicals - ATP, which makes our work a benchmark in what can be achieved synthetically*" say Dr. Subi J. George, and Dr. Sundaram Balasubramanian. A research team led by the duo and have shown supramolecular polymerisation of a carefully designed monomer coming together and stacking on each other in a helical sense on interaction with a biological cue, ATP (Nature Communications, Mishra *et al*, 2018). This phenomenon is very close to naturally occurring processes such as those involving actin that help cells to maintain shape. In living systems, actin assembles on its own using its monomer components under the influence of adenosine triphosphate (ATP) and like a tiny machine works like a treadmill to support cellular movements. Their study has come closest in synthetically mimicking that natural process. Thus, it opens up new and exciting avenues for achieving spatially and temporally controlled supramolecular growth and development of biomimetic materials.

Why the HIV-1C viral subtype replicates faster

Of the approximately ten genetic families of HIV-1 (A through K), the C family (HIV-1C) is responsible for more than half of global infections and approximately 95 - 99% of HIV cases reported from India. The HIV-AIDS Laboratory headed by Prof Ranga Udaykumar of the Molecular Biology and Genetics Unit has been investigating the causes underlying the domination of HIV-1C, at the molecular level. A recent report from the laboratory demonstrated that HIV-1C, unlike other genetic families of HIV-1, can efficiently duplicate the PTAP domain of Gag - a structural protein necessary for viral budding (Journal of Biological Chemistry, Sharma *et al*, 2018). The duplication of the PTAP domain conferred a great replication advantage on the variant viral strains in eight independent subjects as compared to the co-infecting viral strains containing only one such domain, as determined by next-generation sequencing and viral pairwise competition assay. This study is the first to provide experimental evidence to confirm the positive impact of PTAP duplication on viral fitness in natural infection. Importantly, the study has serious implications for HIV evolution as PTAP duplication could be effectively transmitted to the other genetic families of HIV-1 by genetic recombination. Furthermore, the finding may also have a serious impact on the current strategies of disease management if an association between PTAP duplication and drug resistance, as alluded by the present study, is established. The laboratory is presently examining this hypothesis using a pediatric clinical cohort in collaboration with the Indira Gandhi Institute of Child Health, Bangalore.

Electrochemical sensor detects dopamine and paracetamol

Prof. Sebastian C. Peter and his team developed a novel electrochemical sensor - nanostructured $Pt/CeO_2@Cu_2O$ nanocomposites for individual and simultaneous detection of neurotransmitter dopamine and analgesic paracetamol. Whereas in-vivo models reveal that long-term intake of paracetamol reduce dopamine levels significantly, overdose of paracetamol may affect the sympathetic nervous system resulting in fatal hepatotoxicity and nephrotoxicity. Therefore, simultaneous analysis of dopamine and paracetamol is of paramount interest from a clinical and pharmacological perspective. The $Pt/CeO_2@Cu_2O$ modified electrode is highly preferred due to large surface area, reversible redox activity, high surface-oxygen mobility, chemical inertness, bio-compatibility, non-toxicity and applicability over a wide range of areas. The $Pt/CeO_2@Cu_2O$ nanocomposite was tested for the simultaneous detection of dopamine and paracetamol in pharmaceutical products, as well as in spiked human serum and urine samples. The nanocomposites have the following advantages such as low-cost, high sensitivity, selectivity, and low detection limit. This work was published by Prof. Sebastian C. Peter and his post doctoral fellow Dr. A. R. Rajamani in ACS Applied Nano Materials.

One Step Closer to Therapeutics for Alzheimer's Disease

Prof. Tapas K Kundu's group from Transcription and Disease Laboratory of the Molecular Biology and Genetics Unit discovered a small molecule activator (TTK21) of master epigenetics enzyme p300/CBP. In collaboration with Prof. Eswaramoorthy's group from the Chemistry and Physics of Materials Unit, they employed glucose derived carbon nanosphere that could activate the enzyme in the brain of mice. Recently, in collaboration with Prof. Anne-Laurence Boutillier of Strasbourg University, they have shown that CBP/p300 HAT activation by CSP-TTK21 efficiently reverses epigenetic and transcriptional process and rescues synaptic plasticity and behavioral deficits associated with Alzheimer's disease in mouse models. The findings have been recently published in EMBO Molecular Medicine (Chatterjee *et al*, 2018)

Academic Activities

57 students have joined different degree programs at the Center through admissions in August of 2018, in addition to the 5 students who had joined through the mid-year admissions in January 2018. On 2nd August 2018, the Academic Office organized an Orientation Program for new students, JNC faculty gave presentations on various topics ranging from research ethics, computer usage and ethics, safety measures to protection of women at workplace. These were followed by an interactive workshop with the Counsellor.

The current student strength is 332. The notification regarding admissions to M.S. (Engg./Research) and Ph.D. program for the January session of 2018-19 has been advertised in newspapers, and announced on our web site, with a deadline of November 22, 2018 for online applications at www.jncasr.ac.in/admit.

Intellectual Property

Patents Granted

Indian Patent Office issued

1) Patent (No. 295700) for 'A High Sensitivity Assay for Molecular Typing of Biological Sample, Probes and a Kit Thereof' developed by **Profs. Ranga Udaykumar and Chandrabhas Narayana *et al***.; and

2) Patent (No. 296510) for 'Cationic Antibacterial Compound, Composition, Method and Articles Thereof' developed by **Prof. Jayanta Haldar *et al***.

Chinese Patent Office issued

Patent (No. ZL201380070984.4) for 'Antimicrobial Compounds, Their Synthesis and Applications Thereof' developed by **Prof. Jayanta Haldar *et al***.

Patents Filed

Two Indian Patent Applications filed for the inventions:

- Method And System To Assess Solar Cells developed by **Prof. K. S. Narayan *et al***. (Patent Appl. No. 201841020900, filed on 5-06-2018)
- **Dr. Premkumar Senguttuvan** (Provisional Patent Appl. No. 201841032648, filed on 30-08-2018)

Two International Patent Applications filed under PCT:

- Dynamic Host-Guest Interactive System developed by **Prof. Sarit S. Agasti *et al***.
- Method And System To Assess Solar Cells developed by **Prof. K. S. Narayan *et al***.

Five National Phase Patent Applications filed for:

- Method for modulating autophagy and applications thereof: filed in Australia, Europe, Singapore and USA, developed by **Prof. Ravi Manjithaya *et al***.
- A composite, scaffold and applications thereof: filed in USA, developed by **Prof. T. Govindaraju *et al***.

Outreach Activities

The CNR Rao Hall of Science and Education Technology Unit (ETU) organized the '**Student Mentoring Programme**' from April 2 to May 13, 2018. Eight students of Class XI students participating in this programme which was supported by the CNR Rao Education Foundation in continuation with the SMP programme this year. During the residential internship at JNCASR the participants attended regular classes, laboratory and library work along with sports and recreational activities. Assignments and tests were also a part of the programme.

Under the auspices of the Science Outreach Programme, the **Teachers-students programmes/ workshops** was organised by the CNR Rao Hall of Science and ETU organised on July 2, 2018. The recipients of the CNR Rao Education Foundation sponsored 2017 prizes for Outstanding Science Teachers were Shri. Krishnamurthy L. Bhat. and Dr. SK Samsul Alam. The Lecture Programme had a lecture by Prof. G.U. Kulkarni and by Prof. K.S. Valdiya. Around 200 students and teachers attended the program.

On August 21, 2018, a '**Programme in Physics for students**' was organized where three lectures were delivered by faculty members from the Centre and NCBS. Around 175 students and teachers participated in the programme. On September 19, 2018, a '**Programme in Biology for students**' was organized wherein 180 students and teachers participated.

Fellowship and Extension Programmes

SRFP

Summer Research Fellowship Programme (SRFP)

This year, 88 students were offered the fellowship. 63 students availed the scholarship and received research training in various areas of Physics, Chemistry, Biology or Engineering at research institutes in Bangalore, and elsewhere in the country.

POCE

Project Oriented Chemistry Education (POCE)

Out of 398 students,10 students were selected for this year's POCE programme. Nine students of POCE-2016-18 batch were awarded Diploma in Chemistry.

POBE

Project Oriented Biology Education (POBE)

Ten students from 07 different states were selected out of 375 applications. Six students of POBE-2016-18 completed the program successfully and were awarded the Diploma in Biology

Visiting Fellowship Programme

22 applications received for the Visiting Fellowships Programme 2018-19 for different categories. 12 were selected under Physical Sciences and 4 were selected under Biological Sciences category

Student Buddy Programme

During September 2018, 56 students and 5 teachers participated from two schools; KV Bangalore and Sagar Science Forum, Shimoga

Awards and Achievements

Awards received by faculty

CNR Rao

- Received the Honorary Causa Doctorate from Presidency University, Kolkata (80th Hon Causa Doctorate)
- Received Honorary Doctorate from University of Manchester, UK
- Top cited Author Award 2018 by Institute of Physics Publishing (IOP)

K S Valdiya

Life-Time Excellence Award from Ministry of Earth Sciences, Government of India

Umesh V Waghmare

Top cited Author Award 2018 by Institute of Physics Publishing (IOP)

Maneesha Inamdar

Dr. Kalpana Chawla Award for Women Scientist in the field of Science & Technology for 2017 by KSCST, Govt of Karnataka

Appointment

Subir K Das, Head, CompLab

Promotions

Associate Professor

Kanishka Biswas

(w.e.f. 21.05.2018)

Professor

Subir K Das

(w.e.f. 15.09.2018)

Superannuation

Namita Surolia

(w.e.f. 01.05.2018)

Awards received by students

Abhilash Lakshman's (Ph.D. student, Chronobiology Lab) entry to 2018 Society for Research in Biological Rhythms (SRBR) Meeting, ChronoVideo Competition earns Runner Up position

https://youtu.be/a63UUZ9o11c.

Keerthipriya P. (Ph.D. student, EIBU), has been awarded the runner up prize for her talk at the SPEEC-UP meeting held in Centre for Ecological Sciences, IISc, Bangalore on August 31, 2018.

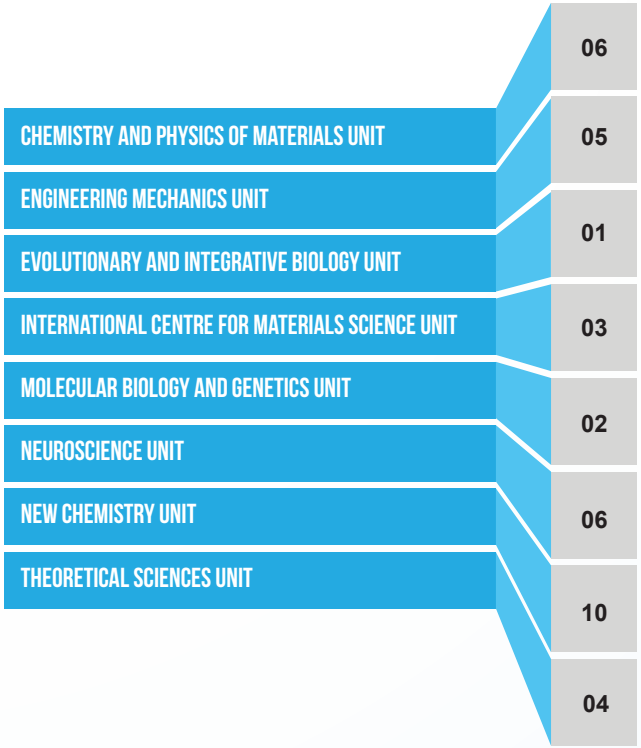
Rajaji Vincent (Ph.D. student, CPMU) received the best poster presentation award at the 56th European High Pressure Research Group (EHPRG) meeting, held in Aveiro, Portugal, from September 2-7, 2018.

Lectures, Meetings and Events

Endowment Lectures

- ***A.V. Rama Rao Foundation Lectures in Chemistry,*** Ideal Synthesis and Realistic Approaches by Prof. Krishna P. Kaliappan, Department of Chemistry, IIT Bombay; Prize Lecture: A Leap to Boost-up Energy Storage with Metal-Sulfur Batteries by Prof. Aninda Jiban Bhattacharyya, Solid State and Structural Chemistry Unit, Indian Institute of Science, May 15, 2018.
- ***Prof. C.N.R. Rao Oration Award Lecture (19th in the series),*** Encoding Memories in Dense Disordered Packings of Soap Bubbles by Prof. Rajesh Ganapathy, JNCASR, August 13, 2018.
- ***DAE Raja Ramanna Lectures in Physics, Hybrid Perovskites***, The exciting new family of multifaceted materials by Prof. Satishchandra B. Ogale, Indian Institute of Science Education Research, Pune; prize lecture: Bose Fermi Duality in 3 dimensions by Prof. Shiraz Minwalla, Tata Institute of Fundamental Research, Mumbai, September 17, 2018.
- ***ISRO Satish Dhawan Lecture,*** Nationalism as an excuse for bad Science by Shri. Shekhar Gupta, Founder and Editor-in-Chief 'ThePrint', October 01, 2018.

Unit Meetings



Events

Hindi Week celebrations were held at our Centre from September 05-14, 2018. The events organised during the week were:

- Workshop on noting and drafting, by Dr. V. Tilagam, Senior Hindi Officer, Indian Institute of Science, Bangalore.
- Scientific lecture on Internet security, by Dr. Ravi Shankar Yadav, Scientist E, Centre for Artificial Intelligence and Robotics, DRDO, Bangalore.
- Quiz programme on general knowledge of Official Language, Dr. S. N. Mahesh, Centre for Artificial Intelligence and Robotics, DRDO, Bangalore.
- Hindi extempore, Mr.Damodaran, Deputy Director, Coffee Board, Bangalore
- On the spot noting and drafting, Shri M. Savadatti, Hindi Consultant, JNCASR, Asst. Director (Rtd.), Hindi Teaching Scheme, Bangalore.
- Lecture: हिन्दी, दिलों को जोड़नेवाली भाषा (Hindi for connecting hearts), by Mrs Jahanzeb Akhtar, Indian Revenue Service, Principal Commissioner of Income Tax, followed by prize distribution and distribution of certificates to staff members who completed Prabodh, Praveen & Pragya.

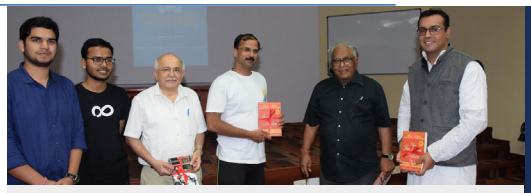
JNCASR-FCBS workshop was held on October 25-27, 2018 at Trivandrum.

Events contd...

Dhwani hosted four programmes between June and September 2018. The first was a reading of the play '*Photograph 51*' based on the discovery of DNA structure. Dhwani and Bangalore Little Theatre (BLT) dedicated this performance to Prof. CNR Rao, who turned 84. The second talk by Prof C.S. Aravinda titled '*S. Ramanujan- A Legend and a Symbol*' which highlighted some unique aspects of the mathematical prodigy was dedicated to Prof R. Narasimha. A talk by Deepthi Navratna titled '*The Journey of a Raga: Natyashastra to Neuroscience*' attempted to draw connections between our musical traditions and the neurobiology of sensory perception. Old-timers and recent entrants alike, enjoyed the revelations behind the design and architecture of our campus and its architect Charles Correa as narrated by architect Sanjay Mohe in his talk "*Learning from the master: The architecture of Charles Correa*".

International Yoga Day

International Yoga Day at JNCASR was celebrated on June 21, 2018. A series of events were organised during the occasion, these include release of a poster by Prof. C.N.R. Rao; a lecture on "*Art of stress-free living*" by Deepak Arora (an IT professional and a yoga instructor); and demonstration of asanas by Raghu Prasad (trained yoga practitioner from Yoga Peeth, Haridwar).



Bharath Ratna Prof. CNR Rao released the YOGA Poster, prepared by the students of JNCASR. Prof. V. Nagaraja, President, JNCASR, graced the occasion and was presented with a book on YOGA.

Upcoming Events

- **Annual Faculty Meeting:** The Annual Faculty Meeting and In-House Symposium is scheduled on Nov 13 and 14, 2018. Talks by eminent scientists from the Centre and other scientific institutions have been scheduled during this two-day event. A concert featuring musician Shri Niladri Kumar is also scheduled on Nov 13, 2018 at 6:30pm at the New Auditorium in JNCASR Jakkur Campus.
- 7th Asian Forum of Chromosome and Chromatin Biology, Nov 15-17, 2018, Convenors: Prof. Tapas K. Kundu, Professor, MBGU, JNCASR & Director, CSIR-CDRI, Lucknow and Dr. Rakesh K. Mishra, Director, CSIR-CCMB, Hyderabad, www.jncasr.ac.in/chromatinasia.
- International Symposium on Solid State Chemistry of Transition Metal Oxides, Nov 30 – Dec 1, 2018, Convenor: Prof. A. Sundaresan, JNCASR.
- Winter School on Frontiers in Materials Science, Dec 03-07, 2018.
- Indo-UK Workshop on Electrochemical Routes to Energy Storage, Energy Conversion and Fuel Production, Dec 10-14, 2018.
- The Asian Congress of Fluid Mechanics (ACFM), Prof. G.S. Bhat, IISc, Bangalore, Dec 13-17, 2019.
- International Conference on Biological Transactions : Molecules to Organisms (BTMO-2019), Prof. Usha Vijayaraghavan, IISc, Bangalore, Jan 17-20, 2019.
- Fluid Days: presentations and discussions on fluid mechanics, Jan 24-25, 2019, www.jncasr.ac.in/fluidsday.

Jawaharlal Nehru Centre for Advanced Scientific Research

Jakkur, Bengaluru - 560 064, Karnataka, India

Phone: 91-80-22082750; Fax: 91-80-22082766

E-mail: admin@jncasr.ac.in; Website: www.jncasr.ac.in

Editor: **Dr. Sheeba Vasu**

Editorial Assistance: **Nabonita Guha and Library Staff**

Design by dataworx.co.in