



A recipient of several prestigious honours and awards, such as Bhatnagar Prize, FICCI Award, Ranbaxy Research Award and VASVIK Award, Prof. Brahmachari, believes that CSIR not only stands for 'Council of Scientific & Industrial Research' but also for 'Council of Scientific & Innovative Research with corporate, social Indian responsibility'.

Prof. Brahmachari addressed a large gathering of CSIR scientists who had assembled in the CSIR auditorium; the Shanti Swarup Bhatnagar Sabhaghar, on 11 November 2008 to felicitate Prof. Brahmachari on his completion of one year in the office.

Welcoming Prof. Brahmachari to the felicitation function, Dr Naresh Kumar, Head, RDPD, said, "We have assembled here today to listen to the dreams, wishes and expectations of our leader, Prof. Samir K. Brahmachari, Director General, CSIR..."

Prof. Brahmachari began by taking stock of the past one year since he had assumed office and thanked the scientists and staff for the eventful first year. More importantly he described and exhorted the scientists to imbibe the qualities of a leader.

Prof. Brahmachari said, "I thought I knew CSIR. Actually I only knew the rules of CSIR. I did not know the enormous diversity of CSIR; the scientific might and the strength of CSIR; nor did I know the many complex issues that a DG-CSIR has to face. But I believe, and I have believed throughout my life that if you have faith in people, if you have the courage to face truth, an ability to speak the truth, the courage to stand on conviction and principles, you can meet any challenge. It is said that a leader is watched. People may not always believe what a leader says. But they will observe what a leader does. And only when they are convinced will they follow," Prof. Brahmachari remarked.

Paying rich tributes to the former Director Generals of CSIR, Prof. Brahmachari said, "What we have today is because of all that the illustrious DGs did earlier. They did their best what could be done at that

junction. It sometimes surprises me that how they could do so well and how they thought so differently, which made CSIR so fantastic. In 1953, a DG thought of NRDC—a company for spin-offs of CSIR technology. In 1984, another DG thought to set up DSIR! Look at the record. In every single term of every DG—They have done unbelievable things. I am told that after the GOI and Indian Railways, CSIR owns the most real estate. Think about all those DGs who took the decision to buy the sprawling tracts of land—prime property. Just think about the location of Anusandhan Bhawan—right next to the Parliament building. What great vision all these leaders had. Before these great visionaries, my achievements, whatever they be, are small by comparison. I feel humble when I realize that my name will come on the list along with them."

"If you look back you will remember our battle to win back our own traditional knowledge. Our fight to win back the *Haldi* patent came at a time when only a few knew what patents were. CSIR took the initiative. There were no grants. Yet a DG-CSIR took on the world's mightiest of the mighty. Challenged them, and got the patent revoked

after a legal battle. But this one spark led to a huge light being lit all over India. The Government of India has recently brought in Bayh Dole Act. Around 12 years back, a DG of CSIR lit the small spark. It is an innovation path now."

"In Hindu belief," Prof. Brahmachari continued, "life is a continuum. You go around and around and are only part of a continuum. It is an interesting philosophy. In CSIR's history, each DG is an incarnation, each scientist, staff member is an incarnation too. They come, perform and go away. The institute is the *atma*, the spirit. We, the people, are the body. Rabindranath Tagore said, '*Ateeter kotha kahi bortoman jodi jai, shay kotha o koibo na.*' Roughly translated it means: If talking about the past, the present passes away, I will not talk about the past. I will concentrate on the present and the future. I will not make a list of the achievements— that is a waste of time."

"To me CSIR stands for Council of Scientific and Innovative Research. Then we will add Corporate Social Indian Responsibility. I urge you to think about the common man. Keep him in mind when you work. This is my

target. I am confident you will. This is my goal this year. We must apply this at CSIR.”

Prof. Brahmachari then mentioned about a wonderful book gifted to him by Dr Sivaram, Director, National Chemical Laboratory, Pune. The book was Maxwell’s *21 Indispensable Qualities of A Leader*. He shared some of the lessons imparted in that book and urged the CSIR personnel to imbibe these qualities and to emerge as leaders. He said that it was possible to have extraordinary achievements employing ordinary, good people. But for that one needs the 21 characteristics or indispensable qualities of a leader. But these qualities cannot be achieved in one day — it takes years to make them a part of one’s persona.

The qualities he discussed were:

- **Character:** Talent is a Gift, but Character is a Choice. Strong Character is the foundation on which lasting success is built. A leader cannot rise above the limitation of character. Sometimes highly talented people suddenly fall apart when they reach a level of success. To them success has become a burden as well as a blessing. They lack the bedrock character to sustain them through the stress that success brings and they head for disaster. They suffer from painful feeling of aloneness. Arrogance, destructive adventure-seeking and adultery—all destructive things—creep in. To improve one’s character one should

analyze one’s weak point. One should identify where corners are being cut; compromises being made and where one has let down someone. People must learn to face their flaws, apologize sincerely and deal with the consequences of their actions. They must create a plan that will prevent them from making the same mistake again.

- **Charisma:** The first impression can seal the deal. Prof. Brahmachari emphasized the importance of the first impression that one gives to another. He advised that people should be more concerned about making others feel good about themselves. This is more important than making them feel good about oneself.
- **Commitment:** It separates doers from dreamers. He said that commitment to the cause makes the dream come true.
- **Communication:** Without it you travel alone. It is important to communicate freely, frankly and honestly with all team members.
- **Competence:** There is no substitute for competence. The world will flock to one once it is convinced of one’s competence.
- **Courage:** One person with courage is a majority. Prof. Brahmachari cited the example of Mahatma Gandhi in the context of the Power of One — One with conviction.
- **Focus:** The sharper it is; the sharper you are. Focus is an absolute necessity for dreams to materialize.
- **Generosity:** Your candle loses

nothing when it lights another. Prof. Brahmachari exhorted the scientists of CSIR to think about the common man.

- **Initiative:** You won’t leave home without it. Prof. Brahmachari spoke on the importance of taking the initiative instead of being a passive bystander.
- **Listening:** To connect with their hearts, use your ears. Prof. Brahmachari shared with the audience his experience as DG-CSIR when in the first few months he visited many CSIR laboratories. “I listened,” he said. And just because people realized that someone was listening, many of their grudges or resentments disappeared.
- **Positive Attitude:** If you believe you can, you can. Prof. Brahmachari said that success depends on attitude and belief in success often paves the way for it.
- **Problem Solving:** You can’t let your problems be a problem. A problem must be faced; it must be resolved. It must not be ignored; rather a solution must be found.
- **Relationships:** If you get along, they’ll get along. Prof. Brahmachari urged the audience to make an effort to cultivate better relationships; to take out the helping hand to those in need.
- **Responsibility:** If you won’t carry the ball, you can’t lead the team. Prof. Brahmachari sent a message that leadership involves taking responsibility irrespective of the level.



- **Self-Discipline:** The first person you lead is you. Leaders have self-discipline of a high order.
- **Teachability:** To keep leading, keep learning. Prof. Brahmachari underlined the fact that one cannot lead if one stops learning.
- **Vision:** You can seize only what you can see. There is no substitute for vision.

Prof. Brahmachari urged everyone to pick up one point at a time; study it, internalize the message and try to make it part of one's qualities. It would take time and effort but would be worth the exercise because inculcating the qualities of a leader will make winners out of us all.

Finally, in conclusion Prof. Brahmachari said, "Before the second year commences, I leave you with the message — You can make it. *It is possible. It is not me who can do it: it is YOU who will do it. My role is like that of a lens: I simply focus.*"

NPL-SAC MoU for Development of Rb Atomic Clock for Space Applications

The National Physical Laboratory (NPL), New Delhi, has signed a memorandum of understanding with Space Application Centre (SAC), Ahmadabad, on 23 September 2008 for a project on "Development of Rb Atomic Clock for Space Applications". Under this MoU, NPL will develop the physics package of Rb atomic clocks. The total project cost of Rs 1.63 crore will be borne by SAC. The project is of 25 months duration and it is being implemented under the leadership of Dr G.M. Saxena, Scientist, NPL. The ultimate goal is to develop Rb atomic clock for the Indian Regional Navigational Satellite System (IRNSS), similar to the Global Positioning System (GPS).

R&D at Central Electronics Engineering Research Institute (CEERI), Pilani: New Projects

Design and Fabrication Capabilities for Very High Power Microwave Tubes

Research and development in the field of microwave tubes has been one of the main thrust areas at the Central Electronics Engineering Research Institute (CEERI), Pilani, for over last four decades. It has successfully designed, developed and also batch produced some of the tubes to meet various national strategic requirements. Know-how of some of the tubes developed has been passed on to industries.

As a part of CSIR Network programme under 10th Plan period, CEERI along with two sister laboratories, CGCRI-Kolkata and CMERI-Durgapur, took up projects on development of some critical gap technologies necessary for microwave

tubes under development or likely to be developed in near future.

This activity has boosted the technical capabilities of microwave tubes community at CEERI, which resulted in taking up several sponsored projects. One of the present thrust areas of CEERI is to work on very high power MW tubes typically of 250 kW (average) power and subsequently go up to 1.0 MW (CW) in future. With this intention, and having built good expertise under 10th plan, CEERI has taken up a network project under 11th Plan period on "Design and Fabrication Capabilities for Very High Power Microwave Tubes". The development of millimeter power microwave tubes also requires some special materials including ceramics and its composites in addition to mechanical fabrication aspects of precision components and establishing specialized characterization facilities. Some of them are available with the sister laboratories like CGCRI, CMERI, CSIO and NPL.

The development of microwave tubes involves combination of several high technology areas like material science, mechanical engineering, vacuum technology, high voltage technology, microwave technology, etc. Though the basic technology is well established at different organizations in the country, the proposed design and development would require substantial enhancement over the available technologies, particularly for meeting the requirements of handling high peak and average power level, production and control of high DC voltages and special fabrication techniques for very high frequency devices. It may not be possible to develop all the necessary technologies in-house during the proposed plan period. Accordingly, the objectives have been framed under this network project keeping in mind the requirement of these high power devices in various programmes of the country like (i) Accelerator Driven Sub-critical Systems (ADSS), (ii) International Thermo-nuclear Experimental Research (ITER), (iii) National Fusion Programme of DAE, (iv) Linear Accelerator for Medical Applications, and (v) Conventional requirement of these devices.

Deliverables from the Project:

a. To design and develop special technologies including multi-beam related to very high power (100-250 kW CW) microwave tubes particularly Klystrons along with development and characterization of (a) key components like large geometry (50 mm dia) cathodes and high

- power (250 kW CW) RF window, (b) sub-assemblies and (c) high voltage power supplies. (CEERI, CMERI, CGCRI, NPL)
- b. To design and develop special technologies related to very high power (1.0 MW CW) and high frequency (120 GHz) fast wave type devices including development of (a) special materials like CVD diamond, aluminum nitride and (ii) sub-assemblies with their characterization and related high voltage power supplies. (CEERI, CMERI, CGCRI)
- c. To design and develop high efficiency (> 60%) and high frequency traveling-wave tubes including the special power supplies for their characterization and testing after establishing critical technologies and developing new materials like copper reinforced high density graphite and special ceramics. Also, to develop advanced technologies related to vacuum-microelectronic devices. (CEERI, CMERI, CGCRI, NPL, CSIO).
- d. To develop and characterize plasma cathode gun and plasma switches (CEERI, CMERI).

Target Beneficiaries:

Microwave Tubes have lot of significance for the various strategic, industrial, medical communications, energy and other sectors in the country. The conventional tubes would remain in use in significant quantities for decades to come. In addition to above, newer

applications requiring these devices up to very high power levels (≥ 1.0 MW CW) have emerged. Also, newer type of fast wave devices would be required in the power range of 1.0 MW (CW) covering frequencies up to 170 GHz. The accelerator driven sub-critical system (ADSS) programme of DAE requires very high power (≈ 1.0 MW CW) Klystron. They and others also need Multi-beam Klystrons to reduce the operating voltage and increase efficiencies. Very recently, India has joined the ITER (International Thermonuclear Experimental Reactor) Programme as one of the seven participating members, which requires these high power devices up to very high frequencies. In addition, the National Fusion Programme of the country also requires these and other high power microwave devices. ITER, ADSS and Fusion Programme of the country are very long-term programmes requiring these devices.

Sanctioned amount for this network project is Rs 45 crore over a period of five years.

**Technology
Development
for Smart Systems**

Today, electronic systems can be designed using one or more (in a suitable mix) highly integrated high performance computing platforms such as microcontrollers, digital signal processors (DSPs), reconfigurable computing platforms combined with field programmable



gate arrays (FPGAs) and system-on-chip (SoC) platforms. These platforms can be suitably programmed and configured to run very sophisticated and complex algorithms rapidly to give a real-time response. A CSIR Supra Institutional Project has been taken up at CEERI with the following objectives:

- Setting up of R&D facilities for detailed characterization of sensors and micro-sensors and development of signal conditioning circuitry for sensors and micro-sensors
- Development of compact ruggedized version of sensor signal conditioning circuitry using Low Temperature Co-fired Ceramic (LTCC) and Hybrid Microcircuit (HMC) technologies
- Exploration of algorithms and their real-time embedded implementation methods using the right mix of microcontrollers, digital signal processors, field programmable gate arrays (FPGAs), processor cores, and reconfigurable computing platforms
- Development of wireless sensor networking techniques

Outcomes of the Project:

- Image processing based smart system for sorting and grading of fruits, plastics and bakery products
- Image processing based smart system for human gesture identification

- Wireless communication and sensor networking techniques for smart systems
- Setting up of characterization facilities, design and development of signal conditioning circuitry/platform and development of mixed-signal sub-system blocks for sensor applications
- Low Temperature Co-fired Ceramic Technology (LTCC) for microsensor packaging and sensor electronics integration

Sanctioned amount for this five-year project is Rs 12 crore.

Fabrication of LED Devices and Systems for Solid State Lighting Applications

According to Solid State Lighting roadmap (R&D-2007, USA), the projected efficacy of commercial white LEDs was 68 lm/W in 2006 and 135 lm/W in 2012. All the high power LED designs are multifinger/multicell structures with flip-chip mounting. The challenges for InGaN LEDs are the improvement of quantum efficiency for higher wavelengths and higher current densities and also higher light extraction efficiency. GaN based LED structures grown using MOCVD system at CEERI demonstrated blue emission at wafer level. MOCVD system with this capability of 3" x 2" wafers is second in India, next to TIFR. At packaging level, some Indian companies were already involved in

GaN based white LED packaging by importing the chips from abroad. CEERI, in collaboration with NPL, has taken up a CSIR Network project under which:

- Layout design of multifinger LED structures and mask fabrication will be done at CEERI.
- Blue LED structures will be grown by MOCVD on 2" sapphire substrates for optimising unit processes at CEERI. Photoluminescence mapping system would be used for the characterization of epitaxial layers. Other characterizations like XRD, Hall effect, SIMS, ellipsometry, etc. would be provided by NPL on need basis.
- Patterned layers of p-GaN and InGaN/GaN quantum wells will be etched by reactive ion etching system.
- Ti/Al/Ni/Au n-type ohmic contacts on n-GaN layer and Ni/Au p-type ohmic contacts on p-GaN layer will be carried out using electron beam evaporation system and the ohmic contacts will be optimised after annealing the wafers.
- Very thin Ni/Au layers and indium tin oxide transparent conducting layers will be optimised as transparent conducting coatings on p-GaN layers.
- Wafer thinning up to 50-100 microns will be carried out by thinning and polishing backside of sapphire substrates. Dicing of

sapphire substrates will be optimised by using dicing machine.

- For chips fabricated at CEERI, packaging would be outsourced to Indian companies. This will include applying phosphor on blue LED chips for obtaining white LEDs.

Targeted Specifications:

Operating : 460 - 475 nm
 Wavelength
 Forward Current : 200 - 1000 mA
 Forward Voltage : 3.5 - 4.5 V
 Luminous Efficacy : 25 - 50 lm/W
 Power Conversion : 20 - 30 %
 Efficiency
 Sanctioned amount for this 3-years' duration project is Rs 6.38 crore.

2.6 MW S-band Tunable Pulse Magnetron

The aim of this DIT-sponsored project is to design and develop a tunable magnetron with the operating frequency of 2998 MHz having tuning range from 2992 to 3002 MHz and minimum peak power of 2.6 MW. The magnetron would be required to replace an imported magnetron currently being used in medical LINAC at SAMEER-Mumbai. Therefore, overall physical dimensions, operating voltages, current, magnetic field and operational specifications for the magnetron should be within the range of those for imported tube. CEERI will design and develop the magnetron. SAMEER will supply the pulse modulator (up to 48 kV x 100 A), appropriate electromagnet along with

its supply on loan basis to CEERI for completing the ageing process of magnetron tubes prior to their delivery. SAMEER will conduct the user trials of magnetrons and their performance evaluation in their LINAC system in association with CEERI.

Three magnetrons meeting the specifications will be delivered to SAMEER. A detailed know-how document will be prepared, which can be utilized for potential commercialization. A detailed project completion report will also be prepared for the funding agency. The magnetron will be used in 4-6 MeV LINACs for medical applications (radiation therapy) under Jai Vigyan Programme. SAMEER is interested in its production for self-reliance in the medical accelerator technology. The requirement of the tube is expected to be 8-10 tubes per year for the next 10 years.

The sanctioned amount for this project is Rs 1.17 crore and the duration of the project is two years.

System Level Reconfiguration Techniques for Reconfigurable Computing System (RCS)

This 3-year duration project also has been sponsored by DIT with a sanctioned amount of Rs 90.47 lakh.

The aim of the project is development of reconfiguration techniques and algorithms for scheduling and mapping of the

design library with run-time reconfiguration of RCS at system level. The complete system level design techniques for reconfiguration, scheduling and mapping of the design library onto the reconfigurable hardware will be devised and demonstrated.

The design of optimal real-time reconfigurable system requires understanding of challenging problems such as specification requirement, design space exploration, modelling of system-level architectures, system-level synthesis, automatic interface generation and rapid prototyping.

New techniques and algorithms for reconfiguration scheduling and mapping of design library at system level will be developed. These algorithms and techniques would be verified with real-time operating system (RTOS) support.

The scope of the project involves optimal techniques exploration and design of finite state machine for doing reconfiguration, scheduling and mapping of the design library. The developed techniques are to be integrated with RTOS/OS to use the RCS at higher level of abstraction.

Characterization of RF MEMS Switches

Sponsored by Space Application Centre (SAC), the sanctioned amount for this project is Rs 58.74 lakh and duration of the project is 3 years

Scope of this project is indigenous development of RF MEMS switches.



SAC, Ahmedabad, will provide the RF specifications. CEERI will provide the design, structural analysis and the baseline process for fabrication of devices. Various topologies of switches are in the developmental stages. The finalized topology for basic switch will be fabricated at CEERI. The basic switch and single pole double throw (SPDT) switch will be fabricated at CEERI. Characterization of the fabricated switches would be done at SAC with participation of CEERI. The pilot line requirement will be undertaken by CEERI after completion of this development.

Cartographic Generalization of Map Objects

While creating a map using traditional manual techniques, an experienced cartographer aims to achieve a balance between the amount of real-world information required to make the map useful and avoiding confusion for the user. This is a time-consuming and expensive process. The main problem that needs to be addressed is how to resolve the conflict between different map features when they are displayed at smaller scales. As there is not enough space to display all of the information in an uncluttered manner, methods to typify the data in an intelligent, consistent and coherent way at smaller scales need to be developed. And this is the objective of this DST-sponsored project of 2-year duration with a sanctioned amount of Rs 16 lakh.

R&D at Central Institute of Medicinal & Aromatic Plants (CIMAP), Lucknow

Cloning of genes involved in isoquinoline alkaloid biosynthesis in poppy

Morphine biosynthesis in opium poppy is broadly divided into two parts – pre-reticuline and post-reticuline. Four new genes have been cloned from the opium poppy cv ‘Sampada’. These are S-adenosyl-L-methionine: norcoclaurine 6-O-methyltransferase (*6omt*) and S-adenosyl-L-methionine: 3'-hydroxy-N-methylcoclaurine 4'-O-methyltransferase (*4',omt*) in the pre-reticuline pathway and salutaridinol 7-O-acetyltransferase (*salAT*) codeinone reductase (*cor*) in the post-reticuline pathway. With *tydc* and *ncs* cloned earlier, now genes for six of the total seventeen steps involved in morphine biosynthetic pathway in poppy are available in cloned form from genotype ‘Sampada’.

Novel cytochrome P450 monooxygenase genes (*cyp*) from *Artemisia annua*

A bioinformatics-based approach has been used to hunt for novel *cyp* genes from *Artemisia annua*, whereby the information from the conserved domains of cytochrome P450 genes has been utilized for *cyp* gene amplification. Using primers based on these conserved domains, partial sequences of 22 novel *cyp* genes were obtained, of which, two (*cyp 73* and *cyp83*) have been isolated full length using 5'-RACE.

Semi-quantitative RT-PCR analysis of seasonal variation in transcript abundance of leaf specific/prominent genes *dat* and *sgd* in *Catharanthus roseus* cv. ‘Dhawal’

Semi-quantitative RT-PCR analysis was carried out to measure the transcript abundance of leaf specific genes *dat* and *sgd* in the aerial and underground parts of *C. roseus* (cv ‘Dhawal’) plant during summer (June) and winter (December) seasons. The *dat* transcript levels in the mature leaf of 6 months old field grown plant were found to be higher in winter (December) than in summer (June) season. The *sgd* transcript levels in the mature leaf of 6 months old field grown plant did not vary much with the seasonal change but these were found to be slightly higher in summer (June) than in winter (December) season.

Natural infection on periwinkle (*Catharanthus roseus*) by cucumber mosaic virus (CMV)

The natural occurrence of cucumber mosaic virus (CMV) on *Catharanthus roseus* is not reported in the literature. Since 2005 during early summer (March-May), several plants of *C. roseus* have shown appearance of bright chlorotic spots on the upper leaves which gradually became green mosaic, leathery and deformed leaves, irregular growth, dwarfing, yellowing, faded petals and malformed or suppressed flower production in the experimental fields of CIMAP, Lucknow.

The virus was efficiently sap transmitted from naturally infected periwinkle plants to healthy plants and to a variety of plant species mainly from Chenopodiaceae, Cucurbitaceae and Solanaceae. Local lesions produced on the leaf of *C. amaranticolor* were used as a source of single lesion isolates. Single lesion isolates obtained against CIMAP-CMV isolate of periwinkle from the



Naturally infected *C. roseus* twig showing mosaic, leaf and flower deformation

C. amaranticolor were further propagated in *Nicotiana benthamiana* and used for all further studies. Periwinkle plants inoculated mechanically reacted with symptoms similar to those observed on naturally infected plants.

Myzus persicae and *Aphis gossypii* transmitted the virus in a non-persistent manner to healthy periwinkle (05/10) and *N. benthamiana* (7/10), respectively. Symptoms developed after 15-20 days of feeding. Soil transmission experiments showed negative results. Further studies are being pursued.

Role of efflux pump modulator in altering the activity of ATPase in *Mycobacterium smegmatis*

The effect of phytochemicals such as reserpine, limonene and citral on membrane ATPase activity of *Mycobacterium smegmatis* MC2155 (wild type) and MDR-Q (multi drug resistant mutant) was studied, evaluated and compared with antibiotic ciprofloxacin. ATPases are a class of enzymes that catalyze the decomposition of adenosine triphosphate (ATP) into adenosine diphosphate (ADP) and a free phosphate ion which help the cell to maintain 'homeostasis' condition.

The presence of ciprofloxacin led to a significant decrease in ATPase activity of drug-resistant mutant, when compared with control, suggesting effluxing of the drug in multi drug resistant mutant MDR-Q. However, in presence of ciprofloxacin and plant molecule citral together, ATPase activity was

found to be increased. Reserpine, a known efflux pump modulator was used as control. So citral might be a modulator of efflux pump and its use with standard drugs may help in overcoming the problem of drug resistance of fluoroquinolone in *Mycobacterium*.

Bioconversion of a monoterpene into food flavouring agent vanillin

The study was undertaken with the objective of conversion of abundantly available phytochemical eugenol into vanillin, a compound of industrial importance, using microorganisms *Aspergillus flavus*, *A. niger* and *Pseudomonas aeruginosa*. The results demonstrated that these micro-organisms were able to transform eugenol to vanillin. These findings may provide a novel approach for the production of cost-effective vanillin using micro-organisms.

A cytotoxic and hepatoprotective agent from *Withania somnifera* and biological evaluation of its ester derivatives

Detailed chemical investigation of *Withania somnifera* roots resulted in the isolation and identification of a cytotoxic and hepatoprotective agent, palmitic acid, which was converted to eight semi-synthetic ester derivatives. *t*-Butyl palmitate and amyl palmitate were 4-6 times more active against adherent and suspension colon cancer cell lines. Interestingly, palmitic acid and its



ester derivatives also showed hepatoprotective activity which has been reported for the first time.

New thiocarbamates from *Moringa oleifera*

All parts of this plant are medicinally important and are used in folk medicine for the treatment of various human ailments such as rheumatism, paralysis and epilepsy. From the pods two new thiocarbamates, O-*n*-butyl 4-[(α -L-rhamnopyranosyloxy) benzyl] thiocarbamate (*E*) and O-ethyl-4-[(α -L-rhamnopyranosyloxy)-3hydroxybenzyl] thiocarbamate (*E*) along with niazirin and 5,5-dimethyloxazolidine-2-thione were isolated.

Bioactive phytochemical as mosquitoicidal agent

Essential oil of blue stem grass, *Bothriocola bladhii* with sireodecenone and camphene as the major constituents was shown to exhibit bioactivities against mosquito *Aedes aegypti*. Essential oil was evaluated for ovicidal, larvicidal, growth disruption and adulticidal activities. Out of various bioactivities evaluated the oil was found effective only as larvicidal.

Cytotoxic agents from *Terminalia arjuna*

Although a number of chemicals have been isolated from *Terminalia arjuna*, only a few have been evaluated for their biological significance. As a part of drug discovery programme for cytotoxic

agents from Indian medicinal plants, four novel cytotoxic agents arjunic acid, arjungenin, arjunetin and arjunoglucoside-I were isolated from the bark of *T. arjuna*. Out of the four compounds, arjunic acid was found to be significantly active against the human oral (KB), ovarian (PA-1) and liver (HepG-2 & WRL-68) cancer cell lines. Further, the most active compound arjunic acid was converted into seven semi-synthetic ester derivatives. 2-O-Palmitoyl arjunic acid showed two times more activity, while 2, 3-di-O-acetyl-, 2-O-*p*-anisoyl-, 2,3-di-O-benzoyl- and 2,3-di-O-*p*-nitrobenzoyl arjunic acid showed 1.7 – 2.3 times less activity than the cytotoxic drug vinblastine against the liver cancer cell lines Hep G-2 and WRL-68 respectively.

Cytotoxic activity of *Garcinia indica*

The methanol extract of the fruit rinds of *Garcinia indica* showed potent cytotoxic activity against three human cancer cell lines – colon (COLO-320-DM), breast (MCF-7) and liver (WRL-68) as determined by the MTT assay. Fractionation of the methanol extract into hexane, chloroform and ethyl acetate soluble fractions and evaluation of cytotoxic activity of each of the fractions revealed that the ethyl acetate fraction was more effective as compared to two other fractions. Two polyisoprenylated benzophenones, xanthochymol and isoxanthochymol, were isolated from the ethyl acetate fraction. Both xanthochymol and isoxanthochymol as a single

pure entity did not turn out to be as effective as the ethyl acetate extract from which they have been isolated.

The concentration of xanthochymol and isoxanthochymol in four different extracts — methanol, hexane, chloroform and ethyl acetate, were determined with the help of LC-MS/MS. On the basis of the LC-MS/MS data, combinations of xanthochymol and isoxanthochymol in different ratios were found to be effective. The concentration of xanthochymol and isoxanthochymol in a ratio of 1:2 showed the maximum cytotoxicity.

Cancer cell line dependent cytotoxic activity of essential oil as compared to pure compound

Through *in-vitro* bioassay, 160 plant extracts from CIMAP repository were evaluated against human cancer cell lines and mice liver cells (hepatocytes) as non-cancer control cells. In this evaluation, four plant extracts showed the cell line dependent cytotoxicity in terms of IC-50 and IC-90 values against all the human cancer cell line used. These extracts did not exhibit activity against the mice hepatocytes up to concentration of 100 μ g/ml. On the other hand, paclitaxel, as expected, exhibited activity against the mice hepatocytes at much lower concentrations of 4.2 μ g/ml (IC-50) and 9.6 μ g/ml (IC-90). Bioactivity guided purification led to identification of a pure compound from plant *Vetiveria zizinioides*. This pure compound did not exhibit

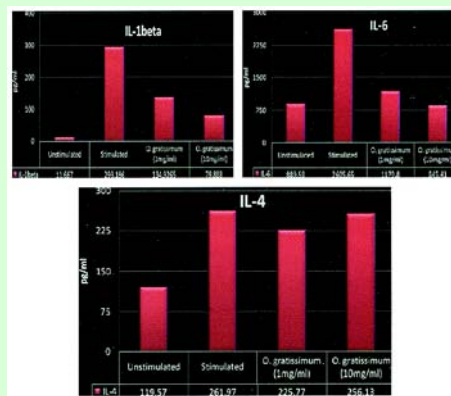
the differential cytotoxicity similar to that of the parent plant extract. Most of the available anticancer agents are having general cytotoxicity which also affects the growth of normal cells. Experimental agents derived from natural products are offering a great opportunity to evaluate not only totally new chemical classes of anticancer agents, but also novel mechanisms of action with holistic approach. The results indicate towards using the holistic approach for developing potent anticancer drug with novel mechanism of action for selectively inhibiting the growth of cancerous cells which could be commercially utilized for the chemotherapy of cancer.

Standardization of cerebral malaria model in *Mus musculus* using markers of chemokine pathway

In an effort to bioprospect medicinal plants for cerebral malaria, a model was standardized for evaluating leads against malaria using *Plasmodium bergheii* (Chloroquine sensitive) and *Plasmodium yoelii nigeriensis* (chloroquine resistant) strains wherein as a conventional parameter, parasitaemia and mean survival time (MST) are being monitored. The expression of the major cytokines TNF- α and IFN- α , haemoglobin and glucose levels in serum was also studied. Analysis of these parameters have indicated that therapeutic efficacy can be predicted in the first week of the month.

Modulation of inflammatory cytokines by *Ocimum gratissimum* under *in-vitro* conditions

Modulation of inflammatory cytokines by aqueous extracts of *O. gratissimum* leaves on murine spleenocytes (stimulated with concavalin A) and murine peritoneal macrophages (stimulated with bacterial lipopolysaccharide) under *in vitro* conditions in a dose dependant manner was studied. *O. gratissimum* at 1 and 10 mg/ml was found to exhibit the anti-inflammatory activity through inhibition of pro-inflammatory cytokines (IL-1 β and IL-6). No significant change was observed in IL-4 expression.



Toxicity profile of *Ocimum sanctum* leaf at acute and sub-acute level in rat

The *in vivo* acute and sub-acute toxicity study of *Ocimum sanctum* (aqueous extract) was conducted as per the approved protocol by institute's Animal Ethical Committee and confirming to

national guidelines on the care and use of laboratory animals with an intention to study the safety profile of the plant (leaf) which is one of the most commonly used medicinal plants in Ayurvedic system of medicine. Aqueous extract of the leaf was prepared as per the Ayurvedic pharmacopoeia and was chemically fingerprinted. The extract was then orally administered for a period of 28 days to Charles Foster Rats (225 \pm 25 gms) @ 5,50 and 300 mg/kg body weight. An acute single dose @ 2000 mg/kg was also evaluated. Parameters like morbidity and mortality besides body weight variation, hematological (total RBCs, WBCs) and serum biochemical profile (triglycerides, total cholesterol, HDL cholesterol, glucose, SGPT & SGOT) were quantified so as to assess the safety level of the plant extract.

No significant changes were evident in morbidity and mortality and other parameters like gain in body weight, hematology, glucose, HDL, total cholesterol, SGPT and SGOT up to the dose rate of 300 mg/kg body weight between 0 and 28 days in sub-acute experiment. Only significant increase in serum triglycerides level was observed in groups of animals treated with the extract @ 300 mg/kg body weight. Acute toxicity experiment revealed non significant changes in all the parameters studied. Thus, it may be concluded that chemically characterized aqueous extract of *O. sanctum* leaf is well tolerated by Charles Foster rat at acute and sub acute level.



Novel analogues of taxoid synthesized

Several novel analogues of the anticancer lead taxoid have been synthesized by coupling brevifoliol and 2-monosubstituted-4-phenyl-1,3-oxazolidine carboxylic acid after removal of the protecting group with acid treatment. Brevifoliol and its synthesized analogues were tested for their cytotoxic activities against four different human cancer cell lines, oral (KB), breast (MCF-7), colon (CaCO₂) and liver (HepG-2) as determined by MTT assay. The C-13 oxidized brevifoliol retained significant activity. Out of the several analogues synthesized, C-13 oxidized brevifoliol-5-[N-t-butoxycarbonyl amino-(2'R, 3'S)-3'-phenyl isoserine] analogue was interesting as it exhibited selective and potent cytotoxicity against liver cancer cell line predominantly.

Method for identification and quantification of polyisoprenylated benzophenones of *Garcinia cambogia*

A sensitive liquid chromatography/

electrospray ionization tandem mass spectrometrical (LC/ESI-MS/MS) method was developed for simultaneous identification and quantification of two polyisoprenylated benzophenones isoxanthochymol and camboginol in the extracts of the fruit rinds, stem bark, seed and leaves of *G. indica* and in the fruit rinds of *G. cambogia*.

Quantitative TLC method for determination of sterol (24 β -ethylcholesta-5,22E, 25-triene-3 β -ol) in *agnimantha* (*Clerodendrum phlomidis*)

A quantitative method using silica gel 60F₂₅₄ high performance thin layer chromatography plates, automated bandwise sample application, and automated visible mode densitometric method has been developed for the determination of 24 β -ethylcholesta-5, 22E,25-triene-3 β -ol (ECTO) in the aerial part of *Clerodendrum phlomidis*. ECTO was used as a chemical marker for the standardization of *C. phlomidis* plant extracts. The method was validated for peak purities, precision, robustness, limit of detection (LOD)

and quantitation (LOQ), etc. as per ICH guidelines.

Separation and quantification of lignans in *Phyllanthus* species by a simple chiral densitometric method

A sensitive, selective, and robust high-performance TLC (HPTLC) method using chiral TLC plates for qualitative and quantitative analysis of phyllanthin, hypophyllanthin, niranthin, and nirtetralin, the active lignans of *Phyllanthus* species, was developed and validated. The effectiveness and role of various stationary phases viz. TLC silica gel 60F₂₅₄ HPTLC silica gel 60F₂₅₄ and chiral TLC plates in the quantitation were evaluated. A precoated chiral TLC plate was found suitable for the simultaneous analysis of four pharmacologically active lignans. The method was validated according to ICH guidelines and was found to be reproducible when applied for the quantitative analysis of the above lignans in the leaves of four *Phyllanthus* species, i.e. *P. amarus*, *P. maderaspatensis*, *P. urinaria* and *P. virgatus*.

NAL displays four aircrafts at INDIA AVIATION : 2008

The National Aerospace Laboratories (NAL), Bangalore, displayed its indigenous aircraft and the scaled models at INDIA AVIATION : 2008 held at Begumpet Airport, Hyderabad, during 15 -18 October 2008.

Hyderabad India Aviation 2008, the country's first ever four-day civil aviation exhibition and conference was flagged off by Minister of Civil Aviation Shri Praful Patel. The event, jointly organized by the Ministry of Civil Aviation and Federation of

Indian Chambers of Commerce and Industry (FICCI), had more than 200 exhibitors representing leading aviation and allied industries from around the world including Airbus, Boeing, EADS, HAL, Rolls Royce, Cessna Aircraft Co., Bell helicopter,



ATR and Bombardier.

The composition of static display included 37 international and domestic aircraft from A-380 the largest to *Pushpak* the smallest airplane. Also on display were *Boeing 777*, *Airbus A-330*, *Learjet*, *Global Express*, *Gulfstream*, *Beachcrafts*, *Cessnas* and helicopters and also the NAL's *HANSA*.

HANSA flew gracefully as always, on each of the four days. Wg. Cdr. Sunit Krishna of ASTE and AVM (retd.) A. S. Lamba flew the pretty trainer well and managed a pleasing impression before the well gathered audience. *SARAS*'s exhibition also generated a lot of interest.

The mock up models of Regional Transport Aircraft (RTA 70) and size to size mock up model of NM5 aircraft were also displayed at the exhibition in HALL B number 14 of the NAL stall. The 5 seat NM5 aircraft (general aviation aircraft) developed as a private-public partnership venture between NAL and Mahindra Aerospace Technologies attracted a lot of interest among the business visitors and the general public. RTA-70 is being developed jointly by NAL and HAL.

Besides aircraft, NAL's Radomes and Composites parts were also displayed at the NAL stall. The multimedia presentation about NAL displayed on the plasma screen got remarkable attention. Top dignitaries like Ashok Baweja, Chairman, HAL; Pradeep Kumar, Defence Secretary, Production; C. G. Krishnadas Nair, former Chairman, HAL; and Krishna Mikkilineni, CEO, Honeywell International India Pvt Ltd visited the NAL stall and showed keen interest in the NAL's projects.

NAL received a good media coverage in *VAYU Aerospace Review*, *Aeromag Asia*, *Indian Aviation* and the official daily – *international aerospace magazine*.

An exclusive open-house interactive session between a congregation of more than 35 CEOs representing major aviation companies, the Minister and senior officials of the Ministry was held on 15 October to discuss the future plans and policy issues. Director, NAL, attended this meet and gave valuable inputs.

NAL's preparation for the air show was planned months in advance and the final result was pleasing. The NAL stall attracted a large number of serious visitors, and most of them enjoyed getting into the pretty mock-up of NM5 aircraft.

ANMC21 Working Level Conference on Asian Jet Passenger Plane 2008



Dr A. R. Upadhyya, Director, NAL, welcoming the delegates to ANMC21 Working Level Conference

Asian Network of Major Cities 21 (ANMC21) that came into existence in the year 2000 is an initiative of Tokyo Governor Mr Shintaro Ishihara. In all, eleven cities are enrolled as members of ANMC21, representing 11 Asian countries. Delhi is one of them. One of the key objectives of ANMC21 is the promotion of development of small to medium sized jet passenger plane. The member cities have met on a number of occasions since 2002.

Attending the 2007 meeting at the invitation of Tokyo Metropolitan Government, in Tokyo, Dr A. R. Upadhyya, Director, National Aerospace Laboratories (NAL), Bangalore, and Dr Kota Harinarayana, Raja Ramanna Fellow, NAL, proposed to host the 2008 working level conference on Jet Passenger Plane in Bangalore. This conference was held on 20 October 2008 at the Eagleton Golf Resort near Bidadi.

The primary objective of this conference was to bring together participants from Asian aircraft manufacturers, research institutions, government organizations, parts manufacturers, IT industries, airlines, general trading organizations and so on. There were 27 participants from other Asian countries consisting of members from the Tokyo Metropolitan Government, Japan Aerospace



Exploration Agency (JAXA), Malaysian Industry-Government Group for High Technology (MiGHT), Mitsubishi Heavy Industries (MHI), Marubeni Aerospace Corporation, Sojitz Corporation, Kawasaki Heavy Industries (KHI), All Nippon Airways, Sumitomo Corporation, Indonesian Aerospace, Fuji Heavy Industries (FHI), Tohoku University, Mitsui and Company and Aerospace Industrial Development Corporation of Taiwan. About 40 participants came from different Indian organizations that included HAL, ADE, GTRE, ADA, CEMILAC, IISc, IIT Kanpur, DGCA, Infosys, Infotech, Confederation of Indian Industries, TCS, L&T, Honeywell, Satyam, Mahindra Aerospace, Tata Advanced Materials and SIATI.

Dr Upadhyaya welcomed the gathering. Mr Makoto Takahashi, Senior Director in charge of International Joint Projects, TMG, also spoke on the occasion. The programme consisted of three technical sessions. The first session was chaired by Prof. R. Narasimha, JNCASR. Dr Kazuhiro Nakahashi, Professor at Tohoku University spoke on the significance of Asian

Collaboration for a Jet Passenger Plane while Dr B. V. R. Mohan Reddy, Chairman of Southern Region of CII, spoke on Aerospace Industries in Southern India highlighting its history, benefits and future growth. Mr Chidananda, Programme Director, Civil Aviation Programme of NAL, spoke on NAL's Initiatives in Civil Aeronautics covering the *Hansa* and *Saras* programmes. Dr Kota Harinarayana spoke on the new generation regional aircraft development initiative taken up by CSIR and NAL. Mr Kiyotaka Ichimaru, General Manager of MHI made a presentation on "Flying into the Future." He essentially covered the Mitsubishi Regional Jet (MRJ) programme in this connection. Mr S. P. Ray, General Manager (Projects) of HAL, covered the Aviation Programmes and Capabilities of HAL.

The second session was chaired by Mr Tatsuro Sakai, former Chairman of Steering Committee of Asian Community Airplane Programme (ACAP) of the Society of Japanese Aerospace Companies (SJAC). Dr Jiro Nakamichi, Head of Aviation of Programme Group, JAXA, spoke on the Aeronautical

Research at JAXA and Development of Japan's Domestically Produced Regional Jet. Mr Yuichi Hirakami of KHI spoke on the commercialization of C-X/XP-1.

The third session was chaired by Dr Chin Hu, former President, Aerospace Industrial Corporation, Taiwan. The first part of this session consisted of six short talks by the Engineering Services Industries in India. Infosys, Infotech, L&T, Mahindra Aerospace, Satyam and TCS made presentations on their aerospace related services. This was followed by the final talk on building partnerships as a major role of the Society of Indian Aerospace Technologies & Industries (SIATI). Dr Upadhyaya and Mr Takahashi summed the programme at the end.

On 21 October, a site visit was arranged for the delegates from outside India. The delegation visited Infosys, HAL and NAL. The visitors expressed their extreme happiness over the meeting and said that they were very impressed by the capabilities available in India. Both the visitors and Indian participants said that future collaborations with Asian countries should be enhanced. KTMD played a major role in organizing the event.

National Workshop on Adaptive Signal Processing

The Aerospace Electronics and Systems Division of the National Aerospace Laboratories (NAL), Bangalore, in view of the importance of Adaptive Signal Processing in many engineering and scientific fields, conducted a National Workshop on this topic during 3-7 November 2008

as a part of the Golden Jubilee Celebrations of NAL.

In practice, any real time signal processing will be adaptive and this also enables to capture their invariably true nature of nonstationarity. The workshop covered: Spectral Estimation,

Parametric Spectral Modeling, Method of Steepest Descent Algorithm, Least Mean Square Algorithm and its variants, Lattice and Transform domain adaptive filters, Frequency domain/ block LMS algorithm, Subband adaptive algorithm, IIR adaptive filters,

Recursive least square (RLS) algorithm, applications like active noise control, Echo cancellation, Channel equalization, ADPCM, Biomedical Applications, etc. DSP processors and their role in implementation of the algorithms. There were many demonstrations on the implementation of algorithms on MATLAB, sigNAL, and DSP processors.

There were three guest lectures on Kalman filtering and its applications by Dr Girija Goplaratnam (FMCD, NAL, Bangalore), New structures for adaptive filtering by Dr M.K. Sridharan (Philips India Ltd, Bangalore) and Antenna arrays, concepts and applications by Prof. T. Sreenivas (ECE, IISc, Bangalore).

Thirty-five delegates from LRDE(6), CRL-BEL(4), ADE(2), NAL(8), ADA (1), ISAC(1) (all from Bangalore), NARL, Tirupati (1) Genisis Microchip India Pvt Ltd., Bangalore (3), Motorola, Bangalore (2), NPOL, Cochin (2), NSTL, Vishakapatnam (1), SDM College of Engineering, Dharwad (2), PESSE, Bangalore (1), NITT, Trichi (1); attended this workshop.

The delegates expressed their high appreciation on : the topics chosen and the manner in which they were covered by the NAL and guest faculty and also on the organization of the workshop in totality.

SERC School on Micro Machining and Micro Fabrication

The second SERC School on Micro Machining and Micro Fabrication was jointly organized by Central Manufacturing Technology Institute and National Aerospace Laboratories during 24 - 28 November 2008 as part of NAL's ongoing golden jubilee celebrations. The current theme of manufacturing aims at higher performance coupled with miniaturization. Micro machining and Micro fabrication are the emerging technologies for realization of components and devices of extremely small sizes comprising tiny but highly sophisticated functional elements. Micro machining of components is carried out using advanced technological processes which include micro drilling, micro milling, micro wire EDM, micro ECM, laser micro machining, bulk micro machining, surface micro machining, lithographic techniques, etc.

The inaugural function held on 23 November 2008 was presided over by Dr V. Radhakrishnan, Prof Emeritus, Indian Institute of Space Science and Technology (IISST), Thiruvananthapuram. Dr P. Radhakrishnan, Director, PSG Institute of Advanced Studies, Coimbatore was the Chief Guest. Dr A. R. Upadhyya, Director, NAL in his welcome address stressed the importance of micro machining and micro fabrication keeping in view of the advancement in miniaturization of product for various applications like MEMS, MAV etc. Mr M. A. Ravindra, Joint Director, CMTI gave a broad overview of SERC School. He said the need for a purposeful and focused interaction between Academia, Industry and R & D Institutions has been recognized for undertaking meaningful Research and Development activities leading to practical and commercially deployable outcomes. To facilitate such interactions and to provide an overview of the latest trends in emerging technologies, SERC has embarked on an initiative to organize Schools on specific topics through renowned organizations active in the field.

The function ended with vote of thanks proposed by Mr P. V. Shashi Kumar, Joint Director, CMTI.

CSIR Director General delivers CECRI Diamond Jubilee Lecture

Dr Samir K. Brahmachari, Director General, CSIR, delivered the special CECRI Diamond Jubilee Lecture and inaugurated CSIR Annual Business Meet (ABM-2008) at the Central Electrochemical Research Institute (CECRI), Karaikudi, on 29 August 2008. Delivering the Diamond Jubilee

Lecture, Prof. Brahmachari recollected the glorious achievements of CSIR laboratories. He proudly recalled the vital role played by CSIR laboratories in nation building. Agriculture, health, drinking water mission, space and energy are some important areas where CSIR laboratories have made vital contributions.



In his address, Prof. Brahmachari mentioned that in 1960, CSIR developed the know-how for the indelible marking ink employed during the polling process, which even today is earning a huge royalty to CSIR. Similarly in 1970s, during the era of Green Revolution in India, more than 70% of pesticides used in India were based on CSIR know-how.

Technology for cleaning coal, design and development of the indigenous “Swaraj” tractor and TSIA electrodes for chlor-alkali production are a few other inventions that rolled out of the CSIR laboratories and richly contributed to the economic progress of the nation. In recent past, CSIR successfully designed and developed a Small Aircraft, *Saras*.

He remarked with pride that in 2007, CSIR scientists have earned



Prof. S. K. Brahmachari, Director General, CSIR, inaugurating the e-library at CECRI

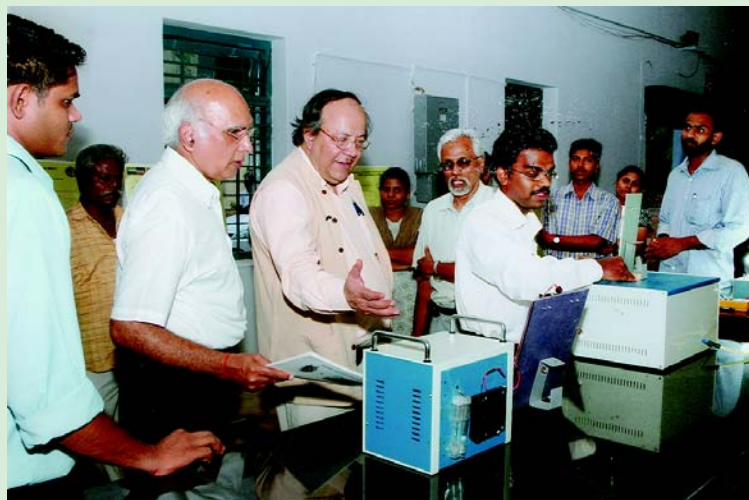
a place in the citation list of Nobel Awardee’s work. CSIR possesses a strong repertoire of trained scientific and technological manpower and it is significantly contributing to the nation’s human resources by training thousands of doctoral and post-doctoral research scholars and project personnel, he added. Then, he briefly mentioned about the IGIB programme on gene mapping of the people living in different parts of the nation and its correlation to the

vulnerability of the population for some specific, widely prevalent diseases such as asthma and diabetic mellitus. This study has assumed international importance

in view of its relevance to assessment of drugs’ efficacy. He also narrated how CSIR and its staff readily offered their technological services to the country when it suffered grave calamities like earthquakes in Maharashtra (Latur) and Gujarat and Tsunami in coastal Tamil Nadu.

Later, Prof. Brahmachari touched upon briefly on the models for S&T management relevant to the nation. In this context, he elaborated the successful model adapted by IGIB by tracing the evolution of the laboratory in the last one decade. By following different innovative R&D tools for technology development and management, he pointed out that, today, IGIB has been transformed from an isolated laboratory working in the area of biochemical research to a laboratory dedicated to contemporary genomics research.

He insisted that in tune with the changing global scenario CSIR should continuously update its knowledgebase and fine-tune itself to face the problems of today and the challenges for the future. He called upon the scientists, especially the younger ones to dream “big” and strive hard to realize their dreams which alone would earn a niche and enviable place for CSIR in the national level and make our nation an unassailable super power. He also wished that, in the present context, the acronym, CSIR should



Prof. S. K. Brahmachari, Director General, CSIR, visiting one of the laboratories of CECRI



stand for Council of Scientific and Innovative Research with Corporate Social Indian Responsibilities.

In conclusion, Prof. Brahmachari quoted, with fervour and dedication the words of Pundit Jawaharlal Nehru, "It is Science alone that can solve the problems of poverty of a nation like India." He stressed that competitive spirit coupled with cooperation among the different CSIR laboratories is the need of the hour to achieve success. Further, he emphasized that 'competition with cooperation' should be the motto of future CSIR and the ultimate aim should be to grow the science for the people to provide comfortable health, pure drinking water, and wealth from waste and sustainable energy. He underlined that this will be the roadmap of CSIR.

A large number of scientists from CECRI, CSIR headquarters and 35 other CSIR laboratories including Dr S. Sivaram (Director, NCL), Dr B. K. Mishra (Director, IMMT), Dr P.G. Rao (Director, NEIST), Shri S. Ghosh (CMD, NRDC) and Dr D. Yogeswara Rao (CSIR HQ) and other invitees attended the lecture.

Later, Prof. Brahmachari inaugurated the CSIR Annual Business Meet (ABM-2008) that was held at CECRI during 29-31 August 2008. In his inaugural address, he briefly described the vital role being played by CSIR in industrial and economic development of the nation. He stressed that business development in CSIR should be at par with the global development. Also, he requested Dr Sivaram, Director, NCL, to be the mentor for the programme to improve and modernize the business strategy for CSIR.

Prof. Brahmachari also inaugurated the e-library facility being established at CECRI. After an address to the entire S&T staff, he visited the laboratories, witnessed the fuel cell activity and inspected the recently established Central Instrumentation Facility. He held a brief discussion with the scientists working in the batteries division and briefed details of the CSIR programme for the development of Soleksha (battery-powered cycle rickshaw) and called upon CECRI scientists to contribute their mite to this socially important R&D programme. Prof. Brahmachari also held a lively interaction session with the students of the B. Tech (Chemical and Electrochemical Engineering) programme conducted by CECRI in affiliation with Anna University.

AWAKEN — An Environmental Awareness Programme for School Children at IICT

The MoEF sponsored ENVIS Centre for Bioinformatics- Vector Control at the Indian Institute of Chemical Technology (IICT), Hyderabad, organized an environmental awareness programme titled 'AWAKEN' for the school children of IICT ZM High School, studying in IX and X class, on 24 October 2008, at IICT.

Welcoming the participants, Dr J.S.Yadav, Director, IICT, stressed the need for everyone to respect and upkeep the environment for future generations. He also mentioned about the chemical industry's efforts towards adopting green technologies particularly by the ones involved in manufacturing of drugs, agrochemicals, and other similar industries.

Dr U.S.N. Murty, Coordinator of ENVIS Centre, spoke on the importance of such programmes to ignite the awareness regarding environment in the young minds. The information given in this programme would make the children more responsible to act as effective volunteers in safeguarding the environment, he added.

Ms Gayathri Ramachandran IAS, former Director General of EPTRI and former Principal Secretary, Government of A.P., who was the Chief Guest on the occasion, told the school children how her teachers imbibed the importance of having a strong commitment towards maintaining environment. She also narrated a few examples of energy conservation programmes she undertook when she was heading the energy sector. She said that we will be running short of the fossil fuels and water if we exploit them at such an alarming pace, and advised students to cut short the usage of water and electricity. She hoped that the seminar would be of great help in motivating the school children to act as soldiers in upkeep of the environment. She quoted the tamil poetess Avvaiyar — "what cannot be imbibed at the age of five may not be



Awareness Programme

possible at the age of fifty”.

There were four speakers for the technical sessions. Dr N. Prasad, a Senior Scientist from SACON delivered his talk on ‘Conservation of Wet lands in India’. He stressed the need of conserving wet lands for the upkeep of the ecology and protecting the fresh water bodies. He spoke about their importance and how these contribute to the rich biodiversity of our country.

Dr P.N. Sarma, Deputy Director and Head, BEEC, ICT, delivered a talk on ‘Water Pollution and Waste Water Management’ in which he said that if proper measures are not adopted there will be acute scarcity of potable water. He spoke about various ways in which water is polluted and cited a few examples of arsenic pollution in West Bengal and fluoride pollution in Nalgonda District of A.P. which causes major impediments to the people who consume such contaminated water. Dr Sarma also explained various methods employed by industries to abate pollution. He said that as per the reports available about the status of potable water available, our country is in the stress category which is not a healthy sign.



Dr J.S. Yadav, Director, ICT, delivering his welcome address during AWAKEN and a view of the audience

In the afternoon session, Mr Baquer of EPTRI, spoke on ‘Biodiversity of Eastern Ghats’ in which he highlighted the rich flora and fauna available in Eastern Ghats and the immediate need to protect it. He also talked about the status of the species which would be extinct if proper care and attention was not given for maintenance of the Biodiversity in Eastern Ghats.

The last lecture was delivered by Dr U. S. N. Murty on ‘Environment and Diseases’. He spoke about how the environment is degrading day by day and how it is escalating the state of the vector borne diseases like malaria, filariasis, dengue, chickengunya, and Japanese encephalitis, spread by different mosquito species. Owing to rapid industrialization and poor sanitary conditions prevailing in most of the developing countries the diseases are resurfacing with greater potency and some of the diseases like dengue and chickengunya have spread their tentacles in the South East Asian countries and India owing to manmade breeding spots and unsanitary conditions created by the human dwellings.

Dr Murty also spoke about the environmental management aspects, and the methods used in Biological control of mosquito larvae, particularly to control the *Anopheles* larvae by introducing *Gambusia* sp. of fish in their breeding sites.

After the technical session the students had a good interaction with the speakers.

Dr K. Sriram of Biology Division, ICT, proposed the vote of thanks.



CSIR Foundation Day Celebrations at CBRI, CSIO, NGRI and NPL

CSIR News has already covered the CSIR Foundation Day celebrations at several labs in the earlier issues (Vol 58 No 22 pp 350-356). Highlighted here are the celebrations at CBRI, CSIO, NGRI and NPL:

Central Building Research Institute (CBRI), Roorkee

The CSIR Foundation Day function at CBRI was presided over by the institute's Director, Dr Madhukar Onkarnath Garg. In his address Dr Garg stressed upon the need of zero energy buildings. He appealed to the scientists of the institute to take up the challenges for developing cost-effective technologies for such buildings.

Mr Anand Kumar, Director (R&D), Indian Oil Corporation, Faridabad, who was the Chief Guest on the occasion, drew attention to

the problem of Global Warming. He emphasized the need for environment friendly constructions. He highlighted the importance of YOGA in our life with living examples.

On this occasion, the retired personnel and the employees who had served CSIR for 25 years were honoured. Two meritorious awards for obtaining more than 90% marks in science subjects in secondary examination (2008) were given to Master Bharat Agarwal S/o Dr Atul

Kumar Agarwal and Ms. Surabhi Sharma D/o Shri Vijay Sharma. The essay competition for the wards of the CBRI employees was also organized and winners were given prizes.

The whole ceremony was compered by Chairman Foundation Committee, Shri Yadvendra Pandey, Scientist, CBRI. The vote of thanks was given by Controller of Administration, Shri Subhash Chandra Tyagi.

Central Scientific Instruments Organisation (CSIO), Chandigarh

At CSIO, Dr R.P. Bajpai, Vice Chancellor, Kurukshetra University, delivered the Foundation Day lecture on 'Science and Technology in Emerging Areas'. He, in his address, traced the 60 years journey of S&T developments and emphasized that we have to strengthen our basic sciences like Physics, Chemistry and Mathematics to meet the emerging challenges of the future effectively. He opined that biological systems offer very high speed performance and techniques need to be developed for integration of Biological and Physical material systems. These systems will need

lot of instrumentation and CSIO can be a trendsetter in these new emerging areas for farming of new technologies and new products.

Dr Pawan Kapur, Director, CSIO, while welcoming the Chief Guest highlighted the aims and goals of CSIR and its contribution to the field of science and technology. He talked about various new schemes



Dr R. P. Bajpai, Vice Chancellor, Kurukshetra University, delivering his lecture

of CSIR for young people. Dr Kapur also presented an overview of the on-going projects and future



CSIR Foundation Day Celebrations



Visitors interacting with one of the scientists of CSIO during Open Day

plans of the organization.

Earlier, CSIO observed Open

the live demonstration of the instruments developed at CSIO and

Day when about 1000 visitors, including students from various schools, engineering colleges, university and general public visited various laboratories of the organization. This provided them a unique opportunity to see

a chance to interact with the scientists.

Later in the evening all those staff members of CSIO, who had completed 25 years of regular service in CSIR and who retired during the period from September 2007 to August 2008 were honoured by presentation of mementoes and shawls.

The programme concluded with the prize distribution to the winners of various competitions held earlier as a part of CSIR Foundation Day.

Shri M.R. Masan, Controller of Administration, proposed the vote of thanks.

National Geophysical Research Institute (NGRI), Hyderabad

At NGRI, Dr A.V. Rama Rao, former Director, Indian Institute of Chemical Technology (IICT), Hyderabad, and Chairman and Managing Director, AVRA Laboratories Private Limited, Hyderabad, delivered the CSIR Foundation Day Lecture on 'Scientists as Managers and Entrepreneurs'. Dr Rama Rao, who excelled in many roles as a Scientist, Director, Manager and entrepreneur, dwelt at length on the different

phases of his journey from scientist to entrepreneur.

After the lecture, Dr Rama Rao presented mementoes to staff members retired during the year 2007-08 and also to those who completed 25 years of service in CSIR. Cash awards to the children of NGRI staff were presented to those who secured 90% or more marks in three science subjects in Intermediate examination.

Earlier, Dr V.P. Dimri, Director, NGRI, welcomed the gathering and spoke on the role of NGRI in the fields of natural resource exploration, earthquake hazards and environmental issues. In particular, he narrated the various milestones reached by NGRI during the last two years.

The function ended with a vote of thanks by Dr Y.J. Bhaskar Rao, Scientist 'G'.

National Physical Laboratory (NPL), New Delhi

NPL is one of the premier Laboratory for R&D activities with main objective to strengthen and advance physics-based research and to establish, maintain and improve the national standards of physical quantities. NPL is responsible for realizing and disseminating the

units of measurement based on the International System (SI). Broadly NPL is actively involved in material science, radio & atmospheric science, metrology and materials characterization research. This national laboratory is playing a significant role by way of assisting

industry, national and other agencies in their development task by helping in precision measurements, calibration and testing, development of devices, processes and finding solutions to allied problems related to physics.

The laboratory observed the



occasion as an Open Day and put exhibits pertaining to its R&D activities on display. More than 1500 students from 22 schools and two colleges visited the various exhibits on display on 25 September.

The activities on display included superconductivity, solar cells, organic LED, electro chromic devices, carbon composites, carbon nanotubes, light-weight-alloys for aviation industries, National

standards activities like AC high voltage, force & pressure standards LIDAR, IONOSONDE, Conducting polymer, Biosensors, Scanning Electron Microscopy, TEM, CMM machine, Glass Technology Unit, Liquid Helium Plant, etc.

The other activities associated with this occasion were cultural programmes, drawing & painting, essay, music & quiz competition.

On this day staff members who won awards were also honoured.

The Foundation Day lecture was delivered by Prof. K. K. Aggrawal, Vice Chancellor of GGSIP University on 26 September.

To organize this programme almost all NPL staff was involved under the chairmanship of Dr Vikram Kumar, Director, NPL, and coordination job was entrusted Dr R. K. Kotnala.

NEERI Scientists get Nina Saxena Excellence in Technology Award – 2008

The Nina Saxena Excellence in Technology Award - 2008 was conferred to the following NEERI scientists: Er. Subhash P. Andey, Er. Prakash S. Kelkar and Dr Madan V. Nanoti. This award was launched by IIT Kharagpur in memory of Dr Nina Saxena, to encourage and promote technical innovation with a social development focus in India.

An international jury of experts, chaired by the Director of IIT Kharagpur, adjudged the nominations on the basis of innovativeness, applicability, benefit to the nation, and most importantly the potential of the application for social development with specific reference to backward areas in India. The award carries a plaque and a cash award of Rs 51,000/.

The award has been given to the NEERI scientists for the development of “NEERI-ZAR” - Portable Instant Water Filter. NEERI-ZAR is a water purification system for rapid treatment and



Er. Prakash S. Kelkar and Er. Subhash P. Andey, NEERI scientists receiving the Nina Saxena Excellence in Technology Award - 2008

supply of safe potable water under emergency situations such as floods, heavy rainfall or cyclones. It is specially useful at such villages, which are not approachable, do not have electric supply and potable water to drink.

NEERI-ZAR is easy to fabricate and simple to operate and maintain, involving low capital cost. It facilitates onsite treatment of available flood water under

emergency situations to remove the organic contamination, suspended solids and bacterial load to produce safe potable water within few hours, using the locally available material. It does not require electricity.

The usefulness of NEERI-ZAR water filter was demonstrated during the floods caused owing to



Honours & Awards

heavy rainfall in the Barmer district of Rajasthan. NEERI had installed 100 units of the NEERI-ZAR in the flood affected remote areas of Barmer district in October 2006 to convert the turbid and contaminated rainwater into potable water. Performance of these units under field conditions was evaluated and the opinion of the local people was recorded. The people using treated water from these units were very happy with the quality of water produced by NEERI-ZAR units. They expressed their gratitude for the help provided



NEERI-ZAR

on the occasion of IIT Kharagpur Foundation Day Programme organized on 18 August 2008, the Chief Guest, Prof. Lord Sushanta

by the N E E R I team for the supply of potable water.

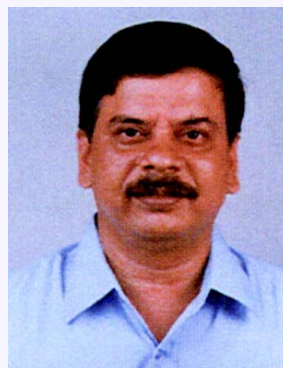
After presenting the award to the N E E R I scientists

Kumar Bhattacharyya, Director of Warwick Manufacturing Group, UK said that the award-winning NEERI – ZAR water purification system not only reduces the expenditure on providing safe drinking water during emergency situation but also reduces the expenditure on medical treatment of water borne diseases caused due to contaminated water. By reducing the epidemic, morbidity and mortality rate, the water purification system leads to an overall improvement in the quality of life, he added.

M.R. Srinivasa Rao Award to Dr G. Parthasarathy

The Council of Geological Society of India has awarded Dr Gopalakrishnarao Parthasarathy, Scientist, National Geophysical Research Institute, Hyderabad, the M.R. Srinivasa Rao Award for Experimental Mineralogy and Petrology in recognition of his valuable contribution to the field of Mineralogy and Petrology.

A Ph. D. from Indian Institute of Science, Dr Parthasarathy has been working on high-pressure science since 1980. He is a recipient of National Mineral Award by Ministry of Mines (2003); Hari Om PRL award from PRL, Department of Space, Government of India (2003); MRSI-medal from Materials Research Society of India (2007) and A.P. Scientist Award in Physical Sciences from AP Council of Science and Technology (2007). He has authored about 155 SCI papers and 140 research papers in conference proceedings and has five US and PCT patents to his credit. Since 2003, he has been working on high-pressure phase stability of titanium- based oxide minerals relevant to Lunar Mineralogy and helium-3 exploration in Lunar regolith. He is a life fellow of Geological Society of India, Indian Geophysical Union, Mineralogical Society of India, Indian Society of Applied Geochemists, and Andhra Pradesh Academy of Sciences. He is an Editorial Member of the *International Journal of Mining and Processing of Minerals*. He is also a member of International Lunar Exploration Group, India.

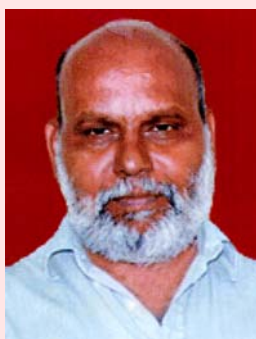


Krishnan Gold Medal to Dr A. R. Bansal

Dr Abhay Ram Bansal, Scientist, National Geophysical Research Institute (NGRI), Hyderabad, has been awarded Krishnan Gold Medal for the year 2008 by the Indian Geophysical Union in recognition of his significant contribution to the field of earth sciences and related field. The award carries a citation and Gold Medal.



Dr Prabhu Matondkar to Lead INDO-US Networked Centre



Dr Prabhu Matondkar of the National Institute of Oceanography (NIO), Goa, and Dr Joaquim I. Goes of Bigelow Laboratory for Ocean Sciences, USA, will be coordinating the Indo-US Science and Technology Forum (IUSSTF) supported Indo-US Networked Center on 'Climate Change and its Impact on the Ecosystem of the Arabian Sea' This centre will:

- Strengthen and enhance Indo-US collaboration and cooperation in oceanographic research and long monitoring;
- Encourage inter-disciplinary research and excellence in oceanographic and climate change science in the Arabian Sea;
- Create an environment that will encourage scientific research on oceans and cross-cultural exchange of ideas especially among students and young scientists; and
- Insure and develop a new generation of researchers to investigate climate change issues and relevance to the Indian Ocean and human populations around them.

Dr T. Harinarayana selected a National Delegate to Iceland and elected Fellow of AP Akademi of Sciences

The Ministry of External Affairs, Government of India, has selected a few eminent scientists and managers to visit Iceland to develop co-operation for exploitation of geothermal energy in India. Dr T. Harinarayana, Head, Magnetotellorics, National Geophysical Research Institute (NGRI), Hyderabad, is a member of this group. NGRI has completed major projects and investigated the deep crust covering different geothermal regions several in the country, eg Puga (J&K), Tatapani (Chattisgarh), Tapovan-Vishnugad (Uttarrkhand), Badrinath (Uttarakhand), Kullu-Manali (HP), Manikaran (HP), Sutlej-Spiti Valley (HP) and Surajkund (Jharkhand). These projects were executed under the guidance of Dr Harinarayana.



Recently, NGRI has signed an MoU with NTPC to develop geothermal energy in India.

The visit to Iceland will pave a way to develop power projects using geothermal energy, which is a clean and renewable energy source.

Also, Dr Harinarayana, has been elected Fellow of the Andhra Pradesh Akademi of Sciences. Recently, he also won the A.P. Scientist award from Government of Andhra Pradesh for the newly introduced field of Earth and Planetary Sciences. Dr Harinarayana is a well known in international circles as executive member of IAGA (International Association of Geomagnetism and Aeronomy); member of the Russian Academy of Natural Sciences (RANS), Moscow; Bureau member of EMSEV (Electro Magnetic Studies for Earthquakes and Volcanoes), Japan and also executive member of International Electro-magnetic Induction (EMI) working group 1.2. He is presently the Head of "Magnetotelluric" group, one of the major projects at NGRI and has made significant contributions to Oil Exploration, Geothermal Studies, Deep Crustal and Earthquake Studies. He has more than 60 research contributions to his credit and was a senior guest editor for special issues of two international journals.



Prof S.K. Brahmachari wins Sixth Biospectrum Person of the Year 2008 Award

Prof Samir Kumar Brahmachari, Director General CSIR, has been awarded the Sixth BioSpectrum Person of the Year award 2008. The award has been given to him for his significant contributions, in particular to his enormous achievements in the past twelve months including 'Publication of the Indian Human Genome Map (IGVdb), The Open (Source) Drug Discovery Programme and for bringing the prestigious Human Genome Organization (HUGO) meeting to India for the first time ever.' The award consists of a trophy and a citation.

According to an article in 5 December 2008 issue of *Biospectrum*, Prof. Brahmachari recognized very early the importance of genomics in the world and organized a genome analysis workshop with American molecular geneticist Charles Cantor in 1987 at IISc.

He was one of the earliest members of the Human Genome Organization, which was formed in 1988. India was nowhere on the genomic map then. And today 20 years down the line, when he is at the helm of decision making at CSIR, he has left no stone unturned to place India on the world genomic map. Year 2008 saw, Human Genome Organization (HUGO) hold its 13th Human Genome Meeting in Hyderabad as it turned 20 years old, thus recognizing the importance of India and its scientific capabilities in genomics. The event saw a galaxy of scientists from India and abroad deliver lectures, workshops and symposia on various aspects of genomics.

Not only this, CSIR, has also launched the Open Source Drug Discovery Programme in global partnership to combat the scourge of infectious diseases that afflict the developing world. Tuberculosis (TB) will be the first disease target for the project that has been allotted a sum of 500 crore and aims to provide a platform for collaborative research thus targeting affordable health. Prof. Brahmachari leads the Indian Genome Variation Consortium, which has developed a database of over 1,000 genes related to disease and drug response, exploring human genome variation in multi-ethnic, multi-lingual populations of India to develop a national resource: the genetic profile of the people of India.

Prof. S.K. Brahmachari to be honoured by IISc, Bangalore

Also, Prof. Brahmachari has been selected as one of the Distinguished Alumni of Indian Institute of Science, Bangalore, which is celebrating its Centenary Year (May 2008-May 2009).

As part of the Centenary celebrations, IISc is honouring Alumni who have distinguished themselves in various fields both within and outside IISc and those who have maintained 'Strong links with IISc'.

The distinguished Alumni Awardees have been selected on the basis of 'outstanding intellectual accomplishment', their contribution to Science/Technology/Industry and demonstrated contribution to an institution building process.

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