

# ENSEMBLE

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Newsletter of the Indo-French Centre for the Promotion of Advanced Research



**Building**  
Scientific Competency

## editor's note

**J**ourney of CEFIPRA beyond its 25 years is strongly rooted into its experience of 25 years of existence. At the core of it is its role in supporting the development of Indo-French scientific competencies in the cutting-edge areas of knowledge. In this edition, we share a glimpse of that experience through the outcomes of two excellent projects, which were among nine others presented during the seminar on "Successful Indo-French S&T Cooperation through CEFIPRA" held at Paris on May 17, 2013. The Scientific Council met during 10-14 May, 2013 at Grenoble, France for the 51<sup>st</sup> time to support and assess the knowledge progression through CEFIPRA. Summary of the two projects under progress are testimony of the quality of science we support to further bilateral scientific competencies in addressing global challenges.

To carry out the expanded mandate of catalyzing the different phases of innovation cycle, we are continuing our efforts to reach out to new stakeholders. In this context, a seminar for SMEs in Karnataka held in Bangalore on 25th May, 2013 in collaboration with the Government of Karnataka is worth reporting to highlight the opportunities for improving their competence through collaboration with French partners. In our continuing strive to link the Indo-French S&T Ecosystems, we have highlighted the workshop on big data organized with INRIA, France, which will result in another targeted programme between INRIA and DST.

We are also proud to announce the selection of six Indian doctoral students for the prestigious 10th Annual ESONN Training School. Thus, continuing our support to the knowledge supply chain and capacity building in Nano electronics and interface between physics and biology.

This issue highlights the tip of the iceberg of the knowledge products generated through the support of CEFIPRA. We intend to bring out the different aspects of CEFIPRA's role over the years and seek your inputs in bringing out such exciting stories or your experiences of working with CEFIPRA over the years.

Merci au revoir! Thanks till we meet again!



**Debapriya Dutta**  
Director, CEFIPRA

# leader

## Building Scientific Competency



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**B**uilding competencies, particularly so when it encompasses the seriousness of science and its output for nation building, is an endeavor that requires considerable rigor and perseverance. CEFIPRA has been diligently pursuing the goal of creating new talent and pooling expertise in a manner that the sum is more than the parts, for more than 25 years now.

**COLLABORATIVE RESEARCH PROGRAM** is the flagship initiative of CEFIPRA that seeks to build core competencies in relevant fields of science, as determined by CEFIPRA's Scientific Council (SC) in both India and France. The program covers the entire gamut of steps required to be taken in this endeavor right from identifying groups with complimenting strengths to fostering and mentoring intellectual interactions that ensue as a result. A core competency results from a specific set of skills or techniques that deliver additional value. This has been fundamental in the analysis undertaken by the Scientific

Council of the respective strengths of S&T groups in India and France. Rather than relying on vertical integration, CEFIPRA has adopted a strategy that adds value to the systems already existing on both sides.

When it comes to linking various constituents of S&T ecosystems of India and France, the thrust of CEFIPRA's interventions can be broadly divided into three components:

- Identifying promising areas where India and France can add value from collaboration.
- Supporting R&D in interdisciplinary themes
- Building human resources in S&T domain.

While keeping its eyes on its primary objectives, CEFIPRA has been nimble footed to factor in the ever evolving S&T priorities of two countries and changing needs and aspirations of the scientific communities on both sides. Guidance received by CEFIPRA in the form of policy directives from the two governments has been an important beacon to steer through the course.



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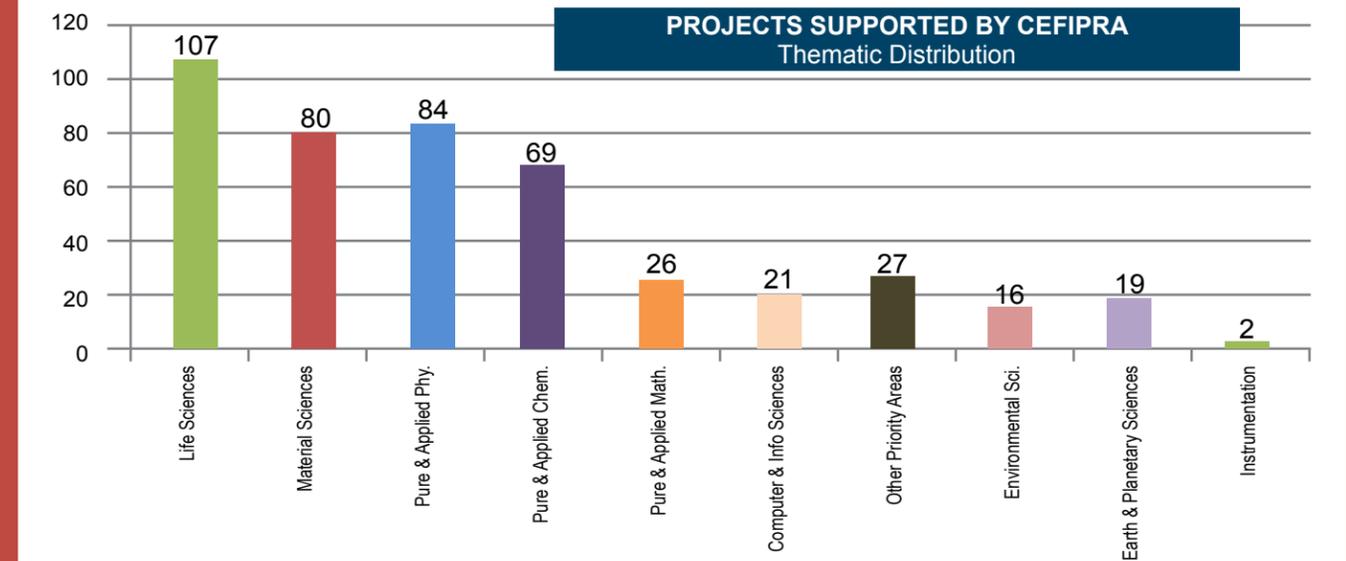
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My first contact with CEFIPRA was in Goa in 2004 at the Indo-French symposium on “Structure and Function of Metalloenzymes” organized by Dr. Shymalava Mazumdar (TIFR, Mumbai) and Dr. Juan Carlos Fontecilla-Camps (Institute of Structural Biology, CNRS, Grenoble). Since then, I have never ceased to be interested by India.

In 2006, the Ministry of Foreign Affairs invited me to serve on CEFIPRA’s Scientific Council to handle French side of the fields of chemistry and biotechnologies. I served for more than five years until 2011. With Indian and French colleagues we evaluated bilateral projects and selected those with promise for further development and/or funding. These projects led to quality fundamental research work as evidenced by the number of articles published in high impact journals. My association with CEFIPRA gave me very interesting opportunities to visit various universities and research centers, something that I enjoyed in particular. Knowledge about scientific landscape in both countries was helpful to initiate working out collaborative arrangements.

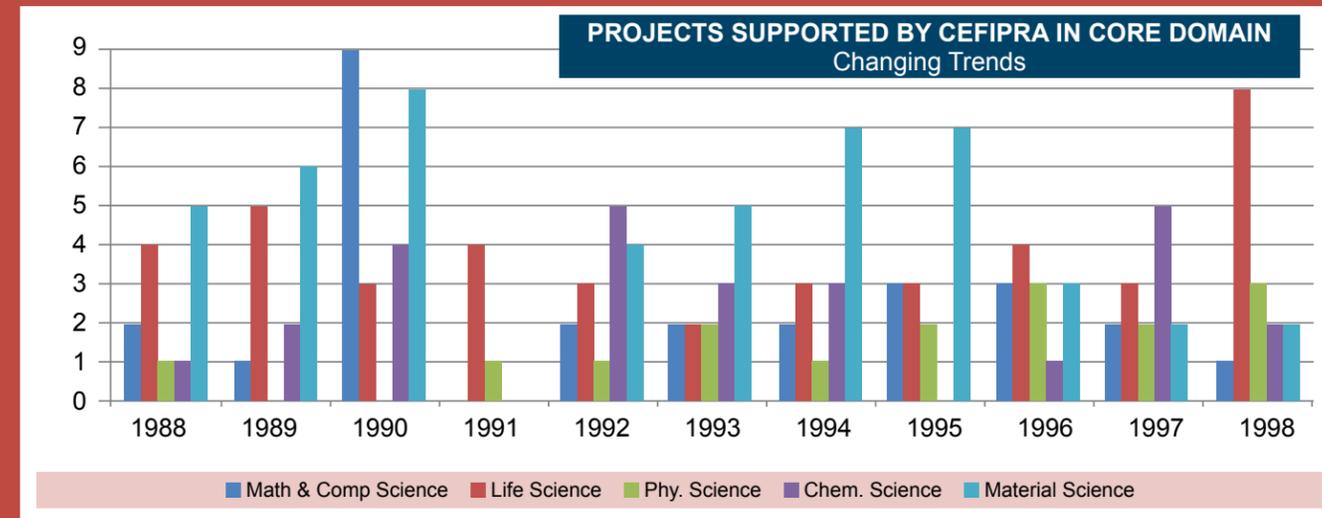
India and France have now agreed to expand bilateral cooperation on fundamental and applied research. CEFIPRA is well placed to promote bilateral scientific cooperation in all its dimensions.

Modern science requires significant resources. I believe and I hope that the French and Indian governments will know to assess the importance of the action of CEFIPRA and will continue to support it at an adequate level. Science has advanced a lot in the last 10 years and multi-disciplinary approaches hold the future. Disciplines such as chemistry, physics and mathematics are expanding through interface with other disciplines. The best examples are the interfaces between chemistry and biology, chemistry and physics or biology and physics. I would recommend that CEFIPRA takes into account this scientific evolution into its funding priorities. ●

Indian science has witnessed a rapid growth in the recent past both in terms of research funding, as well as in the quantifiable output measured in terms of journal publications and patents. There are Indian scientists working at the cutting edge in almost all disciplines of science and engineering. However, for a nation of its size, the number of globally competitive Indian scientists is still relatively very small, and they too work in a small number of well-funded institutions.

Despite the praiseworthy efforts of individual scientists in all areas, there is an absence of the critical mass that is essential for the organic advancement in the field of science. Moreover, there is also a lack of an ecosystem where the fruits of scientific research can be employed for people’s well-being and the larger benefit of the country.

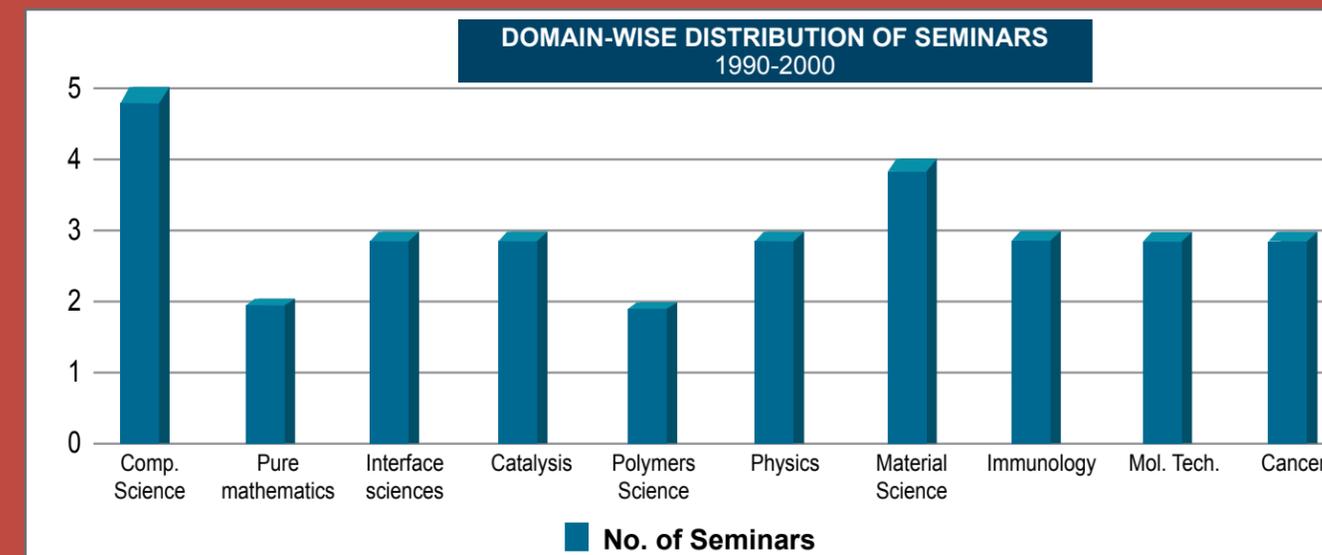
A critical task in building core scientific competencies is to scale up the number of scientists and institutions, and to develop pathways that help translate various scientific innovations into useful product and services. Strong collaborations between Indian and French institutions often made possible by efforts of CEFIPRA, have helped built up strong competencies in areas such as Applied Mathematics and Physics at top Indian institutions over the years. Research efforts of Indian scientists in geological, atmospheric and ocean sciences have also significantly benefitted through this coming together of institutions from two countries. Biological science is now emerging as a strong focus of collaboration between India and France. This is at a time when research in biology is advancing very rapidly in India. The Industrial research Committee of CEFIPRA has recognised this and continues to provided impetus to Indian efforts at translating research outcomes into societal benefits. ●



**IDENTIFYING INCIPENT AREAS OF RELEVANCE TO THE TWO COUNTRIES FOR INTERACTIONS**

CEFIPRA’s Scientific Council, while taking stock of ongoing Indo-French interaction in the S&T field in the formative years of CEFIPRA’s existence, could only but reckon that while there were a few initiatives in large number of scientific disciplines, the core collaborative strengths of India and France were nested in the field of Mathematics and Astronomical Sciences (see graph above). In the years that followed, the Scientific Council got down the task of identifying already existing lab level collaborations, which had demonstrated their productivity by way of strong publications in reputed national and international journals, and leveraging these links by providing support and mentorship as force multiplying inputs. Recognizing that developing core competencies is a long drawn process that requires incremental and continuous interventions overtime to bring about durable

improvements, successive Scientific Councils at CEFIPRA intervened by doing focused seminars in domains where collaborations were needed (see graph below). The council also focused on identifying systemic weaknesses that acted as bottlenecks in the flow of ideas and human resources. This is an obvious must for nursing existing collaborative research initiatives and to take them to the next level. To achieve a correct diagnosis of the needs and priorities for Indo-French S&T collaboration, CEFIPRA has been steadfast in organising workshops and brain storming sessions on a wide variety of S&T themes. (see graph below) This in turn has triggered long lasting and mutually beneficial collaborations between premier institutions in both countries. These efforts have borne fruit with the induction of a number of new collaborating groups to the bilateral research portfolio. Needless to say, the number and diversity of projects under CEFIPRA’s Collaborative Research Program has evolved into a sizeable portfolio



over the past decades. What is notable is that this has been achieved during a time when the world of science has been changing rapidly, paving way for technological leaps that allowed scientists to achieve more and more in ever shorter periods of time. Availability of state of the art infrastructure on either side has spurred collaborations based on complimenting strengths and needs of scientific professionals and institutions. (see graph on page iii for diversity of CEFIPRA supported projects).

**COLLABORATIVE RESEARCH PROGRAM**  
Focal Areas

- Pure and Applied Mathematics
- Computer and Information Sciences
- Life and Health Sciences
- Pure and Applied Physics
- Pure and Applied Chemistry
- Instrumentation
- Earth and Planetary Sciences
- Material Sciences
- Environmental Sciences
- Water
- Biotechnology
- Technology for Information and Communication

**SUPPORTING INTERDISCIPLINARY PROJECTS**

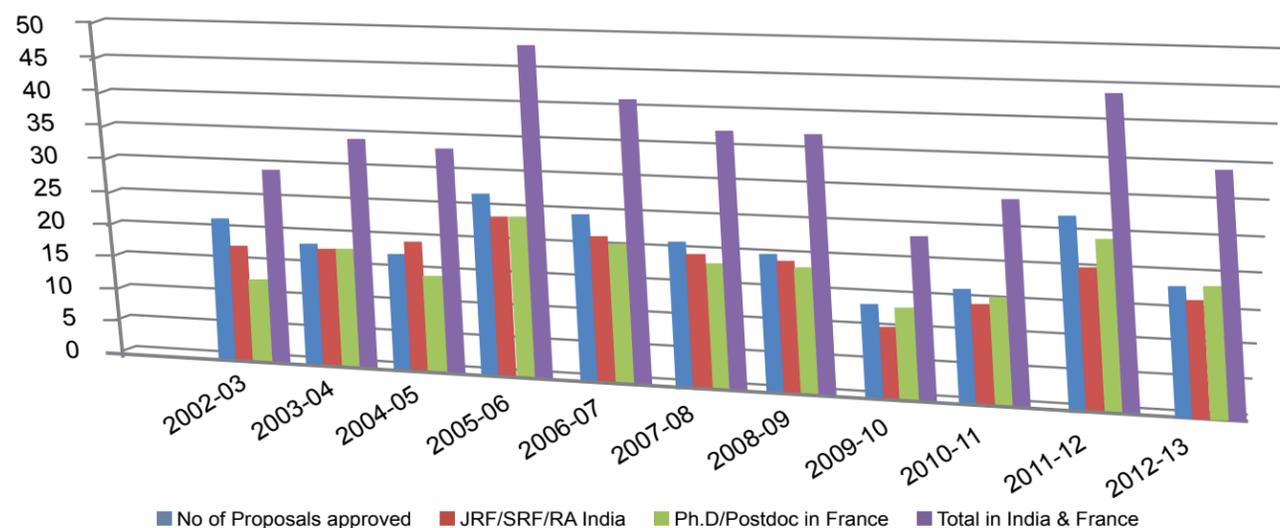
Collaborative Research Program has delivered on its mandate by bringing together highly motivated groups working on various scientific problems through the simple yet effective mechanisms of CEFIPRA. This is well evident in the quality of publications and diversity of patents secured over the period under reference. What stands out in the whole process is the high proportion of projects straddling multiple scientific disciplines especially in the

fields of molecular biology, immunology for infectious diseases, material sciences and nanotechnology.

**DEVELOPING NEW S&T TALENT**

CEFIPRA has never lost sight of the fact that future of science is as good as the scientists of the future. In recognition of this often under appreciated reality, CEFIPRA has devoted significant attention and resources to create opportunities for young scientists who are engaged with CEFIPRA supported projects as doctoral/post doctoral fellows. This is to ensure that while the projects generate new knowledge, they also nurture a new generation of scientific talent that can carry the baton forward with a sense of continuity. Over the years CEFIPRA has contributed to scientific capacities in India and France by establishing strong and productive networks of scientific groups and institutions in the areas of infectious diseases, engineering materials, catalysis, Information Technology to name a few. Using the limited resources at its disposal successive Scientific Councils of CEFIPRA have been able to establish robust institutional linkages that would serve the two countries well in the times to come. This is not only in terms of providing new products, processes and services but also a new and able generation of scientists who will deal with problems of tomorrow with the benefit of strong foundation being laid today. 450 groups in diverse fields of scientific enquiry and equally diverse geographic setting in India and France have the capability of shouldering the load of expectations that two countries have from them in the context of shared priorities and goals. Their promise is only matched by their zeal and effort in pursuing new knowledge In the meantime they continue in the pursuance of knowledge as they know it with great zeal and effort. ●

**COLLABORATIVE RESEARCH PROGRAM**  
Developing New Talent



**Collaborative Research Program**  
Prominent Publications

S. No.	Article	Journal	Project Reference & Collaborator(s)
1	Induced domain formation in endocytic invagination, Lipid Sorting, and Scission <i>Ludger Johannes and Satyajit Mayor</i>	Cell 142, August 20, 2010	<b>Project No. 3803-2:</b> siRNAome of toxin endocytosis and retrograde transport <b>Principal Collaborators:</b> Prof. Satyajit Jitu Mayor, National Centre for Biological Sciences, Bangalore, and Prof. Ludger Johannes, Institut Curie, Paris, France
2	Plasmonic space folding: Focusing surface Plasmons via negative refraction in complementary media <i>MuamerKadic, SebastienGuenneau, Stefan Enoch, and S. Anantha Ramakrishna</i>	ACS Nano (Web Publication Date: July 11, 2011; DOI: 10.1021/nn201334m)	<b>Project No. 3804-2:</b> Plasmonic properties of checkerboard metallic structures and films <b>Principal Collaborators:</b> Dr. S. Anantha Ramakrishna, Indian Institute of Technology, Kanpur, and Dr. Sebastien Guenneau, Université Aix-Marseille III, Marseille, France
3	Retrograde transport: Two(or more) roads diverged in an Endosomal Tree <i>Ludger Johannes and Christian Wunder</i>	Traffic 2011: 956-962	<b>Project No. 3803-2:</b> siRNAome of toxin endocytosis and retrograde transport <b>Principal Collaborators:</b> Prof. Satyajit Jitu Mayor, National Centre for Biological Sciences, Bangalore, and Prof. Ludger Johannes, Institut Curie, Paris, France
4	SNAP-tag based proteomics approach for the study of the Retrograde route <i>Getao Shi, Michel Azoulay, FlorentDingli, Christophe Lamaze, DamarysLoew, Jean Claude Florent and Ludger Johannes</i>	Traffic 2012	<b>Project No. 3803-2:</b> siRNAome of toxin endocytosis and retrograde transport <b>Principal Collaborators:</b> Prof. Satyajit Jitu Mayor, National Centre for Biological Sciences, Bangalore, and Prof. Ludger Johannes, Institut Curie, Paris, France
5	Formation of efficient Catalytic fiber nanoparticles on carbon nanotubes <i>Prabhapreet Singh et.al</i>	Angew.Chem. 2011, 50, 1	<b>Project No. 3705-2: Development of functionalized Carbon nano tubes</b> <b>Principal Collaborators:</b> SandeepVerma, IIT, Kanpur, Alberto Bianco, IBMC Strasbourg
6	Hydrophobic and Hydrophilic balance and its effects on Mesophase behavior in Ethers <i>MadanK.Singh et. al</i>	J Royal Society of Chemistry	<b>Project No. 3805-1: New Environment friendly media for organic transformations</b> <b>Principal Collaborators:</b> Dr. Anil Kumar, NCL Pune, Dr. Yves Queneau, Université Claude Bernard Lyon 1, Lyon
7	The Vanishing Volume of the 4 super spaces <i>Guillaume Bossar, P.S. Howe, K.S. Stelle, Pierre Vanhove</i>	LPTENS-11/20, CPHT-RR046.0511, June 2013	<b>Project No. 4104-2: Moduli stabilization, magnetized branes and particles.</b> <b>Principal Collaborators:</b> PrasantaTripathi, IIT Chennai, and Dr. MariosPetropoulos, EcolePolytechnique, Paris
8	Gravity strings, modular and quasimodular forms <i>P.M. Petropoulos and Pierre Vanhove</i>	CPHT-RR005.0211, 2013	<b>Project No. 4104-2: Moduli stabilization, magnetized branes and particles.</b> <b>Principal Collaborators:</b> PrasantaTripathi, IIT Chennai, and Dr. MariosPetropoulos, EcolePolytechnique, Paris
9	Stellar sources in the ISOGAL intermediate bulge fields <i>D. K. Ojha, A. Omont, F. Schuller, G. Simon, S. Ganesh and M. Schultheis</i>	A&A 403, 141-154 (2003); DOI: 10.1051/0004-6361:20030208	<b>Project No. 1910-1: Infrared Astronomy</b> <b>Principal Collaborators:</b> Prof. U. C. Joshi, Physical Research Laboratory, Ahmedabad, and Dr. Guy Simon, Observatoire de Paris, France

## ARSENIC IN BENGAL GROUNDWATER FROM FIELD SCALE TO MOLECULAR MODELING



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**A**rsenic is an odorless and tasteless semi-metal element in the periodic table. It enters drinking water supplies from natural deposits in the earth or from agricultural and industrial practices. Some people who drink water containing arsenic well in excess of the permissible maximum contaminant level for many years could experience skin damage or problems with their circulatory system, and may have an increased risk of getting cancer.

Millions of river floodplain and delta inhabitants across south-east Asia rely on shallow tube wells to avoid drinking surface water that is often contaminated with microbial pathogens. However, elevated arsenic content of groundwater from many of these wells is a cause of serious morbidity and frequent mortality for over 100 million villagers relying on inexpensive shallow tubewells for drinking water needs. The health complications range from deadly cancers in general and growth deformities amongst the young.

In a research project supported by CEFIPRA over the years 2000-2003 we investigated the problem of arsenic contamination in sub-soil aquifers in the State of West Bengal in India.

In particular the project team focused on the following issues:

- Level of arsenic contamination in sub-soil aquifers in a well characterized site,
- biogeochemical reactions/ processes that control the fate and transport of arsenic, as understood by coupling laboratory experimentation with reactive transport modeling as well as diffractometric (neutron, X-Ray), microscopic (AFM) and spectroscopic (XAFS, Mössbauer) studies, and
- routes through which human populations get exposed to groundwater arsenic.

Effective comprehensive remediation strategies need to consider these factors as well: (i) economic, cultural and political factors, including communication mechanisms (ii) current availability, development and implementation of various remediation strategies.

The origin of Arsenic in the Himalayan ranges and its transfer through dramatic flash flows to foothills' sediments and plain aquifers is the topic of a recently submitted new project for support from CEFIPRA. ●



## ASSESSING AND PREDICTING THE THREE-DIMENSIONAL STRUCTURES OF PROTEIN COMPLEXES



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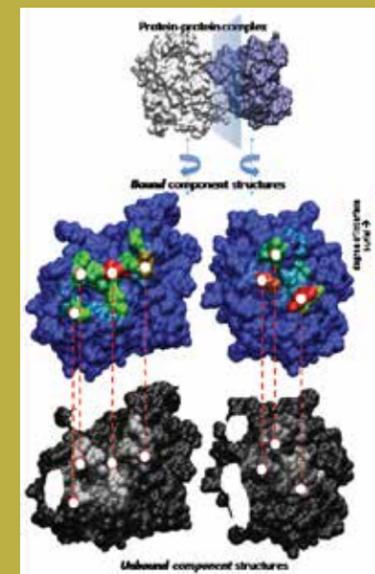
**Pinak Chakrabarti**  
Professor, Biochemistry  
Bose Institute, Kolkata

**R**esearch on assessing and predicting the three-dimensional structures of protein complexes has been difficult to fund, as Joël Janin the originator of CAPRI (Critical Assessment of Predicted Protein Interactions) warned us when we started. Many of the obstacles are understandable as the subject is multidisciplinary, drawing on biology, physical chemistry, structural biology, geometry, bioinformatics and computer science. But multi disciplinarity is a double-edged sword: the federative connotation of the word itself is appealing, but in practice a multidisciplinary project often invites critiques from all corners.

Further, predicting the structures of protein complexes (docking) currently falls squarely in a no man's land.

Docking tends to look simple, like playing with blocks, because of the heuristic and historical emphasis on rigid-body modes of interaction. This overshadows the harsher reality, which demands extensive configurational search in a system consisting of fully flexible macromolecules interacting in solvent. The contrast is staggering: we pass from a system with six degrees of freedom to one with tens or hundreds of thousands, challenging even the most advanced molecular simulation techniques.

My colleagues Pinak Chakrabarti, Gautam Basu, Joël Janin, and I chose to take a phenomenological approach to protein recognition. But such approaches too have their detractors. They are, to be sure, limited to necessarily incomplete biological data. More damningly, they are often dismissed as stamp collecting or fishing expeditions. But the latter critiques tend to ignore the fundamental soundness of gathering information before effective action can be taken, and which, in any event, will be required in order to intellectually grasp the results of future ex-computing, pure-simulation efforts.



We thus began collecting hundreds of examples of protein interactions for which extensive structural data was available, involving thousands of interacting proteins and hundreds of thousands of residues. We carefully annotated these systems in terms of the myriad structural and physical-chemical changes that accompany protein association. We developed a bioinformatics tool, called Flexbase, that provides consistent and unrestricted access to the stored information. We gleaned a number of principles from our data. One example is the previously unsuspected tendency of sidechains to adopt less-common conformations in protein-protein interfaces-- even before the interaction takes place. Such a finding may help identify biological interfaces

in proteins without needing to know the structure of the final complex. Another is the remarkable subunit packing differences seen between high-affinity states of human hemoglobin compared to low-affinity ones, which furthers our understanding of the mechanisms of allostery-- a fundamental concept in biological control.

We have all experienced the shifting focus of many funding organisations towards applied research, which in France is sometimes championed as a modern, anglo-saxon approach. Remarkably, however, basic research in France continues to be supported via annual funding from the national research centers. But these limited budgets preclude intense collaborative efforts, which are particularly necessary in a multidisciplinary field such as this one. I would like to express my appreciation of CEFIPRA's understanding of these stakes better than most. They provide a simple, well-run organisation that allows collaborative basic research to be carried out at an international scale. My partners and I greatly enjoyed this project, and we hope similar opportunities will continue to exist for future participants. ●

## BLOOM–TORRE–MACHACEK SYNDROME CAPTURING THE BLOOM

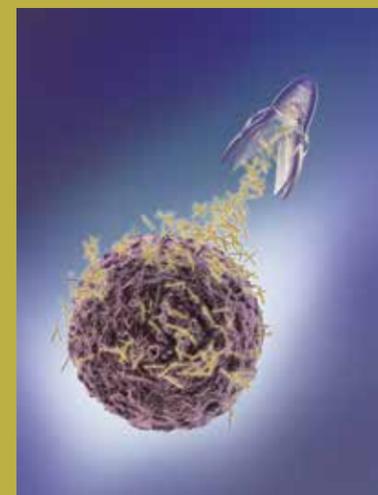


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Cancer affects about 700,000 individuals every year in India and results in around 350,000 deaths per year. Bloom Syndrome (BS), also known as Bloom–Torre–Machacek syndrome, is a rare autosomal recessive disorder characterized by short stature and predisposition to the development of cancer. Cells from a person with Bloom Syndrome exhibit a striking genomic instability that includes excessive homologous recombination. The condition was discovered and first described by New York dermatologist Dr. David Bloom in 1954.



BS is an autosomal recessive disorder that is associated with predisposition to cancer. BS is characterized by proportional dwarfism, sun-induced chronic erythema, type II diabetes, male infertility and female subfertility and frequent infections due to immune deficiency. The BS afflicted individuals are predisposed to

cancers. However, unlike other cancer pre-disposition syndromes, BS patients suffer from almost all the major types of cancer. This indicates that Bloom Syndrome, RecQ helicase-like (or BLM gene) is possibly involved at an early (possibly regulatory) stage in many different types of cancer development – underscoring the usefulness of BLM (as a protein) and BS (as a cancer predisposition syndrome) in the study of cancer genetics.

### ROLE OF BLM HELICASE IN DNA DAMAGE RESPONSE

The role of the helicase in the DNA damage response is yet to be fully deciphered. The response of BLM to DNA damage signal is possibly a direct consequence of the changes in its intranuclear localization. In asynchronous

cells, BLM is found to be in PML nuclear bodies (PML NBs) and nucleolus. Exposure to DNA damaging agents or replication inhibitors like hydroxyurea (HU) results in relocalization of BLM to the sites of stalled replication forks. We have demonstrated that BLM is phosphorylated constitutively by Chk1 at Ser646, and this phosphorylation decreased rapidly after exposure to DNA damage. This resulted in diminished interaction of BLM with nucleolin and PML isoforms and consequently, decreased helicase accumulation in nucleolus and PML NBs. Instead after DNA damage BLM becomes a member of the genome surveillance BRCA1 associated BASC complex and hence colocalizes and associates with pro-recombinogenic protein RAD51, proliferating cell nuclear antigen (PCNA), mismatch repair enzymes e.g. MSH2/6, MLH1, BRCA1, MRE11-Rad50-NBS1 complex and ATM and ATR.

The work being carried out on this project will lead to important breakthroughs in our understanding of the role of BLM in Double-Strand Break repair, and thus help to better appreciate how the lack of recruitment of a particular protein (i.e. BLM) can lead to the generation of almost all forms of cancers in human. In other words, the recruitment profile of BLM may enable us to understand the few “mission critical” parameters which the helicase maybe controlling thereby preventing neoplastic transformation in healthy individuals.

All data and the computational methodology will be deposited in the public domain. Indeed the bioinformatic studies from this project will lead to refinement of the existing procedures and development of new softwares and algorithms. Both information about BLM distribution and chromatin structure which could be generated, as well as methods used to perform thorough analysis of the data, will be invaluable to researchers in many fields including DNA repair, transcription and chromatin structure.

A vibrant platform is being created so that future studies in the same area could also be carried out on more complex biological problems involving multiple variables during DNA damage response pathway. ●

## NEW LAYERED OXIDES FOR ENERGY STORAGE AND CONVERSION



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The rapid growth of technologies poses particular urgency for the development of new and efficient power sources, whose properties include high energy density and rechargeability. Lithium-ion (Li-ion) batteries are one of the best candidates to meet these requirements. Li-ion batteries are the premier power sources of today’s mobile technology and are prime candidates in the contest of powering electric vehicles (EV) and hybrid electric vehicles (HEV).

Particularly, polyanion containing Fe based compounds are of great interest due to a higher voltage range (~3.6-2.5 V) with  $Fe_3^+/Fe_2^+$  redox couple. To this note many iron based compounds are studied such as  $Li_3Fe_2(PO_4)_3$ ,  $Fe_2(PO_4)_3$ ,  $LiFePO_4$ ,  $FePO_4$ ,  $Fe_{1.33}PO_4(OH,F)$ ,  $Li_2FeSiO_4$ ,  $(Na,Li)FePo_4F$ .

However, much effort has been put for the development of olivine  $LiFePO_4$  as cathode material for Li-ion batteries due to its high theoretical capacity, safety and

thermal stability. The renewed interest in the search for new compounds that can be used as potential electrode materials for Li-ion batteries is due to the safety concerns associated with the redox chemistry of the electrode materials. In addition, large scale mobile application require robust and low cost systems. Several families of materials are screened for this purpose.

Many iron based phosphates have been studied. Among all the iron phosphates studied,  $LiFePO_4$  is found to be an outstanding material due to its high operating voltage, high capacity and good cyclability.

In the framework of this project, we achieved soft chemistry synthesis of new transition metal frameworks and thorough investigations on the composition-structure-properties relationship in transition metal oxide systems. The synergy between the structural and physical characterizations in electrochemistry especially on applied side is the ideal multidisciplinary needed

to succeed in preparing new compounds for energy storage. Thus, three new phases are actually under investigation,  $Fe_3(PO_4)_2(OH)_2$ ,  $Fe_2O(SO_4)_2$  and  $Na_2VO(HPO_4)_2$ . Our collaboration is highly fruitful and we wish to go further in future.

The first results show that the possibility to generate new electrode materials through soft chemistry reaction. Indeed, transition metal hydrogenophosphates/sulphates present a great potential for the discovery of new electrode materials in view of various applications mainly for Li-ion batteries. It is quite remarkable that in such systems the hydrogen species can play an important role for generating new precursors in view of Li/Na exchange and intercalation. We continue these studies and hope to publish them as soon as possible. ●



## INDO-FRENCH SCHOOL ON MATERIALS FOR THE FUTURE

15-19 April 2013 | Poitiers

The first Indo-French School on Materials for the Future held on April 15-19, 2013 in Poitiers, France. The school aimed at being a first step towards some new Indo-French actions of formations and research in the area of materials for the future, between Pprime Institute (CNRS



– Poitiers University – ISAE-ENSMA) on the French side, and Indian Institute of Science – Bangalore and Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bangalore on the Indian side.

Prof. CNR Rao of the JNCASR inaugurated the school. Prof.

D.D. Sarma, Prof. Atul Chokshi, Prof. U. Ramamurthy and Dr. Bikramjit Basu, from Indian Institute of Science – Bangalore also participated in the school. Participation of Dr. G. Abadias, Dr. S. Boyer, Dr. S. Brochard, Dr. S. Castagnet, Dr. J. Cormier, Dr. C. Gérard, Dr. M. Gigliotti, Prof. P. Goudeau, Prof. JC. Grandidier, Prof. MC. Lafarie, Prof. J. Mendez, Dr. Y. Nahas, Dr. C. Nadot-Martin, Prof. Y. Nadot, Prof. L. Pizzagalli, Dr. L. Signor, Prof. L. Thilly, and Prof. P. Villechaise from Pprime Institute and its Department of Physics and Mechanics of Materials added tremendous value to the proceedings.

The school included an enriched poster session dedicated to PhD students, post-doctoral fellows and young researchers in addition to research talks and a visit to the Pprime Institute.

The poster session allowed participants to discuss topics of their interest with experts from both countries. It has to be noted that this formation has been recognised as part of Pprime Institute PhD Students diploma.

The school covered a wide range of topics in material science and engineering. Courses and research talks dealt mainly with subjects like nanomaterials, composite materials, polymers, metallurgy and biomaterials. Experimental and theoretical investigations were also equally represented. While the discussions were quite advanced in the area of nanomaterials, new dialogue were initiated on subjects like metallurgy and composite materials. ●

## Seminar for SMEs OPPORTUNITIES FOR IMPROVING COMPETITIVENESS THROUGH COLLABORATION WITH FRENCH PARTNERS

27 May, 2013 | Bangalore

A one-day Seminar for Small and Medium Scale Industries in Karnataka on “Opportunities for Improving Competitiveness through collaboration with French partners” was jointly organized by CEFIPRA; Visvesvaraya Industrial Trade Centre, Bangalore and Karnataka State Council for Science and Technology, Bangalore. The seminar was attended by more than 100 individuals representing relevant institutions from across the state of Karnataka.

Addressing the participants Sri M. N. Vidya Shankar,

IAS, Principal Secretary, Department of Industries & Commerce, Government of Karnataka highlighted the importance of access to foreign markets for survival in a competitive world for which technical leadership is the basic requirement. He drew the attention of the audience to various ongoing initiatives that seek to promote collaboration between Karnataka based enterprises and help foreign firms to achieve economies of scale and reduce R&D costs. Mr. Eric Lavertu, Consul General of France reiterated the role of collaborative R&D in industrial and economic growth. He underlined the commitment of Govt.

## Seminar on SUCCESSFUL INDO-FRENCH COLLABORATIONS

17 May 2013 | Paris

A seminar of France based stakeholders of CEFIPRA was organised on May 17, 2013 at Paris, France. The objective of the seminar was to provide a platform to CEFIPRA’s stakeholders to articulate their experiences of working with CEFIPRA, and its mechanisms to foster S&T collaboration between India and France. Another purpose was to elicit their views as to how CEFIPRA can best service its expanded mandate while also ensuring an inclusive and equitable participation of various constituents of its targeted community.

The French Co-Chair of CEFIPRA, Mme. Helene Duchene was present at the inaugural session, along with representatives of various French agencies like the Ministry of Higher education and Research, CNRS, Ministry of Industry, OSEO, INSERM, ANR, INRA etc.

The deliberations at the seminar were divided into two sessions. The first session saw presentations by PI’s of ten CEFIPRA supported projects that have been considered successful in various reviews. The PI’s were encouraged to share their candid views on strengths and weaknesses of various aspects of collaborative mechanisms of CEFIPRA. The presentations were well received and set the tone and pace for subsequent discussions.

The second session “Fostering Indo-French innovative ecosystems through CEFIPRA” brought forth the practices followed by various French agencies having role in enhancing cooperation between research and industry. The session saw the participation of AGREENIUM, OSEO,

SYSTEMATIC, INPI, MEDICEM & Cap-Digital. While OSEO emphasised upon various avenues that it has made available for connecting with small and medium companies in France, the industry representatives emphasised on the need to utilise organisational leverage offered by various agencies to reach out to industrial organisations. In this context, several of them highlighted that they are already in touch with CEFIPRA to pursue similar objectives.



The meeting concluded with the consensus that the core strengths of CEFIPRA should be maintained while trying to be proactive in some specific domains that are of current and immediate relevance to academic and industrial stakeholders. ●



of France to provide all necessary help and support for seeing through a framework for realizing such cooperation/ collaboration between France and other industrial locations in Karnataka, with special emphasis on Bangalore.

Sri. R. Shiva Kumar, President-elect FKCCI, Bangalore

informed that France is listed fifth in Indian trade partnership with foreign countries and nearly 12 billion Euros have been kept aside for bilateral trade between two countries. He mentioned that Energy, Automobile and Aerospace sectors can yield quick returns in such bilateral R&D agreements.

In his address, Dr. Debpriya Datta, Director, CEFIPRA gave a brief update on various efforts of CEFIPRA to deepen the partnership between India and France by linking academic, R&D and industrial institutions of both countries with each other.

The inaugural session was followed by two technical sessions that covered the entire gamut of issues that concern SMEs in the context of international R&D efforts with specific reference to India and France. ●

## Seminar on RECENT TRENDS IN PROTEOMICS

6-8 April 2013 | Bangalore

The Scientific Council of CEFIPRA had felt that Proteomics was an important area where the expertise instituted in the two countries should be utilised for nucleating collaborations between expert groups of the two countries. Accordingly, a seminar on “Recent trends in Proteomics” was organised at Bangalore, India. Six distinct groups from France were represented by nine French scientists while twelve Indian groups were represented by 21 scientists.

The presentations by French and Indian scientists covered various aspects of the sector. In particular, discussions on subjects like the proteomic approach for understanding cancer, stress tolerance in plants, enzymatic mechanisms in the proteome, functional proteomic studies, advanced tools and techniques for proteomic R&D were highlights of the seminar.

The meeting started with a brief inauguration with introductory remarks from Drs. Kumar Somasundaram, Gerome Garin, K. Dharmalingam and Mr. V.V. Rao from CEFIPRA. There was plenty of time for participants to discuss, and exchange ideas with the possible future collaborations. On the last day, there was a discussion moderated by Drs. Kumar Somasundaram, Gerome Garin with inputs from Prof. K Dharmalingam which identified and prioritised possibilities of working together based with complementarity in expertise available in Indian and French Institutions.

Some of the potential areas identified during the deliberation for collaborative work were: cancer, diabetes, infectious diseases, model organisms, metabolomics, post-translational modifications and training workshops. ●



## Forthcoming Events

- September 23-26, 2013, Bangalore, India Seminar on “Dynamics of Earth and Planetary cores”  
E-mail : [director@cefipra.org](mailto:director@cefipra.org)
- November 15-19, 2013 Madurai/Kodaikanal, India Scientific Council meeting of CEFIPRA  
E-mail : [director@cefipra.org](mailto:director@cefipra.org)
- November 20-21, 2013, Madurai, India Industrial Research Committee meeting of CEFIPRA  
E-mail : [director@cefipra.org](mailto:director@cefipra.org)

## Workshop on CHALLENGES IN OVERCOMING COMPLEXITY FROM BIG DATA TO CYBER-PHYSICAL SYSTEMS

4 – 5 April 2013 | New Delhi

It has been felt for long that while there are active research groups in the field of ICST in India as well as France, the number of collaborative research initiatives in ICST between India and France have been few. This indicated scope for a significantly enhancing Indo-French collaboration in this field. With this background the India-France Workshop in ICST “Challenges in Overcoming Complexity: From Big Data to Cyber-Physical Systems” was held on 4-5 April, 2013 at New Delhi.

Jointly organized by CEFIPRA, INRIA, CNRS and Khosla School of Information Technology (IT Delhi), the workshop brought together Indian and French researchers to explore the possibilities of collaborative work in the field of ICST by Indian and French institutions.

The program of the workshop included two invited talks. One was by Prof. Vijay Chandru of Strand Genomics, Bangalore on the topic Genomic Medicine: New paradigms of knowledge curation and decision-support”. The other talk was by Prof. Gerard Huet of INRIA on “Cultural heritage in the digital age: Challenges and research problems”. In addition there were 17 technical presentations, selected from submitted white papers and expressions of intent to collaborate.

Scientists, researchers and industry professionals agreed on importance and prospects of collaborative R&D and expressed a strong desire to convert possibilities into real activity on the ground. The topics that were mentioned as possible candidates for joint R&D included algorithmics; machine learning; analysis of the semantic web, computational geometry, social networks; formal methods; embedded systems and architecture; cyber-physical systems; sensor networks and distributed

systems. Also of particular interest were applications of computational techniques to areas ranging like natural language, robotics, managing power networks, computational biology, healthcare and earth observations. There were also two invited talks that elaborated upon the research being done in INRIA in the areas of high-performance computing (Dr. Jean Roman) and Cyber-physical systems (by Dr. Alain Girault).

The workshop concluded on following points of agreement:

- Researchers who had already firmed up collaborative arrangements should be encouraged to submit proposals to CEFIPRA under its regular call for proposals.
- Initiate a targeted call for fresh collaborations in the field of computing and informatics (ICST), aimed at (a) encouraging young researchers, and (b) for incubating collaborations in new areas and on new topics.
- French side (INRIA in particular) has identified a budget of Euro 75000-100,000 per year, with support of upto Euro 10,000-15,000 towards a single project. The Indian funding agencies should consider providing matching sums to enable fresh collaborations.
- Future workshops can focus on areas of common interest to both nations such as a) Embedded Systems and Reconfigurable Computing, where there are active research teams on both the Indian and French sides and b)) High-Performance Computing.

Most participants felt that brainstorming workshops such the one under discussion should be held more frequently to focus on themes of common interest and where there was a strong potential for collaboration and effective outcomes. ●



## CEFIPRA supported Indian Participants for European School on Nanosciences and Nanotechnologies (ESONN)

	<p><b>Neha Sharan</b> Indian Institute of Science Bangalore, Karnataka.</p>		<p><b>Shammi Verma</b> Inter University Accelerator Centre New Delhi</p>
	<p><b>Jayseelan Chidambaram</b> C. Abdul Hakeem College Vellore, Tamil Nadu.</p>		<p><b>Tanay Roy</b> Tata Institute of Fundamental Research Mumbai, Maharashtra.</p>
	<p><b>Harshad Harde</b> National Institute of Pharmaceutical Education and Research, Mohali, Punjab.</p>		<p><b>Nandini Bhandaru</b> Indian Institute of Technology-Kharagpur Kharagpur, West Bengal.</p>



Indo-French Centre for the Promotion of Advanced Research (IFCPAR) is a model for international collaborative research in advanced areas of science and technology. The centre was established in 1987 with support from Department of Science & Technology, Government of India and the Ministry of Foreign Affairs, Government of France.



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