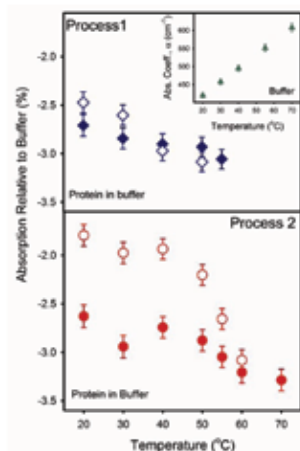


Newsletter

Vol: 4 | Issue: 1 | Period: May to August 2011 | Published on: 25.10.2011

Terahertz absorption study identifies the hydration layer of a protein to follow its structural perturbation during thermal unfolding

Rajib K. Mitra



This article has been chosen as the cover article of the Journal.

Ref: Luong, T.Q., Verma, P.K., Mitra, R.K. and Havenith, M., "Do Hydration Dynamics Follow the Structural Perturbation during Thermal Denaturation of a Protein: A Terahertz Absorption Study" *Biophysical Journal*, 101 (2011) 925-933

This study investigates the thermal denaturation of human serum albumin (a transport protein present in human blood plasma) and the associated solvation using terahertz (THz) spectroscopy in aqueous buffer solution. Far- and near-ultraviolet circular dichroism (CD) spectroscopy revealed that the protein undergoes a native (N) to extended (E) state transition at temperature $\leq 55^\circ\text{C}$ with a marginal change in the secondary and tertiary structure. At 70°C , the protein transforms into an unfolded (U) state with significant irreversible disruption of its structures. Concentration- and temperature-dependent THz absorption coefficient (α) of the protein solution were measured using a p-Ge THz difference spectrometer (2.1–2.8 THz frequency range), thereby probing the collective protein-water network dynamics. When the solvated protein was heated up to 55°C and cooled down again (Process 1), a reversible change in THz absorption was observed. When increasing the temperature up to 70°C (Process 2), a dramatic irreversible change of THz absorption was observed. The increase in THz absorption compared to bulk water was attributed to a blue shift in the spectrum of the solvated protein compared to bulk water. This is supported by measurements of THz absorption coefficients using THz time-domain spectroscopy (0.1–1.2 THz frequency range). The use of picosecond-resolved fluorescence spectroscopy of the tryptophan 214 moiety of the protein also supported the fact. All experimental observations were explained by a change in the hydration dynamics of the solvated protein due to the additional exposure of hydrophobic residues upon unfolding.



SATYENDRA NATH BOSE NATIONAL CENTRE FOR BASIC SCIENCES

Editorial

We are publishing a new volume of the newsletter of our Centre. This time we have found a lot of enthusiastic contributors. This is certainly a healthy sign. In fact this time we could not publish a number of good contributions due to limitation in space. We have completed our admission this year and got a bunch of new students (10 in regular Ph.D program, 10 in integrated Ph.D and 2 in TWAS-BOSE fellows). We hope that the new students will be part of this enthusiasm. We are passing through the twenty-fifth year of our Centre. This year should have many more academic activities in our Centre to mark this mile-stone which appears to be at a low ebb at this moment. Could we not go on for more vibrant academic programs at this juncture?

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Integrated Ph.D Programme at the S. N. Bose affiliated to the University of Calcutta

From the Academic Year 2011-2012, the Centre has introduced an Integrated Ph.D Programme in Physical Sciences. The University of Calcutta vide their Notification No. CSR/114/10, extended their affiliation to this programme. The Syllabus and Course Structure have been approved by the Academic Council and Board of Studies constituted jointly by the CU and SNBNCBS. On 03.08.2011, the classes have already begun for the new batch comprising 10 students.



Best poster awards to Ashis Kumar Nandy

Mr. Ashis Kumar Nandy, a Ph. D. student working under Prof. Priya Mahadevan, has attended INDO-US Meeting on New Functional Materials: Synthesis, Properties and Methods at Manali, Himachal Pradesh. His poster and talk on the topic " KO_2 : Realization of Orbital Ordering in a p-Shell System" received the first prize. He is receiving the award from Prof. Martha Greenblatt.

Report on Modulated Differential Scanning Calorimeter (MDSC)

Kalyan Mandal



A MDSC (TA instruments, model Q 2000) has been procured and installed successfully in our Centre, shown in the photograph. Differential scanning calorimetry is a thermal analysis technique that measures the temperature and heat flow associated with transitions in materials as a function of time and temperature. Such measurements provide qualitative and quantitative information about physical and chemical changes that involve endothermic or exothermic processes or changes in heat capacity. The instrument can operate within the temperature range from -180°C to 700°C . Typical measurements include glass transitions, melting points, boiling points, crystallization time, temperature and percent crystallinity, reaction kinetics, specific heat and heat capacity, thermal stability etc. MDSC permits separation of the total heat flow signal into its thermodynamic (heat capacity) and kinetic components. MDSC offers simultaneous improvements in sensitivity and resolution, and can separate overlapping events that are difficult or impossible to do by standard DSC. All the researchers are encouraged to take advantage of this now facility in our Centre.

In brief:

1. The following students have been awarded Doctoral Degree:

- Debabrata Dutta, Date of Degree Award: 17.06.2011, from West Bengal University of Technology. Title of Thesis: **"BIFURCATION IN MAPS WITH MEMORY AND PREDATOR PREY MODELS WITH MODULATED CONTROL"**.
- Arya Paul, Date of Award: 03.06.2011, from West Bengal University of Technology. Title of Thesis: **"ELASTO-PLASTIC THEORIES FOR MICROSTRUCTURE SELECTION IN SOLIDS"**.

2. New Bose Test: The intake for the Integrated Ph.D Programme (IPh.D) was made for the first time through a National Level Entrance Examination (BOSE TEST) conducted by SNBNCBS, on 19th June 2011.

Stability of the Bulk Phase of Layered ZnO

Bipul Rakshit

Recently a novel phase of ZnO has been synthesized which is analogous to α -boron nitride, although more three dimensional and consists of planar hexagonal sheets of ZnO. Examining the dynamic stability of the structure by calculating the phonon dispersions, from Local Density Approximation (LDA) or Generalized Gradient Approximation (GGA) (Fig. 1) we find unstable phonon modes over a considerable part of the Brillouin zone. LDA/GGA level calculations have usually been able to predict structural stability of s - p bonded systems. By examining our results, we predict the failure in the present case is the incorrect location of Zn d states in the valence band of ZnO. This results in enhanced Zn d - O p bonding and actually changes the nature of bonding in the present system, making it primarily Zn d - O p . Correcting for this with a Hubbard-like U on the Zn d states, the optimized structure is predicted to be stable (Fig. 2). This highlights the fact that the large bondlength contraction that one finds in going from sp^3 to sp^2 type bonding results in an increased necessity to correct for self-interaction errors.

Ref: Bipul Rakshit and Priya Mahadevan, *Phys. Rev. Lett.*, 107, 085508 (2011)

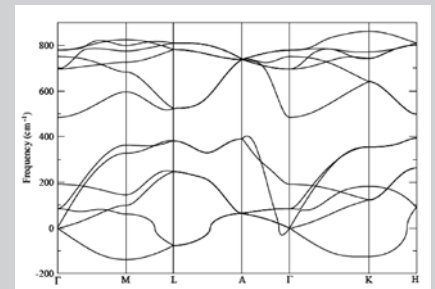


Fig.1: Phonon dispersion curve using LDA shows unstable modes, indicating instability.

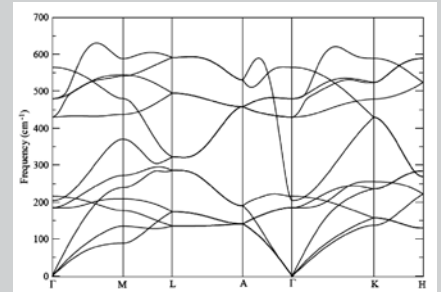


Fig.2: Self-interaction error corrected by LDA+U, gives stable structure.



EVENTS

C.K. Majumdar Memorial Summer Workshop on Physics 2011

Kalyan Mandal

Organized jointly by S.N. Bose National Centre for Basic Sciences (SNBNCBS), Indian Association of Physics Teachers (RC 15), & Maharaja Manindra Chandra College, Kolkata. The above programme was held at SNBNCBS from June 6 to 15, 2011 and was attended by about 28 participants most of them being the outgoing 3rd year B.Sc students of Physics (Hons.) and they came from different colleges of West Bengal, Ranchi, Jharkhand and IIT Madras. The workshop was loaded with lectures, interactive sessions and lab visits. Some sessions were also allotted for students' presentation, open house, hands-on experiments and experimental projects. On the inaugural day, teachers from different colleges were also invited to participate in the day's proceedings. The programme was partially funded from the TPSC scheme of SNBNCBS. The responsibility of Joint convener of the programme was shared by Dr. Kalyan Mandal of SNBNCBS and by Dr. Saswati Dasgupta, the Secretary of IAPT RC 15.



Summer School 2011 on Trends in Optics

The Summer School, organized by Dr. Saikat Ghosh, was held on 23rd and 24th June 2011 at our Centre, the other participating institutions being IACS, Kolkata; IISER, Kolkata; HCU, Hyderabad; PRL, Ahmedabad. This summer school was organized to initiate new collaborations and research initiatives while serving as a pedagogical resource for students. In diverse areas in condensed matter and trapped atomic systems, biology, nano-scale systems, astrophysics and cosmology. Accordingly, there is a flurry of research initiatives in almost all part of the world including a large number of researchers from India. The school was designed to be pedagogical in nature with an expected 60:40 ratio of students and faculties. Several posters from different institutes were put up and were discussed during the two day period programme.



International Conference on Ferromagnetic Shape Memory Alloys (ICFSMA) 2011

P. K. Mukhopadhyay

The third ICFSMA conference was organized by IFW, Dresden, Germany, from July 18-22, 2011. This is the third in the series of conferences that deals exclusively with the Ferromagnetic Shape Memory Alloys. This series was started in 2007 by us in our centre and has now become an international series, may be the only one to have this unique distinction. In 3rd ICFSMA there were more than 110 participants from Asia, Europe and USA. There were topics on theoretical modelling and experimental methods and results. From our centre, Dr. P. K. Mukhopadhyay was a member of the International Organizing committee and a session chairman. Dr. Rajini Kanth presented two posters. Dr. C. Biswas gave an oral presentation. The 4th conference will be held in Boise, USA in 2013.



THESIS SUMMARY

Study of wire-shaped ferromagnetic materials

Bipul Das

In recent years, research on magnetic nanowires (NWs) has drawn significant attention because of their potential applications in magnetic and magneto-electronic devices. When arranged in periodic arrays, such as electrodeposited in pores of templates, they might be used in patterned magnetic recording media, sensors and microwave devices. It is possible to store a single bit of data in a single nanowire with a diameter below the superparamagnetic diameter of a spherical nanoparticles of same material. By injecting domain walls in the NW, more than a single data can also store in a single NW. The special one-dimensional shape of the nanowires also makes them

ideal for basic research. The magnetic multilayered nanowires are found to be very useful tool to study Giant Magneto-Resistance (GMR) effect with current perpendicular to the plane configuration. When the nanowires are used as the storage media or sensor it is particularly important to know the property of the arrays as a whole. Two dimensional arrays of Ni, Co, CoPt and NiFe NWs and Ni nanotubes (NTs) are synthesized by electrodeposition technique. The NWs/NTs are grown within the nano pores of alumina and polycarbonate membranes. The membranes are commercially purchased. However, alumina membranes are also prepared in laboratory. The surface

morphology and crystalline phases of all the nanostructures are investigated in detail which indicates the crystalline phases have been changed with diameter of NWs or under thermal annealing. We investigate the magnetic state of the home made alumina membranes which reveals the aluminum substrate beneath the alumina membranes turned in to ferromagnetic after anodization process. Magnetization processes of the NWs are studied in order to understand the effect of various anisotropies which determine the easy axis of arrays of Nws on increasing their aspect ratio. In case of CoPt NWs, the role of stress during thermal annealing has been studied.

Monte Carlo Simulations of the Advective Inflow and Outflow around a Black Hole

Himadri Ghosh

In this thesis I describe the development of a three-dimensional radiative transfer code using Monte Carlo technique and

its application to various astrophysical problems. This code is capable of simulating the radiation spectra coming out of the

electron cloud of an accretion disk around compact objects, such as black hole X-ray binaries (XRBs). Physical processes



included in this code are the relativistic Maxwell-Jüttner momentum distribution of the electrons, Compton scattering with these electrons, gravitational red shift of the photons. Processes like synchrotron radiation, bremsstrahlung radiation, Coulomb coupling and the pair production are also possible to incorporate. Various types of photon energy distribution (e. g., mono-energetic, power-law, black-body and multi-colour black body) and geometry of the photon source (e. g., point or disk) can be used. In my thesis, I have mainly used multi-colour black body photons coming out of a Keplerian disk as the source of soft radiation. This soft radiation is intercepted by the electron cloud of the accretion disk. Depending on the optical depth of the cloud, soft photons may get inverse-Comptonized via multiple scattering or no scattering at all, and they emerge out of the cloud as relatively hard

radiation. Our simulations give information regarding the accretion disk and the central compact object. We apply the code to the Two Component Accretion Flow (TCAF) model of black hole XRBs to explain the cause of spectral state transitions. We have also applied this code in a system where both the inflow and outflow are present. We find that the diverging outflow actually causes the down-scattering of the photons whereas the infalling matter upscatters them, thus the final spectrum in presence of jet/outflow is a complex mixture of both kinds of photons. In addition to using various static models (e. g., torus, sphere or sphere with a conical jet) arising out of the analytical solutions present in the literature, we also use realistic accretion flows obtained by hydrodynamic simulations. In the last part of my thesis, I use the output of this simulation as the input flow configuration for Monte Carlo

simulation to calculate the spectral, timing and directional properties of the output radiation at each time step. We present results of zero angular momentum Bondi solution and low angular momentum accretion flows. One major conclusion is that in the presence of an axisymmetric disk which emits soft photons, even an originally spherically symmetric accreting Compton cloud becomes axisymmetric as there are considerable cooling. This effect becomes more prominent for low angular momentum flow which produces shock waves close to the axis. The post shock region cools down and the flow velocity is also increased in the region. The effect of the bulk velocity of the electrons on the spectra is highlighted. We show that in the soft states, the bulk motion Comptonization leaves its mark as a power-law at high energies.

Ultrafast Spectroscopic Studies on Chemically and Biologically Relevant Aqueous/Non-Aqueous Environments

Promod Kumar Verma

In biosystems, water is a component of a multicomponent fluid mixture with various biomolecules, small organic molecules, variety of ions (monoatomic or molecular), charged species etc. The dissolution of solutes (biomolecules, ionic compounds and charged chemical species) in water is accompanied by formation of hydration shell (layers) around them. The dynamical coupling between biomolecules and their hydration water is long recognized as a major determinant of protein stability and macromolecular functions. In chemical and biological environments, water exists mainly as interfacial water, which is located in the close vicinity of different types of interfaces and is mostly confined in cellular cavities and interstitial voids as isolated water molecules. These environments may contain from millions to only a few tens of water molecules. The attractive/repulsive interaction between the interface and water molecules, as well as the geometrical constraint by the environment, causes significant changes in local and long-range water structure. As a result, chemistry in aqueous biomolecular systems and in organized molecular assemblies differs markedly from that in a homogeneous fluid medium. The

dynamical interplay between water and protein has also been a subject of extensive study in protein folding and protein-protein recognition processes. Characterization of the intermediate states during denaturation is critical for a mechanistic understanding of protein functioning. The focus of this thesis is to explore dynamics and reactivity of water and their correlation as well as energetics in chemical (e.g., mixed solvents, polymer matrices and ionic/nonionic molecules), biological (e.g., proteins) and biomimetic (e.g., reverse micelles, lamellae) environments. To explore ultrafast processes in such environments, we have used both organic chromophores (dyes) as well as biocompatible inorganic nanocrystals. Conventional organic chromophores are employed to unravel femtosecond and picosecond-resolved solvation dynamics, solvolysis, linear dichroism, FRET (Förster resonance energy transfer), fluorescence anisotropy and enzymatic activity. On the other hand, biocompatible inorganic nanocrystals have been used to monitor various intermediates of a protein during thermal unfolding.



Black holes and the positive cosmological constant

Sourav Bhattacharya

In this thesis I have studied some properties of black hole spacetimes endowed with a positive cosmological constant Λ . We know from exact solutions that the inclusion of a positive Λ into the Einstein equations gives rise to an outer null hypersurface under some reasonable conditions. This outer null hypersurface acts as an outer boundary of the spacetime and is known as the cosmological event horizon. In all stationary exact and known solutions with $\Lambda > 0$, this boundary is a Killing horizon. Due to this boundary an observer located inside the cosmological horizon cannot refer to the region behind that and thus any precise notion of asymptotic is lost. My main goal in this thesis was to investigate the role or effect of this outer boundary of the spacetime in gravity. The motivation of this study comes from the recent observations made by Riess et al (1998) and Perlmutter et al (1999) which indicate that there is a strong possibility that our universe is indeed endowed with a small but positive Λ .

The organization and the outline of the thesis is as the following. In Chapter 1 we review very briefly the history of Λ and elaborate our motivation to study gravity with this. We consider some exact stationary solutions with positive Λ and discuss the properties of the cosmological event horizon. We also review topics like black hole no hair theorems, geodesic motion in cosmic string spacetimes and thermodynamics and Hawking radiation, which are to be addressed in the remaining part of the thesis. In Chapter 2 we establish a general criterion for the existence of the cosmological event horizons in static and stationary axisymmetric spacetimes. We find that the energy-momentum tensor must violate the strong energy condition, at least over some portion of a spacelike hypersurface in our region of interest. In Chapter 3 we discuss various classical no hair theorems for black hole spacetimes endowed with a positive Λ , i.e. endowed with a cosmological horizon. We consider both static and stationary axisymmetric spacetimes for our study. We find for static spacetimes a clear exception of the no hair theorem for the Abelian Higgs model-- we find a spherically symmetric electrically charged solution which has no $\Lambda \geq 0$ analogue. This comes from the non-trivial boundary condition at the cosmological horizon. In particular, this indicates that the existence of the cosmological horizon may change the local physics. In Chapter 4 we construct static cosmic Nielsen Olesen string spacetimes with $\Lambda > 0$. We consider both free and infinitely long string and a string piercing the horizons of the Schwarzschild-de Sitter spacetime. The conical defect terms are estimated for both the cases. For a free cosmic string, we also discuss the geodesic motion and demonstrate the

so called repulsive effect of positive Λ . In Chapter 5 we construct a positive definite, continuous mass function at the exterior of the Schwarzschild-de Sitter spacetime. We connect this mass function with the geodesic motion. We compute its variation and discuss thermodynamics for the Schwarzschild-de Sitter spacetime. In Chapter 6 we discuss Hawking or Hawking like radiation via the semiclassical complex path method. We prove the universality of particle emission from any Killing horizon of a stationary spacetime. This helps us to discuss the particle creation by the black hole and the cosmological horizon in equal footing. Finally, we conclude the thesis in Chapter 7 and mention some future direction of study.

A Study of the Effect of Disorder and Confinement on Binary Systems

Shremoyee Ganguly

A study of binary systems in cluster form (confined systems) as well as in the bulk is of great technological relevance and is also physically intuitive. The basic types of structures that can be formed for mono-atomic clusters are now well established. For example Lennard-Jones clusters provide a well-characterized archetypal model for systems with isotropic interactions. However, the situation for binary clusters is potentially more challenging, and the new types of structures that can be stabilized by the presence of two different atom types are only beginning to be mapped out. Considering the scenario in the bulk, the discovery of binary alloys like brass (formed by alloying copper and zinc), bronze (formed by combining copper with a small proportion of tin) and steel (formed by alloying iron with a small amount of carbon) has remarkably improved the quality of human life. Alloying two or more constituents is one of the most successful processes in the search for new materials. Therefore, the study of the electronic structure of alloys is an important area of research in materials physics. Alloys of our interest are multi-component systems which primarily exhibit metallic bonding and may contain one or more phases. In the present study we will be studying the effect of randomness in binary alloys.



CuTCNQ nanowires for future nonvolatile RAM

Rabaya Basori

In the recent years, research on memory based devices mainly focuses on downscaling of memory technology dynamic random access memory (RAM), Flash, ferroelectric RAM, magnetoresistive RAM to attain faster and more efficient data storage and processing. Use of resistive-switching materials like resistive RAM, oxide resistive RAM, phase change memory, etc. combined with nanotechnology may be a solution. Materials, which have large difference between ON and OFF states, are desirable for future high-density non-volatile memory applications. Organic semiconductors are currently investigated as an alternative to inorganic (metal-oxide) resistive-switching material for future memory generations. A nonvolatile organic memory device can be switched into states of either low or high resistance. Simple fabrication and the properties of organic devices make them suitable for low cost non-volatile memory applications.

Metal-TCNQ (7,7,8,8-Tetracyanoquinodimethane) charge transfer complexes have long been considered as organic logical and memory materials due to their electrical switching phenomenon induced by the structural phase transition. A promising candidate for nonvolatile organic memory applications is the charge-transfer salt copper-tetracyano-quinodimethane (Cu(TCNQ)). In addition to their good resistive-switching properties, CuTCNQ is advantageous to most other organic memory materials since they can be "self-assembled" on the corresponding metal by spontaneous chemical reaction with TCNQ. The Cu(TCNQ) units are stacked in planes as columns. Within these columns the π orbitals overlap and form a one-dimensional metal. In 1979, Potember et al. [1] first reported the electrical field-induced resistive switching in a Cu/Cu(TCNQ)/Al sandwich structure. The switching phenomenon in CuTCNQ is thought to originate in the reversible charge transfer ability of the complex according to the following reaction:



where M is a metallic donor (e.g. Cu) and the TCNQ molecule is the acceptor. However, the exact switching mechanism is not very clear.

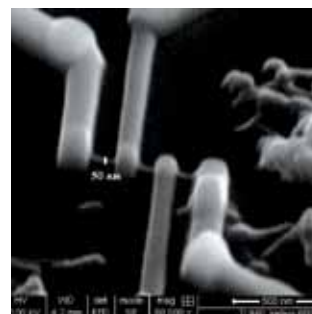
The difficulty in high-density device integration and large switching delay time for traditional bulk and film materials can be overcome by quasi-one dimensional nanostructure. Cu(TCNQ) nanowires has renewed attention because of its large surface to volume ratio and size effects which exhibit perfect crystal structure and opens up prospects for high-density nanoelectronics devices. Recently, some work on the switching

properties and prototype device fabrication of the Cu(TCNQ) nanostructures have been reported. Bistable electrical switching has been observed for devices with directed integration of Cu(TCNQ) nanowires by a lateral bridging growth method [2] Nonvolatile electrical switching with an ON-OFF current ratio of 10^3 was obtained using Cu(TCNQ) nano-tubulars [3]. Although such researches have significantly enhanced the understanding of the CuTCNQ nanostructure materials, but still rigorous measurements are needed to reveal the intrinsic switching characteristics of Cu(TCNQ) nanostructure for reproducible devices.

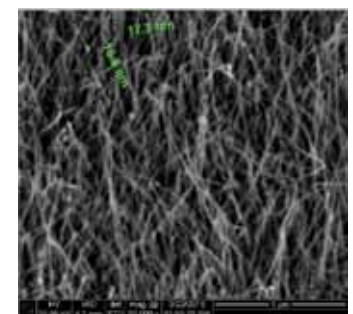
The authors are successfully growing CuTCNQ nanowires by vapor phase method. Electron microscopy shows the nanowires of 20-50 nm in diameters. Low temperature electrical measurements on devices structures with single nanowire with two and four probes, fabricated with lithography technique, are in progress to investigate the transport mechanism.

References:

1. R S Potember, T O Poehler and D O Cowan, Appl. Phys. Lett. 34 (1979) 405
2. K. Xiao, I. N. Ivanov, A. A. Puzetzy, Z. Liu and D. B. Geohegan, Adv. Mater. 18, (2006) 2184.
3. R. Muller, J. Genoe and P. Heremans, Appl. Phys. Lett. 88, (2006) 242105.



Four probe contact on single nanowire



SEM image showing vertically grown CuTCNQ nanowires



विज्ञान और पर्यावरण

प्रशान्त सिंह

इक्कीसवीं सदी में जलवायु परिवर्तन एक गंभीर समस्या बनकर सामने आया है और मैं पर्यावरण असंतुलन को पूरी तरह से विज्ञान को दोष नहीं देना चाहता हूँ, शायद मानव जाति कि हिस्सेदारी अधिक है क्योंकि हमने आवश्यक आवश्यकताओं को ध्यान न देकर अपनी चाहत को पूर्ण करने का प्रयाश करते रहे, और जितना हमने अविष्कारों पे ध्यान दिया उतना सूक्ष्मता से प्रकृति को समझना नहीं चाहा | शायद यही मानव जाति कि भयानक भूलों में गिना जाएगा | जलवायु परिवर्तन पर गोष्ठियां हुईं, पर विकसित देशों की हठधर्मिता ने विश्व को अच्छे परिणामों से वंचित कर दिया | जिसमें हमें निष्फलता ही हाथ लगी कुछ और समितियां होंगी पर हमें पता है अगर, कि जिस राष्ट्र का हित नहीं सधेगा वो कभी भी निष्पक्ष नहीं होगा | इस बारे में विभिन्न राष्ट्रों ने जो दृष्टिकोण अपनाया है इस पर उन्हें पुनर्विचार करने की आवश्यकता है | प्रत्येक राष्ट्र सबके साथ मिलकर कुछ करना चाहता है, स्वयं अपनी सदृच्छा से कुछ नहीं करना चाहता | जब कि यह चिंताजनक विषय राष्ट्रों के लिए सामूहिक स्तर पर उतना गंभीर नहीं है जितना कि प्रत्येक के लिए अपने स्तर पर | अभी तो ऐसा प्रतीत होता है कि किसी भी राष्ट्र को अपनी कोई चिंता नहीं है, वे सब तो विश्व की चिंता कर रहे हैं जैसे कि वे स्वयं विश्व में सम्मिलित न हों | यह भावना परोपकार की भावना न होकर प्रत्येक द्वारा अपने स्वयं के दायित्व से बचने का प्रयास है |

वस्तुतः होना तो यह चाहिए कि प्रत्येक राष्ट्र अपने स्तर पर अपनी चिंता और पारिस्थिति के अनुसार जलवायु संरक्षण के लिए जो सर्वोत्तम कर सकता हो करे | इससे उसका या उसके कार्य का महत्व कम न होकर वह अपनी पर्यावरण विषयक चिंताओं से मुक्त होने की ओर एक कदम आगे बढ़ेगा, स्वेच्छा से अग्रणी होने के श्रेय का अधिकारी बन जाएगा और दूसरों के लिए प्रेरणादायक सिद्ध होगा | इस बारे में सामूहिक कार्यवाही पर बल दिए जाने के चार कारण हैं - प्रत्येक देश स्वयं त्वरित विकास चाहता है और इसके लिए दूरगामी परिणामों को अनदेखा करना चाहता है, किसी एक देश द्वारा कुछ किये जाने से विश्व पर्यावरण में कोई विशेष परिवर्तन नहीं होगा, प्रत्येक राष्ट्र जानता है कि यदि अन्य सभी राष्ट्र वांछित कार्यवाही करें तो उसे कुछ विशेष करने की आवश्यकता नहीं होगी, तथा पर्यावरण असंतुलन में सभी का समान दोष न होकर विकसित देशों के दोष अधिक हैं इसलिए अविकसित देश चाहते हैं कि वे ही इस बारे में पहल करें और अपने व्यवहार को संयमित करें | किन्तु इनमें से कोई भी कारण ऐसा नहीं है जो किसी राष्ट्र को कुछ न करने के लिए प्रेरित करता हो |

उपरोक्त के अतिरिक्त प्रत्येक पर्यावरण विनाशकारी गतिविधि सर्वप्रथम उसी देश को दुष्प्रभावित करती है जो उसके लिए दोषी होता है, दूसरों पर इसका प्रभाव बाद में होता है | इस कारण से यदि कोई देश इस बारे में सकारात्मक पहल करता है तो सर्वप्रथम वही लाभान्वित होता है, दूसरों को इसका लाभ बाद में ही प्राप्त होता है | विश्व स्तर का प्रत्येक पर्यावरण विनाश स्थानीय पर्यावरण विनाश से आरम्भ होता है, इसलिए सुधार भी स्थानीय स्तर पर ही आरम्भ होता है | उदाहरण के लिए पर्यावरण विनाश का सर्वाधिक महत्वपूर्ण कारण पृथ्वी परवनों का विनाश है, जिसके स्थानीय परिणाम भी उतने ही विनाशकारी होते हैं | इसी प्रकार कार्बन डाई ऑक्साइड की अधिकता इसके भारी होने के कारण सर्वप्रथम स्थानीय वातावरण को दुष्प्रभावित करती है | विश्वीय तपन पर इसका प्रभाव बहुत बाद में होता है | ऊपर जो कुछ राष्ट्रों के लिए कहा गया है वह सब व्यक्तियों के लिए भी अनुकरणीय है | हम में से प्रत्येक को और हमारे प्रत्येक राष्ट्र को तीन विशेष कदम उठाने होंगे -

- ▲ जनसँख्या पर नियंत्रण रखें,
- ▲ प्रति व्यक्ति ऊर्जा खपत को न्यूनतम करें, और
- ▲ शहरीकरण को प्रतिबंधित करें और गाँवों का विकास करें |

तभी पृथ्वी की मानवता का भविष्य उज्ज्वल हो सकेगा, अन्यथा हम विनाश की ओर तीव्र गति से बढ़ रहे हैं |

Observation of Forest week

Supriyo Ganguly & Swarup Dutta

Forest week, 2011, was organized by the Engineering Section at the campus of SNBNCBS. All faculties, students and administrative staff members participated in a tree plantation programme held during the period, 14-21st July 2011. The Director inaugurated the programme on 14th July, 2011 at 9.45 a.m. which was followed by tree plantation by the other senior faculties. Prof. S.S.Jana, Ex-Head of the Dept of Zoology, Surendranath College, Kolkata was present as a special guest, who donated valuable potted plants to the Centre. More than 500 saplings were planted during this programme.



STUDENT'S PAGE

Down The Memory Lane Of SNBPL - 2011

Biplab Bhattacharjee

“Here comes the rain again,
Falling from the stars....
September rains”

Standing in the heavy downpour, looking around the mystic atmosphere, when every reality was fading out of my eyes, the inner eye set out for a journey down the memory lane. Suddenly a few glimpses take me far apart from reality to the past, to the memories of SNBPL-2011 (S. N. Bose Premier League - 2011).

After a gloomy weather the whole day, at the evening a sparkling drizzle makes the weather cozy. It was, 31st April, a Saturday night. I was taking my dinner with family at home. With my favorite “Aalo-Posto” along with Dal, Rasogollas and a sweet and sour Mango, I was enjoying my Rotis. Suddenly a ‘Zakir Hussain’ tabla track takes me to another world while in a sudden I came to know that it was my cell phone that was ringing. It was Ashutosh, one of my class mates who had called me and almost forced to convince me out of nowhere to return back to SNB on Sunday early morning as SNBPL is to be held at SNB the next day, 1st of May.

It was the first Cricket league at SNB in my presence so I was really enthusiastic about it. So the first train to Howrah was not at all an impossible task for me for that purpose at least.

The next morning, when I stepped into the ground, the first match had just started. It was the match between the ‘Mighty Bosons’, the most experienced side and the ‘SNB Devils’, the most unpredictable one. With Kapil Gupta swinging his arms, the first batting ‘Devils’ knelt down with just a mere score of

38. And with the opening combination of Prashant Singh and Sujoy Modak, the most experienced and consistent openers, the Mighty Bosons swept away the match with almost half of the overs to spare.

The next match was between the ‘Devils’ and our team ‘Strangers’, which was the most balanced team on paper containing most of the all-rounder. The destructive Ashu and dependable Amartya seemed out of touch in the match for the Devils. And with ‘Sabyasachi’ coming out as a revelation for our ‘Strangers’ we won the match with ease.

But that is not the whole story. Now it was upto the Devils to show their class. After losing the two opening encounters they were almost in the doorsteps of knocking out. But then SNB-VEERU Ashu almost took his team to the finals out of nowhere. With two most convincing and consecutive wins they are the second finalists along with our most consistent performers. Mighty Bosons, shows lack of commitment later to lose both the other matches to get knocked out of the tournament. With Ashu in peak of his destructiveness and Strangers with sparkling efforts in the field the final was a nail biting encounter. But finally “The Slow and Steady Won The Race”, and the Devils thump all their criticism after their first two loses, with Ashu emerging as the Best Player of the tournament.

Keeping aside who ever had won or lost, it was the spirit of the



game that emerges as the Champion of SNBPL. Amidst few misunderstanding and quarrels, the SNBPL was a full success story, cherishing memories not only in the snaps taken by the SNB Photographers but in everyone's heart.

Suddenly a light flashed on my eyes and I came back to reality, finding myself standing in the heavy downpour. It was really the heat generated by memories of SNBPL which gave me the energy to stand in that downpour. That is how cricket generates passion and passion generates heat. But this is not enough to soak me up. So leaving all of you with the cherishing memories let me go for a shower.



“The National Bird at its best” – Subhajit Sarkar

शायद तुम आ जाओ.....

कल खूटी पर लटके
तुम्हारे दुपट्टे ने अरसे बाद,
हवा के झोंके के साथ
गाहे बेगाहे महक उड़ा दी थी

बदलते मौसमों की आवाजाही में,
नए कुछ चित्र उकेरे हैं मैंने, पर
खत्म होने लगे हैं, रंग जो
तुम पिछली बार लायीं थी

मेरे कमरे की दीवारें
सीलने लगीं हैं,
और तिरछी हो गयी है,
तस्वीर, जो तुमने सीधी की थी

मेरे आँगन की तुलसी,
कुछ झुक सी गयी है
एक अरसा हो गया
है, जब तुमने पानी दिया था

कल फिर मैंने,
पाया था मुझको,
जब दराज़ में देखा था, खत
जो तुमने पहली बार लिखा था

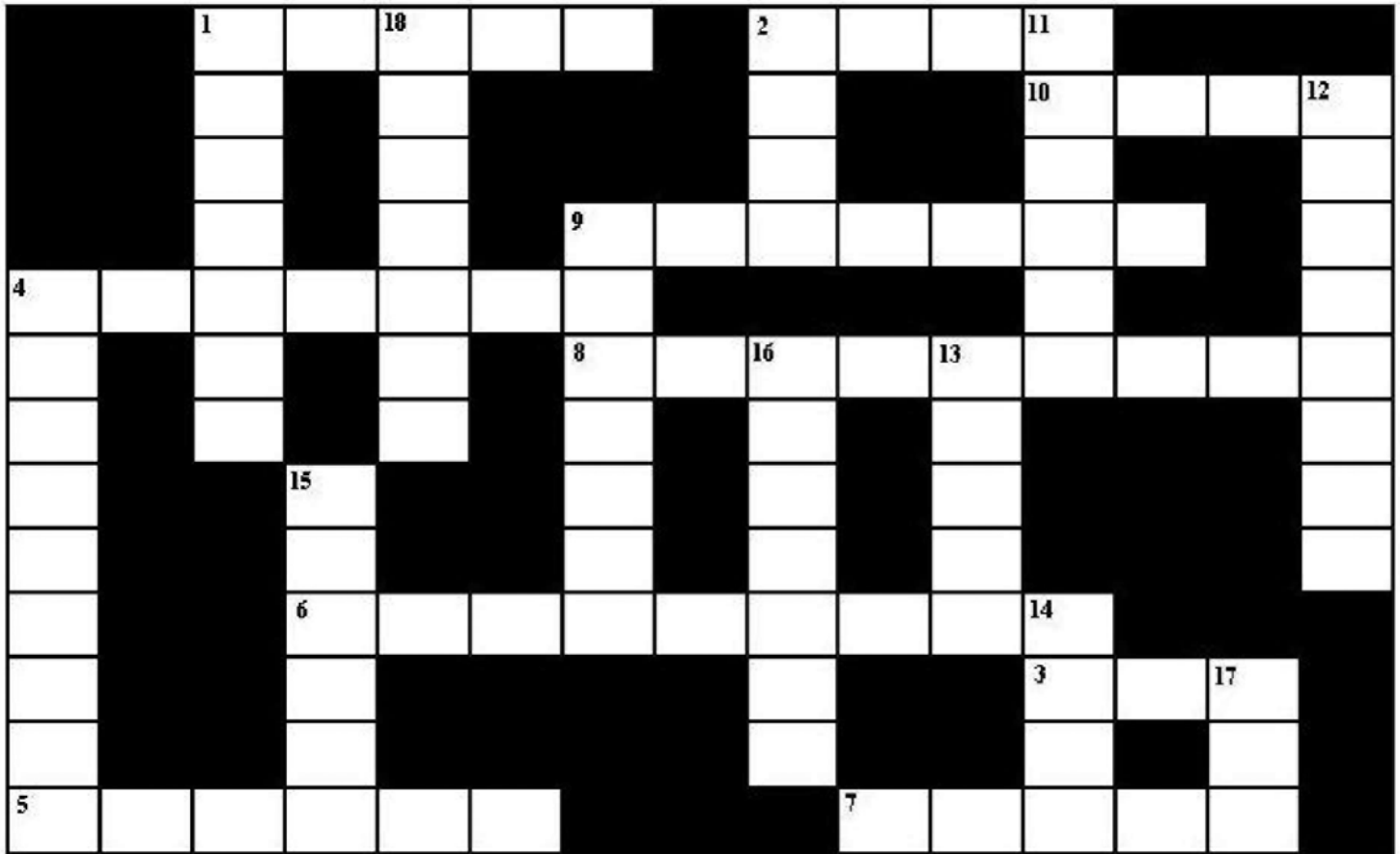
पिछली कुछ रातों में,
पुराने बुझे दिए जलाकर,
पिरो लिए हैं, सारे
मोती जो तुम देकर गयीं थीं

बरामदे की क्यारी के,
गँदे के फूलों ने पहन ली है मुस्कान,
जो यहीं छोड़ गयीं थीं तुम,
अपनी खिलखिलाहट के साथ

फिर बादल गरजे हैं आज,
एक मद्धिम बरसात भी हुयी है,
ठन्डे हो गए हैं कुछ गरम रास्ते
शायद अब तुम आ जाओ.....

— कपिल गुप्ता

CROSSWORD by Ms. Shauri Chakrabarty and Ms. Chandreyee Roy



CLUES

Across:

1. I can never be alone as I am full of colours and flavours.
2. A famous research organization in America.
3. A body part which helps to maintain balance.
4. I can never decrease.
5. Point equally distant from the outer limits.
6. A month in the Julian calendar.
7. Agree or correspond.

8. The length of a boundary

9. This is controlled by red, orange and green colours
10. Light gathering device of a camera.

Down:

1. Certainty is an impossibility in this world.
2. An exploding star.
4. All the living things and their habitat.
9. A hurricane occurring in the pacific ocean.

11. You find this vegetation at high altitudes.

12. To take away.

13. Another word for many.

14. An English singer who shares his name with a sea mammal.

15. It takes the shape of its container.

16. To purify (eg. Alcohol) especially by repeated or fractional distillation.

17. A narrow beam of light.

18. A recently developed operating system for mobiles.



ततैया (वैस्प) के शरीर में सौर्य कोष (सोलर सेल) है

सुष्मिता दासगुप्ता

उन्नीसवीं शताब्दी के अंत से ही मनुष्य सोलर सेल अथवा सौर्य कोष तैयार करके विद्युत उत्पादन की कोशिश करता आ रहा है। इंसान इस विषय को अभी भी पूरी तरह से कब्जे में नहीं कर पाया है। परंतु हरनेट नाम के एक प्रकार के ज़हरीले ततैये बहुत पहले से ही जैव सोलर सेल का प्रयोग करके विद्युत उत्पादन करते आ रहे हैं। मानव सभ्यता के विकास के बहुत पहले से ही ततैये सोलर सेल का प्रयोग कर रहे हैं। यह घटना सुनने में विश्वास योग्य न लगने पर भी सत्य है। ज़हरीले कीड़े-मकौड़ों में ततैये भी अन्यतम कीड़े हैं। खास तौर पर पीले रंग के पेट वाले ततैयों से सभी बच कर चलते हैं तथा डरते हैं। हरनेट नामक ततैये दक्षिण-पूर्व यूरोप, उत्तर-पूर्व अफ्रीका तथा दक्षिण पश्चिम एशिया में पाये जाते हैं। ये बड़ी शीघ्रता से मिट्टी के नीचे गड्ढा बनाकर कर घर बना सकते हैं। इनके छत्ते मधुमक्खी के छत्ते की भाँति षड्भुजाकृति होते हैं। ततैये को लेकर अध्ययन करते समय हरनेट ततैयों के आचरण वैज्ञानिकों को विशेष रूप से आकर्षित करते हैं। उन्होंने पाया कि सुबह की अपेक्षा दोपहर की कड़ी धूप में हरनेटों की तत्परता बढ़ जाती है। तेल अवीव विश्वविद्यालय के एक गवेषकों के समूह ने इस विषय का गहराई से अध्ययन किया। उन्होंने देखा कि ये ततैये सौर्यशक्ति का प्रयोग करके

अतिरिक्त शक्ति का अर्जन कर सकते हैं। उन्होंने निरीक्षण करके पाया कि वास्तव में इन ततैयों की त्वचा में असंख्य सौर्य कोषों की समष्टि है। शुरु में वैज्ञानिक यह समझ नहीं पाये कि यह विद्युत उनके किस काम आता है। गवेषणा करके यह पाया गया कि उनके पेट की पीले हिस्से के एन्जाइम को सक्रिय रखने में ततैये विद्युत का प्रयोग करते हैं। इससे उनके शरीर में अतिरिक्त शक्ति मिलती है। केवल यही नहीं शरीर की तापमान के नियंत्रण के लिए भी वे इस विद्युत का प्रयोग करते हैं। सर्दियों के दिनों में पेट के पीले हिस्से में जमा रखे विद्युत के द्वारा शरीर को गरम रखते हैं और गर्मियों के दिनों में अतिरिक्त सूर्य-ताप को विद्युत में बदल कर शरीर के तापमान को सहन करने योग्य बनाते हैं। ये ज़हरीले ततैये अपने शरीर के सोलर-सेल द्वारा विद्युत तैयार करने का काम पृथ्वी पर होमो-सैपियनों के आगमन से बहुत पहले से ही करते आ रहे हैं

(बर्तमान समाचार पत्र पर सुरजित मुखोपाध्याय द्वारा प्रस्तुत की गई इस जानकारी से प्रभावित होकर मैंने इसका हिन्दी अनुवाद प्रस्तुत करने का प्रयास किया है।)



Indian desert fox

Prosenjit Singha Deo

A rarely photographed species in the wild. Seen very rarely because of its adaption to a limited habitat. It is found only around the Thar desert of India. It is a subspecies of the more commonly found red fox. It is also similar to the Fennec fox (*Vulpes zerda*), adapted and found only around the Sahara desert. Its small size and adapted kidney function help it to survive in desert. Large ears help to detect prey under the sand. I photographed it in the middle of August 2011, during my 3 days trip to Tal Chapar black buck sanctuary, in the Churu district of Rajasthan. Team mates were Arka Sarkar and Bhaskar Das of "Bengalbirds".

PHOTOGRAPHY



"God's Painting" – Tamosa Chary

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