INSA elects new fellows

Ambasht, R. S., Banaras Hindu University, Varanasi

He has made contributions to the understanding of ecosystem structure and functioning of tropical grasslands, forests and riparian ecosystems. His current work on plantation forest stands of fast growing, nitrogen fixing actinorhizal Alnus and Casuarina and rhizobial Leucaena has revealed important findings on in situ nitrogen fixation rates in different nodule age and plant age classes, primary production, nutrient uptake, apportionment in biomass and release rates through litter mass decomposition. His current work on river corridor and watershed ecosystems quantifies the conservation potential of plant populations under varying erosional stresses for soil, water and different nutrient elements.

Appa Rao, Krishna M. V., Tata Institute of Fundamental Research, Bombay.

His current work is in the field of X-ray and gamma ray astronomy and astrophysics. He does both theoretical modelling and experimental observations. In the field of X-ray astronomy (i) he has analysed X-ray observations of different celestial objects by satellites, (ii) he has been making models to explain properties of low mass X-ray binaries. In gamma ray astronomy, he has tried to explain several observations of high energy gamma rays from celestial objects. His current interests also include astronomy and astrophysics of Be stars: (i) Origin of the Be phenomenon, (ii) Origin of X-ray, infrared and optical emission from these objects, (iii) Observation with ground-based telescopes.

Bala Sivaraman, K., Indian Institute of Technology, Madras.

He has made contributions towards the utilization of pericyclic reactions and free-radical cyclizations in synthetic organic chemistry. He has carried out extensive work in the area of thermal and charge induced Claisen rearrangement of porpargyl aryl ethers, Y-halo-propargyl aryl ethers, functionalized allyl aryl ethers, aryl allenic ethers and sequential Claisen-ene rearrangements in aromatic and heterocyclic systems.

Bhaduri, Sumit, Alchemie Research Centre, Thane.

He has made contributions to the organometallic chemistry of metal clusters and their use in catalytic and other transformations. He has initiated and successfully carried out research programs on the application of organometallic and co-ordination compounds as soluble and supported catalysts.

Chakravorty, Maharani, Banaras Hindu University, Varanasi.

Her main research interest lies in understanding of host-virus interaction. She has isolated a number of interesting mutants of Salmonella typhimurium as well as a completely new virulent virus, MB78. A detailed physical map of the phage genome has been constructed by her. She and her group are involved in the construction of the genetic map as well as sequencing of the genome.


He has made contributions to finite difference methods and their stability properties for solution of general non-linear two point boundary value problems, eigenvalue problems and for his work on numerical integration and optimal approximations in Hilbert spaces of analytic functions. His work contributes significantly to the development of appropriate numerical mathematical computer software for the concerned problems.

Gadagkar, R., Indian Institute of Science, Bangalore.

He has made significant contributions to our understanding of the structure and evolution of insect societies. Using novel and imaginative methods he has demonstrated behavioural caste differentiation in primitively eusocial wasps. He has discovered the phenomenon of pre-imaginal caste bias, demonstrated differential larval nutrition as its basis and thus opened up a new field of study. Using a variety of empirical and theoretical approaches, he has demonstrated the inadequacy of genetic theories for the evolution of insect societies and has developed a new class of theories, the focus of which is demography, a factor hitherto unexplored in this context.

Ganguly, C., Bhabha Atomic Research Centre, Bombay.

He is mainly responsible for the development and fabrication of plutonium, uranium (including $^{233}$U) and thorium-based metallic and ceramic nuclear fuels for reactors. His research areas include powder metallurgy, sintering, sol-gel processes, metal matrix composites, radiation damage and evaluation of thermophysical and thermomechanical properties of nuclear fuels and engineering ceramics. He has been fabricating mixed uranium-plutonium monocarbide fuel for the fast breeder test reactor (FBTR) at Kalpakkam and has developed fabrication flow sheet of mixed uranium plutonium oxide, monocarbide and mononitride fuels for the forthcoming prototype fast breeder reactor (PFBR). He has been working on the kinetics of the carbothermic synthesis of carbide and nitride and densification of oxides, carbides and nitrides including rate controlled sintering. He has developed the 'dust-free' sol gel-metastable polye-
ization (SGMP) process for fabrication of ceramic nuclear fuels and low temperature oxidative sintering (LTS) route for UO₂ and (U, Pu)O₂.

Ganguly, N. K., Post Graduate Institute of Medical Education and Research, Chandigarh.

He has elucidated the intricate mechanism of cell membrane damage involved in bacterial and parasitic diarrhoeas, coeliac disease and pylonephritis. This caused the release of immunologic mediators, particularly cytokines acting as modulators of membrane functions. The toxins have been shown to act through kinases and the arachidonic acid pathway involving the calcium-calcimodulin system.

Gopinathan, K. P., Indian Institute of Science, Bangalore.

From the midst of thousands of genes present in the cells of a multicellular organism, how does a particular tissue or cell selectively pick up and express a single gene or set of genes. In order to investigate this important biological question, the mulberry silk worm Bombyx mori has been exploited by K. P. Gopinathan. The synthesis of the silk fibre protein, fibroin(s) in B. mori is confined to the posterior parts of the silk glands and to the late instars of larval development. Use of the cloned fibroin gene has revealed that its expression is regulated both at the transcriptional and post-transcriptional levels. In higher eukaryotes, usually a functional adaptation is observed in a differentiated tissue to achieve its committed function most efficiently. In the case of posterior silk glands of B. mori this functional adaptation is synonymous with the synthesis of large quantities of tRNA, specifically needed to translate the fibroin message. How is the tRNA gene expression, carried out by RNA polymerase III (Pol III) regulated? Although the basal promoter elements of the Pol III transcription have been defined, the major unsolved problems have been the identification of control elements which confer tissue specificity or permit the discrimination between individual tRNA species or between isoacceptors of the same tRNA species. Moreover, since the tRNA genes belong to the multigene families, the selective expression of individual copies from the midst of other members of the multigene family is also intriguing. His research group has contributed significantly on the elucidation of these aspects of Pol III transcription. Simultaneously, they are also developing methodologies to exploit the silkworm for biotechnological purposes using a baculovirus-based expression system and the B. mori-derived cell lines or live caterpillars.

Hans-Gill, R. J., Panjab University, Chandigarh.

She has made significant contributions in the field of geometry of numbers and discrete geometry; specially to the work related to non-homogeneous minima of indefinite quadratic forms leading to the solution of Watson's conjectures, packings and coverings and view obstruction problems.

Recently she has also proved a Markoff chain type isola results for the view obstruction Problem of Cusick for sphere and cube in three dimensions.

Jayaraman, R., Madurai Kamaraj University, Madurai.

He has discovered two genes where products are accessory factors to transcription. He has contributed to the subject of rec A-lex A independent DNA repair pathway. His contributions encompass transcription control in bacteria (E. coli), repair of DNA damage and the origin of mutations in bacteria. His recent work has confirmed the Cairnsian view that environmental stress results in mutations which will overcome the stress. He has obtained genetic evidence to suggest the operation of two pathways of Cairnsian mutagenesis and partially identified their requirements.

Johri, M. M., Tata Institute of Fundamental Research, Bombay.

He has made original contributions to plant developmental biology and to the regulation of nitrate reductase (NR) enzyme. He has been able to sort out and identify various factors which regulate the transition of plant cells from proliferative to differentiative phase by employing the Funaria (a moss) protonema cultures. Caulonema differentiation marks a major developmental switch which was shown to be regulated by auxin. The role of calcium/calcmodulin-dependent protein kinase in signal transduction during auxin action is currently under investigation. His studies on the fate of cells in the shoot apical meristem show that a corn plant consists of repeating units, each of which comprises the axillary bud, internode and the leaf above. The differentiation of these units and of internodes were shown to progress acropetally. A more dynamic picture of the functional organization of the shoot meristem has emerged from this work. Among photosynthetic plants, the Funaria NR is unique in being tetrameric and NADPH-specific. The repression of NR by ammonia was shown to be due to its effect on the uptake of inducer. His group has also devised a novel screening method to identify hybridomas against scarce and labile enzymes without purifying them.

Lakhotia, S. C., Banaras Hindu University, Varanasi.

His current work is mostly on molecular genetics of heat shock induced gene expression in Drosophila. A major aspect of the studies relates to the regulation of expression and functional significance of the non-protein coding heat shock gene at the 93D region of Drosophila melanogaster, another area of studies is directed at elucidating regulation of the unusual heat shock response in Malpighian tubules of Drosophila and at identifying the novel gene/s involved.
Mahajan, K. K., National Physical Laboratory, New Delhi.

He has made outstanding contributions in the areas of ionospheres and upper atmospheres of earth and other planets. In the case of earth's ionosphere his pioneering works include—the loss and transport of the F-region plasma, electron temperature modelling for the International Reference Ionosphere and identification of semiannual effect in the upper atmospheric neutral composition. In the field of planetary atmospheres, his outstanding contributions include the discovery of equatorial anomaly in the ionospheres of Jupiter and Saturn, theory on the formation of photodynamical ionopauses at Venus and Mars and ionospheric evidence for the absence of magnetic field at Mars.

Malik, S. K., Panjab University, Chandigarh.

He has made contributions to nonlinear dispersive wave phenomena in self-gravitating media, electro-hydrodynamics, MHD and magnetic fluids and for work on nonlinear stability and nonlinear wave bifurcation phenomenon in magnetic fluids. In recent years, his research work embarks on the Nonlinear Stability and finding the Bifurcation solutions in the magnetic fluids.

Malhotra, K. C., Indian Statistical Institute, Calcutta.

He is currently working on issues related to the joint management of forest lands (JMFIL) in the country; peoples participation in JMFIL, impact of deforestation and monoculture plantations on the forest dwellers, restitution of biodiversity in south west Bengal, quantification of flow of Non Timber Forest Produce (NTFP) at household level, documentation of traditional knowledge systems related to NTFP and natural resources. He is involved in developing methods for studying human-wildlife habitat interactions, management of sickle cell disease in tribal areas and role of dermal ridges in primate evolution.

Mukherjee, P., Saha Institute of Nuclear Physics, Calcutta.

He has done pioneering experimental work on charged particles induced reactions, nuclear shell model and gamma ray spectroscopy. Mukherjee's outstanding achievements are: nuclear structure studies with transfer reaction, high spin shell model states, inelastic strength distributions in isobaric analog resonance reaction, stability of super heavy nuclei, density fluctuation in nuclear matter, and spin population in sub-barrier fusion reaction.

Narlikar, A. V., National Physical Laboratory, New Delhi.

He has been working in the area of superconductivity for the last more than thirty years. In the early sixties, when type-II superconductors had just emerged, his pioneering studies on niobium and various high field niobium alloys (which are now known as the conventional superconductors) could establish the importance of non-uniform dislocation structures in causing vortex pinning and realizing high critical current densities. Subsequently, he performed extensive studies on A-15 superconductors, their growth and ordering by solid state reactions as also on chevel phase superconductors and heavy fermion systems etc. For the last five years he has been working on substitutional and related studies on various high Tc cuprates, and more recently also on fullerene and other novel systems which he is investigating using scanning tunnelling microscopy and spectroscopy techniques. These investigations have led to some exciting crystallographic details on nanometric scale.

Nityanand, S., (Mrs), Central Drug Research Institute, Lucknow.

She has undertaken systematic evaluation of hypolipidemic activity of the traditional drug guggul, identification of its active constituents and development of a standardized fraction gugulipid as a new hypolipidemic drug, which is being marketed. It also offers a practical approach for development of new drug from indigenous remedies.


His current research activity is in the fields of petrology and isotope geochemistry. The latter includes the determination of absolute isotopic ages of Indian rocks with a view to understanding early crustal evolution. Presence of very old rocks about 3.6 billion years old has been demonstrated in Bastar, MP. High grade metamorphic event in the Eastern Ghats mobile belt has been dated at 1.0 billion years. Magma genesis in and geochemical nature of the earth's mantle as documented in Rajmahal flood basalts, kimberrites and Gondwana lamprophyres are his other research areas.

Purkayastha, R. P., University of Calcutta, Calcutta.

His scientific contributions include the demonstration of the involvement of phytoalexins in differential resistance, basic antigenic compatibility factors in host-parasite relationships and induced resistance in plants. His pioneering work on application of immunoserological technology for determining basic compatibility factor in legume hosts and their parasites is significant. He showed the effect of induced resistance on host antigens in addition to phytoalexin elicitation. He
has also made significant contributions to the field of mushroom science.

Reddy V. Umapathi, Indian Institute of Science, Bangalore.

He has made outstanding contributions in adaptive signal processing which have led to the development of a number of novel algorithms. He has made contributions in digital, adaptive and sensor array signal processing. He developed, for the first time, analytical expressions for the output noise to signal ratio in FFT algorithms, without assuming that the truncation errors are uncorrelated, and also showed that the output noise in the decimation-in-frequency algorithm is smaller than that in decimation-in-time algorithm.

Roy, D. P., Tata Institute of Fundamental Research, Bombay.

His current research interest is the search of new subnuclear particles at the high energy colliders—notably the top quark, higgs bosons and super-symmetric particles. In particular the search strategies suggested by him for (i) the top quark in terms of the isolated lepton signature and (ii) the supersymmetric particles in terms of the missing transverse momentum signature are widely used in the global search for these particles.

Sathyamurthy, N., Indian Institute of Technology, Kanpur.

His contributions have been in the area of (computational) molecular reaction dynamics: use of classical trajectories and time-dependent quantum mechanical calculations for unraveling the nature of the dynamics, probing the transition state and computing state-to-state observables. Recently he has also been examining chaos and fractals in atomic and molecular collisions and dynamics of molecular processes at surfaces.

Shanmugas, G., Madurai Kamaraj University, Madurai.

His previous contributions were on the mechanisms of replication of oncogenic RNA (Retro) and DNA viruses. Currently he is focusing his research on the regulation of cell proliferation and cell cycle using cultured murine and human cells as model systems. He has shown the induction of several early growth response genes in mouse embryo fibroblasts in response to mitogenic stimuli. These genes include positive growth regulators such as oncogenes and transcription factors and negative regulators including a gene for a DNA synthesis inhibitor protein. His present work deals with studies on mutations in the tumour suppressor gene p53 in human cancers by PCR-SSCP analysis.


He has made significant research contributions which have advanced knowledge in the general area of reproductive endocrinology as well as pointed out new avenues for their application in the medical sciences for the last three decades. His major contribution in the last ten years is in the field of inhibit. He has succeeded in isolating inhibit from human seminal plasma and characterizing its amino-acid sequence. A significant dent has been made in elucidating some of inhibit functions which have immense potential applications in contraception and diagnosis and treatment of infertility as well as prostatic cancer.

Virk, D. S., Punjab Agricultural University, Ludhiana.

His research interests are in biometrical genetics and plant breeding. His new theoretical models include mating designs and extension of triple test cross to various families, modification of diallel analysis for factorial designs and new tests of epistasis for single tester analysis, extension of varietal adaptation analysis to multivariate and weighted regression, incomplete data sets and for detection of cross-over interactions. He has proposed the technique of matromorph for obtaining instant inbred lines and limited gene transfer. He has developed new models for the assessment of induced variation in pure-breeding and segregating populations. He has elucidated cytoplasmic-nuclear interactions and has to his credit five varieties and 14 new male sterile lines in pearl millet.