

**SAHA INSTITUTE OF NUCLEAR PHYSICS
ALUMNI ASSOCIATION**

cordially invites you to

3rd

M.K. Pal Memorial Lecture

on

Sprints & Hops:

The Global Journey of a Mutant SARS-CoV-2 Coronavirus

by

Prof. Partha P. Majumdar

Distinguished Professor

National Institute of Biomedical Genomics, Kalyani

Emeritus Professor

Indian Statistical Institute, Kalyani

Programme

Welcome Address

Prof. Polash Banerjee (Secretary, SINPAA)

Address

Prof. Sudeb Bhattacharya (President, SINPAA)

Address by Guest of Honour

Prof. Gautam Bhattacharyya (Director, SINP)

M K Pal Memorial Lecture

Prof. Partha P. Majumdar

Presentation of Memento

Vote of Thanks

Prof. Sandip Sarkar (Treasurer, SINPAA)

**March 20, 2021 at 5 p.m.
(to be held online)**

Sprints and Hops:

The Global Journey of a Mutant SARS-CoV-2 Coronavirus

SARS-CoV-2 was first reported from China. Within three months, it evolved to 10 additional subtypes. Two evolved subtypes (A2 and A2a) carry a non-synonymous Spike protein mutation (D614G). We conducted phylodynamic analysis of over 70,000 SARS-CoV-2 coronavirus sequences worldwide, and found that the mutant subtype (614G) outcompeted the pre-existing type (614D), significantly faster in Europe and North-America than in East Asia. We identified a novel neutrophil elastase (ELANE) cleavage site introduced in the G-mutant, near the S1-S2 junction of the Spike protein. We hypothesised that elevation of neutrophil elastase level at the site of infection will enhance the activation of Spike protein thus facilitating host cell entry for 614G, but not the 614D, subtype. The level of neutrophil elastase in the lung is modulated by its inhibitor α 1-antitrypsin (AAT). AAT prevents lung tissue damage by elastase. However, many individuals exhibit genotype-dependent deficiency of AAT. AAT deficiency eases host-cell entry of the 614G virus, by retarding inhibition of neutrophil elastase and consequently enhancing activation of the Spike protein. AAT deficiency is highly prevalent in European and North-American populations, but much less so in East Asia. Therefore, the 614G subtype is able to infect and spread more easily in populations of the former regions than in the latter region. Our analyses has provided a molecular biological and evolutionary model for the observed differential spread of the 614G subtype, than the original 614D subtype.



Born 26 October, 1932; Died 3 March, 2016

Prof. Manoj Kumar Pal was a distinguished nuclear physicist of our times. A profound thinker, he played a pioneering role in the growth of theoretical nuclear physics in India. His main contribution lies in the decisive role played by him in bridging the apparently disparate nuclear models, the collective and the shell model in the Brueckner-Bethe-Hartree-Fock approach. He contributed extensively to the microscopic understanding of the nucleonic behavior in the nucleus and their correlations, core-polarization and pairing vibrations in degenerate nuclear systems, finding the fission path from study of the collective potential energy of transitional nuclei and development of the adiabatic time-dependent Hartree-Fock theory. A brilliant teacher and an exceptional mentor to research students, Prof. Pal along with his colleagues built one of the finest schools of theoretical nuclear physics in India in his long academic journey. That is his permanent legacy.

Prof. Pal was the Director of the Saha Institute of Nuclear Physics from 1983 till his retirement in 1992. He was a fellow of the Indian National Science Academy, Delhi and fellow of the Indian Academy of Science, Bangalore. He was recipient of M. N. Saha Gold Medal from the Asiatic Society, Kolkata. He wrote books on both the Special and General Theory of Relativity and an advanced textbook titled *Theory of Nuclear Structure* which is widely used by practitioners of nuclear physics worldwide. An erudite scholar in many disciplines, he published a historical novel titled *Forever Free* and a book entitled *Old Wisdom and New Horizon* on science, religion and philosophy.



Prof. Partha P. Majumder is a distinguished scientist in the field of Human Genetics and its different branches. He has made significant contributions to human genetics and evolution using statistical, molecular genetics and anthropological methods. He has devised innovative paradigms and statistical methods for solving biological problems related to modes of inheritance of complex human traits and mapping genes underlying such traits. He applied these methods to data on various common disorders and their quantitative precursor states that has led to a clear understanding of the genetic bases of such disorders. He was one of the early human geneticists to recognize the importance of studying genetic structures of ethnic populations using molecular genetics tools in order to discover genes conferring susceptibilities to various common diseases. This viewpoint has been widely accepted and in fact, the current efforts for the study of common diseases have moved from the confinements of laboratories to villages of population isolates. His work on genetic diversity of ethnic Indian populations has led to a clear reconstruction of the processes of peopling of the Indian subcontinent. This has had major impacts on the design of studies for mapping disease genes. Since degree courses in human genetics are hardly available in Indian universities, he has immensely contributed to capacity-building in human and statistical genetics in India by sustained organization of workshops, summer and winter schools. He has also initiated several elaborate academic programmes in his Institute.

Professor Majumder founded the National Institute of Biomedical Genomics of which he is currently a Distinguished Professor. He is an Emeritus Professor at the Indian Statistical Institute, Sir J.C. Bose National Fellow and selected as a National Science Chair. He is an elected Fellow of all three science academies of India, the West Bengal Academy of Science and Technology (WAST), The World Academy of Sciences (TWAS) and the International Statistical Institute. He is currently the President of the Indian Academy of Sciences and the WAST. He has won the TWAS Biology Prize, Golden Jubilee Commemoration Medal of the INSA, G.D. Birla Award for Scientific Research, Ranbaxy Research Award in Applied Medical Sciences and the New Millennium Science Medal, Government of India.