CURRICULUM VITAE

Name : Ananta Kumar Ghosh

Designation : Professor

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Date of Birth : January 14, 1957

Sex : Male

Nationality : Indian

Education (academic training):

Sl.. No.	Institution	Discipline	Degree	Year	Class
01	Calcutta University	Biochemistry	Ph.D.	1987	
02	Calcutta University	Physiology with specialization in Microbiology and Immunology	M. Sc.	1978	Ist
03	Calcutta University	Physiology (Hons), Chemistry, Zoology	B. Sc.	1976	Ist
04	W.B.B.H.S.E	Science	Higher Secondary	1973	2nd

Award

a) National merit scholarship from Government of India 1976-1978
b) Junior Research Fellowship from CSIR, Government of India, 1981-1982
c) Senior Research Fellowship from CSIR, Government of India, 1983-1985.

Member in Professional society

a) Indian Science Congress
b) Biotechnological Association in India
c) Physiological society of India

Area of research interest and Teaching:

Molecular virology, Seribiotechnology, Hybridoma technology, Cell and Molecular Biology, Recombinant DNA Technology, Gene expression, Antimicrobial proteins and peptides

Research and teaching experience in various institutions

a) Junior Research fellow, CSIR, Govt. of India, in the Indian Institute of Chemical Biology**,** Calcutta, 1981-82.

b) Senior Research fellow, CSIR, Govt. of India, in the Indian Institute of Chemical Biology, Calcutta, 1983-1985.

c) Post Doctoral Fellow in the Department of Pathology, University of Southern California School of Medicine, Los Angeles, California, USA, 1985-1989.

d) Post doctoral fellow in the Department, of Cancer Biology, Harvard University School of Public Health, Boston, USA 1989.

e) Research Associate in the Department of Microbiology and Immunology, Stanford University, School of Medicine, Stanford, California, USA, 1989-1993.

f) Assistant Professor of Research Pathology in the Department of Pathology, University of Southern California School of Medicine, Los Angeles, California, USA 1993-1995.

g) Assistant Professor in the Biotechnology Centre, Indian Institute of Technology, Kharagpur, West Bengal, India, 1995 – 1997.

h) Associate Professor in the Biotechnology Department, Indian Institute of Technology, Kharagpur, West Bengal, India, 1998-2002.

i) Professor in the Biotechnology Department, Indian Institute of Technology, Kharagpur, West Bengal, India, 2003-Present.

j) Visiting Scientist in the Department of Microbiology, University of Washington at Seattle, USA, May-July (1997 - 2001, 2003 - 2006).

Publications (Numbers only)**:**

Research papers in referred journals: **69**
Book chapter-**One**
Abstracts presented in scientific meetings: **36**
Patent filed: **1**

List of Publications

1. **Ghosh, A.K.,** Rakshit**,** M.M. and Ghosh D.K. 1983. Effect of berberine chloride on *Leishmania donovani*. Indian Journal of Medical Research, **78:** 407-416**.**
2. **Ghosh, A.K.,** Bhattacharya, F.K. and Ghosh, D.K. 1985. *Leishmania donovani* : Amastigote inhibition and mode of action of berberine. Experimental Parasitology**,** **60**: 404 – 413.
3. Soe. L.H., **Ghosh, A.K.,** Maxon, R.E., Hoover, E.A., Hardy Jr. W.D., and Roy-Burman, P. 1986. Nucleotide sequence of the 1.2–kb 3' region and genotype distribution of two common c-myc alleles of the domestic cat. Gene, **47**: 185-192.
4. **Ghosh A. K**. and Ghosh, D.K. 1987. Infection pattern of leishmaniasis in hamsters produced by recent isolates from kala-azar patients in India. Indian Journal of Medical Research, **85:** 14-19.
5. Mahato, S.B., Pal, B.C., Khar, S., **Ghosh, A.K.,** Mukherjee, K. and Ghosh, D.K. 1987. Ureastibamine : An improved method of preparation and its antileishmanial activity. Biochemical Medicine and Metabolic Biology, **38:** 47-56.
6. Spodick, D.A., **Ghosh, A.K**. Parimoo, S., and Roy-Burman, P. 1988. The long terminal repeat of feline endogenous RD-14 retroviral DNAs: analysis of transcription regulatory activity and nucleotide sequence. Virus Research**, 9**: 263-283.
7. Berry, B.T., **Ghosh, A.K.,** Kumar, V.D., Spodick, D.A. and Roy-Burman, P. 1988. Structure and function of endogenous feline leukemia virus long terminal repeats and adjoining regions. Journals of Virology, **62:** 3631-3641.
8. **Ghosh, A.K.** and Roy-Burman, P. 1989. Characterization of enhancer elements and their mutation in the long terminal repeats of feline endogenous RD-114 proviruses. Journal of Virology, **63:** 4234-4241.
9. **Ghosh. A.K**., Mukherkee, K. and Ghosh, D.K. 1990. Effect of ureastibamine on *Leishmania donovani* amastigotes. Indian Journal of Medical Research, **91:** 208-213.
10. Pandey, R., **Ghosh, A.K.,** Kumar, D.V., Bachman, B.A., Shibata, D. and Roy-Burman, P. 1991. Recombination between feline leukemia virus subgroup B or C and endogenous *env* elements alters the in vitro biological activities of the viruses. Journal of Virology, **65:** 6495-6508.
11. **Ghosh, A. K.,** Bachmann, M.H., Hoover, E.A. and Mullins, J.I. 1992. Identification of a putative receptor for subgroup a feline leukemia virus on feline T-cells. Journal of Virology, **66:** 3707-3714.
12. Reinhart, T.A., **Ghosh. A.K.,** Hoover, E.A. and Mullins, J.I. 1993. Distinct superinfection interference properties yet similar receptor utilization by cytopathic and noncytopathic feline leukemia viruses. Journal of Virology, **67:** 5153-5163.
13. Mirachandani, D., Zheng, J., Miller, G.J., **Ghosh, A.K.,** Shibata, D. K., Cote, R. J. and Roy-Burman P. 1995. Heterogeneity in intratumor distribution of p53 mutations in human prostate cancer. American Journal of pathology, **147:** 92-101.
14. **Ghosh, A.K.** and Mullins, J.I. 1995. cDNA encoding a functional feline liver / bone kidney-type alkaline phosphatase. Archieves of Biochemistry and Biophysics, **322:** 240-249.

15. Pandey, R., Bechtel, M. K., Su, U., **Ghosh, A.K.,** Hay, K. A., Mathes, L.E. and Roy-Burman, P. 1995. Feline leukemia virus variants experimentally induced thymic lymphosarcmas. Virology 214**:** 584-592.
16. **Ghosh, A.K.,** Shankar, D.B., Shakleford, G.M., Miller, G. J., Zheng, J. MacArther, C.A., and Roy-Burman, P. 1996. Molecular cloning and characterization of human FGF-8 alternative messenger RNA forms. Cell Growth and Differentiation. **7:** 1425-1434.
17. Rudra Ganguly, N., **Ghosh, A.K.,** and Roy-Burman, P.1998. Retrovirus receptor PiT-1 in the *Felis catus.* Biochemica et Biophysica Acta. **1443:** 407-413.
18. Qanungo, K.R., Kundu, S.C., and **Ghosh, A.K.** 2000. Characterization of cytoplasmic polyhedrosis virus infecting tropical and temperate Indian saturniidae silkworms. Acta Virologica. **44:** 349-357.
19. Datta, A., **Ghosh, A.K.,** and Kundu, S. C. 2001. Purification and characterization of fibroin from the tropical saturniid silkworm, *Antheraea mylitta*. Insect Biochemistry and Molecular Biology, **31:** 1013-1018.
20. Datta, A., **Ghosh, A.K.,** and Kundu, S. C. 2001.Differential expression of fibroin gene in developmental stages of saturniid silkworm, *Antheraea mylitta*. Comparative Biochemistry and Physiology, **129:** 197-204.
21. Qanungo, K.R., Kundu, S.C., Mullins J.I and **Ghosh, A.K.** 2002. Molecular cloning and characterization of *Antheraea mylitta* cytoplasmic polyhedrosis virus genome segment 9. Journal of General Virology, **83:** 1483-1491.
22. Mishra, J., Kumar, N., **Ghosh, A.K** and Das, D. 2002. Isolation and molecular cheracterization of hydrogenase gene from a high rate of hydrogen-producing bacterial strain *Enterobacter cloacae* IIT-BT 08. International Journal of Hydrogen Energy, **27:** 1475-1479.
23. Shrivastava, B. and **Ghosh, A. K**. 2003. Protein purification, cDNA cloning and characterization of a novel protease inhibitor from the Indian tasar silkworm, *Antheraea mylitta*. Insect Biochemistry and Molecular Biology, **33:** 1025-1033.
24. Mishra, J., Khurana, S., Kumar, N., **Ghosh, A. K.** and Das, D. (2004). Molecular cloning, characterization and over expression of a novel [Fe]-hydrogenase isolated from a high rate hydrogen producing *Enterobactor clocae* IIT BT-08. Biochemical and Biophysical Research Communication. **324**: 679-685.
25. Sinha-Datta, U., Venkata Ramana Murthy Chavali, and **Ghosh, A.K.** 2005. Molecular cloning and characterization of *Antheraea mylitta* cytoplasmic polyhedrosis virus polyhedrin gene and its variant forms. Biochemical and Biophysical Research Communication. **332**:710-718.
26. **Ghosh, A.K.**, Datta A., Mahendran, B. and Kundu, S.C. 2005. Molecular characterization of a *Pao*-like long terminal repeat retrotransposon, *Tamy*, in Saturniid silkworm, *Antheraea mylitta*. Current Science, **89**: 539-543.
27. Roy, S., Arvind, P., Madhurantakam, C., **Ghosh, A.K.,** Sankaranarayanan, R.., and Das, A.K. 2006. Crystallization and preliminary X-ray diffraction analysis of a protease inhibitor from the haemolymph of the Indian tasar silkworm *Antheraea mylitta.* Acta crystallographica, **F62,** 669-671.
28. Chavali V.R.M. and **Ghosh A. K**. 2007**.** Molecular cloning, sequence analysis and expression of genome segment 7 (S7) of *Antheraea mylitta* cypovirus (AmCPV) that encodes a viral structural protein. Virus Genes, **35**, 433-441.

29. Jangam, S.R., Chakrabarti, M and **Ghosh A.K**. 2007. Molecular cloning, expression and analysis of *Antheraea mylitta* cypovirus genome segments 8 and 11. International Journal of Virology. **3,** 60-72.
30. Mandal, S.M., Pati, B.R., **Ghosh. A.K**. and Das, A.K. 2007. Influence of experimental parameters on identification of whole cell Rhizobium by MALDI TOF Mass Spectrometry. European Journal of Mass Spectrometry. **13,** 165-171.
31. Shrivastava, R., **Ghosh, A.K**. and Das, A.K. 2007. Probing the nucleotide binding and phosphorylation by the histidine kinase of a novel three-protein two-component system from *Mycobacterium tuberculosis*. FEBS Letters. **581,** 1903-1909.
32. Liu, Y., McNevin, J., Zhao, H., Tebit, D.M., Troyer, R.M., McSweyn, M., **Ghosh, A.K**., Shriner, D., Arts E.J., McElrath, M.J., and Mullins J.I. (2007). Evolution of human immunodeficiency virus type 1 cytotoxic T-lymphocyte epitopes: fitness-balanced escape. Journal of Virology. **81,** 12179-12188.
33. Mnadal, S.M., De, D., Roy, S.K., **Ghosh, A.K**., Ram, S. and Das A.K. (2007). Lanthanum-calcium-manganate (La(0.67)Ca(0.33)MnO(3)) nanoparticle assistaed affinity probes for MALDI MS analysis of proteins. European Journal of Mass Spectrometry. **13,** 359-365**.**
34. Potula H.H.Surya Kumar., Kathuria, S. R., **Ghosh A.K.,** Maiti, T.K. and Dey S. 2008. Transient expression, purification and characterization of bioactive human fibroblast growth factor 8B in tobacco plants. Transgenic Research. **17,** 19-32.
35. Mandal, S.M., Pati, B.R., Das, A.K. and **Ghosh A.K.** (2008). Characterization of a symbiotically effective Rhizobium resistant to arsenic: isolated from the root nodules of *Vigna munga* (L.) Hepper grown in arsenic contaminated field. Journal of General and Applied Microbiology. 54, 93-99.
36. Liu, Y., Curlin, M.E., Diem, K., Zhao, H., **Ghosh, A.K.,** Zhu, H., Maenza, J., Woodward, A.S., Stevens, C., Stekler, J., Collier, A.C., Genowati, I., Deng, W., Zioni, R., Corey, L., Zhu, T. and Mullins J.I. (2008) Env length and N-linked glycosylation following transmission of Human immunodeficiency virus type1 subtype b viruses. Virology, 374, 229-233.
37. Chavali, V.R.M., Madhurantakam, C., Ghorai, S., Roy, S., Das, A. K., and **Ghosh, A.K.** (2008). Genome segment 6 of *Antheraea mylitta* cypovirus encodes a structural protein with ATPase activity. Virology, 377, 7-18.
38. Mandal, S. M., **Ghosh A. K**., Pati, B. R. and Das A. K. (2009) Detection of trivalent arsenic [AsIII] complex with DNA: a spectroscopic investigation. Toxicological and Environmental Chemistry. 91, 219-224.
39. Mandal S. M., **Ghosh A. K.** and Mandal, M. (2009). Iron oxide nanoparticle assisted purification and mass spectrometry based proteolytic mapping of intact CD4+ T cells from human blood. Preparative Biochemistry and Biotechnology 39, 1-12.
40. Shrivastava, R., **Ghosh, A.K**. and Das, A.K. (2009). Intra-and inter-molecular domain interactions among novel two-component system proteins coded by Rv0600c, Rv0601c and Rv0602c of *Mycobacterium tuberculosis*. Microbiology, 155, 772-779.
41. Mandal, S. M., Mandal, M., Das, A., Pati, B., **Ghosh, A. K.** (2009). Stimulation of indoleacetic acid production in a Rhizobium isolate of *Vigna mungo* by root nodule phenolic acids. Archives of Microbiology. 191, 389-393.

42. Roy, S., Arvind, P., Madhurantakam, C., **Ghosh, A.K.,** Sankaranarayanan, R. and Das, A. K. (2009). Crystal structure of a fungal protease inhibitor from *Antheraea mylitta*. Journal of Structural Biology, 166, 79-87.
43. Mandal, S. M., Mandal, M., Pati, B. R., Das, A. K. and **Ghosh A. K.** (2009). Proteomics view of a Rhizobium isolate response to arsenite (As III) stress). Acta Microbiol Immunol Hung 56, 157-167.
44. Mandal, S. M., Mandal, M., **Ghosh A. K.** and Dey, S. (2009). Rapid determination of vitamin B2 and B12 in human urine by isocratic liquid chromatography. Anal. Chim. Acta. **640,** 110-113.
45. Mukherjee S., Maity S., Roy,S., Ghorai, S., Chakraborty, M., Agarwal, R., Dutta, D., **Ghosh, A. K.** and Das, A. K. (2009) Cloning, overexpression, purification, crystallization and preliminary X-ray diffraction analysis of glyceraldehyde-3-phosphate dehydrogenase from *Antheraea mylitta*. Acta crystallographica, Section F 65, 937-940.
46. Bhattacharyya, S., Dutta,D., **Ghosh, A. K.** and Das A. K. (2009). Cloning, overexpression, purification, crystallization and preliminary X-ray diffraction analysis of an atypical two-cysteine peroxiredoxin (SAOUHSC_01822) from *Staphylococcus aureus* NCTC 8325. Acta crystallographica, Section F 65, 1113-1115.
47. Maity, S., Goel, S.I., Roy, S., Ghorai,S., Bhattacharyya, S., Venugopalan, A. and **Ghosh, A. K.** (2010). Analysis of transcripts expressed in one day old larvae and fifth instar silk glands of tasar silkworm, *Antheraea mylitta*. Comparative and Functional Genomics, 246738. Epub May 4.
48. Ghorai, S., Chakrabarti, M., Roy, S., Chavali V. R. M., Bagchi, A., and **Ghosh A. K**. (2010) Molecular characterization of genome segment 2 encoding RNA dependent RNA polymerase of *Antheraea mylitta* cytoplasmic polyhedrosis virus. Virology, 404, 21-31.
49. Chakrabarti, M., Ghorai, S., Mani, S.K.K. and **Ghosh A.K.** (2010) Molecular characterization of genome segments 1 and 3 encoding two capsid proteins of *Antheraea mylitta* cytoplasmic polyhedrosis virus. Virology Journal, 7:181-192.
50. Bhattacharyya, S., Dutta, A. K., **Ghosh A. K.,** and Das A.K. (2011).Cloning, overexpression, purification, crystallization and preliminary X-ray diffraction analysis of an inositol monophosphatase family protein (SAS2203) from Staphylococcus aureus MSSA476. ***Acta Cryst*** F67**:** 471-474**.**
51. Mandal, S Migliolo L, Franco OL, and **Ghosh A. K.** (2011) Identification of an antifungal peptide from *Trapa natans* fruits with inhibitory effects on *Candida tropicalis* biofilm formation. Peptides, 32: 1741-1747.
52. Bhattacharyya, S., Dutta D., Saha, B., **Ghosh A. K.** and Das A. K. (2012). Crystal structure of Staphylococcal dual specific inositol monophosphatase/NADPH9H) phosphatase (SAS2203) delineates the molecular basis of substrate specificity. Biochimie, 94: 879-890.
53. Kundu, S.C., Kundu, B., Talukdar, S., Bano, S., Nayak, S., Kundu, J., Mandal, B.B., Bharadwaj. N., Botlagunta, M., Das, B. C., Acharya, C., and **Ghosh A. K.** (2012). Non-mulberry silk biopolymers. Biopolymer, 97: 455-467.
54. Dutta, S. R., Kar, P.K., Srivastava, A. K., Sinha, M. K., Shankar, J. and **Ghosh, A. K**. (2012). Identification of RAPD and SCAR markers associated with yield

components of Indian tropical tasar silkworm *Antheraea mylitta* Drury. Genetics and Molecular Biology, 35: 743-751.

55. Roy, S., Ravipati, V. R., Ghorai, S., Chakrabarti, M., Das, A. K. and **Ghosh, A. K.** (2012) Kinetic analysis, expression pattern and production of a recombinant fungal protease inhibitor of tasar silkworm *Antheraea mylitta.* Applied Biochemistry and Biotechnology, 168: 1076-1085.
56. Mandal, S. M., Porto, W.F., Dey, P., Maiti, M. K., **Ghosh, A. K**. and Franco, O.L. (2013). The attack of the phytopathogens and the trumpt solo: Identification of a novel plant antifungal peptide with distinct fold and disulfide bond pattern. Biochimie, 95:1939-1948.
57. Mandal, S.M., Porto, W.F., De, D., Pule, A., Korpole, S., **Ghosh, A. K**., Roy, S.K. and Franco, O.L. (2013) Screening of serine protease inhibitors with antimicrobial activity using iron oxide nanoparticles functionalyzed with dextran conjugated trypsinized in silico analyses of bacterial serine protease inhibition. Analyst, 139: 464-472.
58. Hatial. I., Addy, P.S., **Ghosh, A.K.** and Basak, A. (2013). Synthesis of highly efficient pH sensitive DNA cleaving aminomethyl N-substituted cyclic enediyne and its L-lysine conjugate. Tetrahedron Letters. 54, 854-857.
59. Hatial, I., Jana, S., Bisai, S., Das, M., **Ghosh, A.K.,** Anoop, A. and Basak, A. (2014). Trienediynes on a 1,3,5-trisubstituted benzene template: a new approach for anhancement of reactivity. Royal Society of Chemistry Advances, 4, 28041-28045.
60. Mukhopadhyay, S.K., Chatterjee, S., Das, S.S., Gouri, S.S., Mishra, A., Patra, M., **Ghosh, A. K**., Das, A. K., Singh, S. M. and Dey, S. (2014). Isolation and characterization of extracellular polysaccharide Thelebolan produced by a newly isolated psychrophilic Antartic fungus Thelobolus. Carbohydrtae Polymers. 104, 204-212.
61. Khanna, N., **Ghosh, A.K.,** Huntemann, M., Despande, S., Han, J., Chen, A., Kyrpides, N., Mavrommatis, K., Szeto, E., Markonitz, V., Ivanova, N., Pusani, I., Pati, A., Pitluck, S., Volan, M., Woyke,T., Teshima, H., Chertkov, O., Daligault, H., Devenport, K., Gu, W., Munk, C., Zhang, X., Bruce, D., Detter, C., Xu, Y., Quintana, B., Reitenga, K., Kunde, Y., Green, L., Erkkila, T., Han, C., Brambilla, E-M., Lang, E., Klenk, H-p., Goodwin, L., Chain, P., and Das, D. (2014). Complete genome sequence of *Enterobavter* Sp. IIT-BT 08: A potential microbial strain for high rate hydrogen production. Standard in Genome Science, 9: 359-369.
62. Biswas P., Kundu, A and **Ghosh A.K** (2014). Genome segment 5 of *Antheraea mylitta* cytoplasmic polyhedrosis virus encodes a bona fide guanylyltransferase. Virology Journal. 11: 1-13.
63. Mandal, S.M., Bharti, R., Porto, W.F., Gauri, S.S., Mandal, M., Franco, O.L., and **Ghosh, A.K.** (2014).Identification of multifunctional peptides from human milk. Peptides, 56: 84-93.
64. Biswas, P., Kundu, A. and **Ghosh A.K.** (2015). Genome segment 4 of *Antheraea mylitta* cytoplasmic polyhedrosis virus encodes RNA triphosphatase and methyltransferase. Journal of General Virology, 96: 95-105.
65. Basak, A., Hatial, I., Das, J. and **Ghosh, A.K.** (2015) Base induced cyclization of propargyl alkenyl sulphones: A high yielding synthesis of 4,5-disubstituted 2H-thiopyran 1,1-dioxides. European Journal of Organic Chemistry. (In Press).

66. Kundu, A., Dutta, A. Biswas, P., Das, A.K., **Ghosh, A. K.** (2015). Functional insights from molecular modeling, docking and dynamics study of a cypoviral RNA dependent RNA polymerase. Journal of Molecular Graphics and Modelling, 61: 160-174.
67. Mandal, S., **Ghosh, A.K.** and Pati, B.R. (2015). Dissemination of antibiotic resistance in MRSA and VRSA strains isolated from hospital effluents. Americal Journal of Infection control, 43: e87-e88.
68. Bhattacharyya, S., Dutta, A., Dutta, D., **Ghosh, A.K.** and Das, A. K. (2016). Structural elucidation of NADP(H) phosphatase activity of staphylococcal dual specific IMPase/NADP(H) phosphatase. Acta Crystallographica Section D22, 281-290.
69. Mandal, S., **Ghosh, A.K.** Pal, D. (2016) Induction of nodD gene in a betarhizobium isolate, Cupriavidus sp of Mimosa pudica by root nodule phenolic acids. Current Microbiology. (In Press).

Book Chapter:

1. Naskar, D., Barua, R.R., **Ghosh, A.K.** and Kundu, S.C. (2014) Introduction to silk biomaterials. In: Silk biomaterials for tissue engineering and regenerative medicine (SC Kundu, eds.) Woodhead Publishing, Cambridge, United Kingdom (2014) 1st edition, pp. 1-40.

Abstracts presented in meeting / conference / symposium

1. **Ghosh, A.K**. and Ghosh, D.K. Effect of berberine chloride on *Leishmania donovani*. Presented in the annual meeting of Society of Biological Chemists held at Chandigarh, India, 1982.
2. **Ghosh, A.K.** and Ghosh, D.K. mode of action of berberine chloride on *Leishmani*a *donovani*. Presented in the annual meeting of Society of Biological Chemists held at Pune, India, 1983.
3. **Ghosh, A.K**. and Ghosh, D.K. Effect of Ureastibamine on *Leishmania donovani*. Presented in the annual meeting of Indian Association of Microbiologists held at Calcutta, India, 1983.
4. **Ghosh, A.K.,** Maity, M.M. and Ghosh, D.K. Intercalation of berberine chloride with *Leishmania donovani* promastigote DNA. International Symposium on Biomolecular Structure and Interaction held at Indian Institute of Science, Bangalore, India, 1984.
5. Spodick, D.A., **Ghosh, A.K**. Parimoo, S. and Roy-Burman, P. variability within U3 sequences of endogenous feline RD-114 LTRs. Presented in the RNA Tumor Virus Meeting held at Cold Spring Harbor Laboratory, New York, on May 19-24, 1987, p.203.
6. Roy-Burman, P., Spodick, D.A., **Ghosh, A.K.** and Parimoo, S. Transcription regulatory elements of the feline endogenous RD-114 provirus loci. Presented in the XIIIth. International Symposium for Comparative Research on Leukemia and related

Disease. (Satellite Conference on Feline retrovirus), Eilat, Israel, on November 14-17, 1987, p.8.

7. Pandey, R., **Ghosh, A.K.,** Kumar, D.V., Bachman, B. A. and Roy-Burman, P. Biological activities of chimeric FeLVs containing endogenous env specific sequences. Presented in the RNA Tumor Virus Meeting held at Cold Spring Harbor laboratory, New York, on May 21-26, 1991, p.31.
8. **Ghosh, A.K.,** Hoover, E. A. and Mullins, J.I. Characterization of a feline leukemia virus receptor. Presented in the RNA Tumor Virus Meeting held at Cold Spring Harbor laboratory, New York, on May 21-26, 1991, p.2.
9. **Ghosh, A.K.,** Shibata, D., Millar, G.J. and Roy-Burman P. Studies of mutations in prostate cancer. Presented in the annual meeting of the American Association for cancer research held in San Francisco, on April 10-13, 1994.
10. **Ghosh, A.K.** Molecular cloning and characterization of human FGF-8. Presented in the 8th annual conference of the Physiological Society of India held at Vidyasager University, Midnapore, India on December 6-8, 1996.
11. Srivastava, B. and **Ghosh, A.K.** Characterization of protease inhibitor from tasar silkworm, *Antheraea mylitta*. Presented in the third international Conference on Wild Silkmoths held at Bhubaneshwar on November 11-14, 1998.
12. Qanungo, K.R., Kundu, S.C. and **Ghosh, A.K**. virus infecting tropical non-mulberry silkworm *Antheraea mylitta*. Presented in the third international conference on Wild Silkmoths held at Bhubaneshwar on November 11-14, 1998.
13. Datta, A., Gupta, S., **Ghosh, A.K.** and Kundu, S.C. An approach towards cloning of fibroin protein from tasar silkworm, *Antheraea mylitta*. Presented in the third international conference on Wild Silkmoths held at Bhubaneshwar on November 11-14, 1998.
14. Qanungo, K.R., **Ghosh, A.K.** and Kundu, S.C. The virus causing grasserie disease in *Antheraea mylitta* and *Antheraea proylei* is a type IV cytoplasmic polyhedrosis virus. Presented in the 2nd Virology Symposium held at International Centre for Genetic Engineering and Biotechnology, New Delhi on November 9-11, 1998.
15. Datta, A., Gupta, S., **Ghosh, A.K.,** Qanungo, K.R and Kundu, S.C Molecular characterization of fibroin protein from tasar silkworm, *Antheraea mylitta*. Presented in the 18th International Congress of Genetics held at Beijing, China on August 10-15, 1998.
16. Qanungo, K.R, **Ghosh A.K.,** Sinha, U., Srivastava, B and Kundu, S.C. Electron microscopy and molecular characterization of cytoplasmic polyhedrosis virus from tasar silkworm *Antheraea mylitta*. Presented in the 18th International Congress of Genetics held at Beijing, China on August 10-15, 1998.
17. Qanungo, K.R., Kundu, S.C. and **Ghosh, A.K.** Expression of a novel RNA binding protein of a type IV cytoplasmic polyhedrosis virus in prokaryotic and eukaryotic systems. Presented in the Annual meeting of the Society of Biological Chemists held at Calcutta on December 7-9, 2000.
18. **Ghosh, A.K.** Qanungo, K.R. and Kundu, S.C. Molecular analysis of *Antheraea mylitta* cytoplasmic polyhedrosis virus genome. Presented in the 88th session of the Indian Science Congress held at New Delhi on January 4-7, 2001.
19. Sinha U., Kundu, S.C. and **Ghosh, A.K**. Cloning, sequencing and expression of polyhedrin from cytoplasmic polyhedrosis virus infecting Indian saturniidae

silkworms. Presented in the first conference of Biotechnology Society of India held at V. P. Chest Institute, New Delhi, on October 4-6, 2001.

20. Kundu, S.C., Saha, M., Qanungo, K.R., Datta, A., Sinha, U., Padhi, B.K., Mahendran, B., Murthy, Ch.V.R., Ghosh, S.K. and **Ghosh, A.K**. Indian tropical wild tasar silkworm (*Antheraea mylitta*): Molecular Characterization of ecoraces, fibroin protein and cypovirus. Presented in the Fourth International Conference on 'Wild Silkmoths' held at Jogja Expo Center, Yogyakarta, Indonesia on April 23-27, 2002.

21. Shrivastava, B., Ghosh S and **Ghosh A. K**. Purification of a protease inhibitor from Indian tasar silkworm, *Antheraea mylitta*. Presented in the National seminar and workshop on Advanced Separation Processes held at IIT, Kharagpur, on July 30-August 3, 2002.

22. Chavali, V. R. Murthy., Das, A. K., and **Ghosh, A. K.** Molecular analysis of genome segments 6 and 7 of cypovirus infecting Indian tasar silkworm, *Antheraea mylitta*. Presented in the Second National Conference of Biotechnology Society of India- "Biotech 2004" held at Institute of Genomics and Integrative Biology, New Delhi on October 13-15, 2004.

23. Shrivastava, Rashmi, Hazra, Sougata, **Ghosh, A. K.** and Das, A. K. Insight into structure and interactions of two component signal transduction proteins of Mycobacterium tuberculosis. Presented in the Second National Conference of Biotechnology Society of India- "Biotech 2004" held at Institute of Genomics and Integrative Biology, New Delhi on October 13-15, 2004.

24. V.R Murthy Chavali, Das A. K., and **Ghosh, A.K.** Genome segments 6 and 7 of *Antheraea mylitta* cypovirus encode viral structural protein. Presented in the third National conference of Biotechnology Society of India, held at JNU New Delhi on December 22-24, 2005.

25. Ghosh, A.K., Bhattacharya, S., Maity, S. and Goel S. Generation and analysis of expressed sequences from non-mulberry silkworm, *Antheraea mylitta*. Presented in the International symposium on insect Genetics and Genomics, held in the Centre for DNA Fingerprinting and Diagnostics, Hyderabad, India on January 9-11, 2006.

26. Ghosh, A.K., Chavali, V. R. Murthy., Jangam, S., and Chakraborty, M . Molecular analysis of cypovirus infecting Indian Tasar silkworm, *Antheraea mylitta.* Presented in the 9th dsRNA Virus Symposium, held in Cape Town, South Africa, October 21-26, 2006.

27. Mandal, S. M., Pati, B.R., and **Ghosh, A. K.** Isolation and Characterization of a symbiotically effective Rhizobium resistant to arsenic: Site of accumulation and mobilization. Presented at the 47th annual conference of Association of Microbiologists of India, held at Bhopal, India on December 6-8, 2006.

28. Mandal, S. M., Mondal, K. C., **Ghosh, A. K.** and Pati, B. R. Endogenous phenolic compounds are regulators of indoleacetic acid production by the symbiont of legume-Rhizobium symbiosis.. Presented in the 14 th congress of West Bengal Science and Technology held at Kolkata, India, on February 28-March 1, 2007.

29. Ghosh A. K. Molecular Analysis of cypovirus infecting tasar silkworm. Presented in the UGC sponsored national seminar on Current trends of researches in health and diseases held in Vidyasagar University, India, on March 30, 2009.

30. **Ghosh A. K.** Cypovirus infecting tasar silkworm: Molecular and functional analysis. Presented in the International conference on Bio Medical research held in KIIT University, Bhubameswar, India on November 13 –14, 2009.
31. Ghorai, S. and **Ghosh, A. K.** Molecular and functional characterization of *Antheraea mylitta* cypovirs RNA dependent RNA polymerase. Presented in the National symposium of the RNA group of India held at University of Pune, India, on January 18- 19, 2010.
32. Chakraborty, M., Ghorai, S. and **Ghosh A. K.** *Antheraea mylitta* cytoplasmic polyhedrosis virus: Analysis of capsid protein and RNA dependent RNA polymerase. Presented in the workshop on recent advances in sericulture research held at Bengaluru, India on May 18-19, 2010.
33. **Ghosh, A. K.** Molecular and functional analysis of *Antheraea mylitta* cytoplasmic polyhedrosis virus. Presented in the International conference on frontier in biological research held at Vidyasagar University, India on February 26-27, 2012.
34. Biswas, P. and **Ghosh A. K.** Molecular cloning and characterization of *Antheraea mylitta* cytoplasmic polyhedrosis virus genome segments 4 and 5. Presented in the 11th International symposium on double stranded RNA viruses held in San Juan, Puerto Roco, USA, November 27-December 01, 2012.
35. Kundu, A., Das, A. K. and **Ghosh, A. K.** Molecular medeling and structure analysis of *Antheraea mylitta* cytoplasmic polyhedrosis virus RNA dependent RNA polymerase. Presented in the 11th International symposium on double stranded RNA viruses held in San Juan, Puerto Roco, USA, November 27-December 01, 2012.
36. Kundu, A., Das, A. K. and **Ghosh, A. K.** Structural analysis and functional characterization of Antheraea mylitta cytoplasmic polyhedrosis virus RNA dependent RNA polymerase. Presented in the 4th Molecular Virology meeting held on Thiruvanantapuram, Kerala, India April 16-17, 2015.

Research guidance:

Guidance at postdoctoral level:	Guided two postdoctoral fellow
Guidance at doctoral level:	Guided twelve Ph.D. student's thesis and another ten are in progress**.**
Guidance at postgraduate level:	Guided twenty eight M. Tech student's thesis and another four are in progress.
Guidance at undergraduate level:	Guided twenty four B. Tech student's thesis and four are in progress

Sponsored R & D Projects undertaken :

Principal Investigator:

Completed

1. Biochemical and genetic analysis of subgroup A feline leukemia virus receptor. Sponsored by May-wright foundation, USA, from June 1994 to December 1995 for US dollar 40,000.
2. Characterization and cloning of feline leukemia virus subgroup B receptor. Sponsored by American Cancer Society, USA, from January 1995 to December 1995 for US dollar 12,500.
3. Molecular characterization of *Antheraea mylitta* nuclear polyhedrosis virus. Sponsored by Department of Biotechnology, Govt. of India, from March 1997 to September 2000, for Rs. 20.23 lakhs.
4. Cloning and characterization of feline leukemia virus receptor. Sponsored by Department of Science and Technology, Govt. of India, from October 1998 to February 2001, for Rs 12.26 lakhs.
5. Cloning, expression and immunological characterization of *Antheraea mylitta* cytoplasmic polyhedrosis virus polyhedrin. Sponsored by Department of Biotechnology, Govt. of India, from April 2001 to March 2004 for Rs. 20.19 lakhs.
6. Modernization of recombinant DNA technology laboratory. Sponsored by MHRD, Govt. of India from April 2003 to March 2004 for Rs. 10 lakhs.
7. Cloning, sequencing and expression of *Antheraea mylitta* cytoplasmic polyhedrosis virus RNA dependent RNA polymerase. Sponsored by MHRD, Govt. of India, from May 2003 to April 2005 for Rs 16.0 lakhs.
8. Molecular cloning and characterization of *Antheraea mylitta* cutoplasmic polyhedrosis virus genome segments 8 and 11. Sponsored by Council of Scientific and Industrial Research, Govt. of India from June 2003 to May 2006 for Rs. 11 Lakhs.
9. Cloning and analysis of expressed sequences from silk moths. Sponsored by Department of Biotechnology, Govt. of India, from August 2003 to July 2006 for Rs. 59 lakhs.
10. Optimization of the production of *Antheraea mylitta* cytoplasmic polyhedrosis virus anti-polyhedrin monoclonal antibody in bioreactor. Sponsored by MHRD, Govt. of India, from May 2005 to April 2007 for Rs. 12.0 lakhs.
11. Cloning and characterization of a fungal protease inhibitor from the hemolymph of tasar silkworm *Antheraea mylitta*. Sponsored by Indian Council of Medical Research, Govt. of India, from October 2005 to September 2008 for Rs 18 lakhs.
12. Molecular analysis of *Antheraea mylitta* cytoplasmic polyhedrosis virus genome segment 1 and 2. Sponsored by Department of Science and Technology, Govt. of India, from November 2006 to October 2009 for Rs. 19.90 lakhs
13. Molecular Analysis of genome segments 6 of *Antheraea mylitta* cypovirus . Sponsored by CSIR, Govt. of India from October 2008 to September 2011 for Rs. 14 lakhs.
14. Selection aided molecular marker system for improvement of tasar silkworm *Antheraea mylitta* drury sponsored by Central Silk Board, Ministry of Textiles, Govt, of India. January 2007 to March 2011 for 12.0 lakhs
15. Establishment and Characterization of cell lines from tasar silkworm, *Antheraea. mylitta.*. Sponsored by Department of Biotechnology, Govt. of India. from July 2009 to June 2011 for Rs. 25.58 lakhs.

16.Molecular cloning and characterization of *Antheraea mylitta* cytoplasmic polyhedrosis virus genome segments 4 and 5. Sponsored by CSIR Govt. of India from March 2012 to February 2015 for Rs. 27 lakhs

Ongoing:

1. Molecular and structural analysis of *Antheraea mylitta* cytoplasmic polyhedrosis virus RNA dependent RNA polymerase. Sponsored by DST, Govt. of India, from March 2013 to March 2016 for Rs. 39.70 lakhs
2. Isolation and characterization of antifungal peptides from muga silkworm *Antheraea assamensis* Helfer. Sponsored by DBT (under Twinning Programme for NE), Govt of India, From January, 2014 to December 2017. for Rs. 34.90 lakhs.
3. Development of sensitive diagnostic kit for the detection of pathogens in stored food grains. Sponsored by MHRD, from February 2014 to January 2017 for 112 lakhs.
4. Purification and characterization of anti-fungal peptides from the hemolumph of tasar silkworm *Antheraea mylitta*. Sponsored by ICMR, Govt. of India, From March 2015 to February 2018 for 23.70 lakhs.

Co-Principal investigator:

Completed

1. Biochemical and genetic analysis of fibroin from Tasar silkworm *Antheraea mylitta*. Sponsored by Department of Biotechnology, Govt. of India, from March 1997 to September 2000, for Rs. 14.26 lakhs.
2. Molecular genetics of tropical tasar silkworm *Antheraea mylitta.* Sponsored by Department of Biotechnology, Govt. of India, from August 1999 to July 2002, for Rs. 22.35 lakhs.
3. Production of hydrogen as a cleaner fuel through waste recycling. Sponsored by Department of Biotechnology. Govt. of India, from September 1999 to August 2002, for Rs. 21.65 lakhs.
4. Cloning and characterization of fibroin gene of Indian tasar silkworm (*Antheraea mylitta)*. Sponsored by Department of Biotechnology, Govt. of India, from March 2002 to February 2005, for Rs. 17.55 lakhs.
5. Improvement of hydrogen production by over expression of hydrogenase producing gene of high yielding strain of *Enterobacter cloacae* IIT-BT-08 in fast growing *E. coli*. Sponsored by Department of Biotechnology, Govt. of India, from October 2001 to September 2004 for Rs. 25.60 lakhs.
6. Improvement of hydrogen production from industrial waste using hybrid bioreactor. Sponsored by Department of Biotechnology, Govt. of India, from February 2004 to January 2007 for Rs. 23.72 lakhs.
7. Optimization of human fibroblast growth factors (diagnostic) production in recombinant plant cells in bioreactor , sponsored by MHRD, Govt. of India, from May 2005 to April 2007 for Rs. 15 lakhs.

8. Characterization of two histidine kinase and their cognate response regulator involved in signal transduction system of *Mycobacterium tuberculosis*. Sponsored by DBT from November 2005 to October 2008 for Rs. 23.68 lakhs.
9. Establishment of a center of Bioprospecting in IIT Kharagpur: Prospecting novel genes and molecules of *Santalum album* L. and *Amaranthus tricolor* L. Sponsored by DBT from December 2007 to November 2010 for Rs. 66.54 lakhs.
10. Identification and Characterization of molecular tools in order to generate improved jute cultivers. Sponsored by CSIR, Govt. of India, from December 2009 to November 2012 for 16.76 lakhs.
11. Immunogenic responses of silk biomaterials used for cell based tissue engineering and regenerative medicine. Sponsored by DST, Govt. of India from March 2011-February 2013 for Rs 35 lakhs.
12. Bioprospecting of Antartic flora: screening of novel genes and healthcare molecules. Sponsored by Ministry of earth Sciences, Govt. of India from August 2010 to July 2013. for Rs.105.96 lakhs.
13. Dielectrophoretic separation of biological cells in microfluidic channels. Sponsored by NPMASS programme Cell, Aeronautical Development Agency, from May 2013 to May 2014 for Rs. 10.35 lakhs.
14. Silk Protein mediated surface modification of NiTi alloy based stent material for improved endothelialization and reduced thrombogenicity. Sponsored by DBT, Govt. of India. from September 2013 to August 2014 for Rs. 34.05 lakhs.
15. Silk Scaffolds for peripheral nerve regeneration. Sponsored by British High Commission (UKIERI) under Trilateral Partnership from April 2013 to December 2015 for Rs. 13.99 lakhs.

Ongoing :

Brief research achievement:

Our laboratory is working on structural and molecular characterization of virus infecting tasar silkworm *Antheraea mylitta*. *Antheraea mylitta* is an indigenous wild type non-mulberry silkworm grown in eastern part of India silkworm and produces tasar silk. Being wild in nature these silkworms suffer from various microbial (bacteria, virus, protozoa and fungi) infections among which viral infection is predominant. Due to viral infection the production of tasar silk is gradually decreasing each year. To determine the causative virus, we have purified viruses from infected larvae by CsCl density gradient centrifugation and determined the structure of this virus, through scanning and transmission electron microscopy. Through molecular analysis of viral genetic materials we have shown that this virus is a cytoplasmic polyhedrosis virus belongs to Reoviridae family containing eleven double stranded RNA in its genome.

To understand viral life cycle and pathogenesis, all the eleven genome segments of *Antheraea mylitta* cytoplasmic polyhedrosis virus (AmCPV) have been cloned, sequenced and functionally characterized by expressing encoded (genes) proteins in *E.*

coli and insect cells. It has been shown that S1(3852 bp) and S3 (3784 bp) code for viral capsid proteins (141 and 123 kDa, respectively), S2 (3798 bp) codes for RNA dependent RNA polymerase (137 kDa, S4 (3353 bp) codes for methyl transferase (120 kDa), S5 (2180 bp) codes for guanylyl transferase (65 kDa), S6 (1944 bp) codes for protein (68 kDa) having ATP binding and ATPase activity, S7 (1789 bp) and S8 (1677 bp) encode viral structural proteins (61 and 60 kDA, respectively, S9 (1473 bp) codes for a non-structural protein (38 kDa) having RNA binding property, S10 (1502 bp) codes for viral polyhedron (28 kDa) and S11 (390 bp) does not contain any ORF.

An immunological (using rabbit anti-polyhedrin antibody) and PCR (using polyhedrin gene specific primer) based detection system of viral infection has been developed. We have also cloned and analyzed fibroin gene and other expressed sequences from tasar silkworms especially from silk glands to create an EST database and to use these sequences for functional analysis of genes involved in silk gland development. We have identified some RAPD and SCAR markers associated with yield component of tasar silkworm. We have also purified a novel fungal protease inhibitor (11 kDa) from the haemolymph of tasar silk worm, cloned, sequenced and expressed as soluble functional recombinant protein in *E. coli*. Its biochemical and biophysical characterization and determination of structure by X-ray crystallography have also been done. Work is on progress to understand the structure and mechanism of initiation of RNA synthesis by AmCPV RdRP, to establish an *Antheraea mylitta* cell lines for the understanding of virus–host cell interaction and pathogenesis, and purification of anti microbial peptides and proteins from *Antheraea mylitta* and *Antheraea assamensis* for their use as anti-microbial therapeutic agents.

Very recently our lab also has initiated a project to isolate and identify pathogens (bacteria and fungi in stored food grains) and to develop monoclonal antibody against these microbes for their detection by a simple immunologic procedure.

Other academic activities:

1. Joint coordinator of one short-term course entitled “Bioprocess engineering with genetically modified organisms” sponsored by DBT, Govt. of India, held at Dept. of Biotechnology, IIT, Kharagpur, on July 14-30, 1999.
2. Joint organizing secretary of International Symposium on “Post-genomic Biotechnology” held at IIT, Kharagpur on February 10-12, 2002.
3. Professor in charge of Recombinant DNA Technology laboratory in the Dept. of Biotechnology, IIT, Kharagpur.
4. Faculty adviser to B. Tech and M. Tech students of Biotechnology Department, IIT, Kharagpur.
5. Member, Board of studies and Ph.D. Committee of Vidyasagar University, Midnapore, Visva bharati University, Shantiniketan and West Bengal University of Technology , Kolkata.
6. Post-graduate program coordinator in the department of Biotechnology, IIt Kharagpur (1996-2001)

7. Undergraduate program Coordinator in the Department of Biotechnology, IIT, Kharagpur (2009-present)
8. Member of several DSC Committee, Departmental purchase committee, B. C. Roy. Technology Hospital purchase committee.
9. Reviewer of Scientific journals, and Projects from DST and DBT, CSIR.
10. Examiner of M. Sc. and Ph.D. thesis from other Universities such as Calcutta, Jadvapur, Sambalpur, Utkal, JNTU, Vidyasagar etc.
11. Professor in-charge of several state-of the-art equipments (Automated DNA sequencer, Real time PCR and 2-D Gel electrophoresis system) in the Central Research Facility of IIT- Kharagpur (2002-present)
12. Professor in charge of Advance Laboratory for plant Genetic Engineering in IIT-Kharagpur (2008-2013).
13. Academic committee member and chairman of Bio-Science group in Advance Technology Development Centre of IIT-Kharagpur (2011-2013)
14. Senate member of IIT-Kharagpur (2003-present).
15. Head of the Department of Biotechnology (2006 to 2009).
16. Chairman, Central Research Facility (Life Science Division), IIT-Kharagpur.(2009-2013)
17. Institutional Radiological safety officer (2010-present)
18. Member of Institutional animal ethics committee, Human ethics committee and Bio-safety committee.
19. Joint coordinator of a short term course entitled “Environmental genomics and Biotechnology” sponsored by MHRD, Govt. of India, held at Dept. of Biotechnology, IIT, Kharagpur, on December 2-9, 2011.