

# Curriculum Vitae of Professor Bishnu Pada Chatterjee

## **BISHNU PADA CHATTERJEE**

Distinguished Honorary Scientist, Chittaranjan National Cancer Institute, Kolkata.

Honorary Research Advisor, MIT-World Peace University, Pune, India

Honorary Scientist, National Academy of Sciences, India

Adjunct Professor, Yokohama City University, Yokohama, Japan.

Formerly Senior Professor, Department of Biological Chemistry, Indian Association for the Cultivation of Science, Jadavpur, Kolkata .

Emeritus Professor, Department of Natural Sciences, West Bengal University of Technology, Salt Lake, Kolkata,

Sir Asutosh Mookerjee Fellow, Indian Science Congress Association,

Senior Scientist Platinum Jubilee Fellow, National Academy of Sciences, India

Emeritus Fellow, All India Council of Technical Education,

Mob: +916289724483, E-mail: [cbishnup@gmail.com](mailto:cbishnup@gmail.com)

## **Academy Fellowship**

- Elected Fellow of West Bengal Academy of Science & Technology, 1994
- Elected Fellow of National Academy of Sciences, India, 1999
- Elected Fellow of Association of Carbohydrate Chemists and Technologists, India, 2010
- Elected Fellow of National Academy of Medical Sciences, 2014
- Elected Fellow of Indian Science Congress Association, 2018

## **Research Fellowship**

- Received JSPS Senior Fellowship in the University of Kyoto, 2004
- Received Emeritus Fellowship from All India Council of Technical Education for 2007-2010
- Received “Utility Service of Expertise Research Scientists” (USERS) from Department of Science & Technology, Government of India for 2010-2011
- Received Senior Scientist Platinum Jubilee Fellowship from National Academy of Sciences, India for 2011-2013
- Received Sir Asutosh Mookerjee Fellowship from Indian Science Congress Association for 2014-2018

## **Service to Professional Organization**

- Member of the Institute Body and other bodies, Post Graduate Institute of Medical Education and Research, Chandigarh as Indian Science Congress Association representative from 2003-2008, 2011-2014 and 2014-2019

- Member of the Task Force Committee and Project Review Committee on Allergy, Biochemistry, Immunology, Indian Council of Medical Research, Govt. of India 2005-2010 and 2011-2014
- Treasurer, Indian Science Congress Association, 2010-2011.
- Member of the Institute Body and other committees, All India Institute of Medical Sciences, New Delhi as Indian Science Congress Association representative from 2005-2010.
- Member of the Research Degree Committee in Biochemistry and in Biotechnology of C.S.J.M. (Kanpur University), 2003-2007.
- General Secretary, Indian Science Congress Association, 2003-2006.
- Treasurer, Indian Biophysical Society, 2003-2006.
- President, Association of Carbohydrate Chemists and Technologists (India), 2003-2005
- Treasurer, Indian Science Congress Association, 2001-2003.
- Member, Advisory Committee, Andhra University, Vishakhapatnam, Andhra Pradesh, 2001-2005.
- Member, Technical Advisory Committee, Biological Sciences Division, Indian Statistical Institute, 1995-1999.
- Member, Editorial Board, Biochemical Archives, U. S. A, 1993-1999.
- Member, Editorial Board, Glycobiology Insights, 2009-2010

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**Honors and Distinction**

- Publication of special volume of Trends in Carbohydrate Research in the honor of Prof B. P. Chatterjee's 80<sup>th</sup> Birthday
- 70<sup>th</sup> Birth day celebration by Association of Carbohydrate Chemists and Technologists (India) in CARBO-XXVII at CFTRI, Mysore, 13-15 December, 2014
- 65<sup>th</sup> Birth day celebration by Association of Carbohydrate Chemists and Technologists (India) in CARBO-XXII at NIPER, Mohali, 13-15 December, 2009

**Invited Lecture (International)**

- 12<sup>th</sup> International Carbohydrate Conference, University of Utrecht, Utrecht, The Netherlands, 1984
- 4<sup>th</sup> European Carbohydrate Conference, University of Darmstadt, Darmstadt, Germany, 1987
- 9<sup>th</sup> International Lectin Conference, Cambridge, England, 1987
- International Seminar on Down Stream Processing in Biotechnology Calcutta, 1991
- 14<sup>th</sup> International Lectin Conference, May 1992, Darjeeling, India
- 15<sup>th</sup> International Lectin Conference, August 1993, Hungary.
- XVI International Symposium on Glycoconjugates (GLYCO 16), Hague, Netherlands, 2001

- XVII International Symposium on Glycoconjugates (GLYCO 17), Bangalore, India, 2003.  
Graduate School of Pharmaceutical Science, Kyoto, Japan, 2004
- University of Tokyo, Tokyo, Japan, 2004
- Ochanomiju University, Tokyo, Japan, 2004
- 13<sup>th</sup> European Carbohydrate Symposium (Eurocarb 13), Bratislava, Slovakia 2005
- XVIII International Symposium on Glycoconjugates (GLYCO 18), Florence, Italy, 2005.
- International Symposium on “Glycans on Proteins and Lipids: Implications in Cellular Functions and Evolution”, Bangalore, India, 2006.
- Molecular Immunology of Complex Carbohydrates-3, Taipei, Taiwan, 2007
- XIX International Symposium on Glycoconjugates (GLYCO 19), Cairns, Australia, 2007.
- 23<sup>rd</sup> International Lectin Conference (INTERLEC-23), Scotland, 2008
- Institute of Molecular Science, Okazaki, Japan, 2009
- Aichi Cancer Centre, Research Institute Nagoya, Japan, 2009
- Ochanomiju University, Tokyo, Japan, 2009
- Ritsumeiken University, Shiga, Japan, 2009
- XX International Symposium on Glycoconjugates (GLYCO 20), San Juan, Puerto Rico, 2009
- XXI International Symposium on Glycoconjugates (GLYCO 21).Vienna, Austria, 2011.
- University of Chicago at Illinois, University of Stony Brook, New York, University of Baltimore, University of Notre Dame, July, 2012.
- XXII International Symposium on Glycoconjugates (GLYCO 22), Dalian, China, June, 2013
- 10<sup>th</sup> International Symposium on Cell Surface Macromolecule, Kolkata, Jan 20-24, 2014
- Key Note address in 29<sup>th</sup> Carbohydrate Conference (CARBO XXIX), Mohali, Punjab, Dec 29-31, 2014
- Introductory remarks as Special guest in The Cancer Concern---A Cancer Awareness Program, Kolkata, April 2, 2015
- 9<sup>th</sup> Asian Biophysics Association organized by Biophysical Society of China, Hangzhou, China, May 9-12, 2015
- XXIII International Symposium on Glycoconjugates (GLYCO 23), Split, September, 15- 20, 2015

#### **Brief Statement of Other Activities**

- Chaired in scientific sessions and delivered plenary and invited lectures in several National Conferences.

- Reviewer of scientific papers of several National and International journals.
- Guided twenty eight (28) Ph.D. students.
- Examiner of Ph.D. thesis of different Indian Universities.

## Glycobiology

1. R. Ghosh, R. Ahmed, H, Ahmed, B. P. Chatterjee (2022). Phosphorylated protein from serum : A Promising Potential Diagnostic Biomarker of Cancer. *Int. J. Mol. Sci.* 23, 12359. IF: 6.208.
2. Y. Bhatia, G Mandal, S. Islam, R Ghosh et al (2021). Phosphozinc finger protein: A promising serum biomolecule as noninvasive diagnostic marker of chronic hepatitis B related liver diseases including liver cancer. *J. Radiat. Cancer Res.* 12, 147-158. IF: 2.438. Citation: 1
3. P P Bose, U Chatterjee, **B P Chatterjee** (2018). Assessment of altered fucosylation of serum  $\alpha$ -1-acid glycoprotein in hepatocellular carcinoma patients by gold-nanoparticle aggregation immunoassay. *Material Science Research India* 15 (3), 263-271. IF: 0.565. Citation:2
3. G Mandal, A Saroha, P P Bose, **B P Chatterjee** (2016). Altered glycosylation, expression of serum haptoglobin and alpha-1-antitrypsin in chronic hepatitis C, hepatitis C induced liver cirrhosis and hepatocellular carcinoma patients. *Glycoconjugate J*, **33**, 209-218. IF: 3.009, Citation: 27
4. P P Bose, G Mandal, D Kumar, A Duseja, **B P Chatterjee** (2016). Visual detection of serum asialohaptoglobin by plasmonic sandwich ELISA- a new platform for cirrhosis diagnosis. *Analyst*, **141**, 76-84. IF: 5.227, Citation: 14
5. G. Mandal, H. Yagi, K. Kato, **B. P Chatterjee** (2015). Structural heterogeneity of glycoform of  $\alpha$ -1 acid glycoprotein in alcoholic cirrhosis patients. *Adv. Exp. Med. Biol.* **842**, 389-401. IF: 3.65, Citation: 8
6. G Mondal, U Chatterjee, **B P Chatterjee** (2014). Glycosylation of acute phase proteins: A promising disease biomarker. *Proceeding of National Academy of Sciences, India, (Biological Sciences)* 84, 865-874. IF: 0.282, Citation: 12
7. G Mandal, H Yagi, K Kato and **B P Chatterjee** (2013). Multidimensional HPLC analysis of N-linked glycans of serum alpha-1 acid glycoprotein in chronic hepatitis B and hepatitis B induced liver cirrhosis patients. *Trends Carbo. Res.* **5**, No-1, 11-19. IF: 0.562
8. A Saroha, S Kumar, **B P Chatterjee** and H R. Das (2012). Jacalin bound plasma O-glycoprotein and reduced sialylation of plasma alpha 2-HS glycoprotein (A2HSG) in rheumatoid arthritis patients. *Plos One*, **7**, e46374. IF: 3.752, Citation: 29.
9. **B P Chatterjee**, G Mondal and U. Chatterjee (2011) Reactivity of alpha fetoprotein with lectins in the differential diagnosis of non-malignant and malignant liver disease. *Trends Carbo. Res.* **3**, No-3, 26-31. IF: 0.562
10. A Saroha, S Biswas, **B P Chatterjee** and H Das (2011). Altered glycosylation and expression of plasma alpha-1-acid glycoprotein and haptoglobin in rheumatoid arthritis. *J Chromatogr. B* **879**, 1839-1843. IF: 3.318, Citation; 46
11. G Mondal, U Chatterjee, Y Chawla and **B P Chatterjee** (2011). An evaluation of the differences in the glycosylation of alpha-fetoprotein between hepatitis and liver cirrhosis by lectin-ELISA. *Trends Carbo. Res.* **3**, No-1, 13-20. IF: 0.129, Citation: 1

12. G Mondal, U. Chatterjee, Y Chawla and **B P Chatterjee** (2011). Alteration of glycan branching and differential expression of sialic acid on alpha fetoprotein among hepatitis patients. *Glycoconjugate J*, **28**, 1-9. IF: 3.009, Citation: 33
13. **B P Chatterjee**, U Chatterjee and G Mondal (2010). Changes of serum protein glycosylation as marker in the differential diagnosis of hepatitis and liver cirrhosis. *Proceedings of National Academy of Sciences, India (Biological Sciences)*, **80**, 190-200. IF: 0.96, Citation :1
14. G Mandal, U Chatterjee, H R Das and **B P Chatterjee** (2009) Enhancement of alpha -1-acid glycoprotein and fucosylation changes in hepatitis B patients as biomarker in the pathogenesis of the disease. *Glycoconjugate J*, **26**, 1225-1234. IF: 3.009, Citation: 18

## Biotechnology

1. S Chatterjee, AK Guha, BP Chatterjee (2019). Evaluation of quantity and quality of chitosan produce from *Rhizopus oryzae* by utilizing food product processing waste whey and molasses. *Journal of Environmental Management* 251, 109565. IF: 6.789. Citation: 16
2. S Kar, G Mandal and **B P Chatterjee** (2010). Purification and characterization of chitosanase from *Paecilomyces lilacinus*. *Trends Carbo. Res.* **2**, 10-20. IF: 0.562
3. S Chatterjee, S Chatterjee, **B P Chatterjee** and A K Guha (2008). Influence of some plant growth hormone on the growth of *Mucor rouxii* and chitosan production. *Micrbiol Res.* **164**, 347-351. IF: 5.07, Citation: 29
4. S Chatterjee, S Chatterjee, **B P Chatterjee** and Arun K. Guha (2008). Enhancement of growth and chitosan production by *Rhizopus oryzae* in whey medium by plant growth hormones. *Int. J. Biol. Macromol.***42**, 120-126. IF: 8.025, Citation: 83
5. S Chatterjee, S Chatterjee, **B P Chatterjee** and A K Guha (2007). Adsorptive removal of congo red, a carcinogenic textile dye by chitosan hydrobeads: binding mechanism, equilibrium and kinetics. *Colloid & Surface A: Physicochemical and Engineering Aspects* **299**, 146-152. IF: 5.518, Citation: 450.
6. S. Chatterjee, **B P Chatterjee** and A. K. Guha (2006). Kinetics of *Mucor rouxii* fermentation in relation to chitosan production. *Res. J. Microbiol* **1**, 90-94. IF: 0.19, Citation: 5
7. S Chatterjee, S Chatterjee, **B P Chatterjee**, A R. Das and A. K. Guha (2005). Adsorption of a model anionic dye, eosin Y, from aqueous solution by chitosan hydrobeads. *J. Colloid and Interface Sci.* **288**, 30-35. IF: 9.965, Citation: 327
8. S Chatterjee, M Adhya, A K Guha and **B P Chatterjee** (2005). Chitosan from *Mucor rouxii*: production and physico-chemical characterization. *Process Biochem.* **40**, 395-400. IF: 4.885, Citation: 274
9. R Mukhopadhyay, S Chatterjee, **B P Chatterjee** and A K Guha (2005). Enhancement of biomass production of edible mushroom *Pleurotus sajore caju* grown in whey by plant growth hormones. *Process Biochem.***40**, 1241-1244. IF: 4.885, Citation: 50
10. R. Mukhopadhyay, S. Chatterjee and **B P Chatterjee**, P C Banerjee, A K Guha (2005). Production of gluconic acid from whey by free and immobilized *Aspergillus niger*. *Int. Dairy J* **15**, 299-300. IF: 3.572, Citation: 79
11. S Chatterjee, S Chatterjee, **B P Chatterjee** and A K Guha (2004). Clarification of fruit juice with chitosan. *Process Biochem.* **39**, 2229-2232. IF: 4.885 Citation: 187
12. R Mukhopadhyay, D Talukdar and **B P Chatterjee**, A K Guha (2003). Whey: Processing with chitosan and isolation of lactose. *Process Biochem.* **39**, 381-385. IF: 4.885, Citation: 59

13. S Chatterjee, A K Guha and **B P Chatterjee** (2003). Preparation and characterization of lobster shell chitosan: Modification of traditional method. *Ind. J. Chem. Technol.* **10**, 350-354. IF: 0.76, Citation: 12
14. R Mukhopadhyay, **B P Chatterjee** and A. K. Guha, (2002). Biochemical changes during fermentation of edible mushroom *Pleurotus sajor-caju* in whey. *Process Biochem* **38**, 723-725. IF: 4.885, Citation: 30
15. D Paul, R Mukhopadhyay, **B P Chatterjee** and A K Guha (2002). Lactose from whey-evaluation of different isolation procedures on yield and quality. *Ind. J. Dairy. Sci.*, **55**, 1-4. IF: 0.435
16. D Paul, R Mukhopadhyay, **B P Chatterjee** and A K Guha (2002). Nutritional profile of food yeast *Kluveromyces fragilis* biomass grown on whey. *Appl. Biochem. Biotechnol.* **97**, 209-218. IF: 3.094, Citation: 36
17. J Bhowal, S Ghosh, **B P Chatterjee** and A K Guha (1999). Influence of carbon and nitrogen concentration on hemagglutinin production by phytopathogenic fungus *Macrophomina phaseolina*. *Biochem. Arch.* **15**, 291-296. IF: 3.01, Citation:2
18. R Mukhopadhyay, **B P Chatterjee** and A K Guha (1999) Effect of nitrogenous sources on the growth of *Pleurotus sajor –caju*, an edible mushroom, grown on whey. *Biochem. Arch.* **15**, 393-398. IF: 3.01. Citation: 10
19. J Bhowal, S Ghosh, B P Chatterjee and A K Guha (1999). Nutritional influence on the development and specific production of extracellular hemagglutinin for the pathogenic fungus *Fusarium udum*. *Biochem. Arch.* **15**, 75-80. IF: 3.01. Citation: 5
20. D Paul, B P Chatterjee, S Basu Sarbadhikari and A K. Guha (1998). Supplementary effect of yeast extract on the production of lactic acid by immobilized cells of *Lactococcus* and *Lactobacillus* species from deproteinized whey. *Ind. J. Dairy Sci.* **50**, 218-223
21. D Paul, B P Chatterjee and A K Guha (1998). Some biochemical changes during fermentation of food yeast *Kluveromyces fragilis* in whey. *Biochem. Arch.* **14**, 43-48. IF: 3.01
22. D Paul and B P Chatterjee, A K Guha (1996). Available lysine in protein of *Kluveromyces fragilis* yeast grown in whey. *Ind. J. Dairy Sci.* **48**, 78-82. IF: 0.435. Citation: 2
23. A K. Guha, D Paul, B. P. Chatterjee (1995). Influence of nitrogenous sources on the production of food yeast *Kluveromyces fragilis*. *Biochem. Arch.* **11**, 239-243. IF: 3.01. Citation: 1
24. Paul, A K Guha and B P Chatterjee (1994). Effect of plant growth hormones on *Kluveromyces fragilis* grown on deproteinized whey. *Biochem. Arch.* **10**, 277-283. IF:3.01. Citation: 18

## Lectin

1. S R Chowdhury, U Ray, **B P Chatterjee**, S S Roy (2017). Targeted apoptosis in ovarian cancer cells through mitochondrial dysfunction in response to *Sambucus nigra* agglutinin: Cell Death and Disease. **8**, e2762; doi:10.1038/cddis.2017.7. IF: 9.696 Citation: 53
2. P P Bose, S Bhattacharjee, S Singha, S Mandal, G Mandal, P Gupta, **B. P. Chatterjee** (2016). A glucose/mannose binding lectin from litchi (*Litchi chinensis*) seed: Biochemical and biophysical characterizations. *Biochem Biophys Reports* **6**, 242-252. IF:0.522 Citation: 17
3. S. Singha, P. P. Bose, T. Ganguly, P. T. Campana, R. Ghosh, **B. P. Chatterjee.** (2015). Comparison of the nature of interactions of two sialic acid specific lectins

- Saraca indica* and *Sambucus nigra* with *N*-acetylneuraminic acid by spectroscopic techniques. *J. Lumin.* **160**, 119-127. IF: 3.280, Citation: 4
4. S.Singha, G. Dutta, P. P. Bose, S. Das, M. Bardhan, **B. P. Chatterjee**, T. Ganguly (2015). Use of spectroscopic techniques to reveal the nature of the interactions of two sialic acid specific lectins with gold nanoparticles. *J. Nanosci. Nanotech.* **15**, 1-11. IF: 1.28, Citation: 5
  5. J Pramanik, U Chatterjee, G Mondal, Campana P T and **B.P. Chatterjee** (2010). Tn/T Specific Agglutinin from Estuarine Crab *Scylla Serrata* with Potent Mitogenic Activity on Mouse Splenocytes and Antiproliferative Effect on Hepatocellular Carcinoma (HepG2) Cell. *Glycobiology Insights* **2**, 1-16. Citation:8
  6. M Adhya, B. Singha and **B. P. Chatterjee** (2009). *Macoma birmanica* agglutinin recognizes glycoside cluster of  $\beta$ GlcNAc and  $\alpha$ Man. *Carbohydr. Res.* **344**, 2489–2495. IF: 2.975, Citation: 6
  7. M. Adhya, B. Singha and **B. P. Chatterjee** (2009). Purification and characterization of an *N*-acetylglucosamine specific lectin from marine bivalve *Macoma birmanica*. *Fish and Shellfish Immunol.* **27**, 1-8. IF: 4.622, Citation:32
  8. B Singha, M Adhya and **B P. Chatterjee** (2008). Cat fish (*Clarias batrachus*) serum lectinrecognizes polyvalent Tn [ $\alpha$ -D-GalpNAc1-Ser/Thr], T $\alpha$  [ $\beta$ -D-Galp-(1 $\rightarrow$ 3)- $\alpha$ -D-GalpNAc1Ser/Thr], and II[ $\beta$ -D-Galp(1 $\rightarrow$ 4)- $\beta$ -D-GlcpNAc1-] mammalian glycotopes. *Carbohydr. Res.* **343**, 2384-2392. IF: 2.975, Citation:14
  9. U Chatterjee, P P Bose, S Dey, T P Singh and **B P Chatterjee** (2008). Antiproliferative effect of T/Tn specific *Artocarpus lakoocha* agglutinin (ALA) on human leukemic cells (Jurkat, U937, K562) and their imaging by QD-ALA nanoconjugate. *Glycoconjugate J.* **25**, 741-752. IF: 3.009, Citation:14
  10. Singha, M. Adhya and **B. P. Chatterjee** (2007). Multivalent II [ $\beta$ -D-Galp-(1 $\rightarrow$ 4)- $\beta$ -D-GlcpNAc] and T $\alpha$  $\beta$ -D-Galp-(1 $\rightarrow$ 3)- $\alpha$ -D-GalpNAc] specific Moraceae family plant lectin from the seeds of *Ficus bengalensis* fruits. *Carbohydr. Res.* **342**, 1034-1043. IF: 2.975, Citation:21
  11. K Saja, U Chatterjee, **B P Chatterjee** and P R Sudhakaran (2007). Activation dependent expression of MMPs in peripheral blood mononuclear cells involves protein kinase A. *Mol. Cell. Biochem.* **296**, 185-192. IF: 3.842, Citation: 23
  12. M. Adhya, B. Singha and **B. P. Chatterjee** (2006). *Ficus cunia* agglutinin for recognition of bacteria. *Ind. J. Biochem. Biophys.* **43**, 94-97. IF: 1.476, Citation: 8
  13. J. Bhowal, S. Ghosh, A. K. Guha and **B. P. Chatterjee** (2006). Infection of jute seedlings by the phytopathogenic fungus *Macrophomina phaseolina* mediated by endogenous lectin. *Res. J. Microbiol* **1**, 51-60. IF: 0.52, Citation: 2
  14. J. Bhowal, A. K. Guha and **B. P. Chatterjee** (2005). Purification and molecular characterization of a sialic acid specific lectin from the phytopathogenic fungus *Macrophomina phaseolina*. *Carbohydr. Res.* **340**, 1973-1982. IF: 2.975, Citation: 55
  15. S Dutta, B. Singha, B. Bhattacharya, **B. P. Chatterjee** and S. Majumder (2005). Characterization of a galactose binding serum lectin from the Indian catfish, *Clarias batrachus*: Possible involvement of fish lectins in differential recognition of pathogens. *Com. Biochem. Physiol. Part C* **141**, 76-84. IF: 2.12, Citation: 67
  16. T Singh, U Chatterjee, June H Wu, **B P Chatterjee** and A M Wu (2005). Carbohydrate recognition factors of a T $\alpha$  (Gal $\beta$ 1 $\rightarrow$ 3GalNAc $\alpha$ 1 $\rightarrow$ Ser/Thr) and Tn (GalNAc $\alpha$ 1 $\rightarrow$ Ser/Thr) specific lectin isolated from the seeds of *Artocarpus lakoocha*. *Glycobiology* **15**, 67-78. IF: 5.954, Citation:22
  17. J Bhowal, A. Mitra, S. Banerjee, S. Sikdar, A. K. Guha and **B. P. Chatterjee** (2004). Purification and characterization of extracellular agglutinin from dermatophyte

- Tricophyton rubrum* with specificity towards sialic acid containing glycoconjugates. *Ind. J. Biochem. Biophys.* **41**, 81-88. IF: 0.357, Citation:8
18. S Banerjee S Chaki J Bhowal and **B P Chatterjee** (2004). Mucin specific mitogenic lectin from freshwater gastropod *Belamya bengalensis*: Purification and molecular characterization. *Arch. Biochem. Biophys.* **421**, 125-134. IF: 3.391, Citation:34
  19. S K R Amin, S Banerjee, S R Kasturi and **B P Chatterjee** (2000). Binding mechanism of methyl- $\alpha$ -N-acetyl-D-galactopyranosylamine to *Artocarpus lakoocha* lectin, artocarpin: A proton nuclear magnetic resonance study. *Ind. J. Biochem. Biophys.* **37**, 299-306. IF: 0.958, Citation:1
  20. S Bandyopadhyay, M Majumder and **B P Chatterjee** (1999). Subcellular localization of artocarpin in *Artocarpus lakoocha* seeds. *Biochem. Arch.* **15**, 285-290, IF: 3.02
  21. S Ghosh, M Majumder, S Majumder, N K Ganguly and **B P Chatterjee** (1999) Saracin: A lectin from *Saraca indica* seed integument induces apoptosis in human T-lymphocytes. *Arch. Biochem. Biophys.* **371**, 163-168. IF: 3.391, Citation: 65
  22. **B P Chatterjee** and H. Ahmed (1998). Lectins from plant and animals: carbohydrate specificity, unity in diversity and diversity in unity. *Biochem. Arch.* **14**, 1-15, IF: 3.02. Citation: 4
  23. T. Chattopadhyay and **B P Chatterjee** (1997). Further biochemical and biophysical characterization of scyllin, *Scylla serrata* hemolymph. *Biochem. Mol. Biol. Int.* **42**, 183-191. IF: 4.709, Citation:11
  24. M Majumder, T Chattopadhyay, A K Guha and **B P Chatterjee** (1997). Inhibition of bacterial respiration by a low molecular weight lectin from *Scylla serrata* crab hemolymph. *Ind. J. Biochem. Biophys.* **34**, 87-89. IF: 0.958, IF: 1.476, Citation:13
  25. T Chattopadhyay, A K Guha and **B P Chatterjee** (1996). Novel antimicrobial activity of scyllin, a haemolymph lectin of the edible crab *Scylla serrata*. *Biomed. Lett.*, **53**, 29-40. IF: 3.72 Citation: 16
  26. M Majumder and **B P Chatterjee** (1996). Subcellular distribution of jacalin in *Artocarpus integrifolia* (jackfruit) seed. *Cytobio.*, **88**, 201-208. Citation:4
  27. A K Guha, A Mitra and **B P Chatterjee** (1996). An alternative method for the identification of serotypes of *Klebsiella pneumoniae* by lectins. *J. Ind. Acad. Forensic* **32**, 1-6.
  28. S Ray, M Majumder and **B P Chatterjee** (1995) Turbidimetric assay of ant-egg glycoprotein-lectin interaction. *Biochem. Arch.* **11**, 255-259.
  29. S Ray, **B P Chatterjee** (1995). Saracin: A lectin from *Saraca indica* seed integument recognizes complex carbohydrates. *Phytochemistry* **40**, 643-649. IF: 4.004, Citation: 36
  30. A Mitra, A K Guha and **B P Chatterjee** (1994). Typing of *Shigella dysenteriae* strains of different serogroups by lectins. *Zbl. Bakt.* **281**, 55-60, Citation: 5
  31. A Mitra, A K Guha and **B P Chatterjee** (1994). Intra- and extracellular hemagglutinin from dermatophyte *Tricophyton rubrum*: development, specific production and nutritional influence. *Biochem. Arch.* **10**, 33-39, IF:3.02. Citation: 3
  32. T Chattopadhyay and **B P Chatterjee** (1993). Effect of physico-chemical parameters on turbidimetric assay of scyllin-fetuin interaction. *Biochem. Arch.* **9**, 303-309, IF:3.02
  33. T Chattopadhyay and **B P Chatterjee** (1993). A low-molecular weight lectin from the edible crab *Scylla serrata* hemolymph: Purification and partial characterization. *Biochem. Arch.*, **9**, 65-72, IF: 3.02. Citation: 18
  34. S Chowdhury and **B P Chatterjee** (1993). Artocarpin-galactomanan interaction-characterization of the combining site of artocarpin. *Phytochemistry* **32**, 243-249. IF: 4.004, Citation:7

35. S Ray and **B P Chatterjee** (1992). Lectin binding reactions monitored by enzyme immunoassay exemplified by carbohydrate determination in ant egg glycoprotein. *Biochem. Arch.* **8**, 295-300, IF:3.02, Citation: 1.
36. S Ray, H Ahmed, S Basu and **B P Chatterjee** (1992). Purification, characterization and carbohydrate specificity of *Ficus cunia* lectin. *Carbohydr. Res.* **242**, 247-263. IF: 2.975, Citation:26
37. S Sikdar and **B P Chatterjee** (1991). Circular dichroism and carbohydrate-induced conformational alterations of *Crotalaria striata* lectin, crotalarin. *Biochem. Arch.* **7**, 105-111, IF:3.02
38. S Sikdar and **B P Chatterjee** (1991). Studies on the effect of various parameters on crotalarin-fetuin interaction. *Ind. J. Biochem. Biophys.* **28**, 146-149. IF: 1.476, Citation:2
39. S Chowdhury, H Ahmed and **B P Chatterjee** (1991). Chemical modification of *Artocarpus lakoocha* lectin. *Biochemie.* **73**, 563-571. IF: 3.18, Citation:21
40. S Sikdar and **B P Chatterjee** (1990). Chemical modification studies on the blood group A-specific lectin, crotalarin (*Crotalaria striata*) and its effect on hemagglutinating activity. *Mol. Cell. Biochem.* **96**, 107-116. IF: 3.842, Citation: 4
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#### Articles (seminars, symposia, conference)

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2. S. Chatterjee, S Som Majumder, **B P Chatterjee** and A K Guha, (2003). Copper ion adsorption on chitosan beads, physicochemical characterization. In: *Proceedings of International Biohydrometallurgy Symposium*, IBS 2003, Athens, September 14-19, Elsevier Science.
3. R Pal, A K Guha and **B P Chatterjee** (1988). Lectin typing of *Pseudomonas aeruginosa* strains of different serogroups. Habs and Fisher types. *Proceedings of Fourth Carbohydrate Conference*, Calcutta, 136-150.
4. S Sikdar and **B P Chatterjee**. (1988). Carbohydrate specificity of blood group A-specific lectin, crotalarin from *Crotalaria striata* seed. *Proceedings of Fourth Carbohydrate Conference*, Calcutta, pp 185-198.
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## Projects

<b>Title of the Project &amp; Reference number</b>	<b>Duration From To</b>	<b>Amounts in Lakhs Rs.</b>
<b>IACS</b>		
a. Lectin –carbohydrate interaction year)	1981-2007	2,00,000.00 (each
b. Allergy & Immunology year)	1995-2007	2,00,000.00 (each
c. Biotechnology of Agro-waste year)	1998-2007	2,00,000.00 (each

## ICMR

a. Immunochemical characterization of house dust allergen with respect to its specificity in the assessment of allergic mechanism and the evaluation of desensitization therapy.	April 87- Jan 89.	60, 500.00
b. Standardisation of desensitization process in inhalent and ingestant allergies and the correlation of the therapeutic response with the allergen-specific immunoglobulin profiles before and after the therapeutic procedure.	April 88- March 89.	1, 40, 697.70

The above two projects were transferred by Late Dr. Sachin Choudhary (PI) of Institute of Child Health, Calcutta to Prof. B. P. Chatterjee, IACS, Kolkata and continued for the above period.

c. Molecular characterization of cross-reactive IgE- binding components in three fish species and comparison of fish hypersensitivity in pediatrics and adults with T cells response in pathogenesis of the disease. File No-62/1/99 BMS	April 2002- March 2006	12,74,734.00
d. Patterns of food allergens specific cytokines production by T lymphocyte subsets of atopic children. File No. 62/1/2006-BMS	Dec 2007-Nov 2010	16,78,200.00
e. Diagnostic accuracy of serum $\alpha$ 1 acid glycoprotein concentration and fucosylation for the differential diagnosis of chronic hepatitis, liver cirrhosis and hepatocellular carcinoma as measured by antibody–lectin sandwich assay File No. 52/22/2008-BMS	July 2010-July, 2013	34,70,000.00
f. Comparative study of human serum phosphoproteome among chronic hepatitis B, viral liver cirrhosis and hepatocellular carcinoma	Oct2014- Sept 2016	25,45600.00
g. Use of phosphoprotein biomarkers to develop plasmonic ELISA for predicting chronic hepatitis, liver cirrhosis, and hepatocellular carcinoma File No.5/3/8/342/2017-ITR	August 2019 -	69,88,100.00
h. Identification of non-invasive micro RNA and proteomic biomarkers in plasma for early detection of head and neck squamous cell carcinoma in Indian patients File No. 5/13/25//2019/NCD-III	Sept 2019 -	49,44,800.00
i. Development of lectin nanobiosensor for early detection of urinary bladder cancer by noninvasive approach	May 2023-	60,46,636.00
<b>DST</b>		
a. Molecular characterization of naturally occurring allergens for identification of immunopotential moieties to evolve effective immunotherapy in allergenic morbidities.	June 91- Dec 94.	7, 05,785.00

DST (W.B.)

a. Production of lactose lactic acid and edible protein from unutilized whey.	April 91-March 93.	2,13,416.00
b. Production of chitin and chitosan from waste materials and their commercial exploitation in water purification and food processing waste management. File No. 1649/ST/P/S&T/5G – 18/98	April 98- March 2000.	3,64,500.00
<b>DBT</b>		
a. Fermentative production of chitosan from fungi and its industrial applications. File No. BT/PR/1373/PID/48/98	June 2000-May 2003.	19,76,000.00
b. Biochemical investigation into the aberrant glycosylation of serum glycoproteins during inflammation using carbohydrate - binding proteins. File No. BT/PR 4462/BRB/10/350/2003	May 2005-Dec 2008.	26,60,200.00
<b>ICAR</b>		
a. Isolation, purification and characterization of a cat fish lectin. File No. 4-11/2000 – ASR-1 Project Code No. 06/40/9	April 2002-March 2005.	14,47,912.00
<b>NASI</b>		
a. Nanoscience and glycoscience in health and disease using lectin as tool. File NoNAS/324/12/2010-11	Jan, 2011-Dec, 2013	16,68,000.00
<b>CSIR</b>		
a. Chitosanase from fungi and applications on its substrate for the production of glucosaminyl mono - and oligosaccharides and isolation of lectins. File No. 38(1107) /05/EMR II	April 2006-Dec 2008.	14,80,200.00
b. Betel nut lectin: isolation, biological properties and exploration of lectin-quantum dot nanoconjugates as novel fluorescent marker for identification of cancer cells File No. 38(1256) /10/EMR II	Sep 2010-Aug, 2014	21,16,727.00
c. Proteomics and glycomics studies on cell surface proteins of different leukemic cell lines-demonstration of a novel biomarking platform File No. 37 (1656) / 15 / EMR-II	Oct, 2015- Sep,2018	24,95,600.00

## **Highlights of the research contributions of Prof. B. P. Chatterjee**

### **Structure-function studies and applications of lectins**

Discovery and characterization of novel lectins from plants and animals for understanding several biological processes and specific separation of IgA<sub>1</sub> and IgD from other Igs have been achieved. Lectin from phytopathogenic fungus was found to resist the fungal attack of cash crops. From 2005 onwards the commendable research has been the development of glycobiology with the aid of lectins from diverse sources which have been found to be indispensable tool to study glycobiology of cells. Quantum dot- lectin conjugate identified the leukemic cells – Jurkat, U937, K562 from normal lymphocytes by fluorescence imaging. Utilizing glycoproteomics and lectinomics as well as HPLC mapping followed by MALDI-TOF-MS identified accurate biomarker of liver diseases (hepatitis, nonalcoholic fatty liver disease, steatohepatitis, alcoholic cirrhosis, and hepatocellular carcinoma (HCC). Lectin microarray, plasmonic ELISA are unique techniques utilized to differentially diagnose hepatitis, liver cirrhosis and HCC. A novel enzyme linked lectinosorbent assay has been recently developed coupled with plasmon mechanism of gold nanoparticle aggregation as the colorimetric read out which can visually distinguish the cirrhotic liver patients from the normal healthy controls by a serological assay. The assay can be useful for rapid point-of-care detection, which even untrained person can execute without specialized instrument.

### **Allergy and Immunology**

The existence of mite in dust on old library books was unequivocally proved for using in skin prick test and immunotherapy for allergy patients was acclaimed nationally and internationally. A placebo-controlled study of immunotherapy with coconut pollen extract provided clinical improvement in patients, which received the recommendation of WHO on allergen immunotherapy guidelines for allergic rhinitis and therapeutic vaccines for allergic diseases. Identification and characterization of food allergens especially variety of fishes and the role of Th1 and Th2 cytokines in the disease have been achieved. Thermal processing of fish effectively alters food proteins to reduce fish allergenicity which has been noticed. A detailed investigation on the allergy caused by ingestion of rohu, hilsa, pomfret, bhetki fishes in adults and children showed that children were more susceptible to fish allergy than adults. Reduction of allergenicity by thermal as well as enzymatic processing has been a breakthrough in the field of food allergy. This technique will provide safety to fish eating population.

Atopic children with food (rice, wheat, fish, egg, milk, groundnut, orange, banana, mango) allergy is directly correlated with allergy and asthma. Imbalance between Th1 and Th2 cytokines leads to asthma and regulation of Th17 is becoming an emerging tool for controlling asthma. Asthma is known to be correlated with Th2 immune response. There is evidence that T-regulatory cells are important to prevent allergic diseases like asthma. There are few studies based on the role of Th17 cells in allergic diseases. Our group have found a positive correlation between total serum IgE level and Th 2, Th 17 cytokines in a pediatric population with asthma.

A multiplexed assay where simultaneous detection of common food allergens in different food allergic patients has been developed which provide the estimation of specific IgE concentrations for different allergen in multitude of individual's sera simultaneously in a multiplexed form based on sensitive plasmonic phenomena of gold nanoparticle (GNP)

### **Biotechnology of agro-waste**

Chitosan produced by fermentation of *Mucor rouxii* in molasses salt medium as cheap carbon source in high yield showing less polydispersed, comparable physico-chemical properties with those of commercially available chitosan and good crystalline nature. Water-soluble chitosan prepared has been used for the clarification of fruit (orange, lemon, grape, apple) juices.

Whey, the by-product of the dairy industries causing environmental pollution has been processed to remove proteins, suspended solids and minerals with chitosan for the isolation of lactose, thus reducing the pollution load of whey and easing its disposal problem. Lactose isolated from whey after treatment with chitosan gel followed by alcohol precipitation technique was of pharmaceutical grade. Biochemical oxygen demand (BOD) of whey was reduced by 87% after isolation of lactose.

Edible mushroom *Pleurotus sajor-caju* grown under submerged condition in deproteinized whey supplemented with plant growth hormone indole-3-acetic acid (IAA) yielded high biomass and with high protein content. Enhancement of chitosan production by *Rhizopus oryzae* in deproteinized whey was achieved in the presence of plant growth hormone, gibberellic acid.

The efficacy of adsorption of a water-soluble model anionic dye, eosin Y, a coal tar xanthene dye to avoid environmental hazards by sulfate-conditioned chitosan hydrobeads was achieved. The use of chitosan in the form of hydrobeads to remove congo red, a member of anionic dyes from its aqueous solution and dye-chitosan interaction during the adsorption in single component system as well as in presence of other contaminants was achieved.

### **Lectin-nanoparticle conjugates for cancer detection**

Lectin Self-Assembled Monolayer Array as nanobiosensors using AFM as tool and luminescent Magnetic Quantum Dots for Biomedical Imaging has been applied for detection of different cancer cells..