

DR. SUBHAS CHANDRA JANA

Degree: Ph. D. (Sc.)

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DOCTORAL DEGREE

Title of thesis: Studies on relationship among members of the *Azotobacteraceae* and effect in vitro of some pesticides on Nitrogen fixation in *Azotobacter chroococcum*.

Year of the award of degree: 1990

RESEARCH EXPERIENCES

M.Sc. research experiences (June 1983 - May 1984):

University of Kalyani, Nadia, West Bengal, India

- Fatty acids (saturated and unsaturated) were screened for antimicrobial activity against five test microbes (*E. coli*, *Mycobacterium flavum*, *Trichophyton mentagrophytes*, *T. tonsurans*, and *Candida albicans*)

Ph. D. research experiences (June 1984 – March 1989):

Bose Institute, Calcutta, India

Scientist has paid their attention to the use of Azotobacters as biofertilizers to the soil for crop improvement. Due to some harmful effects of chemical fertilizers on natural resources, the use of theses Azotobacters could be placed by the biofertilizers. As such, biological nitrogen fixation technology is a viable alternative to chemical fertilizer in agriculture. And thereby is receiving greater attention with the hope of meeting the food scarcity in the world due to rapid rate of increasing population. There is a debatable question about the placement and nomenclature of the strains in the Azotobacteraceae family. The author studied the relatedness among the members of the Azotobacteraceae family by studying the key enzymes and electrophoretic comparison of total cellular protein and isoenzymes. In this investigations nitrogen fixation of one bacterial strain, *A.chroococcum* BI2 had also studied.

- Studied nutritional pattern and carbohydrate metabolism of some soil isolated nitrogen fixing bacterial strains.
- Characterized some members of *Azotobacteraceae* based on protein and isoenzyme.
- Studied pesticides effect on the growth and nitrogen fixation of *Azotobacter chroococcum*.

Post Doctoral research experiences: 23 years

University of Wyoming, USA (April 1989 – April 1990)

Characteristics and mode of action of an antimicrobial peptide (AMP) produced by *Pediococcus acidilactici* strain H.

Certain lactic acid bacteria used in meat fermentation produce antimicrobial protein during their growth which could be used to extend the shelf life of meat and other food products. The inhibitory compound studied in this program is produced by *Pediococcus acidilactici* strain H. This compound is a low molecular weight peptide secreted extracellularly in the growth medium. The program is designed to study the physical, chemical, and biological properties of this antimicrobial peptide. The program also includes purification of this antimicrobial peptide using various techniques, chromatography and PAGE. The gene responsible for AMP is located on the plasmid of this bacterium. The gene can easily be transferred to the related bacteria using the process of conjugation or by electroporation through plasmid transfer.

- i. Isolated and identified bacteriocin producing strain.
- ii. Optimized bacteriocin production in small scale fermentor.
- iii. Purified bacteriocin for further work.
- iv. Identified bacteriocin producing gene in Plasmid.
- v. Genetical work, conjugation, and electroporation, Plasmid DNA purification were done.

Bose Institute, Calcutta, India (May 1990 – Sept. 1996)

Worked in the project entitled “Microbial production of beta amylase from *Bacillus megaterium* B6.”

University of Calcutta.35, Ballygunge Circular Road, Calcutta- 700019.

- i) Dept. of Botany (Oct 1996 – April 1997)
Isoenzyme marker analysis of Salt tolerant rice varieties.
- ii) Dept. of Zoology (May 1997 – June 1998)
Isoenzyme marker analysis of *Drosophilla sp.* from different polluted area.

TEACHING EXPERIENCES

Under Graduate : i) Microbiology (Hons.) – 17 years

Post Graduate : ii) Microbiology –14 Years

INVOLVEMENT IN RESEARCH PROJECTS AS PI

Nature of work	Duration	Title of Project	Sanction letter no. & date, Rs.	Status
UGC Minor research Project	2 years	Bio preservation of food	No. F PSW 30/90 (ERO)&15.09.99 Rs.50,000/-	Completed
UGC Major Research Project	3 years	Studies on Ca ⁺² independent highly thermostable beta amylase from mesophilic bacterium <i>Bacillus</i> sp DJ ₅ .	F. No. 33-214/2007 SR & 06.03.2008 Rs.8,34,000/-	Completed (2008-2011)
W.B. State DST Research Project	3 years	Studies on agricultural applications of biopesticides in different combinations for the management of betel vine disease.	320(Sanc.)/ST/P /S&T/1G-7/2009 dt. – 02.09.2010 Rs.8,10,000/-	Completed (2010 – 2013)
Higher Education Department, Govt. of West Bengal	1 year	Mother and child health	1023(Sanc)EH/P /CG/4C-82/2015 dt. 09.02.2016 Rs.6,00,000/-	Completed (2016-2017)
Ministry of Food Processing Industries, New Delhi	2 years	Production of functional dahi by isolated probiotic strain from breast fed human baby	88/MFPI/R&D/2012 dt. 04 Dec. 2015 Rs.24,50,000/-	On going (2016- till date)
UGC	5 years	Epidemiology study of Trichomoniasis in West Bengal and non-antibiotic management strategy with the help of probiotic Lactic Acid Bacteria.	F1-17.1/2016-17/RGNF-2015-17-SC-WES-20917	Ongoing (2016 – till now)
Department of Biotechnology, Govt. of West Bengal	3 years	Isolation of free living nitrogen fixing, phosphate solubilizing, salt tolerant Azotobacter and production of multipurpose biofertilizer with vermicompost as base material.	525/BT (Estt.)/RD – 16/2014 dt. 29.03.2017 Rs.15,50,000/-	On going (2017 – till date)
ICMR	3 years	Studies on the effect of bacteriocinogenic Lab strains on Vaginitis.	5/10/FR/4/2015-RCH dt.07.03.18 Rs.32,50,000/-	Waiting for fund approval.

Supervision of Ph. D. students:

Dr. Abhijit Poddar [Ph. D. awarded (Jadavpur University) on 07.05.2013]

From the vast study with isolated and identified strain *Bacillus subtilis* DJ5 recorded achievement were very high in comparison to the expected results. The enzyme beta –amylase, showed hyperthermostability, wide pH stability suitable for the industry. This strain can utilize different indigenous and raw starches for its beta-amylase production. So, the industry can use raw cheap sources of starch for beta-amylase production which indirectly creates some positive reflections on marketed values of its products. Mesophilic organism is very easy to maintain. Moreover, the enzyme is very easy to purify. So, cost effective production of this enzyme definitely control the economy of the society. Hyperthermostable nature of this beta-amylase will eliminates starch processing cost during industrial fermentation. The enzyme can withstand harsh and robust condition of industrial setup. It will make the enzyme suitable candidate for industrial application. Enzyme is much promising to be used in detergent industry as it showed stability in presence of detergents. The enzyme and the cell immobilized condition will meet the demand of starch processing industry. The stability and reusability of both the immobilized enzyme and cell is ideal for industry.

Dr. Madhusree Raychaudhuri [Ph. D. awarded (Jadavpur University) on 31.01.2019]

Lactic acid bacteria were isolated from perishable papaya on MRS agar media. It is identified as *Lactococcus lactis* JC10 by 16S rRNA sequencing analysis. Antimicrobial protein, bacteriocin, produced by this bacterium was found to be effective against gram-positive and gram-negative bacteria including food borne pathogens showing its broad spectrum nature. It showed a wide range of thermal stability ranging from -20 o C for 270 days to 115.6 o C for 20 minutes and equally active at pH 2 to 10. Bacteriocin was purified by FPLC system with a mono-Q column. Bacteriocin had used for the preservation of fresh-cut pine apple slices for up to 12 days to increase self-life. Media optimized for maximum production of bacteriocin from this strain. This product is industrially viable.

Dr. Malay Mandal [Ph. D. awarded (Jadavpur University) on 05.07.2017]

Bacteriocins are proteinaceous toxins produced by a number of Gram -positive and Gram-negative bacteria during growth to inhibit the related bacteria. They are safe to apply in food industry as natural preservatives. It can also be used as biocontrol agent against *xanthomonas axonipodis* pv. *betlicola*, phytopathogenic bacteria infect piper betle. Non-hazardous, eco-friendly natural product, bacteriocin can be used commercially in crude form against phytopathogenic fungi, *sclerotium rolfsii*, *xanthomonas* sp., etc.

Life Member:

1. Association of Microbiologists of India (Since 2008)
2. Indian Science Congress Association (Since 2009)
3. Society for Applied Biotechnology (Since 2009)

Administrative Experience:

- Committee member of college- sub-committee (Darjeeling Govt. college and Bidhannagar college).
- Member: Board of undergraduate studies in Botany; University of North Bengal (1999-2003).
- HOD, Dept. of Microbiology, Bidhannagar College (Govt. of West Bengal) {From 31.01.13}.
- Member of Board of Studies, West Bengal State University. (June 2013 to June 2016).
- Officer-in-Charge, Bidhannagar College (Govt. of West Bengal) {From 31-10-13 to 07/02/17}.
- Head Examiner – North Bengal University, West Bengal State University.
- BOS member in Sidho Kanho Birsha University, Dept. of Microbiology – 2015 onwards.
- BOS member in Sidho Kanho Birsha University, Dept. of Botany – 2015 onwards.
- PG BOS member from -2004 onwards (Bidhannagar college, PG Department of Microbiology, under WBSU).

Selection Committee

- DPI Nominee for CAS (Barasat Govt. College & Nistarini College, Purulia University) – 2015.

Seminar, Symposia and Workshop:

Attended Indian Science Congress, State Science Congress, Microbiological Association and Biotechnological Association with papers both at national and international level in different times from 1984 till date.

PUBLICATIONS

Paper Published: 27

List of paper published:

1. Jana S.C., Chakrabartty P.K. and Mishra A.K. Enzymatic differentiation of *Azotobacter* and *Azomonas*. *Curr. Sci.* 58,709, (1989).
2. Biswas S.R., Jana S.C., Mishra A.K. and Nanda G.; Production, Purification and Characterization of Xylanase from a hyperxylanolytic mutant of *Aspergillus ochraceus*. *Biotech. Bioeng.* 35,244, (1990).
3. Jana S.C., Chakrabartty P.K. and Mishra A.K.; Taxonomic relationship of some members of *Azotobacteraceae* based on their protein profile. *J. Basic. Microbiol.* 32,29, (1992).
4. Jana S.C. Isoenzyme profiles in *Azotobacteraceae*. *J. Basic. Microbiol.* 34,31, (1994).
5. Jana, S.C. and Mishra A.K.; Factors affecting the growth and acetylene reduction of *Azotobacter chroococcum* B12. *Indian J. Microbiol.* 34, (1994).
6. Ray R.R., Jana S.C. and Nanda G.; Saccharification of indigenous starches by beta-amylase of *Bacillus megaterium*. *World J. Microbiol.* 10,691, (1994).
7. Ray R.R., Jana S.C. and Nanda G.; Adsorption of beta-amylase from *Bacillus carotarum* B6 onto different native starches. *Lett. Appl. Microbiol.* 19,454, (1994).
8. Ray R.R., Jana S.C. and Nanda G.; Biochemical approaches of increasing the thermostability of beta-amylase of *Bacillus megaterium* B6. *FEBS Letters.* 356,30, (1994).
9. Ray R.R., Jana S.C. and Nanda G.; Beta-amylase from *Bacillus megaterium* B6. *Folia Microbiologica.* 39,567, (1994).
10. Jana S.C. and Nanda G.; Production of Xylanase by *Nocardia* sp. is isolated from soil. *Bioved.* 5, 167-170, (1994).
11. Ray R.R., Jana S.C. and Nanda G.; Beta-amylase production by immobilized cell of *Bacillus megaterium* B6. *J. Basic. Microbiol.* 35,113, (1995).
12. R.R. Ray, Jana, S.C. and G. Nanda. Immobilisation of beta-amylase from *Bacillus megaterium* B6 on gelatin by Crosslinking. *J. Appl. Bacteriol.* 79,157, (1995).
13. Ray R.R., Jana S.C. and Nanda G.; Optimization of physiochemical conditions of beta-amylase of *Bacillus megaterium* B6. *Acta Microbiologica Polonica.* 44, (1995).
14. Ray R.R., Jana S.C. and Nanda G.; Induction and carbon catabolite repression in the biosynthesis of beta-amylase by *Bacillus megaterium* B6. *Biochemistry and Molecular Biology International.* 38, 223-30, (1996).
15. Prasad M., Jana S.C., Chaudhuri I and Chaudhuri R.K. Allozyme Diversity in West Bengal Rice Landraces. *Acta Botanica Indica.* 28,119-123, (2000).

16. Poddar A., Gachhui R., Jana S.C.; Cell immobilization of *Bacillus subtilis* DJ5 for production of novel hyperthermostable extracellular β amylase. Aust. J. Basic. Appl. Sci. 5, 456-464. (2011).
17. Poddar A., Jana S.C.; Immobilization of hyperthermostable β amylase from *Bacillus subtilis* DJ5 into gelatin film by glutaraldehyde crosslinking. Int. J. Pharm Bio. Sci. 2, B77-B86. (2011).
18. Poddar A., Gachhui R., Jana S.C.; Saccharification of native starches by hyperthermostable β amylase from *Bacillus subtilis* DJ5 and optimization of process condition for higher production of maltose. Int. J. Appl. Biotechnol. Biochem. 1, 221-230. (2011).
19. Poddar A., Ghara T.K, Jana S.C.; Response surface methodological optimization of production condition of hyperthermostable β amylase from *Bacillus subtilis* DJ5 under solid state fermentation using barley as substrate. Int. J. Pharm Bio. Sci. 3, B9-B19. (2012).
20. Poddar A., Gachhui R., Jana S.C.; Optimization of physico-chemical condition for improved production of hyperthermostable amylase from *Bacillus subtilis* DJ5. J Biochem Tech 3(4), 370-374. (2012).
21. Chatterjee M, Mandal M, Jana S. C.; Isolation and identification of *Lactococcus lactis* JC10 from rotten papaya and characterization of its bacteriocin including its antimicrobial spectrum, Wulfenia, 19, (2013).
22. Poddar A., Jana S.C.; Optimization of novel hyperthermostable β amylase production by *Bacillus subtilis* DJ5 using solid agroresidual substrates. Int. J. Environ. Sci. Technol. Doi: 10.1007/s13762-013-0275-3. (2013).
23. Poddar A., Ghara T.K, Jana S.C; Critical process parameters optimization for hyperthermostable β amylase production by *Bacillus subtilis* DJ5 using response surface methodology. Acta Sci Biol Sci. 36(1):87-93. doi: 10.4025/actascibiols.v36i1.17427. (2014).
24. Mandal M & Jana S C, Effect of bacteriocin from isolated *Lactococcus lactis* JC10 on *Xanthomonas campestris*, causal agent of bacterial leaf blight in Piper betle L. (Paan), Annals of Plant Sciences, Vol 2, No 08 (2013).
25. M Mandal and S C Jana. Antagonistic Effects of Bacteriocin and Bacteriocinogenic *Lactobacillus* on stem rot causing *Sclerotium rolfsii* in Betel. International Journal of Bioassays 4.11: 4454-4457. (2015).
26. M Chatterjee, S C Jana & U Raychaudhuri, Isolation, purification and characterization of a bacteriocin with broad spectrum activity from *Lactococcus lactis* JC10 from perishable papaya, Journal of microbiology, Biotechnology and Food Science.6.1.655-660.(2016).
27. S C Jana & M Mandal; Study on antagonistic effect of *Trichoderma* isolates on *Sclerotium rolfsii*. Journal of Experimental Biology and Agricultural Sciences. 5(4):507-514 (2017)

Name of the referees:

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2. Prof. Tapan Dutta, Scientist, Bose Institute, Kolkata; Ph: 9432932748, email: tapan@jcbose.ac.in