

The only way of finding the limits of the possible is by going beyond them into the impossible.

-Arthur C. Clarke

ACKNOWLEDGEMENTS

This is a solemn opportunity to express my veneration to the entire magnanimous fraternity to those who directly or indirectly have contributed or associated to this work and made it possible.

No words or mere accolades are big enough to express my gratitude towards, the person who stood rock solid beside me during the entire tenure of my research career, yes he is my guide, my supervisor, my guardian **Dr. Ranadhir Chakraborty**. His guidance, continuous inspiration and boundless optimism encouraged me to pull the work and give it a meaningful conclusion. Not even a part of the work would have reached its culmination without him.

I owe special thanks and gratitude to my teachers **Mr. T. Gopalan** and **Mr. Balwinder Singh Bajwa**, who seeded and cultured the scientific research aptitude within me.

Right from my first day in the Department of Biotechnology, I had the opportunity to gain some good advice and wisdom from my teachers **Dr. Shilpi Ghosh** and **Dr. Dipanwita Saha**.

I express my sincere thanks to my teachers **Prof. B.N. Chakraborty**, **Prof. P.K. Sarkar**, **Prof. A.P. Das**, **Prof. Usha Chakraborty**, **Prof. P. K. Basu**, **Dr. Aniruddha Saha**, **Dr. Arnab Sen**, **Sri Palash Mandal** and all other teachers and non-teaching staffs of the Department of Botany, N.B.U. for their valuable advice and genuine assistance.

I got overwhelming support from the Department of Botany, Zoology, Computer Science and Chemistry of University of North Bengal, in all possible forms starting from free flow of logistic amenities to sharing of infrastructures, technical know-how and academic knowledge. So, I record my special thanks to **Soubasya Sur**, **Manpreet Bajwa**, **Monojeet da**, **Bikash da**, **Sikta di**, **Sir C. R. Nayak**, and **Dr. A. K. Nanda**.

I am also grateful for financial assistance in the form of fellowship provided by the **DBT research grant (BT/PR-7164/BCE 08/448/2006)**, Govt. of India.

When I started off as a learner during my research period, trying to imbibe every moments as I slowly progressed, the journey resurfaced as I started learning every step of my accomplished

job from my senior lab-mates **Shriparna di, Bhaskar da, and Anirudra da**. Others followed suit with equal fervour, romping me home with all their diligent enthusiasm to the best of their abilities **Arvind Kumar, Bipransh Tiwary, Amit Mandal, Dhananjay Kumar, Prashantee Singh, Debjani Sarkar, Rituparna Sarkar, and Sonam Bhutia** fills up this void to create an all pervading atmosphere of compassionate vigour. I would also like to thank **Papai Singha, Subhash** and **Bishu** who also helped me sail smoothly by providing continues support and assistance. Special thanks to **Kamal, Manab, Madhumita, Moushree, Gargi, Anasooya**, and other research scholars for their help and for providing healthy ambience during my work.

Few people have a very special place in our lives, sharing a bond which is none others can prove to be stronger off. Although not directly involved in any scientific contributions my buddies **Sanghita, Amrita, Soumen, Swagata, Abhijit, Kallol, Biswajit, Sudipta, Deep**, the list goes on..., have always provided me the light atmosphere which is always a boon in a profession like ours. Spoilt to the brink with an overdose of unadulterated fun and enjoyment, I still treasure the quality time spent with them who had backed me with conviction.

It will perhaps be improper to name individuals since the list of philanthropists who had bailed me out at times of desperate need is so long that it involves the risk of special persons get omitted. I should convey my thanks to all my students. Nevertheless, I must offer my special accolade to the office staffs of the Department of Biotechnology, specially, **Asit da, Biswajit da, Dipak and Raja da** for their untiring cooperation and support.

I am forced to break the age old saying that there are no 'Sorry' and 'Thank You' in friendship. Friends have a very special place in our lives, sharing a bond which is none others can prove to be stronger off. My friends **Trishna, Amrita, Rohit, Sumon, Dipan**...have always provided me the light atmosphere which is always a bonus in a research period.

Small gestures of favour counted in a big way in the form of care and support from my well wishers **Soumitra da, Jishu da, Bua da, Raja da, Bublud da, Madhumita di, Tanusree di, Krishnakali, Reshmi** and other members of NESPON family and specially my beloved **Masimuni and Mesomoshai (Mr. Satchidananda Mukherjee)**. Association with them had given me all time blessings and enough courage, with constant endeavor to carve out a niche for myself.

Words are insufficient to express my feelings and my gratitude for my mother **Mrs. Anima Bhowal** for bringing me up and encouraging at every step of mine. I feel extremely privileged to

have a wonderful, highly caring and very supportive in-laws **Mrs. Namita Saha, Mr. Amal K. Saha, Mr. Apurba Saha and Mrs. Rupa Saha** to whom I offer my deepest thanks and gratitude for all round involvement in my thesis and support without which writing this thesis would not have been possible. My thanks to my sisters **Nancy** and **Doll** for taking very good care at the final stages of my compilation.

My father **Late Mr. Sib Sankar Bhowal**, a highly cool man though worked for Army, far ahead of his time who unfortunately could not live long enough to see this thesis to fulfil his most cherished dream.

Peeping his head out of this big crowd, standing apart with phenomenal qualities deserves a big applause. A big praise to someone, who is nearest, dearest and closest to my heart, a trove of intrinsic worth to cherish throughout my life, my life partner- **Swarup Saha**. He has been harbouring me with constant support and courage to carry on this daunting task amidst several obstacles, time and again.

I thank you all.

Suparna Bhowal

Place: Siliguri

Date: 1st Dec 2011