

## ACKNOWLEDGEMENTS

*I take this opportunity to express my heartfelt indebtedness and gratefulness to my supervisor, Prof. Ashim K. Chakravarty. I would like to thank him for giving me the opportunity to work under his valuable guidance. His vast knowledge and novel guidance has helped me immensely to pursue the work meticulously. I would like to thank him again for spending his extensive valuable time in giving suggestions while writing the thesis and for bearing with me and my shortcomings. His truly scientist intuition has made him as a constant oasis of ideas and passions in science, which exceptionally inspire and enrich my growth as a student, a researcher and a scientist want to be. I believe that I'm blessed with his guidance and will always be grateful to him for whatever he has done for me.*

*I am thankful to all the faculty members of the Dept. of Zoology, North Bengal University starting from Prof. B.C. Pal, Prof. D.C. Deb, Prof. J. Pal, Prof. A. Mukhopadhyay, Prof. T.K. Chaudhuri, Prof. S. Barat, Dr. Min Bahadur and Dr. S. Bhattacharya for their constant encouragement.*

*I would like to thank all the non-teaching staffs of Dept. of Zoology and also Centre for Life Sciences and special thanks goes to Mr. S.B. Sunar, Mr. S Kundu and Mr. D Singha for rendering their helping hands to me.*

*I am very much thankful to Dr. Bholanath Paul, IITR, Lucknow for allowing me to carry out quantization of TNF- $\alpha$  in his laboratory and providing valuable chemicals for ELISA reading. I am also thankful to Dr. Nripendra Nath Mandal, Division of Molecular Medicine, Bose Institute, Kolkata and his scholars for their enormous help to carry out FACS reading in the Centre for Instrument Facilities, Bose Institute.*

*I am indebted to Prof. B. Basu, Dept. of Chemistry, NBU for his valuable guidance and interpreting spectroscopic data in carrying out chemical characterization of ethanolic leaf extract of Eupatorium adenophorum. Thanks also goes to Dr. A.K. Nanda, Dept of Chemistry, NBU for his on and off help in this regard. I am also thankful to Dr. Sajal Das, Dept of Chemistry, NBU and all the scholars of Organic Synthesis Laboratory of the department.*

*I gratefully acknowledge Dr. Shankar N Chatterjee, former Jt. Director, Seribiotecnology, Govt. of India, Bangalore for his advice, supervision and crucial contribution in carrying out the experiments for gene expression analysis.*

*I like to express my sincere gratitude to Dr. A. Sen, Dept. of Botany, NBU, for allowing me to access instrumental facilities, especially PCR, in his laboratory. I also like to thank Dr. Ranadhir Chakraborty, Dept. of Biotechnology, NBU to let me avail instrumental facilities in his laboratory whenever required. I must also thank Prof. A.P. Das for carrying out scientific identification of the plant material and his encouraging words.*

*I am sincerely grateful to Dr. (Mrs.) Alo Chakravarty for treating me as a member of the family and her motherly attitude to me all the time.*

*I am very much thankful to Dr. Hadida Yasmin for her immense help, valuable suggestions and encouragement through out the period.*

*I also like to thank all the research scholars of the Department of Zoology including Mr. Bikash Mitra, Dr. Arindam Das, Dr. Sumanta Bagchi and Dr. Prithwiraj Jha. I would like to specially thank Mr. Bikash Mitra for his untiring help that led to*

*submission of the thesis in due time. Special thanks also goes to Mr. Gautam Debnath and Mr. Rudra Prasad Roy for their brotherly support.*

*Where would I be without my family? My parents deserve special mention for their inseparable support and prayers. I am very much indebted to them for raising me with their caring and gentle love. I specially convey my acknowledgement to my sister, Tiyasha. This thesis also owes much to the love and encouragement I received from my other family members.*

*Words fail me to express my appreciation to my wife Dipanjana whose dedication, love and persistent confidence in me, has taken the load off my shoulder. I owe her for being unselfishly let her intelligence, passions, and ambitions collide with mine. Therefore, I would also thank my parents in law for letting me take her hand in marriage, and accepting me as a member of the family, warmly.*

*I am also sincerely thankful to the Lady Tata Memorial Trust and the University Grants Commission for financial assistance to complete this work,*

*Finally, I would like to thank everybody who was important to the successful realization of this thesis, as well as expressing my apology that I could not mention personally one by one.*

*Tamal Mazumder 2/6/2020*  
TAMAL MAZUMDER