ACKNOWLEDGEMENTS

Thesis is the end of journey to obtaining the Ph.D. degree. The work presented in this Ph.D. thesis would not have been materialized without the close association, contribution, encouragement and invaluable support of several people. Therefore, it is an immense pleasant that at the end of my research work I have the opportunity to express my sincere gratitude and appreciation to all those people who so generously made this Ph.D. thesis possible and an memorable experience for me.

In particular, I owe a great deal of appreciation and gratitude to Dr. Madhumita Mukherjee, Addl. Director of Fisheries (Technical), Department of Fisheries, Govt. of West Bengal for enlightening me the first glance of research.

This thesis represents not only my work at the keyboard; it is a milestone of work in the Entomology Laboratory, Department of Zoology, University of Calcutta and the Cell and Molecular Therapeutics Laboratory, Department of Biochemistry, Oriental Institute of Science and Technology, Vidyasagar University. My experience at here has been nothing short of amazing but I have been given exclusive opportunities and taken advantage of them. Therefore, this thesis is also the result of many experiences and I have encountered from dozens of remarkable individuals who, I wish to acknowledge.

First and foremost, I take this opportunity to convey my deep sense of gratitude and regards to my supervisor Dr. Amlan Das, Associate Professor, Entomology Laboratory, Department of Zoology, University of Calcutta, for introducing me to such an interesting and advanced field of research and providing motivation and encouragement towards real time research work. I acknowledge with much appreciation his valuable advice, constructive ideas and scientific inputs. Concisely, he had gone out of his ways to help me out whenever I was in a need during the tenure of my work. He has been supportive since the days I began working. His endless passion for fundamental science, constructive criticism, dedicated help, inspiration, extensive discussion and active participation for providing high-quality research work, have made a deep impression on me. During last seven years, I learnt a lot from him. I thank him for providing me space and freedom and nurturing my abilities to converted my raw, naive and often unstructured thoughts into science. I am also indebted to him for holding me to a high research standard by enforcing strict validations for each research result and thus teaching me how

to do research. His advices on both research and on my career have been priceless. I am really glad to be associated with a person like him in my life.

At the onset, I convey my humble gratitude and sincere thanks from my heart to my supervisor Dr. Smarajit Maiti, Professor and Head of the Department, Cell and Molecular Therapeutics Laboratory, Department of Biochemistry, Oriental Institute of Science and Technology, Vidyasagar University, Midnapore, West Bengal, India for his constant encouragement, overpowering moral support, patient advice, sustained interest, excellent guidance, candid and thoughtful constructive criticisms throughout the course of investigation and preparation of the manuscript. His overpowering support, timely guidance went all the way from the early stages of the experimental work to its analysis and especially during its presentation. Not only did he provide apparently in exhaustive source of information, but also his inspiring, enthusiastic nature encouraged me to reach my objectives. I am also obliged to my supervisor for his constant cooperation and supports in all aspects extended by him during the research period. My sir not only supervised the preparation of this investigation but also took great pains to help me overcome many problems in concluding it. In this regard, I want to express my sincere regards to him once again.

I think that this thesis will not turn into a complete one until I am acknowledging my all teachers because of whose teaching and encouragement at different stages of education have made it possible for me to see this day. My profound gratitude's are to my teachers, who teach me from my childhood.

I express my deep sense of appreciation to Professor Ranjan Chakrabarti, Hon'ble Vice Chancellor, Dr. Jayanta Kishore Nandi, Registrar, and Dr. Subrata Kumar De, Dean, Faculty Council for Postgraduate Studies in Science, Vidyasagar University, for providing me this platform to accomplish my work in this Institute.

I would like to thank Dr. Amal Kumar Bhunia, Assistant Registrar, Sri Susanta Ghorai and Sri Rajesh Karmakar of Ph.D. Cell of Vidyasagar University for their cooperation and timely support.

I express my earnest thankfulness to the present and past members of the Ph.D. Committee, Department of Biochemistry, Vidyasagar University, for their suggestions and arranging the procedures during my research work.

I am grateful to the Director, Zoological Survey of India, Prani Vigyan Bhawan, M-Block, New Alipore, Kolkata-700053 for identifying me the studied insects.

I express my regard for Dr. Madhusudan Das, Professor & former Head, Department of Zoology, University of Calcutta for providing me facilities to conduct the screening work.

It's my great pleasure to express my sincere thanks to Professor Amit Kumar Das, Department of Biotechnology, Indian Institute of Technology, Kharagpur-721302, West Bengal, India for his cooperation and helpful suggestion.

I express my warm regards and deepest gratitude to all the respected teachers, faculty members and all laboratory staffs of the Department of Biochemistry, Oriental Institute of Science and Technology, Vidyasagar University for motivating me during my research work.

I acknowledge my gratefulness to Sri Sumit Mandal, Smt. Dipsikha Ghosh my lab mates of the Entomology Laboratory, Department of Zoology, University of Calcutta for sharing their experiences with me, which indeed helps me a lot to improve my investigation, past and present.

My heartiest thanks go to Sk. Sajed Ali, Md. Mobidullah Khan, Sri Sumit Sahoo, Aarifa Nazmeen and all members of the Cell and Molecular Therapeutics Laboratory, Oriental Institute of Science and Technology for being good lab mates and helping in throughout my experiments.

I am enormously thankful to Sri Nirmallya Sinha, Faculty of Nutrition, Department of Nutrition, Raja N.L. Khan Women's College, Paschim Medinipur who is always therefor-fantastic statistical work with me throughout my paper and thesis writing.

I would also like to thank to Sri Suvankar Maity and Sri Sukamal Bhunia, Research Assistant, Department of Fisheries (Microbiology and Parasitology), Govt. of West Bengal, and Sri Santanu Bera, for their assistance with the collection of insects from field to laboratory.

I want to thank Smt. Sumana Maity, P.G. Learner, Department of Nutrition, Vidyasagar University for her unconditional help to compose the picture, plates, and figures for presentation, publication, and thesis preparation.

I wish to express my gratitude to my friends for their constant source of inspiration, strength, and intellectual courage that helped me to pass this agonizing period in the most positive way.

I am deeply feeling that it is more than a duty to reminisce the feeling, love, inspiration, encouragement, and constant support extended to me from my father, mother, brother, and other family members, involved during the whole course of my work. They have instilled many admirable qualities in me and taught me about hard work and self-respect.

Finally, my heartiest appreciation I express to my friend Smt. Prativa Pradhan, Assistant Teacher of Life Science, Kaliachak Girls High School (H.S.), Malda, West Bengal and former Assistant Technology Manager, Department of Agriculture, Govt. of West Bengal, whose technical help and genuine mental support, encouraged me to complete my thesis. I am richly blessed for this.

Last but not the least, I express my heartfelt thanks to the little ones Rupam, Subhashree and Subham for their help and cooperation in different ways.

It is very difficult to mention every individual name who directly or indirectly lent their helping hands in this venture but I have missed their names in this small space, I hope they will accept my sincere thanks for all that they did and will remain permanent in my memory.

I greatly acknowledge the SERB-DST, Government of India for providing financial assistance (SR/FT/LS-174/2012) which made my work possible and comfortable.

Above all, I bow my head to the supremacy of Almighty God for granting me the wisdom, health, and strength to undertake and complete this research task successfully.

Thank you all.

Midnapore, 11th August, 2020

Subha Janmastami

(Sri Balaram Manna)