## Acknowledgement

I offer prayers to Almighty/Allah - Entire source of every knowledge and wisdom; for constant blessings, being merciful, forgiving me for happened mistakes and for pouring out the opportunities as I travelled along the way to achieve this dreamful goal. Writing this tough volume is harder than I thought and more rewarding than I could have ever imagined. None of these would have been possible without Guruji His Holiness Syedna Aaliqadar Mufaddal Saifuddin Saheb (T.V.S) and Late Syedna Mohammad Burhanuddin Saheb (R.A) for his valuable guidance, support and blessings in my life and family.

"Two roads diverged in a wood, and I, took the one less travelled by, and that has made all the difference". With these lines by the famous poet Robert Frost, as my PhD journey nears the end, I would like to express my heartiest gratitude to everyone who made this expedition possible. These are the people who have lent a helping hand in one way or the other and have indeed helped me make a difference in my own life.

"You can never cross the ocean until you have the courage to lose sight of the shore" by saying this, I bestow my unbound gratitude and deep sense of respect to my mentor Dr. Ranjitsinh V. Devkar, The Admiral, who kept my ship sailing in the ocean of the Knowledge. I have learned the best of his management, strategy building, interacting with societies, problem solving ability and what not! He guided me not just during my academic phase but of life as well. I appreciate the certitude that he conveys free hand to his students and let them chisel their art of work while he will stand by you as your backbone. The passion he brings to the lab is just praiseworthy. He is the most understanding and super chill guide/mentor a student can ever ask for because I never felt the line of seniority or superiority while having any conversation. I will surely imbibe his words in my life that "Hit the bull's eye."

I would also like to extend my acknowledgements to current Head, Department of Zoology, **Prof. Kauresh** Vachhrajani and former heads **Prof. Pragna Parikh**, **Prof. Dolly Kumar** and **Prof. P.C. Mankodi** for their support. Also, I want to thank all the teachers who put in their contributions from my undergraduate and post graduation days. **Prof. B. Suresh** and **Dr. U.K, Gowrikumari** whose guidance and support over the years were noteworthy. I would also like to thank **late Prof. Vihas Vasu** who was more than just a teacher. My deep condolences to him. Sir, you gone too soon.

I extend my sincere gratitude to **Prof. Doo Sup Choi**, Professor at Mayo Clinic, Rochester, Minnesota for providing valueable suggestions for behavioral studies and allowing his post-doctoral fellow, **Dr. Whidhul** Hasan for helping me in Behavioral Analysis. Also I would like to acknowledge **Dr. Prakash Koringa**, for extending NGS (Next Generation Sequencing) facility and **Dr. Mansi Desai** for her contribution in Metagenomics studies in Dr. Koringa's lab. **Prof. Govindaswamy Umapathy, Centre for Cell and Molecular Biology, Hyderabad** and **Dr. Sriram Seshadri Nirma University, Ahmedabad** as well as his

student Mr.Sunny, for their assistance in conducting ELISA experiments. I wish to express my sincere thanks to Prof. A.V Ramachandran Sir, for inspiring and motivating me in my initial days of this voyage.

I also pay my sincere regards to dignified non-teaching staff of the department. Shree Rajesh Nayak, Late Shree Sangeet Patel, Shailesh Chikne, Hemant Parmar, Urmilaben Patel, Hitesh Suthar, Gulab Yadav, Shankar Rabari, Shripad Mane, Dilip Bhil, Nazir Salat, Haji Ghachi, Mukesh Rabari and Rajendra Rabari for their generous cooperation which lead to hassle-free function of administrative work.

I am thankful to **Prof. Rajesh Singh**, Department of Biochemistry, MSUB, for providing access to their laboratory instrumentation whenever required. I further express my gratitude to Director, DBT-MSUB-ILSPARE for allowing the use of Central Instrument facility at the Dr. Vikram Sarabhai Institute of Cell and Molecular Biology, Science Block, MSUB.

Being extrovert and omnific in nature, I was fortunate enough to get like minded people in my lab. To start with I thank my seniors **Dr. Shweta Patel, Dr. Sarmita Jana, Dr.Kavita S. Shirsath, Dr. Apeksha Joshi.**Special Thanks to **Dr. Jaymesh Thadani** for his creditable contribution in initial days, for teaching me fundamental scientific principles, sharing your expertise during in vivo studies as well as in wet lab. They welcomed me wholeheartedly and I never had a single day of feeling like a fresher.

My heartfelt gratitudes for my senior/ elder brother Dr. Kapil Upadhyay. With the amount of relations I share with you, a tiny paragraph will fail to surmise the felt acknowledgements, because such bonds are made forever. You just not helped me in the initial days because that process is still going and will go till my entire life. Thanks for sharing your experiences and letting me understand the situations and helping me with "What to do next?". I also express my gratitude to my Buddy/labmate — (To be Dr.) Ms. Hitarthi Vyas, without her belief and combined efforts, completion of my wet labwork would not have been possible. Thanks for critically evaluating my research papers and making them the special touch. I will not forget sharing your tiffin which used to full of various delicious Gujarati delicacies and our tea/coffee sessions. I could rely on you whenever my absence in the lab was unavoidable. We both always worked as a team. Special thanks for helping me in an administrative work, too.

Nilay and Shruti, even though you guys joined the lab in quarter past half of my PhD, you guys were always helpful wherever and whenever I needed. I am very greatful to Nilay for helping me as a younger brother in any task, whether related to helping me in normal routine work, in vivo study, analysis work, creativity task for my research articles/presentations/thesis. Thanks Shruti for sharing your delicious food, behavioral analysis work and to proof-read my thesis. Thanks Rhydham because we have grown our bond so nice in such small time period. Thanks for helping me in my work and (GUT-wala) analysis part too. I believe you three will maintain the momentum of the lab with your hard work and commitment for sure.

I would like to acknowledge DST-PURSE and Gujarat State Biotechnology Mission (GSBTM), Gandhinagar Research Fellowships during my PhD programme. Also I would like to thank the Clerical staff of DST-PURSE, Mr. Rakesh M. Parikh, Mrs. Jigna R. Parikh, Mrs. Revathi G Iyer, Mr. Savant Santosh and Mr. Gopal Tandale for timely and smooth functioning of disembursement of fellowship during tough time of COVID-19. I would also like to thank BCHET (Burhani Centennial Higher Education Trust) for providing financial support during the study.

I also would like to acknowledge Dr. Jaldeep Laghnoja, who not only shared the lab but also memories. I sincerely thank my fellow-mates, Dr. Kangkan Sarma, Dr. Ruzbeh Mirza, Ankit Khandelwal, Himadri Bhatt, Dr. Urja Verma, Dr. Kashmira Khaire, Dr. Shashikant Sharma and Raju Dabhi who made the PhD phase fun filled, joyous and colorful. Frequent chai visits, meetings in corridors, participation in departmental activities and much more that we shared made working place jubilant. Further, I want to acknowledge all the Research Scholars of Department of Zoology who formed a healthy scientific environment. I would also like to acknowledge my friends Murtaza, Hussain, Mohammad, Mustafa, Ammar Husain Mandasourwala and Marut Adroja for their support during this journey.

I would also like to thank the dissertaion students team who were there as a back-stage support system for nocturnal behavioral analysis: Vivek, Sunny, Gopal, Nainesh, Ankit and my cousin Hussain. A warm thanks to the MS University Vigillance and Security team for providing the safety and service even late at night, Mr. P.P Kanhani Sir, Mr. Piyush Pathak, Mr. Rajesh Patil, Mr. Ravi Mungekar, Mr. Kanu Rajput, Mr. Noorubhai, Mr. Bhagwan bhai and Mr. Vijay Sapkal for their support. I would like to thank Chandrakant Visawe and Ratna Visawe for helping in histological work.

I would also like to thank Mrs. Neeta Dhar Mam (GCU), Mr. Milind bhai (DADA), Mr. Mayur Dhamecha, Mr. Yagnesh Dave and Ms. Sonal Jadhav at the administrative and exam section of MSUB head office, for facilitating speedy execution of the administrative processes right from PhD registration to the final submission of this thesis. I would also like to thank Mr. K, M Damor, Mr. Chirag Varia, Mr. Harmit Kahar, Mr. Pinakin Vankar and Mr. Umaji Khot, at the Faculty of Science administrative office for facililating speedy execution of the office work documents even at the last moment.

My warm and heartfelt thanks to two persons who mean a lot to me, my beloved grand-parents, Late. Mohmadhusen Vohra and Mrs. Sakina Vohra and my beloved parents, Mrs. Fatema Vohra and Mr. Hatim Vohra for showing faith in me and giving me time and support. They have been selfless in giving me the best of everything and I express my deep gratitude for their love and sacrifices, without which this work would not have been completed. I express my loving thanks to my dearest sister, Mariya and Batul, my nephews (Burhanuddin and Husain) for supporting me, My heartfelt regards goes to my in-laws for

being extremely supportive and understanding, especially my Mother-in-law, Arwa Cyclewala and Father-in-law, Mr. Murtaza Cyclewala, who stood by my side even though it was difficult for them to understand what I worked on. I am also thankful to my in-law family (Maria ben, Amatullah and Taher) for their constant support throughout the journey. I am really grateful to them and also other family members for their constant love and blessings.

My heartfelt thanks to my another family in Chicago, United States, Mr. Rogelio Martinez, Mrs. Celia Martinez, Mr. Rogelio Martinez (Junior), Mrs. Angela Martinez, Mr. Eddie Martinez, Mr. Freddy Martinez and Ms. Berenice Martinez for their continuous love, support and motivations during this journey. I would also like to remember my Madame. Late Margarette Stoiljkovich (Coordinator-AFS Chicago) and my teacher Late. Mrs. Batulben Bharmal for her blessings from heaven.

I take this moment to express my gratitude to my betterhalf, **Rukaiya**, for understanding and supporting my goals and aspirations that made the completion of my PhD possible. Her love, care and encouragement has been my strength even in tough times. Her patience and sacrifice will continue to be my inspiration and I am thankful to her for believing in my capabilities more than I did. I have no words to thank my son **Saifuddin** (**Piece of Heart**), he was in a new world when he was born and knew nothing, but his support and smile helped me to forget my sorrows and made that so easy to pass and provided me new strength.

This list is endless and can go on and on. My apologies and heartfelt gratitude to anyone whom I have missed out, but these people also had some or the other role to play during my study.

Finally, I would like to thank everybody who was important to the successful realization of this thesis and whose names I might have inadvertently missed out.

Vohra Aliasgar Hatimbhai