

Acknowledgement

I would like to express my deepest gratitude to “**Prabhu Shree Ram**” for your divine guidance, strength, and blessings, which have been my constant companions throughout this amazing journey. Throughout the journey, your presence provided me with courage and perseverance in difficult situations. Your divine grace has illuminated my path, enabling me to overcome the challenges to achieve this milestone. I dedicate my entire work to you, and I am extremely grateful for your blessings.

Firstly, I would like to express my deep gratitude to my research mentor, **Prof. Devarshi Gajjar**, for having belief in me and providing me the opportunity to embark on my research project in the domains of microbial genomics and bioinformatics, regardless of my foundation in core microbiology. She provided all the necessary resources to carry out this captivating study, as doing research utilizing whole genome sequencing remains an aspiration for several scholars, particularly at public institutions. Also, I am deeply grateful to Madam for your unwavering support, guidance, and profound knowledge throughout my journey have been the cornerstone of this work. Your constant constructive feedback, patience, and encouragement have been instrumental in constructing my thesis. You contributed not just as my mentor but also as a consistent source of encouragement, demonstrating your commitment and enthusiasm as a researcher. Your prompt guidance and flexibility to explore concepts, regardless of their level of development, have generated a dynamic and uplifting research atmosphere. Her profound scientific aptitude has always served as a source of ideas and intellectual stimulation, fostering my development as a student, researcher, and future scientist. Please accept my utmost respect for all of this and many more.

I thank **Prof. Haribhai Kataria**, dean of the science faculty, for his motivation, guidance, and support. I also extend my heartfelt gratitude to **Prof. G. Archana**, the Head of Department, and a member of the doctoral committee, for their insights, suggestions, and guidance throughout my Ph.D. I am deeply grateful for the institutional facilities, as well as the moral, financial, and technical support they provided during my research tenure.

I express my sincere gratitude to all the members of my Doctoral Research Committee (DRC), **Prof. Mrunalini Nair, Prof. Anuradha Nerurkar, Prof. Sanjay Ingle, Dr. Nandita Baxi, Dr. Ratika Srivastava, Prof. Pushpa Robin, and Prof. Rajesh Singh**, for their invaluable assistance

and mentorship throughout my research journey. Their support and constructive feedback played a pivotal role in facilitating the successful completion of this study.

I would like to express my gratitude to the other departmental teachers and collaborators, **Dr. Pranav Vyas, Dr. Pushendra Singh** (Scientist-F, ICMR-NIRTH, Jabalpur, MP), **Dr. Ekadashi Rajni** (Associate Prof. at Mahatma Gandhi Hospital and Medical College, Jaipur), and **Dr. Geeti Maheshwari** (MD Pathologist at Toparani Advanced Lab, Vadodara), for their invaluable assistance, advice, and providing clinical samples during the project. Additionally, I would like to express my sincere appreciation to **Dr. Madhvi Joshi** (Joint Director- GBRC), **Prof. Chaitanya Joshi** (Director- GBRC), and his **team** for granting me the opportunity to carry out all my sequencing and data analysis activities at the Gujarat Biotechnology Research Centre, DST, GOG. Conducting research without the assistance of non-teaching staff can be extremely challenging. Fortunately, I am supported by several staff members, including **Mr. Shirish Sir, Dr. Harsukh Tank, Nitesh Sir, Aparna Madam, and Seema Madam**, as well as other non-teaching staff members from the department. They consistently provide guidance and support for all my documentation and administrative tasks.

Ph.D. students often experience thoughts of social exclusion during their doctoral programs, but I personally did not experience this because of the exceptional friendliness among my lab colleagues and master's students. At first, I would like to offer my admiration to my friend, **Ms. Pinal Trivedi**, for her exceptional support throughout my research journey. She is an exceptionally delightful person and a kind, modest companion. Throughout my Ph.D., she consistently provided me with help and compassion whenever I had feelings of sadness or disappointment, offering encouragement and understanding for both professional and personal challenges. The support, especially for the documentation and paperwork during my absence, she provided had a crucial role in facilitating the completion of my Ph.D.

Furthermore, I would like to express my gratitude to **Ms. Purvi Joshi**. I enjoyed collaborating with her and valued the presence of an additional individual to distribute laboratory duties with. She demonstrated exceptional competence and efficiency in operating the lab, swiftly acquiring new skills, and providing valuable assistance. I would like to express my gratitude to **Mr. Milan Rathod**, who was an exceptional companion with whom I had a fraternal relationship. He rapidly became a trusted colleague in the laboratory and played a crucial role in assisting me with my tasks. I express my gratitude to **Ms. Heli Upadhyay** for her invaluable aid and support during my

research endeavor. I would like to express my gratitude to **Mr. Oluwatosin Akinwotu** for his assistance and support. I also express my gratitude to **Mr. Paparaidu Sanapala** for his valuable advice and unwavering support. I would also like to extend my appreciation to my senior colleagues and previous members of the laboratory, **Dr. Swati Madhu, Dr. Siddhi Desai, and Dr. Hiral Patel**, for their invaluable guidance, support, and help in conducting experiments and analyzing data. Additionally, I extend my gratitude to **Dr. Siddhi Desai** for providing clinical isolates to facilitate my research.

I would like to express my gratitude to my wonderful friends, **Ms. Payal Mavadiya**, for her invaluable assistance, support, and updates pertaining to academic matters and university affairs; **Dr. Humayara Khan**, for her help and support regarding Ph.D. documentation and paperwork during my Ph.D. journey; and **Mr. Vipul Bhinsara**, for his unwavering assistance, support, and enjoyable experiences we shared during my Ph.D. research. I also thanks to my senior and junior colleagues of the department **Dr. Khyati Mehta, Dr. Hasmatbanu Buchad, Ms. Shivani Raval** and **Ms. Khushboo Rana** for their invaluable assistance and support.

I am grateful to the dissertation students who worked with me, namely **Urmil, Ashutosh, Shalini, Vishal, Priyanka, Pragyan, and Maxime**, as well as the master's students **Shrinkhala, Laxmikant, Shriram, Manish, Sanjay, Dhanashri, Twinkle, Shikhasmita, Nikita, Hemant, Dhrumil, Sunil, and Rohit**, who directly or indirectly helped me during my research. I also appreciate **Ms. Janvi Patel** for her help, especially in thesis formatting. In addition, I would like to express my gratitude to my friends **Mayank, Vishal, Hemant, Sunil, Santosh, and Vipul**, who participated in cricket activities with me on weekends, as this positively impacted our mental and physical well-being.

I am deeply appreciative of my family's constant love and support, and words alone cannot adequately convey my gratitude. Dear "**Maa and Papa**", you have always shown unwavering faith in me and provided constant support in my pursuit of my aspirations. I've succeeded because of your sacrifice, patience, and understanding. During this journey, your affection, endurance, and unwavering backing have consistently inspired me. You have consistently provided support throughout both the positive and negative moments, consistently giving a receptive ear and a reassuring presence. I express my gratitude for your understanding and support. Dear siblings, I greatly appreciate your unwavering belief in me and the uplifting words you have shared, as they have provided me with immense fortitude.

Finally, I would also like to express my gratitude to the **Department of Microbiology and Biotechnology Center**, Faculty of Science, The M. S. University of Baroda, Vadodara for providing the necessary research facilities. Additionally, I would like to acknowledge the **Gujarat Biotechnology Research Centre**, Gandhinagar for their Next Generation Sequencing platform and bioinformatics expertise, **Dr. Toprani Advanced Lab** in Vadodara, and **Metropolis Lab** for providing the clinical samples. I would like to extend my appreciation to **GSBTM** and **ICMR** for their generous financial support, which greatly facilitated the smooth execution of my research.