

---

## Acknowledgements

I WOULD LIKE TO BEGIN WITH THE ANTHEM OF LIVERPOOL FOOTBALL CLUB, WHO I'VE SUPPORTED SINCE I WAS IN MY EARLY TEENS. IT HAS BEEN POSTED ON MY LAB CUPBOARD SINCE THE DAY I BEGAN MY WORK. IT HAS INSPIRED ME WHENEVER I WAS DOWN.

### YOU'LL NEVER WALK ALONE

“WHEN YOU WALK THROUGH A STORM. HOLD YOUR HEAD UP HIGH. AND DON'T BE AFRAID OF THE DARK. AT THE END OF THE STORM. THERE'S A GOLDEN SKY. AND THE SWEET SILVER SONG OF THE LARK

WALK ON THROUGH THE WIND. WALK ON THROUGH THE RAIN.

FOR YOUR DREAMS BE TOSSED AND BLOWN

WALK ON, WALK ON. WITH HOPE IN YOUR HEART.

AND YOU'LL NEVER WALK ALONE

YOU'LL NEVER WALK ALONE”

*Today as I sit to acknowledge each and every person who has played a part in making this thesis possible, I scratch my head; not because there aren't any but because there are so many and I find it difficult where to begin. It hasn't been a straightforward journey, it feels like a movie directed by Christopher Nolan, a very complicated and non-linear journey full of surprises at every possible moment. I wouldn't say that each part of my Ph.D. has been rosy and good but then that's life; without the lows, the highs wouldn't be as enjoyable. It's been quite a few years here, in the University and the Department but the thing I'll miss most dearly is the beautiful campus of the University especially during the winters and monsoon where it used to feel next to heaven. The amount of time I've spent at the Dept. of Microbiology and Biotechnology centre throughout my Ph.D., it's easy to assume I will miss the lab & every nook and corner of the place especially when it won't be my routine and reminisce the good times. The experiences I've had here, good and the bad, have made me the person I am today. A more evolved and mature one than what I was when I joined. The lessons learnt here and I'm not talking about the academic ones but lessons of life have been crucial in shaping my personality.*

*Countless people have helped, contributed and influenced this work but it would be fair to say that my first, foremost and the most heartfelt thanks would go to none other than my Ph.D. guide, Prof. Anuradha Nerurkar. I am grateful for the person she is and it's inspiring to see the way she deals with*

---

*the things as they come. I am humbled to have worked under your mentorship not only for the Ph.D. but also during my M.Sc. dissertation and that's where the journey began. I count myself lucky to have been accepted by you as your Ph.D. student. She has not only helped me innumerable times when I hit a roadblock in my work but was also there to motivate me when I felt all chips were down. I thank you for being calm and patient throughout the years, till the very end. Sometimes it took me time to realise why she would ask me to do certain things but in the long run I have and am grateful for it. Such a Ph.D. supervisor is rare and I'm one of the few lucky ones who had one.*

*I would like to extend my Thanks to Prof. G. Archana, HOD, Department of Microbiology and Biotechnology Centre, The M.S. University of Baroda for always showing support to me whenever it was required. I would like to formally thank her for the two strains she provided for my experiments - GFP harboring E. coli S17-1  $\lambda$ pir and Rhodococcus erythropolis CRD13.3C. I am grateful for her positive critique throughout the years during presentations that helped me shape my work for the better. I thank Prof. T. Bagchi, ex-HOD, Department of Microbiology and Biotechnology Centre, The M.S. University of Baroda who was the HOD during my time as a M.Sc. student and initially when I joined as a Ph.D. scholar. I would like to thank Prof. Devarshi Gajjar who's friendly nature and always ready to help attitude was always great when doing any departmental work. Thanks for your support all these years in every way possible. I would sincerely like to thank the Late Dr. Johannes Manjrekar, a soft free spirit who inspired students without even trying. His passion for photography and haiku's are well known. His spirit lives on in every student he inspired to have a hobby or a life outside of studies. I thank Dr. Pranav Vyas for his motivational pep talks. I heartily thank Prof. S. Ingle and Prof J. Pohnerkar for being members of my Doctoral Advisory Committee and also for their valuable suggestions they gave during and after the annual presentations. I would also like to thank Dr. M. Nair, Dr. N. Baxi, Dr. P. Singh, Dr. R. Srivastava and Dr. Rajesh Patkar for their support.*

*I would like to acknowledge Dr. R.R. Acharya, Research Scientist, Anand Agriculture University for providing the soil samples and information regarding vegetable soft rot diseases native to the area. I would extend my gratitude towards Dr. Harish Suthar, Asst. Prof., Navsari Agriculture University who gave me a tour when I visited his University and showed me the in field methods adopted by them regarding plant diseases. I thank Dr. Yves Dessaux, Former Director of research, CNRS and Deputy director, Department of Microbiology, Institute of integrative cell biology, France for his quick and positive response to my request of acquiring the Rhodococcus erythropolis strain. I thank Dr Henrik Stotz, Crop Protection, School of Life &*

---

*Medical Sciences, University of Hertfordshire, Hatfield, UK for his inputs and support when I was applying for Commonwealth Split-site Scholarship.*

*I thank the non-teaching staff of department. Shirish sir was ready to any required official documents or to resolve any query regarding the fellowship. Mandvekar sir was always helpful in the lab in every way possible. Aparna ma'm provided with the required strains from the departmental stock whenever required which was very important through the Ph.D. Praveen sir and Seema ma'm provided an unaltered supply of glassware, distilled water and any help that was required regarding the dept. Harsukh sir was always there for any ordering item related query and used to solve problems quick. Nitesh sir, Varghese sir and Nair sir also helped in many formalities to be carried out at department and university.*

*Now I thank a couple of people who have been my strongest support throughout my journey at the department and beyond. I thank my senior and friend, Dr. Vihang Thite who has been a constant support who has taught me most things I required to complete my Ph.D. From protocols to theories to practicals to problem solving to technical issues of any sort to how to deal with different situations in the dept. He was always there when I needed him and still is a phonecall away from extending his help irrespective of the situation or circumstances. I am very appreciative of Dr. Thite helping me out with enzyme kinetics and enzyme related studies. Discussions with him during tea breaks were worthwhile. I am extremely grateful to know Dr. Abhik Saha, person who I consider a good friend. He has been there since my M.Sc. days for helping me out in every way possible. I am indebted to him for his help during the starting of my Ph.D. as well as helping me out with my Molecular Biology experiments from another corner of the world. Discussions with him on football, cricket, movies and everything in between over food got me going through these years. Both Dr. Thite and Dr. Saha have been equally helpful even after leaving the department. Both played a huge role in where I am today.*

*I thank Dr. Priya Pillai for her knowledge and help with potato plants which helped me design my experiments. I would like to thank my lab mates Dr. Jitendra Gosai, Dr. Sneha Garge, Dr. Siddhi Vora, Dr. Sweta Talreja and Mrs. Reshma Shaikh for having such a good and fun atmosphere in the lab. We had some really fun times and outings which I will definitely never forget. I am grateful to have my batchmate who I consider a genuine friend, Ms. Juliya Thomas as a constant support system throughout my time here. I am thankful to Mr. Akhil Thaker, Mr. Divya Purohit, Mrs. Khyati Mehta and Mr. Anand Paranandi from Bharat Chattoo Genome Research Centre who extended their helping hand letting me perform my last few experiments at BCGRC lab which let me put my benchwork to conclusion, especially during*

---

the tough time in and around the Covid-19 pandemic. I thank my junior, Ms. Roshni Patel for proofreading my thesis and her help with experiments. I also thank my other colleagues Ms. Abhi Shah, Ms. Hasmat B, Dr. Mihir Sarang, Dr. Siddhi Desai, Mr. Anand Dave, Ms. Jaswinder Kaur, Mr. Ajinkya T and Ms. Mansi Agrawal.

I would like to extend my thanks to the M.Sc. students who worked with me: Rajvee Shah, Aditya Malwe, Rashika, Shiksha Sharma, Paheli Sharma, Paras Kamboj and Manasa B. Each and everyone with a personality that was unique, open to learning and most importantly, great people to hang out with in general. It's with pride I say that I consider some of them as good friends that I made through my Ph.D. journey. I learnt with them, grew with them and feel extremely proud when I see them doing great in their respective careers. I have met some great people during my years but none better than my classmates Dr. Isha Ranadive and Dr. Anindya Bhattacharjee who have been there through thick and thin with me, helped me in personally and professionally. I also thank Dr. Ranadive for proofreading my thesis and helping with the cover page. Also, Dr. Bhattacharjee for helping me out whenever I was in Pune and to all the good times. I would like to thank some of my juniors Prajakta Mahajan, Harsh Ashar, Pancham, Swagatama, Lavita, Abdeali for being fun people to hang out with. I am thankful for Ms. Riddhi P for helping me out through numerous situations. I also thank Swagatama and Ms. Akshata Desai for their help and expertise with graphic images.

Lastly, I come to a few people without whom nothing of this would be possible. People who do not belong to the field but their contribution is priceless. The big three, Mr. Abhishek Dey, Ms. Ruta Lele and Mr. Jaimin Modi for being my constant support system, day in day out. They were there for me irrespective of time or place. I could be completely open to them and they would patiently listen, console and advice when things were low and were there when things were good and it was time to celebrate. Would also thank Mr. Meet Desai and Mrs. Nivedita Thakar for being extremely great people, great hosts and friends since school. Also, would like to thank Mr. Malak Desai who has been my friend since we were toddlers. I thank my younger brother Manneck for our trips, constant hangout sessions, silly jokes, constant support and football watchalongs. We might argue as much as any sibling pair but life would be dull without him. Finally, I'm grateful and thankful to have my Mom and Dad who have supported me in all my endeavours without an inch of hesitation.

-Ashtaad