Porphyromonas gingivalis, the beast with two heads
Gabarrini, Giorgio

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Chapter 10

Acknowledgements
A thank you

Dear reader,
welcome to the last chapter and, if you’re like most people (and most people usually are), the first chapter you’ll read. Maybe you’re someone from my reading committee (hi, by the way) (Highly learned opponent), maybe you’re a collaborator or a supervisor and you’ll actually read the rest of the thesis after this [realistic laughter]. Maybe you’re a friend or a colleague or a vague work acquaintance and maybe you promised me, or even yourself, that this time is gonna be different and you’ll actually read this book in its entirety although we both know it’s not gonna happen. Maybe you’re my mother (what are you doing here and when did you learn English?) or my brother (just read the introduction, honestly, the rest might just seem crazy complicated). Maybe you’re a student, years from now, tasked with copying a protocol, brushing up on the basics, or just checking a minor detail like ‘which sonication program I used’ (the right one, in case you were wondering). Whoever you are, maybe halfway through, maybe at a certain chapter, or maybe right at the cover, this book will start to seem so much boring to you that why not flipping through the pages and check the acknowledgments? What has this guy written in the one chapter in which you’re not bound by the rules and limitations of scientific writing (or common decency for that matter)? Is it gonna be fun? (No. You have been warned). Are you cited in this chapter? I know that’s most likely the only reason why you’re reading this, if you’re not scanning it for your name already. And I understand. Who hasn’t done that with at least one thesis (or each of them)? Who doesn’t want to be thanked? I promise you’re here, maybe not like you’d like it but you’re here. A thesis, or the PhD as a whole for that matter, is something impossible to do alone. There’s so many people, situations, hurdles, straight up messes that help you, mold you, (sometimes leave you in shambles\(^1\) and forge you. The only right thing is to thank them all. It is customary in these cases to start with the supervisors. For the first time in my PhD, I won’t follow the rules (well, there was that time in Leiden a couple years back but nobody has to know). I’d like to thank my father. You’d think that family members don’t give much contribution to science but I discover every day how many aspects of my scientist self were shaped by them. Curiosity, thirst for knowledge and passion for books are all

\(^{1}\) I’m thinking about the inoculation loop shortage of 1974.
things that if I didn’t inherit (almost genetically) were definitely fostered, fed, and bred by my dad. And I don’t owe him just behaviors but the chance to grow in an environment steeped in “culture”, for lack of a better word, whether that was the difficult novels read to me as a child as bedtime stories (which I sadly learned to appreciate only later in time), the historical sites I got to visit on holidays, or his astronomical stories (and I mean ‘regarding astronomy’, although they did seem astronomical to my child self). I would not have been the same scientist (or maybe a scientist at all) without him. The same can be said for my mother, to which I owe my stubbornness. Indeed, that has served me well almost always/most times/I-actually-don’t-care-because-I-love-it. Disguised as thoroughness, which really is just a fancy and more acceptable synonym for it, my stubbornness helped me get through months-long seemingly useless subprojects and soldier on through paradoxically longer lonely weekends in the lab. It also made me a very annoying person but that’s another story. Funnily enough, albeit my parents never tried their hands at a PhD (wise choice), they gave me all the tools I needed to at least survive one. Two of these tools are encouragement and support, at which my mother excels. Always capable of sensing the slightest hint of disappointment from the tone of my voice, she would provide relief and succor (although explaining her in detail the problems in my experiments remains, to this day, one of the hardest challenges of my PhD). Without my brother, however, none of this would have been possible, as he had always reassured me of the sanity of my career decisions, even this one and even in the face of my faltering. This, despite his own very personal view of biology as something overly simplified due to biology books being “filled with all those weird colorful drawings” (for shame, brother! How do you want to represent proteins?). Without him, I definitely wouldn’t have written this book (but a similar one, with equally colorful drawings).

I want to thank my supervisors, Arie Jan van Winkelhoff and Jan Maarten van Dijl, for allowing me to work on this project and the usual boring things said on this topic. I’d rather give a different take on this bit. I’d like to thank A. J. for letting me know about the savage savannah beast that is *P. gingivalis*, for creating the project, and giving me a place and a fighting chance in this field. For all the constructive talks (and endless connections) in the field that have lead us to surprising turns and straight up plot twists in this project, to intercity/interstate/interspecies (the jaguar) collaborations and one crazy fancy conference he sadly couldn’t attend (so he sent me in
his stead). For being THE repository of *P. gingivalis* knowledge that all team members have consulted time and again (because the meeting will finish before you can check up the literature on your phone). And for being a great promoter. I know I might have driven him mad more than once throughout my PhD and I take this chance to apologize for that. On the other hand, I’m sure that this section will definitely take the cake, as he is a strict adherent to a rigorous style of scientific writing and I’m more in tune with what he called a “novel-suited” and stylistic kind of writing. I realize now this must be hell for him, as I’m having troubles myself with all these nested parenthetical clauses [and all the ones between brackets too]. I promise I’ll be more rigorous in my next papers and this is just an exception (it’s the bad influence of the acknowledgements section).

I’d like to thank Jan Maarten for all the parties... No, I’m kidding. For giving me the chance to learn notions, techniques and subtleties, from assays to editorial diplomacy. For our many paper-meetings, all the “which paper is this one again?” and “what did we say in the other one?” (“God knows. Let’s check pubmed!”). For making those sentences better and for taking my rebuttals and “purifying them” by shearing away all the unexpectedly insulting tones and the thinly-veiled irritation (you’ll get what’s coming for you, Reviewer #3!). An exquisitely mild-mannered man, he thought me patience and inner peace in the face of adversities and collaborators’ and colleagues’ slow responses, two focal points and true pillars upon which diplomacy stands tall. He also introduced me to semi-professional whiskey tasting and that, in its own way, has almost as much relevance. Thanks, because I learned and because it was fun.

I think it’d been difficult to have better supervisors (not that I tried, but still) but even if possible I’d decline as they made my PhD life memorable and their teachings and legacies left deep and perfectly outlined footprints in my personal story. I also want to thank another supervisor, Hermie, which while not being my PhD promoter deserves a spot here. He contributed to my PhD as a collaborator and a co-author, with talks and suggestions, and by offering me a postdoc position. Not that he doesn’t have a bundle of good and noble reasons to be thanked for but I wanted to get this one out of the way fast because man, did I like being offered that job! (It’s the acknowledgements, I’m not gonna lie to you here). Jokes aside, for what concerns my PhD, he gave me the tranquility I needed to take care of the last inevitable problems and tie up all loose ends. He was very understanding and gave me time, and that has been deeply
appreciated. I also want to thank him for the fun (as his gritty, twisted humor is a match to mine), for fostering independence and for his passion for science (and general wariness concerning academia politics), which I can’t help but admire. I’d also like to mention Girbe, which has similar views, as I know from several “we’re not completely sober so let’s talk about serious topics” parties. Always cheerful, always passionate, and genuinely inquisitive, Girbe had a positive effect on my PhD, as his dedication for his work and love for science are an inspiration.

Among my colleagues, I can’t fail to thank my paranymphen (is it written like this?) (Do I even care?) (No). These beautiful girls\(^2\) all deserve my praise and deep appreciation, and not just for what I assume is an incredible cabaret and party (guilt-tripping must start early on). However, I fear whichever order I decide for mentioning them might create in the people in second and third positions some mild unpleasantness (and guilt-inducing cries, and passive-aggressive tantrum fits and, in one case, a well-adjusted punch to my solar plexus\(^3\)) (I’m not kidding, I’ve already experienced this on all my other theses). I will therefore thank them according to their academic contribution to my work, as this thesis is the summary of it (although you could hardly tell from this section). Or so I thought. None of them, however, has given any academic contribution to my work. So I’ll just list them in the order I met them. Firstly, then, I want to thank Suruchi, which I met as a student (and had the pleasure of supervising) but really got to know as a PhD candidate (and got the debatable pleasure of being teased by on a daily basis). From the quirks to the habits, from the need to circling around you jumping excitedly when she talks about her holidays or other cheerful topics, to her usage of ‘lalalalala’ instead of ‘etc’ to cut short on lists of things, I’ve known Suru for more than four years (or so I think, as she knows full well I’m not that good at counting) and I have to say she’s simply kind. Capable of losing sleep and getting headaches by worrying too much about other people’s problems (problems that weren’t even worrying much those people in the first place), she’s thoroughly dedicated in helping others. Throughout these years, I’ve had the luck and privilege of being one of those others and I’m glad I was fortunate enough to have her support, encouragement, and slightly irritating teasing to keep me going. I’m thankful for all the laughs, the

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\(^2\) And I’m including Francis.

\(^3\) And I’m excluding Francis.
thoughtful offers of my favorite foods at the earliest signs of crisis, the jokes (which albeit funny are nowhere as funny as she thinks they are), the numerous attempts at cheering me up (which is not easy), but mostly for having been there. I shared with Suruchi all the important steps of my project. She lived through all my good (and bad) results and shared joyful (and much less joyful, if not downright nightmarish) moments. She was there (as she likes to recount endlessly) when I first managed to purify PPAD after months of unexpectedly failing techniques, as she was there for the first published paper, as well as the last (of this PhD!). These years and this PhD wouldn’t have really been the same without her.

My other paronymfsphwhatever is Margarita, who quickly rose through the ranks of my friends with the gentle subtlety of an enraged tornado. Her humor, kindness, concern, and swearing-filled encouragements accompanied and lulled me throughout the last and worst part of my PhD. Through thick and thin, good and bad, publishing and perishing, Margarita has been an invaluable friend. Cooking, listening, advising, organizing pizza nights are just some of the ways in which she helped. But if I have to pick just one, I’d say I’m thankful for the way she believed in me even when I didn’t. In all those talks about my future, she showed a concern and care others might find difficult to muster. Always ready to thoroughly insult whoever (she thought) even slightly wronged me, she redefined for me the meaning of the word support. My PhD would have been definitely harsher without her and I’d had been left, unarmored, to cope with the diamond-producing pressures that only a PhD, and graphite buried 100 miles deep, are subjected to. I realize that from this it seems I had a very World War II-like PhD, with Nazi prison camps and D-day-like moments. It’s obviously an exaggeration. It’s just the familiar, beloved, and unlicensed showmanship of the acknowledgements. Of course my PhD wasn’t like this. It was more World War I-like, with trench warfare and mustard gas moments. And it was in moments such as these that I could luckily count on Maggie and thank her for being there.

Last but most definitely not least, I’d like to thank Francis, for all those much needed rant-filled and coke zero-fueled breaks and all those “ice cream? Ice cream!” postprandial moments. All the dinners that invariably ended up being burgers (invariably at the same place and constituting of, invariably, the same burger²), all the drinks that

² And thank God for that, as it is an amazing burger.
invariably ended up being beers (or Russian-sounding cocktails) and the post-drinks moments, that invariably ended up involving other drinks (but stronger). Talking about anything including (surprisingly) work was a rather refreshing and necessary outlet for all the accumulated stress that PhDs (renowned stress hoarders) have to deal with. Always ready with a (terrible) quip or a knock, coke zero in hand, at the door of my office (whichever the office, although the closest ones more frequently), Francis has been a very good friend in the latest part of my PhD (whether he knows it or not) and I’m truly thankful for that (whether he knows it or not). The silent attention to my rants, frustrations, confessions, and worries followed by a simple comment, a less simple advice or encouragement, and topped by a generous shot of hard liquor is a behavior I’ll always be thankful for.

In particular, I’ll always remember one specific encouragement (that I, surprisingly, believed) and how astoundingly weird his laugh sounds (he’s the Italian Jimmy Carr). I’m sorry to have mocked it so much he stopped doing it (no, I’m not, I count it as a CV-worthy achievement).

Aside from my actual paranymphen, I feel the need to thank a friend that was supposed to be one but had to retire due to a horrible accident that left her incapable of distinguishing stone oven-baked from frozen pizza, Laura. A collaborator of the highest quality, on top of being a good friend. Her help was competent, precise, delivered on time (and thank God for that!), highly useful, tremendously needed and, funny enough, unasked for. While working on the paper that would have become Chapter 5, ‘No place like OM’, I found myself stumped. The missing part was (the soon to be) Figure 5, and all that went along with it. Powering through months-long training on the needed complex computer programs and a full course on coding seemed the only way to solve that mess. All while the clock was ticking and several papers still had to be brought to light by the renowned obstetrical forces of effort, blood, and highly caffeinated energy drinks. In those nightmarish moments, when she asked me which problem I was facing, I was quick to dismiss her in the trusty and proven way friends use in these cases (let me bore you to death with my complaints for an hour and then go back to work while not returning you the favor). I was therefore surprised to see an almost clinical interest in the details of my work and its problems. I was even more surprised, however, to find out

5 It’s a thing.
that she inquired from my other *P. gingivalis* colleague Tim all the details on this bacterium and my work on it. After this, Laura came to inform me that she had all the knowledge she needed to help me with my data and the little she didn’t have she would have acquired along the way. Surprise and gratitude were soon joined by relief and, later on, pride when our work was finally shaped the way it can be seen now in this book. Her help marked my comeback on the publishing scene and in my PhD work life in general, making this an event she doesn’t know how much I cherish or I’m grateful for. I mentioned this event not because I like telling stories (although I do), but because it is a perfect example of many of the qualities of Laura and the things I’m thankful to her for. Her boundless will to help and readiness to put others’ well-being in front of her own is as awe inspiring as it is worrying (stop prioritizing other people’s works!). Especially considering her genuine selflessness, as I had found at a later date that she had no intention of being counted as an author and only intended to help for my sake. Her kind nature, her unyielding dedication toward her job, her unbending work ethic, her passion for science and her project are an inspiration and the reasons why I’m thanking her now and for which I’m proud to call her a friend.

Other two important friends I want to thank and, technically, my original paranymphen candidates, are Ruben and Ewoud. Great scientists, friends, and (most importantly) idiots, they undoubtedly bettered my life here. They might not have contributed to my work, as our fields were wildly different and work talk was not allowed when we were hanging out (not that we didn’t try), but they eased my way into this city and PhD job. They were the people equivalent of a shoehorn for my life in Groningen. All those burger nights at Pappa Joe’s were the start of something (I sadly still had to realize) I will remember forever. In all truthfulness, however, that’s not where the best burgers in town can be found⁶. But it didn’t really matter, as the main characters of those nights were the talks about nothing and everything, over a beer or twenty, the time spent, and the pulled pork of The Butcher. I’ll never forget when we accidently made friends with a drunk guy at the O’Ceallaigh (which turned out to be the owner) after having hijacked Ruben’s Tinder account. They’ve truly been my first friends here and the two best members of the “three

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⁶ If you’re interested, come find me during the party or around the hospital and we can discuss it.
musketeers”. Thanks to Ruben, for teaching me Photoshop, making me Poster Maker and pushing my candidacy as Borrel Meister, two (self-nominated and made up) titles I proudly held for years. We were office-mates for an year and yet I’ve never found out how he managed to put micro-breaks on his Mac, a reference I sadly realize nobody else is probably getting. Thanks to my other-office office-mate Ewoud, for all the laughs we had, shenanigans we made, and stupid videos we watched; all things that made our office win the title of “best office in the world” three years in a row (sadly, the fourth year we lost to the Brazilian branch office of Google). I’ll always remember that time when he interrupted my work to make me watch a funny video and halfway through Jan Maarten managed to sneak behind us. He actually ended up watching it too. My deepest regret was that it was remarkably not funny. We should have been caught watching the one with the cat, the skateboard on the stairs and the guy on fire.7

Among my other colleagues, I can’t fail to thank my friend (and incredibly productive – but incredibly slow – collaborator) Stefano. Ours was the quest to find the best restaurant in town. Food enthusiast and cooking aficionado, his burning desire to be around food (whichever side of its production) mirrored and matched mine. With him I created “the Dinner Club”, a highly diversified outfit composed of people devoted to cooking (and eating) that were meeting bi-weekly to share recipes (never did), cooking, and eating the resulting product (did a lot). Famous members of this group are people known for sudden weight increase and coronaries problems (all worth it). I also thank Stefano for his contribution in finishing up my thesis, and most of all making me keep an important promise, as his deep bioinformatic knowledge obtained through years of study was what I was lacking, and needed, to finish ‘Venomous bite’ and therefore this thesis. I’ve enjoyed the discussions on the content, potential, and fate of the paper but I prefer, however, to remember him for all those moments involving food, for the friendly cooking rivalry, for that time we used science to make limoncello, and for that one carbonara that was 90% pork belly. As it should be (No, not really, especially if you have a history of cardiomyopathies in your family).

Another collaborator to thank is Marines, latest addition to the P. gingivalis team. Her work on ‘No place like OM’ saved me some time

7 Google it.

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and several headaches. What generated several headaches, instead, was our collaboration on ‘Talk to your gut’, which made me realize how dedicated and committed she could be to analyze the literature. Sadly, to the point of being annoying, as I had to physically drag her away from her laptop because she started looking for references of P. gingivalis’s evasion mechanisms and ended on the socio-economical aftermath of World War II. Possessing a barely contained and unstoppable (chaotic) energy, Marines is definitely the bringer of cheer in the team. Her craziness is a splendid match to mine and, because she loves when I put this word in a paper, they have a great interplay. I’d therefore like to thank her for all the time we wasted together, the coffee breaks that ended with unbelievable amounts of fried food, all the onigiri we shared, all the breaks we shouldn’t have taken, and all the snacks we shouldn’t have eaten. I’ll always remember her frequent cries of “If I eat this now, and I ate this for breakfast, I’ll have enough calories left... to eat half a banana for dinner”. I also thank her for all the weird moments in the lab (and out), which I would have never experienced otherwise (and shouldn’t either). Unforgettable moments such as mutual scratches when our arms were stuck in the anaerobic cabinet (“No, on the forehead. No, more to the left. To the left. Just keep the hand steady and I’ll move my head”), the lack of ice cream-induced temper tantrum when she lied on the ground and refused to stand up (I had to move her to a chair but she still didn’t want to get up), the haircut she got in our office8, the time she cried watching the death of a dragon in Game of Thrones9 (“But it was such a good boy!”), or her cat-like behaviors (and I mean scratching, hissing, and, enigmatically enough, purring. Also, sitting in empty boxes10). What am I ever gonna do without her?

A proper diet and a productive working time, most likely.

A “thank you” also goes to the remaining member of the Pg team, Tim [canned laughter]. I enjoyed our unending work discussions, crazy hypotheses and our long email chains of back and forth papers suggestions for each other. Ok, I’ll admit that I’m exaggerating the scope of our work passions to pass us as serious scientists but the core is there. We all know, though, that the real thanks I owe the man are for making me absolutely despise cider. He’s the reason why I’ll never touch that hellish beverage ever again. Three times he

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8 Don’t ask.
9 Spoiler!
10 You might think I’m joking. I’m not.
convinced me to try one, and he picked three of the worst cider brands ever created. And that one in London? It was like a Fanta turned into vinegar. My stomach sued me afterwards. At least now I know what never to order in a pub.

Undoubtedly, I could not leave out my students, and not just for helping me to bring to life the wailing (and alarmingly incontinent) messes that are my papers. In order of apparition, I’ll start with Caitlin, my first student and the biggest optimist (to which I’ve ever had the pleasure of showing how a PCR works) I’ve ever seen. She splendidly and successfully started the cloning of PPAD for the antibody production, my first nightmare in a long gleeful PPAD-related list of nightmares. And thanks to Suruchi, which (as mentioned) saw the end of said nightmares. Thanks to Rick, for his long and meaningful (and tedious, sorry about that, I sure am lucky I didn’t have to do it myself!) work on ‘Dropping anchor’. He laid down the groundwork (and many load-bearing walls) for the rent-controlled apartment that was that paper. You think I’d be done with the architectural metaphor but, alas, no. A thank you, in fact, goes also to Nienke, who helped put a roof on this very nice studio - unfurnished, all inclusive, only 600 euros a month. I thank her because her work was very helpful and because it was fun to hear her yell to me the volumes and concentrations from behind the sink, while I was mixing dangerous chemicals (safety first, fear foremost). A big thank you also goes to Eloisa, for all her help in analyzing the Porphyromonas strains and for the most deliciously mild mannered insults I have ever heard (only some directed at me). I’ll never forget (and she’ll never forgive me for) letting her get us lost in the UMCG in an attempt to teach her the way to the diagnostics lab. I’ll also remember her exquisitely quiet and gentle demeanor but, most of all, her unhealthy obsession for baked goods. And, of course, the time she cried because of how spicy was my jalapeño frittata, immediately after saying that no Italian will ever cook spicy enough for a Mexican. Lastly, I would like to thank Juliana and Nesrine for their invaluable help in the FISH and 16S analyses. I know that this has nothing to do with my thesis work and only my postdoc but I’d feel bad to leave them out.

Talking about students, I can’t fail to mention two, Rianne and Andrea. Both very bright and capable but, aside from that, the total opposite of each other. Rianne helped creating the gingipains’ antibodies used here and there (I don’t remember the papers and at this point I’m too lazy to check). Andrea, on the other hand, always
reminded Eloisa that I was “the best supervisor in the world” and that I “rocked”, which is worth a lot in my book. However, she also used to say “nobody uses ‘silly goose’ as an expression anymore” and “you’re old”, so I’m conflicted.

Thanks to all my not previously mentioned co-authors and collaborators. Thanks especially to Mike Curtis, my favorite ‘suggested reviewer’, every time I was submitting a paper. I wonder how many times he actually got to review my manuscripts and if he ever got fed up with it. It was nice to finally have him join the ranks of the authors, for ‘Dropping anchor’. I’m gonna go ahead and assume he was happy to not have to review another one of my manuscripts, for once. On that note, a big thank you also goes to E.C. Reynolds, as I always wrote his name too when I sign up people as suggested reviewer. I have never met him but I imagine him receiving an email from an editor and going “Again!”.

Thanks to Marja Laine, for providing the Porphyromonas strains that allowed ‘Conserved exoenzymes’ to take form (how do I hate that I couldn’t put a pun in the title. Word counts for titles are the worst). Without her help there would be no manuscript, we’d still be saying that PPAD is only present in P. gingivalis and, most important of all, I wouldn’t have a plethora of jokes on jaguars in my repertoire.

Thanks to John Rossen and Monika, with which I had the pleasure of sharing an office. With Monika, not John. Although that seems like it’d be fun. Thanks to them and Kai we could deal with the pesky sequencing analysis that I dreaded for so long.

Thanks to Johanna Westra, Arjan Vissink, Elisabeth Brouwer and Koen Janssen and all the other members of the Extended Pg team or GRAPE (no, I do not remember the meaning of the acronym) for lending me their expertise time and again. Most of all thanks to Menke, for all her help with my first paper. It was very exciting to finally see something with my name on it published and on pubmed. Thanks also to Jeroen Kuipers for the precious TEM pictures, the P. gingivalis equivalent of tasteful erotic art. The electronmicrographs are so good that they’re now used as legal currency in several state prisons.

And now, for something completely different, I’d like to thank an Italian that made literally no contributions to this thesis work but great ones to my PhD, if not more (Surprisingly, scientists have recently discovered that there is life outside a PhD. The whole academic community, however, remains skeptic). This Italian is my best friend, Aurelio, although a lot of people know him as Marco
(Aurelio is a nickname, not his last name). Through thick and thin and a decade of laughs and pains, crazy and work, Aurelio has been my best friend for so long that people wonder when he’s gonna lose the title (soon, in a fixed match with the crowd favorite underdog). I definitely would have too much to say here so I’ll try my best to be concise (but judging from certain word counted papers I’m not good at that). I really appreciated the support and the company and the extremely long and academically articulated discussions about absolutely inane topics, ‘cavemen vs. astronauts’ style. My PhD became easier when he decided to study in Groningen, convinced by my tourism office-worthy speech about the city (Ha! Fool). Even though it was quite painful to let him crush at my place for two weeks he has been, since then, an upstanding neighbor and friend. The camaraderie, all the “I already done my workout today but I can do cardio to keep you company”, all the times we ate like pigs to celebrate some good news and all the times we ate like pigs to console ourselves after some bad news and also all the times we ate like pigs even though we didn’t find any good excuse, the tons of audio messages, including the ones (several) over 8 minutes long (categorized as “pipponi”11), that one time we misread the workout routine and ended up accidentally increasing it tenfold (so basically what we remember as ‘the time my heart stopped beating’), the ‘Can I pass by your house now? Can I? Is your phone off? Can I?’ texts right before knocking anyway, and all the humongous amounts of McFlurries we ingested that would have killed lesser lactose intolerants are all the reasons why I’m thankful to him and consider him like a brother (well, more like a long-lost cousin, but still).

I take this chance, now that we’re talking about Italy, to thank all those new Italians that instead I’ve met here. Federico Iovino, for offering me to buy his house (I never did but I still regret it), Federico (Oldoni), who’s still working, wherever he is, Carmine, who’s (probably) still not smiling, wherever he is, Marco Carretta, whose nickname I’ve confused for a last name for years, the good old Vincenzo, for being one of the most good-natured people I’ve ever met, Valentina Francia, Anna, Elvira, Roberta and Federica for being one hell of a group and, yes, unsurprisingly for all the dinners. And the newer Italians: Nicola (Nick), Jacopo (sua Sfiziositá) and Valentina (we gotta come up with something). And, of course, I also want to thank all the people in the Clan (which I’ve left behind)

11 I’m not gonna translate that.
because I lost a bet years ago and now I have to. Boes, Oni, Ruggero, Crisio, il Naso, Nonno, Cerotti and, especially, LG, the best one, who popped up in Groningen a couple of times, to ‘enjoy the weather and regret it later’. It was nice to have a piece of the old life back here. A thank you also to the people from the new life, starting from the ones from the lab(s). Thanks to Rocio, which I’d like to remember as the (jokingly) coke fueled tornado of entropy I first met (humanity’s first inexhaustible source of energy) and that, sadly, now acts like a proper, responsible, and capable PhD. Thanks for all the Mexican food, especially that drink with the rice due to which I first thought “Crazy!” and then: [mildly pleased] “Uh”. Thanks to Rense for always being there, ready to help. When he first give me the password of my first (temporary) computer I remember thinking to myself “What is a Rozeboom?”. It was him. Thanks to Dennis for being the youngest, over 30 teenager I’ve ever met. I remember him sword-playing using Pipetboy pipettes with a very giggling Carmine, the serious guy known for never laughing. Among all of us, he’s really the one with the youngest heart. Thanks to Sjouke, whose cabaret was the first one I ever participated in (even though I did not know him at the time). I’m glad we didn’t use the video with the blow up doll eating burgers, he’s a family man. Thanks to Minia, for the energy she brought when she came in the lab, making a lot of people’s days a tad brighter. Sadly, she quickly had to get back to her beloved Greifswald (There’s no joke here, she really likes the place). I also want to especially thank her for teaching me how to make Spanish tortilla and that starter with the avocado and the tuna that I later shamelessly passed off as my own and that earned me the admiration of my dinner guests. Thanks to Solomon, for being the best percussionist in the lab when it comes to playing the lab journal (against flat surfaces such as desks, wardrobes, and people’s backs). I will always remember him for his peculiar way of saying hello that everyone who knows him remembers quite well (but I can’t detail here because of common decency), and the time he sneakily flipped me the bird behind the back of the people I was introducing to the lab, to enjoy my reaction (a baffled muffled rage). Thanks to Jolanda, for being a constant in my PhD and the help for the ultracentrifuge, the machine that, at the time, nobody even knew where it was located or if it existed. Thanks to Emma, for being the ‘office mama’ in my very first office. I know the term sounds like the boss of a work-

12 It’s a long story.
themed brothel but that’s not what I meant. She was the guiding force in the office and I thank her for that. Thanks to Femmy, the bright and funny ex member of the lab (and now, finally, a free person). I’ll always be amazed by her inexhaustible repertoire of facial expressions, and by how much she secretly hates me for saying it. Thanks for all the crazy conversations and the funny moments that involved moderate to less than moderate amounts of alcohol (and yes, I’m thinking about the lullaby singing)(it’s a thing). Thanks to Janine, for all the chats, the breaks, and the company, almost always religiously in front of an appelflap and a cappuccino. I still remember all those times when I received the secret “appelflap” signal. If you string all those moments together you might not believe I ever had time for work (and you’d be right). Thanks to Paco, for all the help he gave me (and demanded to be paid back in cookies). He scavenged my old Mac for bits and pieces of data and I’m thankful for that and for putting my old friend to rest. Thanks to Bimal for that squash match that made me realize I don’t like squash. Or he’s just too good. And thanks for all the table tennis lectures and matches. Something I have to thank also Xin for. Especially his “if you shoot it strong enough, precision doesn’t matter anymore”. An advice that extends its usefulness outside the realm of table tennis. And thanks also for all the hot pots and poker games, and for making me discover that Chinese sesame sauce made with love, (probably heavy metals) and sesame that is highly addictive. Thanks to Elisa, for bringing some of the old hometown back in my life. You kinda need an echo of home wherever you go. Thanks to Yaremit, which I like to remember as always laughing, especially at my jokes (whether that is true or not). Thanks to Mafalda, for all the Portuguese dinners and for introducing me to bacalhau. And thanks to Andrea, for the Mexican food and for introducing me to mole. I didn’t think chocolate could be used like that. Thanks to Marjolein, for being so optimistically positive and for her awesome cat. Thanks to Min, for her inspiring silent hard work, and all the times I saw her in the office on a Sunday. Thanks to Usma, for the unyielding cheer and that one time she tried to outdance Bhanu (Man, she’s good!). Thanks to Marina, for being always honestly happy (and equally honestly sad). From the new office, I have to thank my new office mates (obviously). Paola, for all the Italian-fueled moments and the bidirectional de-stressing complaints about each other’s PhDs. And, of course, for the occasional Kinder Bueno. Rita, for teaching me that salad becomes edible when it’s 90% olive oil (I’m kidding and I’ll probably be
murdered for this joke) and how good fish can be when it’s cooked by a Portuguese (with a lot of olive oil) (tell my wife I love her and delete my browser history). Thanks to Lu, for the inspiring positivism, the way she seems to get sucked in by her chair, and for that time she came to me and out of the blue asked “Giorgio, why are you a good person?” (I don’t know, but I choked up a bit) (They pay me?). Thanks to Gaby, for all the candies she generously always shares with her office mates. I owe her some kilos. Thanks to Carien, for all the help in my postdoc project and for showing me, for the first time, the FISH technique. And thanks to Eleni, for all the help and support since the first days of my PhD to the last of my postdocs, and especially that email (that I still keep) on potential postdoc positions. And lastly, thanks to Mehdi for having started the Ribogut project and for relaying to our DSM colleagues his generous (and totally unjustified) opinion of me.

But, of course, and thank God for that, there’s also life outside the lab (although it never quite seems like that). Among all the people outside the lab, these magical creatures of dubious existence, I must mention two, albeit they made no contribution to this thesis work having no relation whatsoever with it (and, once again, thank God for that). Thanks to Luisa and our time-honored traditions. Thanks to all the movies we’ve seen together and thanks to all the ones I’m convinced we’ve seen together, even though she never even knew existed (who the hell did I watch those with?). Thanks to all the dinners that should have consisted of ever novel, stimulating, and peculiar food but always ended up consisting of burgers (not even the best ones in town13). Thanks for all the talks over, unsurprisingly, a burger or otherwise, statistically, greek food. Or, maybe most likely, a glass of wine (I swear I never saw her without one in her hand). I’ll always remember her when I remember a Marvel movie. Even if she wasn’t there.

Thanks to Lys, a long-lasting presence in my PhD and the funniest, most random person I’ve ever met. Living proof that university courses are useful (because that’s where I met her, twice), she brought all the cheer I needed (and she probably did too) in the first years of my PhD. Her sass, witty quips, casual craziness, and horrible (truly horrible) puns were humbling and something I’ll never forget. Especially the puns. How could I, after all, when we used to have spontaneous (hours-long) pun duels (punpetitions, if you may),

13 Seriously, ask me if you want to know where to find them.
which I almost always lost? A victory in and of itself, if you ask me. I’d like to thank her for never finishing a review for the same never it took me to not finish mine\textsuperscript{14}. The whole “still not done with review? Yeah, me neither” bit really kept me afloat for a while. I’ll always be grateful for that conversation started with an ill-begotten Christmas text sent in May, as I’ll always remember the aftermath of the UMCG sport day many years ago. For the first time ever I’ll admit that yes, not bringing a jacket that day was stupid of me, as I had never felt colder in my whole life (also, I lied: that sound wasn’t my bike, but my teeth chattering). Without her, my life in Groningen would have been very different. Worse? Not necessarily. Very different? Definitely.

Other people (and things) deserve a thank you for their contribution to this work. First and foremost, thanks to my old Mac (rest in pieces), which lasted me most of my PhD and prevented me from using very basic software not Mac OS compatible. It was terrible, especially in the later years, but the giant screen sparked the envy of many a colleague and it was perfect for watching movies all the Sunday mornings I had to incubate blots. Thanks to the new one, for being the smaller, actually older and less advanced version of his brother, and yet still be functional. Thanks to the guy who always left the cold centrifuges open, at 4°C. I know he might be more than one person, especially because this went on for several years, but I like to picture him as a cartoon-like caricature of an evil scientist. With a lab coat and those fake glasses with nose and moustache, tiptoeing around the lab to turn on all cold centrifuges immediately after I passed to switched them off. Thanks to Gasbarrini G, incredibly prolific author that the pubmed search algorithm always confused me with. I had to get four papers on the site to stop it from automatically redirecting me to his page when searching for my name. I’m not gonna lie, that has been part of my drive to publish. I know he’s actually more than one person, all with a (surprisingly) very common last name, or the most prolific author on pubmed (more than a thousand paper) but I like to direct my hate in only one direction\textsuperscript{15}. I will make him feel the same feelings one day, and because I can’t publish that many papers I will give my children names with the same initials so that they will continue my work\textsuperscript{16}. Thanks to the first

\begin{footnotes}
\item[14] Yeah, go ahead and reread the sentence. I promise it makes sense.
\item[15] It’s cost-effective.
\item[16] That’s the real reason.
\end{footnotes}
sip of coke zero, that always almost mathematically ends up on the keyboard. Thanks to the second spatula of the ice machine, that is always nowhere to be found until you scoop it out with the first one. Thanks to the lab, and I mean that physically, for being (for so many years) the home away from home (often literally), a sudden realization that is only mildly immensely sad. And thanks to the Ribogut office, my office away from my office, as it was in the peace and quiet of those dark hallways that I put together this thesis in a Frankensteinian manner using the spark of creativity (as the only available source of electricity was the faulty wire that shocked me every time I moved my elbow too much). Thanks to the nerve-racking, gut-wrenching, impossibly long (and still too short) death march that was finalizing the thesis. It was a tumultuous but highly educational moment I wouldn’t wish on anybody (except maybe Gasbarrini G). Thanks to everyone and everything that made me, and this book, what we are today. Whether mentioned by name or not (or at all), whether their acknowledgements had enough lines or not, whether they had enough jokes or not, whether listed soon or late, whether they liked what I wrote or not, all these people deserved to be mentioned here and can be sure that I won’t forget their contribution to this book or to me.