



Pernille Rørth

Raw Data

A Novel on Life in Science

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Pernille Rørth
Copenhagen, Denmark

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Preface

I would like to thank the many scientists who have contributed to making my years in science so very interesting. I would also like to thank Christian Caron, my editor, for his excellent suggestions, and Steve, for everything.

This is a work of fiction.

Copenhagen, Denmark
June 2015

Pernille Rørth

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Part I

The Novel

Raw Data

Chapter 1

December 2014

What she really needs is a coffee. Not the lunch bag that somehow ended up in her hand. No, something to keep her going now that the talk-fueled adrenaline is starting to wane. Standing in line, Karen glances around the large convention hall. The poster session is still busy after lunch, but seems less intense than the previous days. People may be getting tired, she thinks, information overload setting in after four packed days. She should try for some posters, though. Or at least mingle. Bad conference coffee in hand, she heads into the crowd.

She scans the poster titles as she wanders down the first row. A few dramatic pictures and colorful diagrams catch her eye. But nothing holds her attention for long. Perhaps meeting fatigue is finally getting to her as well. Turning the corner, she finds a small crowd filling the aisle. A popular poster, it seems. The presenter is an energetic woman in her late twenties, of medium height and build and with mousy blond hair. Karen smiles, reminded of herself attending her first international meeting, years and years ago. She steps closer, trying to hear above the background noise. As she does, a man turns around.

“Karen Larsson. Ah, finally. It’s great to see you.” He holds out his hand to her and continues rapidly. “I really enjoyed your talk this morning. Wonderful stuff. Really amazing.” He is about her age, half a head taller, with curly red-blond hair and beard. He seems familiar, but no name springs to mind immediately. Karen smiles and shakes his hand with a tentative “Thanks”. After a moment she realizes that he spoke with the familiar sing-song accent of home. Now she remembers. Torsten. He did his PhD in Nils’ lab at Karolinska, starting a year after her.

“Torsten. What a surprise. I haven’t seen you for like, forever. How are you?” They fall into an easy chat, catching up on the missing 10 years. He is

still in Sweden, in Lund. Her lab is in Chicago. Prompted, she tells him about her postdoc in Boston, the job at Northwestern, her PhD students and their projects. She has come far, she knows, and feels the rush of well-earned pride. He compliments her on the talk again and the “fantastic movies” she showed. This allows her to gush happily about her “favorite toy”, the high-end, custom-equipped microscope that she has spent most of the past 5 years with. After a while, they run out of obvious topics. But saying goodbye, she finds herself re-energized and ready for more.

Determined to make an effort for the rest of the session, she moves on, looking closely at a few posters, listening to bits of presentations here and there. She manages to pick up a few interesting findings, but mostly drifts along. Several times, she receives a “Great talk this morning” or “I really enjoyed your talk” from complete strangers. This is immensely gratifying. It was worth staying on this afternoon, she thinks, just for the pleasure of these spontaneous compliments.

Halfway down the next aisle, she stops up, abruptly. The perfect hair, the confident walk. Chloe. It must be her. Karen freezes, unable to move forward or to turn away. Then the woman turns to face her. It is not Chloe. Of course not. Pull yourself together, she thinks. You thought she was at the talk too, in the third row. But that wasn’t her either. She is not here. Karen breathes deeply. It is her first time back since she left Boston some 5 years ago. That must be what is making her jumpy. Silly.

Slowly, she starts moving again. She reads more poster titles and glances at images and text. She gets another compliment on her talk. After some time, she notices that the hall is slowly starting to empty out. The first posters are being taken down, rolled up and returned to their protective plastic tubes. A few eager students are still explaining their work. Others are simply chatting, reluctant to let it all go, perhaps. She remembers her lunch bag and eats half of the slightly stale sandwich. It’s hard to believe it has already come and gone, her first talk at a major meeting, something she had been looking forward to for so long. It was worth it, though, all the years, all the preparations. She thinks back to being on the podium, being able to engage that big audience, and the questions and compliments after. Yes, definitely worth it. But the moment has passed and the meeting is closing. She takes a final look around, scanning the faces close by. There are no ghosts here, only ordinary strangers and the occasional old friend. It is better this way. The past is safe where it is.

Chapter 2

November, 2006

The polished red stone is shimmering like a faint halo in the pale morning sunlight. Chloe loves this building. Although smaller than the gray hulks surrounding it, it immediately attracts the eye: the unexpected color and light, the subtle, yet confident curves. The adjacent university buildings seem bland, uninspired by comparison. Chloe feels that she truly belongs here now, at the institute. She has earned her place, even if she is only a member of the transient postdoc population. Four years ago she was a newbie full of well-suppressed insecurities, in awe of the famous faculty members. That girl seems so remote now. Since then, the institute has become her home, her world. As intense and challenging and full a world as she had hoped it would be.

She takes a few quick steps to get to the entrance. However much she loves it here, she is ready for the next phase. It is time to move on and start her own lab as a principal investigator. Preferably at an equally excellent research institute or university. She hopes that today is the day for a final decision about her paper. It has been 3 weeks since the resubmission to *Nature*. The initial reviews were basically positive and she has done everything the reviewers asked for. So the journal editors must accept her paper, they must. The truth is that they can do what they want, and she knows it. But this morning she feels convinced that it will be a yes. She quickens her step and pushes open the huge glass doors with her shoulder, shielding the still warm latte in one hand.

On her way in, Chloe smiles and says "Good morning" to Mr. Cleveland, one of the usual security guys. He is a large man and his fitted light blue uniform makes him look even more imposing. But he is always ready with a friendly smile and is quick to buzz Chloe in when he is on weekend shifts. On this Friday morning, the door is not locked, but a nod and a smile are offered as she passes through the glassed-in entryway. Chloe appreciates the easy friendliness of most Americans. It is so much better than the routine German grumpiness that she grew up with. Nosy watchers always looking for impropriety in a smile or an attractive face. Although not conventionally pretty, Chloe is certainly attractive. She has a handsome, angular face with prominent cheekbones, framed by short, expertly cut, dark brown hair. She is slender, well proportioned and athletic. Partial to ankle boots, blue jeans and fitted cotton shirts, she dresses casually but never sloppily. She is content that she has found a good balance. Feminine enough, yet she does not draw unwanted attention. Her freshness, confidence and intelligent charm are what tend to draw people in, and what most remember. This suits her.

Once inside, Chloe fleetingly admires the building's sleek interior design and gives the art by the elevators the usual quick glance. But she does not linger. She heads for the stairs. The elevators are maddeningly slow, as if she has all the time in the world to get to the lab and get going.

The third floor corridor has glass all along one side, offering a full view of the labs. She initially found this fish tank exposure unnerving. But almost no one wastes time standing in these corridors, looking in. Passing by, she glances into the Wu lab. It is busy, as usual. Heads of black, straight hair are all bent in concentration. The next room along is her lab. Well, it's Tom Palmer's lab. But it has been her home these past few years. It looks just like the Wu lab, the same benches, the same desks, even the same centrifuges, gel-boxes and row upon row of clear bottles on the shelves above. But Tom's lab has more night owls like her, so not everyone is in yet.

Juan is in, working already. He occupies the bench next to Chloe's, so she slides by him to get to her desk. She smiles with a friendly "Good morning, Juan" and he counters with his standard "Ola". A family man, he is always in before her and usually leaves around five in the afternoon. This suits Chloe. She then has both benches at her disposal in the evening, should she need them for experiments. Also, because of his time-constraints, Juan rarely fools around in the lab. An optimal lab neighbor.

This morning, she notices Juan's gym bag underneath his desk. Odd. His regular handball practice is on Wednesdays, not Fridays. She plays with the women's team on Thursdays. When she moved here, she was pleasantly surprised to find that Boston hosted teams for this mostly European ball game. She never got around to trying basketball, even if it does look like fun. Handball is a bit rougher, but she is fast, strong and unafraid, crucial attributes for the game. So the local team is happy to have her. For both Chloe and Juan, matches and tournaments take place on weekends. They sometimes run into each other at these events. They watch the games and admire particularly good jump-shots (Chloe's specialty) or impossibly twisted shots from the line (more Juan's style). Sometimes they talk about the lab as well. The first time they saw each other at the indoor courts, they were both taken aback. Somehow one doesn't expect to see lab mates outside of the lab.

"Is there a match tonight?" She asks, nodding toward the bag.

"No, it's for the weekend. I was planning to go play a bit during my incubations tomorrow."

"So the home front will think you are hard at work the whole time? Very tricky, Juan. I didn't think you had it in you."

"It's a two-hour incubation. I can't make it home and back in that time." He peers at Chloe and realizes she is teasing. "Do you want to come? We need a few more players."

"I might do. I should be able to handle you wimpy boys. I'll bring in my stuff tomorrow. Let me know when you head off?"

"Sure." Juan flashes a quick smile and turns back to his work.

Chloe's bench is unusually orderly. Normally it would feature abandoned pipetmen, boxes of blue and yellow tips and scattered colorful racks of recently used Eppendorf tubes. But today, nothing is out of place. Her desk is also neat and tidy. The tidiness is a result of the inevitable displacement activity before a major writing job. For the past couple of weeks she has forced herself to stay at her computer and finalize her research proposal. So her fingers are now itching to get going on experiments again. But the writing time has been productive and she knows the proposal is the most important part of her job application package. Well, it will be, once her paper is in press. Maybe today. She looks down to the end of the long room, past the many lab benches, and notices that the door to Tom's office is half-open. This means that he is in. He may have gotten word from Nature and sent it on to her.

She sends a quick wish to the nonexistent Gods of hardworking postdocs. User-name, password—and a deep breath before hitting the return button. There it is, forwarded from Tom half an hour ago: '*Decision on your manuscript N-06-22881*'. One email, so simple. The final judgment on her ideas and 4 years of fiercely hard work. Her heart beats faster. She sits down before double-clicking. This is it.

'*Dear Dr. Palmer, we are pleased to inform you that your manuscript N-06-22881 has been accepted for publication . . .*'. "Yes, yes" she blurts out. Juan turns around.

"Juan, my paper just got accepted." She says immediately, smiling, smiling; she is ecstatic. "... at Nature, as a full article".

"That's fantastic. Congratulations." He seems truly pleased for her.

"It is, it is". Chloe leans back in her chair, letting it sink in. Happiness spreads through her, followed by relief. What she has been hoping for—what she needs—is right here. Her paper accepted for publication. The ultimate success of her ambitious project, built on her risky ideas. She never imagined so much work could go into a single paper. Four years, working like crazy. So much trial and error, so much uncertainty. Each little step forward a minor victory, necessary fuel to keep going. Several times along the way she felt that she had enough for a good paper. But Tom nudged her on. "Chloe, what you have is good, yes, but this one could be great. You have to hit it out of the park." So the satisfaction now is immense—as is the relief. It is a home run. And it is all hers. She knows that the work, as published, will look completely

logical and straightforward, each of the many steps is a simple progression from the one before. There is no sign of the many muddles and delays along the way. Her paper describes a well-designed, successful journey, impressive in effort and important in findings. This is how she will tell the story in her job talks.

She reads the rest of the forwarded email. It is a form letter, more or less. She has seen such letters before. The only word that matters is “accepted”. A ‘*Dear Dr. Varga,..*’ would be even better, of course. But that will come. Tom is always corresponding author on papers from his lab. Admittedly, he did come with some good suggestions along the way. Once Myc was involved, he became seriously interested in the project. When she is on her own, she will not have to share the credit. Later. For now, she should find Tom.

On the way to Tom’s office, Chloe passes Michel at his bench. His curly head is bent over a gel he is loading, apparently deeply engrossed in this simple task. She moves closer, her exuberance spilling over.

“Guess what, Michel? My paper got into Nature”.

He lifts his head, his still loaded pipetman in one blue-gloved hand, and the now empty tube in the other.

“Félicitations. Fantastic, Chloe. C’est vraiment merveilleux. The Myc demethylase paper?” Michel’s thick accent transforms the potent oncogene to ‘meek’.

“Yes, Oui, naturellement. I am so happy.” She beams.

Michel did his PhD in France, so coming to Tom’s lab for a postdoc was a major change. He seems happy now, but it was bumpy in the beginning, Chloe remembers. When he found that she spoke a reasonable French and had read some of his favorite authors without the benefit of translation, he opened up. With the many hours in the lab, they occasionally have time for a coffee and a chat. For a short while, Michel leaves his struggles with English for the pleasure of his mother tongue and Chloe battles with yet another language from her ambitious, if unfocused, youth. A simple friendship of shared words.

“Right. I’d better go see Tom.” She leaves Michel to his gel-loading.

From Tom’s office she hears the usual semi-furious tapping. She knocks on the open door and steps in. A full smile breaks through his expression of concentrated intent when he sees her. Tom is in his mid-fifties, fit and always has a bit of a tan. What is left of his hair is cropped short. There must be some gray in there, but it is hard to tell. He almost always wears blue jeans and a faded T-shirt. Given his position, this initially seemed to Chloe to be too informal. But everyone, including the occasional expensively suited trustee, seems to find this attire charming. The overly casual clothes are probably deliberate, Tom’s little game. Certainly, it would be a mistake to take the

relaxed look as an indication that he is laid back. He has an intensity that helps him steer his lab full of intelligent individualists and maintain his position among sharp-witted peers in the bigger world. It is a manner that Chloe has been watching and has learned from. Today, Tom appears to be truly content, for once.

“So, you saw the email?”

“Yes, I did. I’m so happy, ecstatic. We made it.”

“Well, they would have been total idiots not to accept it at this point. It is a great paper and you deserve the credit. So congratulations, Chloe”. Tom counters, generously. It is satisfying to hear Tom acknowledging this—her ideas, her work.

As Chloe sits in the chair opposite, Tom’s phone rings.

“Hello? . . . Oh yes, Hi. Good of you to get back to me.” Chloe starts to get up but Tom signals her to stay. To reinforce the intent, he covers the mouthpiece briefly and says. “This will only take a second.” Tom turns halfway around to continue talking. Meanwhile Chloe lets her gaze wander the office, to be polite.

The first time she was in this office, ages ago, for her postdoc interview, she noticed nothing. She talked and talked, she was way too nervous. Tom nodded along, asking a question here and there. She had no idea what he was thinking or how she was doing. Only later in the day when he gave her a list of fellowships to apply for, did she realize that the interview must have gone well. Since that first stressful conversation, visits to the office have been brief and focused on the work at hand. So she has not paid much attention to the décor. There are almost no personal touches to Tom’s office. There is a simple round table with two matching chairs, one occupied by a pile of journals. A giant bookcase takes up all of one wall. Chloe thinks she will do something bolder with her own office, once she gets one. She would start by hanging her two Clemente watercolors. Then add some more art worth looking at when she can afford it. So the place would really be hers. But maybe this neutral look is more professional. Something to consider.

Tom has turned around at his desk. With raised eyebrows and hand gestures he signals impatience with his phone conversation. It is OK for Chloe. For once she is not in a hurry. She studies the bookcase. Most of the space is taken up by row upon row of old lab notebooks, plus few bound PhD theses. The history of Tom’s lab. All the data generated by former students and postdocs over the years, successful experiments as well as failed ones. The sheer mass of it draws her in. Tom also has another, more public version of lab accomplishments. These are cover images from lab publications that made it to the top journals *Cell*, *Science* or *Nature*. The big stories. These framed journal covers hang in the corridor. Showy, maybe too showy, she has thought in the

past. But today it reminds her that she should think about a suggestion for cover image to submit to Nature. She should design something more original than the usual three-color antibody-stained cells. Something that cleverly illustrates the mechanism she uncovered. . .

Chloe is called back from her musing by Tom finally wrapping up his phone conversation.

"Sorry about that. Some people just go on and on. Anyway, nothing further that needs to be done with the paper, is there? I'll get the forms signed and sent off. It is a beautiful story. You should be very proud." He repeats.

"Thanks. I. . ."

"The institute will want to do some PR on this. You should get some simplified figures ready. And a suggestion for cover image, if you want."

"Yes, of course." These little extra jobs will be pure joy. She smiles again. Despite the massive significance of the paper and its acceptance to her, she realizes that there is little more to say about it now.

"I wanted to tell you that I am sending off the first job applications next week. They will be asking you for letters of recommendation."

She expects the all-important letter from Tom, her postdoc mentor, will be suitably enthusiastic. He is an American, after all, so the superlatives should flow.

"Excellent. Perfect timing. Where are you applying? You should aim high. You have what it takes and with this paper in press, you are in the sweet spot this year. So there is no reason to apply to second-tier places."

She tells him of the nine departments she is applying to. He smiles, nods, appreciating the ambition reflected in these choices.

"Perfect. You can always cast a broader net later on. But I doubt it will be necessary. You'll wow them, I'm sure. The interview process should also be an interesting experience for you. Some pretty smart folks will be paying close attention to your work and your ideas. Lots of excellent scientists at these places."

She has not dared to think about that part of the job-hunting process yet. Beyond the all-important job talk, interviews involve talking one-on-one to key scientists, about her work and about their work. At these places, that should be very exciting. But first, she needs to get invited.

Something else suddenly occurs to Chloe.

"What about the competing paper, from the White group? Is it coming out soon as well? You told me they were onto something similar."

"I don't think so. I don't think they were as far along."

Chloe is puzzled. She thought there was very close competition. Wasn't that what Tom said a few months ago? Well, this is not important now. "So it's all my story, I mean, all ours?"

“Yep. That it is. The patent application for L-334, and related inhibitors of Jmjd10 has also been filed. It should sail right through.”

Chloe had almost forgotten about the patent application. It was a pain to go over what the patent lawyers gave them, so much repetition and detail. Maybe it will make money one day. Who knows? She cannot make herself care about that. No, she needs to get back to those job applications.

“We should celebrate properly” Tom says as Chloe gets up to leave. “Get some champagne and cake for the lab this afternoon. Let me give you some money.”

He pulls out his wallet and counts out some 20’s. Handing them over, he reminds her “First author buys, last author pays, right?”

So she should go shopping. Another chore she is quite content to do.

“Sure, I’ll take care of that now. I’d better get the bubbles cooling for later. And, thanks for, well, thanks for everything.”

On her way back to her desk to get her coat, she realizes she should tell Martin. Surely this is worth disturbing his morning for. Martin’s lab, one of the small labs of the Institute Fellows, is on the fifth floor. Still full of energy, Chloe runs up the four half-flights of stairs and hurries down the corridor. She spots him, through the glass. He is standing behind his postdoc, Chen something, both of them looking at a computer screen. Chloe knocks gently on the glass and cocks her head with a smile as they look up. Martin seems not altogether pleased at the interruption. She enters the lab, deciding to ignore the hint of annoyance, but also to keep it short.

“I just wanted to say—my paper got accepted.”

“Fantastic. Congratulations.” Martin’s expression changes. He smiles broadly. As expected, no kiss or hug is on offer—not at work. “I told you it would go straight in” he continues “didn’t I?”

“You did, and you were right. Good for me.”

“We should celebrate tonight. Call me later, OK?”

“Sure, of course. We will do something nice.” Another charming smile. He does look happy for her. But he also wants to get back to work. He glances back down at Chen, who is waiting for a sign to continue.

“OK, see you later.” she says, cheerfully, as she turns to leave.

Chloe remembers when Martin first came to the institute to give a seminar, applying to be an institute fellow. This was not your typical recent PhD seminar. It was almost irritating how in control he was. His smooth, yet thorough responses to the probing questions from the Institute’s senior faculty were impressive. She managed to come up with a clever, unexpected question as well. So he noticed her and saw that she was to be taken seriously. It also broke the ice, giving her an excuse to talk to him afterwards. There might have been a girlfriend in the background, somewhere. But once he moved to

Boston, it did not take Chloe long to charm him. Or, perhaps, he charmed her. Whatever. The attraction and everything else was mutual. Apart from their dedication to their work, they found that they share cultural interests. Now, they laugh at themselves as a cliché of the perfect science couple.

Back at her desk, Chloe opens the folder with job application files. The satisfaction of replacing “submitted” with “Nature, in press” next to the title of her manuscript is enormous. She looks at her CV displayed on the screen. Not bad, she thinks. Four first author publications in good journals. The Nature paper is doubly important. It shows she can do top level science and the timing is perfect. Her work is now by definition ‘important’. The proposal gets another read-though but nothing needs changing. She has worked hard on this, laboring over both the ideas and the presentation. But it is good now. It presents the importance of this specific sub-area of basic cancer research, her contributions so far and her plans and ideas for the future. And it does all this in just three pages, straightforward and logical. She decides to send the first applications off today, rather than waiting until the deadline. It is, after all, a perfect job for today.

The afternoon celebration in the lab goes off much as Chloe had expected. A lot of smiling and congratulations, some standing around and small talk. Her favorite brownies serve as “cake”—it is her party after all. And champagne. It had to be two bottles given a lab of almost 20 people. And it had to be real champagne, she decided, to set the right tone. Tom says a few words of praise, toasts Chloe and, as always, ends with a jolly “. . .and may you all be next in line.” Meant to be encouraging, of course, but it has an undertone. The truth is, no one needs reminding.

Vikram soon starts fooling around, building architectural brownie constructions. Vik’s combination of smarts and silliness is occasionally bewildering but never boring. Chloe welcomes this infusion of lightheartedness. The congratulations from him were also warm and genuine. From others, the same words were less convincing. She understands. She likes most of her lab mates, and she believes it is reciprocal. But, of course, they all want to be in her shoes. So there is some awkwardness as well, a bit of envy, and no use denying it.

Stealing a chimney from Vik’s construction, Michel comes over to where Chloe is momentarily alone.

“Encore de félicitation. C’est merveilleux. Tu le mérites.”

“Merci, Michel. Très gentil.”

“Mais n’oublie pas tes amis quand tu deviens célèbre.”

“T’oublier? Jamais.”

They continue the light banter for a while. When Juan and Vik move closer, they switch into English but maintain the playful flirtatiousness that comes

natural to both of them. It is, Chloe knows, quite innocent. She sips more champagne and enjoys their quartet's conversation, as it bounces around. The banter and laughter shared by this small group washes away the slightly strained feeling from earlier. Tom has already retreated to his office. From the rest of the room, people soon start drifting off, back to the lab. It is, after all, just a normal workday.

Chloe is still awake, savoring the last moments of the day. They are at her place. Martin is lying next to her, already asleep. It is hard to recognize the public Martin, the brilliant Martin, in this sleeping figure. She thinks of their dinner at Tosca, their private celebration. It was fun and pleasant, mostly. The future came up, naturally, since she talked about her job applications. It is always awkward. They can't help but get a touch defensive, both of them. But the situation is clear. She wants a good job, so she applies to the best places, wherever they are. He would do the same, in her shoes. She is sure of this. Just as she is sure that he will stay in his privileged position as an independent fellow until he is ready to move on to another great job. They respect each other too much to expect anything else. So usually they try to retain a light tone in any conversations about the future. He playfully says he will follow her wherever she goes, when the time is right. She pretends to believe him. It is an act they have and it normally relieves the tension. Tonight, though, her future has become just that bit more real. So it was harder to keep up the pretense. Maybe she should be sad. But the truth is, she is too excited to be sad. The future is finally happening.

She kisses him gently on each eyebrow and turns over on her side. Sleep comes quickly and pulls her far away.

Chapter 3

It is early and the city sky is still dark. The half-lit University buildings seem largely empty, the institute as well. Karen can hear her own footsteps. When she gets close, the security guy at the front desk looks up briefly, recognizes her and buzzes her in. She takes the elevator to the third floor and moves swiftly down the hall. The labs are empty and dimly lit. No one is around. It was like that in her previous labs, as well. No one else would come in as early as her, at least not consistently. She enjoys having this quiet morning time to herself. It is the best time of day to get serious work done. No disturbance, no competition for the shared equipment. Perfect.

She switches on the main overhead lights in the lab and heads straight for her desk. Sliding off her backpack, she glances, as always, at the picture of her