Rachel the Dancer

Waiting for his samples to finish incubating, Jonathan meticulously scribbled down a few comments in his lab notebook and checked the time.

“Chang is two minutes late”, he thought to himself.

There was nothing particularly special about that day. A graduate student at University of Chicago, Jonathan had been working in Dr. Greene’s lab trying to characterize and catalog mutations in the fungus *fusarium graminearum* for over six months. Extremely intelligent and hyper-analytical, Jonathan, quite ostensibly, knew that he was Dr. Greene’s favorite student. Perhaps this was because Dr. Greene saw a reflection of himself; he too was once an A+ student at the University of Chicago who majored in biology with a minor in chemistry. Coincidentally, they also looked remarkably similar, if not for the twenty year age difference. Both were skinny white men, lanky, with rather bulbous foreheads and small beady eyes that were proportional but unmistakably smaller than average.

The beeping of a small timer clipped to Jonathan’s belt signaled the end of the incubation period. Jonathan walked in from the lab’s back room, seeing Chang had arrived and was already working on his own project; he was now ready to run the DNA samples through an electrophoresis gel. The lab, room 346 of Polk Hall, was just an ordinary molecular biology lab. An environmental monstrosity, it housed three ultralow temperature freezers, two regular freezers, four refrigerators, two permanent fume hoods, a few balances, centrifuges, and many other scientific instruments. Half the size of a typical school gymnasium, it consumed as much power in two weeks as the same school would consume in a year. If not by another powerstrip, every electrical socket in the lab was utilized; the delicate balance of extreme power usage was barely managed by two fully loaded circuit breakers.

Jonathan prepared his DNA gel the same way he had hundreds of times before. He knew the recipe required fifty milliliters of distilled water, five grams of agarose, and five microliters of SYBR green dye, but he checked his lab notes just to be sure. Jonathan measured out fifty milliliters of distilled water in a graduated cylinder, poured it into a beaker, swirled the beaker, and then poured the water into the sink. Chang had just washed and dried the same beaker, but furiously independent, Jonathan was not willing to allow the slightest possibility that someone else's mistake would reflect badly on him. After ensuring the absolute sterility of the glassware, Jonathan microwaved the mixture of water and agarose, and searched the refrigerators for the small vial SYBR green.

Sold in milliliters and used in microliters, SYBR green was stored in a two inch clear plastic cylinder with a narrowing funnel-shaped interior. Holding the vial and a micropipette at near cross-eyed distance from his face, Jonathan dexterously depressed the pipette's plunger and inserted the tip into the vial. Like the proboscis of a butterfly, the specialized pipette tip slipped its way to the bottom of the funneled interior. Jonathan released the plunger of the pipette; his eyes widened, and his heart began to race.

"Oh Sh-t!" Jonathan mouthed to himself. "Chang," he said in a concerned drawn out tone, "how much SYBR green did you use last week?"

"Uh, a lot? Why?" Chang replied nonchalantly. He maintained a focus on his work under the fume hood.

"I think we're all out."

This got Chang's attention. He walked over to Jonathan's lab bench, held the empty vial of SYBR green, flicked it a few times and said, "Yeah, I think we're out."

"We're dead, or even worse, fired!" said Jonathan.

"No, you're dead because you're going to tell him that you ran out of dye."

"This is your fault!"

"Maybe, but it's your problem now." Chang, careful to avoid eye contact, returned to his station.

Dr. Greene was, for the most part, a temperate man. Years of scientific research had conditioned him to accept the inevitable realization that most scientific inquiry would yield negative results. Dr. Greene was dedicated to perfection but also to the scientific method. Over time he grudgingly accepted that his experiments would not always support his hypotheses, and he realized it may not be completely fair to blame his student researchers.

The one aspect of biological research that still infuriated him, however, was ordering supplies. If anyone wanted to see Dr. Greene turn bright red and explode with anger, all they would have to do was inform him of the absence of a necessary reagent. To him, there was nothing worse than having to postpone research while impatiently waiting for the next Fedex delivery. The only outlet for his frustration was screaming at the student researchers who were left receiving payment for their mere presence in the lab.

Jonathan found himself in a distressing situation. Dr. Greene thanked the last intern, who dutifully informed him that the lab had run out of 1mL pipette tips, with a swift termination. For Jonathan, a graduate student, this was simply not an option.

I don't really need to add SYBR green, do I? he reasoned to himself. *After all, I could tell him we're running low on SYBR green, wait for him to order a refill, and then run this DNA through a gel next week.*

Following a convincing mental gymnastics routine, Jonathan finally decided he would remain silent. Speaking up was academic suicide and he had worked too hard for this research opportunity.

“Do you think Dr. Greene will notice if I run these samples next week?” Jonathan asked Chang from across the lab.

“Maybe, you should probably just tell him what happened before this gets any worse. The worst that he can do is fire you, and he might do that anyway if you don’t get some work done.”

“Why didn’t you tell me you used all of my dye!”

“I just forgot, okay?”

“No, it’s not okay! Remember what happened to the last intern? He wasn’t even here long enough for me to learn his name. You should’ve told me if you used my dye! Why didn’t you tell me!”

“It’s not *your* dye, and maybe I was just tired of you always getting in my way,” said Chang out of spite.

Jonathan glared at Chan and in disturbingly earnest manner said, “Chang, I will seriously kill you if you did this on purpose.”

“Calm down; I didn’t actually use all your dye on purpose. Sorry, but I’m just saying you’re always using the Opticon 2 when I need it.”

“And you’re always using the Spectrafuge when I need it! I just hope he doesn’t notice I’m not doing actually do anything for the rest of this week and you’d better not tell him.”

As it turns out, Dr. Greene didn’t notice any lack of productivity in the biology lab. If anything, there was a small increase even though Chang worked alone. Chang didn’t work any harder than usual, but without Jonathan constantly occupying the same lab bench, centrifuge,

fume hood, or PCR machine that he just happened to need at a given time, Chang doubled the number of *fusarium* fungus mutants he was able to catalogue in a single week. For once the lab benefitted from a natural unity but unity only in the sense that Chang was the only one working. Fortunately for Jonathan and to Chang's dismay, Fedex promptly delivered the SYBR green the that Saturday. Room 346 would not again experience the luxury of unity until many months later.

Not until Rachel McLaughlin waltzed into room 346 did Dr. Greene's lab experience synchrony once again. Rachel was the most unlikely student to work in Greene's lab; she majored in neither biology nor chemistry. In fact, she majored in dance. In Dr. Greene's eyes, Rachel, who only minored in biology, was not fully committed to either of the subjects he deemed fundamentally incompatible.

From a young age, Dr. Greene fully committed himself to scientific inquiry to the point that he now lived alone in his head and viewed his body as little more than transportation for this head. He had as much of a disdain for dance itself as her eclectic world view that, to him, seemed distracted. "Rachel, you're neither a scientist nor an artist and therefore have no place in this world," he flatly told her.

She had joined lab not by Dr. Greene's agreement but by what he viewed as a bureaucratic intrusion that came bundled with the research grant provided by the university. The university hoped to diversify every field by placing qualified students in notable research positions. Rachel had in interest in biology, and was an A- student. She could score adequately well on the exams but could not compete with the sheer amount of time Biology majors spent on the subject.

Nonetheless, biologically speaking, Rachel was truly an exquisite specimen; she had the perfect form of the modern dancer: long legs, thin yet not frail, and hips that were noticeably defined but not overbearing. Her light blonde hair was only outshined by two exuberant blue eyes parted by narrow nose. Light skinned and essentially flawless, in the lab, she oddly complemented the cleanliness and sterility of the many white scientific instruments more so than her colleagues Jonathan and Chang. Ironically, and in far more negative way, Jonathan would make this apparent similarity a reality.

“Rachel, can you autoclave these used pipettes tips?” he asked.

It was a job tantamount to taking out the trash. For the first week, Rachel only observed and performed the menial tasks of autoclaving trash, wiping down lab benches, and refilling media bottles. Jonathan and Chang suffered no particular grievance from Rachel’s presence; after all, she was not in competition with either of them, but Dr. Greene’s contempt for Rachel was obvious enough, and neither Jonathan nor Chang planned to challenge that notion. Dr. Greene refused to assign Rachel a separate project, yet he was bitter that he had to pay her just as much as Jonathan or Chang.

“Rachel, why are you here?” Dr. Greene mockingly asked.

“I’m interested in biology and wanted some lab experience,” she replied without acknowledging his tone.

“Shouldn’t you be focusing on dance? I don’t see why you chose to major in biology; it’s not one of your strengths and maybe distracting from your life goals.”

“I do focus on dance but biology is simply the scientific method of understanding the same life I try to understand and express through dance.” Her words sounded rehearsed, and

indeed they were; Rachel had spent some time trying to summarize her deepest convictions with a single sentence. To Dr. Greene, her words meant nothing.

Dr. Greene let out a tired sigh and said, “We have a good thing going on, don’t touch anything, and don’t mess anything up.”

When she wasn’t cleaning, Rachel spent most of her time observing Jonathan and Chang. She noticed that there was something awkward about of the two of them she couldn’t quite describe.

It was a product of their overall demeanor. The way they walked, the way they held the instruments, and even the way they talked just seemed absent of any rhythm or grace. Jonathan and Chang were perhaps quantifiably more intelligent than she, yet to her they seemed indescribably dumb. Rachel saw that Jonathan and Chang would often need to use the same equipment at one time.

During her second week in the lab, Rachel saw Jonathan begin his DNA purification protocols that would require incubation for sixty minutes and sixty-five degrees Celsius; at the same time Chang began his protocols that would require the same incubator a different temperature. Rachel listened to their conversation as the two men met in front of the incubator.

“How long do you need this incubator for?” asked Chang

“Sixty minutes at sixty-five degrees Celsius,” Jonathan replied.

“Well I only need it for thirty-five minutes at forty degrees Celsius, so can I put mine in first?”

“Yeah, I guess that makes sense. Wait, but the incubator is at fifty degrees right now, and it cools many times faster than it can heat up, so we’ll save time between us if I go first at sixty-five degrees and just let it cool to forty-degrees when you need it.”

“I guess you’re right, just tell me when you’re done.”

Rachel was astounded by the level of intelligence Jonathan and Chang seemed to utilize erratically. She never really thought about the incubators heating and cooling rates. She did however realize that starting on non-conflicting protocols at the beginning of the day was a simpler solution that would have saved both of them even more time. What Jonathan and Chang had in raw analytical ability they lacked in common sense and coordination.

The next day, Rachel proposed an idea to both of them, “If you both tell me which protocols you’ll be following on a given day, I can create a schedule free of any conflicts. You’ll get far more work done, and I’d get do something besides clean every day.”

Jonathan and Chang were very open to the idea mostly because they had nothing lose from the deal; normally, they would just pick a protocol to start with at random anyway. For Rachel, coordinating the lab came naturally; she remembered the countless dances she choreographed while studying as a dance major. Between all the motions and expressions, timing and positioning held the dance together. Whether the motion was a pirouette or turning on the centrifuge, she ensured every person, every dancer, had a place and a role on her stage.

Jonathan and Chang were her dancers now. As awkward and clumsy as they were, they were as proficient at operating a mass spectrometer as the girls in Rachel’s ballet conservatory were proficient at performing a perfect fouetté en tournant. All the two required was proper timing. For Rachel, it didn’t matter if time was measured in seconds, minutes, or hours. She could intuit how the various protocols’ instructions fit together just as she could the motions of a dance. Like a human heart, room 346 was given a beat and rhythm. The biology lab came to life; never in its history had the lab operated with such efficiency. When Jonathan incubated samples for hours, Chang was using the PCR machine; when Jonathan needed all the centrifuges, Chang

only needed to run gels. For once, every machine in the lab was working just as hard as any human. At this rate, Jonathan and Chang would be finished processing every fungus sample three months ahead of schedule. The rapid increase in progress did not go unnoticed.

“How’d you guys get so much done?” asked Dr. Greene.

“It was all Rachel,” Chang replied.

“Come on, guys, you really shouldn’t joke about these things. That girl needs to straighten out her priorities”

Jonathan and Chang did dare to tell Dr. Greene that they were not kidding about Rachel’s role in the progress of the research. Both knew they would need positive references from their project leader after working at the lab for so long and already including the experience on their resumes. Even so, they both felt guilty that they were receiving praise for work that Rachel had done while she received only scorn.

“You should show Dr. Greene your lab schedules. He’s really been impressed by the number of samples we’ve processed this week,” Jonathan said.

“I thought about it,” Rachel replied.

“Why haven’t you yet?”

“I was just thinking that I don’t really need this internship. You two have been working on this project for over a year, and it’s not like I actually did any real work on the project like you did. I could have left last week if I wanted to but I just wanted to see what it was it was like.”

“Thank you, really. If I can ever do anything for you outside of work, just let me know.”

“You really don’t have to do that.”

“It would be my pleasure. Well, I’m done tonight. I’m spending the weekend with my family. See you on Monday.” Jonathan packed up his laptop and left Rachel alone in the lab. And so their work would continue, Rachel would organize the schedules and Jonathan and Chang would follow her schedules to the second, dancing around the lab.

Staring at the empty lab, Rachel sighed with relief, delighted to have a new found sense of belonging. The lab was peaceful at night; the rhythmic humming of the ten refrigerators and freezers provided and endless symphony of dull roaring tones. There was just one minor issue lingering in her mind. As a dancer, Rachel was taught to make do with any stage she was given, but this lab had one obvious defect that she could not overlook no matter how hard she tried. The lab had four bench top centrifuges, three of which were placed in parallel on a single bench labeled “centrifuge” while one lone centrifuge was placed on the other side of the room. “This makes no sense,” she thought, “but then again, this lab was organized by the same people who I thought were awkward and clumsy just last week.”

She unplugged the lone centrifuge, and picked it up. It was much heavier than it looked; the machine was small white box that inconspicuously housed a solid metal rotor the size of a large grapefruit. As she walked across the room, Rachel had an interesting thought, “This thing probably costs more than my Volvo.” Rachel had always been intrigued by the incredibly high price of scientific supplies; she knew the entire concept probably conformed to the law of supply and demand, yet could not shake the feeling that her dad, an auto mechanic, could have built a machine of similar, if not superior, quality with a few piece of scrap metal. It seemed as if merely labeling something as “biology grade” or affixing a gold sticker embossed with the words “approved by the National Science Foundation” instantly tripled the price of any product.

Rachel's thoughts and balance were suddenly interrupted by something tugging on her left foot; it was caught on a suspended power cord. Rachel screamed as she started falling with the centrifuge spitting past the grip of her thin fingers. She quickly regained her footing and with the palms of her hands squeezed the side walls of the centrifuge as hard as she could, gradually halting its descent. The lab was quiet again; the dull roar of the freezers was only punctuated by Rachel's racing heart. Barely maintaining her grip on the sides of the heavy white box, she waddled awkwardly the rest of the way.

"That could have turned out a lot worse, but at least no one saw me," she thought.

Rachel placed the centrifuge on the bench labeled "centrifuge" and plugged it in. "There," she said with a shaky sense of accomplishment. She turned off the lights, and let the door lock behind her.

The following Monday began as any normal day would. Rachel woke up and drove five minutes to Polk Hall. She took the elevator to the third floor and began walking down the main corridor. As she approached room 346 she heard a splash. Looking down, she noticed a small puddle of water; actually, it was rather large puddle of water leading all the way to the space under the door to room 346. Rachel heard muffled cursing through the closed door.

"Rachel," a voice whispered from behind.

Rachel turned around. Coming out of the bathroom with entire roll of paper towels, Jonathan motioned for her to walk over quietly.

"Did you move the centrifuge?" he asked her, still whispering.

"Yeah, why?" she whispered back.

"Greene's going to kill you!"

"What? Why?" Rachel raised her voice.

“Shhh! We put that centrifuge on the other side of the room because out calculations showed the circuit breaker was fully loaded. That centrifuge flipped the circuit breaker and that side of the room’s been without power since sometime Saturday!”

“So, just turn it back on!”

“We had freezers and refrigerators on that side of the room! Greene’s in there right now trying to figure out what we can keep and what we have to throw away!”

“I didn’t know! What do I do?” she said. Rachel wasn’t crying but Jonathan could see through her glossy eyes that she was holding back tears.

“I don’t know! Just run away and never come back into this building. You don’t want to see Greene right now!”

“No, that’s stupid.”

Rachel walked briskly to the door and opened it.

Hearing the door open, Greene stop reaching around in the back one of the freezers screamed “Jonathan, where are those damn paper tow— You! Look what you did! I told you not to touch anything!”

“But I—”

“How could you be so stupid you cow! Do you know how much you’ve cost me? Just go, you’re fired, just go!”

Tears streamed down Rachel’s face. Her flawless skin reddened with shame. She just wanted it to end. Rachel ran out the door past Jonathan, coving her face as she passed Chang, who was just arriving. She didn’t want anyone else to know what she’d done.

“This is what I get for hiring a good-for-nothing dancer!” Dr. Greene’s echoed down the hallway.

The damage was not nearly as great as Dr. Greene made it appear. The three ultralow temperature freezers, like the freezers in any respectable university, had forty-eight hours of backup power and could hold a temperature below minus fifty degrees Celsius for ten more hours even after that. The minus twenty freezers did shut down; chemicals, reagents, and enzymes worth tens of thousands of dollars had to be thrown away but were all insured. Very much to the delight of Chicago Biological Supply, all of the reagents were reordered and delivered the following week.

For Jonathan and Chang life in the lab reset itself to the way it was before Rachel arrived, or so they thought. The next day was ordinary enough, Jonathan waited for a few samples to incubate as he doodled in his lab notebook.

“Hey Jonathan, which protocols are you starting on now?” Chang asked.

The heart of the lab beat once.

“I’m doing plasmid DNA extraction so I’ll need all of the centrifuges for most of the day”

And again.

“Okay, I guess I’ll start on my RNA purification and then that should give us enough time to start running gels around noon.”

“That sounds good.”

When Jonathan needed to use all of the centrifuges, Chang only needed to run gels. When Jonathan incubated samples, Chang used the PCR machine; Once again, every machine in the lab was working just as hard as any human. Their protocols were coordinated to precise timing. At this rate, Jonathan and Chang would be finished processing every fungus sample three months ahead of schedule. Dr. Greene was pleased by the progress. “Turns out we didn’t need

Rachel after all” he said chuckling. Jonathan and Chang feigned a light laugh; they never saw Rachel again but held her in the highest respect. The lab sprang to life once again; like a human heart, it had a beat and a rhythm. Whether Jonathan or Chang knew it or not, they were still dancing her dance.