
TOMORROW
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LIVING TOMORROW
THE FUTURE
Powered by Fiction

Living Tomorrow

Edited by

Ed Finn and G. Pascal Zachary

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Introduction: In Dreams Begin Responsibilities

Liam Zachary and
G. Pascal Zachary

In a world of urgent problems and exciting possibilities brought about by scientific and technological innovation, what we imagine in our individual and collective consciousness often helps clarify and contextualize what we can create, build, or bring to life in the domain of real, the actual, the physical. This paradoxical dialectic—how the imaginary nourishes reality, which in turn inspires and ignites the imagination—is an essential feature of our times. Designers, engineers, and scientists are front-line players in the construction of our built world. Yet these makers of material worlds are shaped and re-shaped by the collective imaginations of artistic and literary folk—the pure dreamers.

That we imagine our worlds before we build them is a truism of the human condition. So these stories collected here, written by young people engaged with the prospects for science and technology, represent one kind of rehearsal or anticipation for facing the future in all its messy reality. All eleven of these stories imaginatively deal with the social implications and political consequences of future advances in the application of the concepts and methods of biology and the related disciplines of physics, chemistry, computer science, and bioengineering to solve or attempt to solve real-world problems. Whether through advances in gene therapy, human genetic and prosthetic modification, pharmaceutical treatments, or renewable energy, each story creatively dramatizes technological and scientific challenges that may await future generations and future worlds.

Of course, the dramatizations collected in this volume never contain precise instruction guides on how we reach the desired futures: how we we get there and what we do when we arrive. Yet these stories present engaging and challenging situations, thought experiments in which fictional characters face a range of predicaments that humans possibly—and plausibly—may face in the decades ahead.

The degree to which humans can take full responsibility for their creations is never settled, partly because of inevitable unintended consequences. Some of the stories depict challenges associated with environmental change, but managing environmental change is never a straight line, linear project. Other stories present challenges associated with the use of expected or anticipated technological changes and scientific advances in ways that alter the basic quality of human existence. Fictional characters often try to simply cope with changes rather than take command of their situations, not because they are meek or ineffective but because the pace of change and the scope and scale of the techno-scientific tools at their disposal are difficult to master.

Hence, the emergence of a human condition fraught with uncertainty, even elevated risks and dangers. Even well-intended interventions can alter the environment or human biology in unexpected ways and sometimes require new adaptations. Speculative fiction serves as a flexible terrain for creative minds to test out ideas, approaches, and attitudes towards themselves and their communities of interest. The range of thought experiments in this volume is diverse and lively, as snapshots of our stories suggest:

Miniatures Day imaginatively engages the role bioengineering might play in the future as animal species are increasingly threatened by climate change and human development. Although the loss of the world's wildlife is a somber note, engineering solutions could prove fruitful for future study of animal species. The story presents a teacher who entertains a class with descriptions of his boyhood in the sanctuary, where he grew up with an extremely rare best friend: a dog. In this world, animals are scarce. Most people have never touched, or even seen, a living mammal—and the teacher's mysterious black box is most irresistible to one student who harbors a dark secret.

The Race follows the efforts of engineers to revolutionize solar energy technology in a distant future when the world's energy sources are more uncertain. The Americans and the Chinese have partnered to find the cure for impending environmental doom: perfect solar energy. Chris and Li have been holed up in a lab, desperately seeking the solution, each with orders from their government to betray the other if and when the time comes. Their friendship will be tested, but some things are more important than any single person or nation. The story brings to attention our current dependence on non-renewable energy sources and the pressing need to develop new technologies that improve renewable sources.

Programmed to Die asks whether it is morally right to cheat death through technological advances. The story compels the reader to contemplate whether a life loses its appeal if a person lives forever.

Bloodgivers dramatizes new ethical and moral predicaments that might come about as a result of bioengineering human genetic material: falling in love with a species designed to serve yours. The story also addresses the question, "what makes us human?" and imaginatively reflects on human conflicts brought about by technological and scientific innovation. Genetic modification has created the symbiotic races of The Greats and The Givers. Greats can regenerate and recover from anything—as long as their Giver is near. Joanne has been wounded in battle. She's lost in the woods with her fellow soldier, Sam. He's doing the best he can to take care of her, but without the blood of her Giver, Natasha, she will surely die.

In **Gene Dilemma**, science can now tell parents every detail of their children's future talents and proclivities. Conor was meant to play tennis, and he plays it well. His friend Peter, however, has ignored the code in his DNA that says he should be playing soccer, opting to play tennis as well. A simple tennis match becomes the stage for a philosophical conversation on identity and the nature of self-awareness. The encounter raises questions about how technology might change the way society looks at the formation of human identity and makes readers wonder whether in the future there will be room for individuals to push back against their genetic destinies.

The Cursed Nootropic presents a world in which we are dependent on pharmaceutical drugs to complete work tasks and suggests that self and society could change for the worse if the use of these substances is not monitored carefully. This story also brings to attention the potential for precarious relationships to develop between business interests and pharmaceutical drugs in the future.

Tunnel Vision examines the social consequences of a drug that prolongs life. Carter Stone wants immortality. All of society is buzzing over Dr. Carlos Vale's new miracle drink that stops death. Carter can't imagine living his mundane life, working at a coffee shop, for thousands of years. But death sounds even worse. So Carter and his roommate order their first two vials and toast to their new lives. All choices have consequences, and some of the bad ones can last forever.

Carter's story highlights the role of death in giving life meaning and raises questions about how bioengineering advances in drug therapy could change perceptions about life and death.

The Fountain of Youth explores the personal dilemmas of immortality made possible by bioengineering advances in pharmaceuticals. Isaac Heller, the first man to receive the Fountain of Youth treatment from the Daedalus Corporation, is discovering that life isn't fair—especially when your lifespan is five times that of the average man. Isaac's store-bought longevity has cost him his wife and friends, and has him questioning everything about the modern world, where the rich get richer and live longer, while the poor stay poor and die young.

The story questions the benefits of increasing longevity. It suggests that a longer life might alienate us from our peers, make us social pariahs, or force us to witness the deaths of countless family members.

Piece by Piece explores the social consequences of organ prosthetics, suggesting that in the future the disenfranchised will become organ banks for society's wealthy elites. This story makes us consider the importance of access or universal access to bioengineering advances in health care.

Ninety Stories High imagines a future where genetically modified foods allow growing populations to be sustained, as food is grown within the world's largest cities. The story invites us to consider the ethics of genetically modified foods and poses questions about the role bioengineering should or could play in our food systems. Farmers Jake and Marissa must decide whether to stay in the country, or move to the big city. New York is tempting, because of the ninety-story Monument Foods building: a huge tower that promises to feed most of the city. At first Jake is happy to earn a steady paycheck and leave his rural life behind, but soon he misses the intangible charm of life on a real farm.

In **The da Vinci Project** innovation has stagnated ever since we fully mapped the human brain. There are no more defects, and any that do arise are quickly stomped out in youth. A brave student plays the game, pretending to be perfect like everyone else, but secretly reveling in her flaws. Her detailed research into da Vinci and Edison's notebooks gives her the answers to how and why humans lost their creativity. The story illustrates how attempts to bioengineer the brain might actually hinder creativity—by ignoring the reality that so-called "mental disorders" are part of a portfolio of diverse ways of human thinking, and thus are central to what makes humans creative. The story also suggests that deep study of our past can contribute to creating a more ideal future.

To read and enjoy speculative fiction depends on stepping back, suspending disbelief—and insisting that storytelling can serve higher purposes than mere amusement. In stories, we let loose our dreams and fears and navigate diverse responses to complex problems of our built environment. That our stories about

tomorrow don't deliver the sort of precise answers produced by the practice of engineering nevertheless permits writers and readers to experience the terrible freedom of responsibility coupled with uncertainty.

In a world of risks and doubts amplified by emerging technology, the human intelligence represents a bridge between hope and despair, self-actualization and disappointment. In these eleven stories, young authors embark on a journey without end. If science, as Vannevar Bush once said famously at the end of World War II, is "an endless frontier," our means of imagining the future are also endless. Rather than circumscribe the individual imagination, the future beckons to all, nourishing multiple imaginaries and competing, if not always cooperative, visions of tomorrow.

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Weapons of Mass Distraction

Alex Soojung-Kim Pang

It's a typical Saturday morning in our Silicon Valley home. My wife is grading papers. My daughter and her friends are at basketball practice; my son and his friend are on an arcane quest to create the perfect *Magic: The Gathering* card deck. I'm at my desk, swapping out the hard drive on my aging MacBook Pro.

The machine is upside down, the bottom case removed and set aside. Ribbons and cables are detached, and a collection of tiny screws sits on a magnetized project mat, looking like metallic insects on flypaper. I unscrew one last bracket, and carefully lift the old drive out. Then I slot the new hard drive in place, and start the process of reassembling my machine.

My MacBook's sleek design, its look of brushed aluminum impenetrability, appeals to users and intimidates them. If you want to use us, our devices say, you have to accept our terms and learn our rules. So I'm always amazed to discover that these upgrades actually aren't that hard to do. I'm not an engineer; I know how to follow instructions, pay attention, and be patient. Turns out, that's everything I need to keep my hardware in shape.

It's no real surprise that this work doesn't need a college degree. The relentless logic of globalization has turned computers from hairy complicated wonders running on prayers and hacks, into a collection of modular components that can be assembled in seconds by anonymous workers toiling away in a vast factory in a forgettably-named industrial zone in a pop-up city somewhere in the world.

The engineering skill that makes these devices speedy and seamless, it turns out, also makes them easier to hack.

After I got over my initial hesitation, I discovered that I like opening my computer, feeling my way through a designer's clever tricks, and methodically taking it apart and reassembling it. Upgrading is a challenge, but if I keep a clear head, work slowly (I've broken things by being too hasty), and let myself sink into the task, I know it'll work. Happiness psychologists would recognize this immediately: it's what Mihaly Csikszentmihalyi called "flow," the feeling of total absorption in a task that is one of life's most rewarding and sustaining states.

But we've entered an age in which the technology industry has refined flow into a heroin-strong narcotic, an additive that makes Web sites, apps, and games more addictive. Of course, the tech companies have a long history of calling their consumers "users," but today they really mean it. Designers use insights from psychology, behavioral economics, and sociology to create weapons of mass distraction aimed at capturing as much of our time and attention as possible, reselling some of it to advertisers, and using the rest to stoke our appetite for in-app purchases and upgrades.

Part of the devious genius of these technologies is that they scale magnificently: games like Angry Birds and Candy Crush Saga can absorb an evening at home, or a few minutes in line. This means that they don't just make it harder for us to concentrate, sap our patience for challenges, and erode our capacity to focus. They also eat into the time we used to spend doing nothing at all, engaging in what psychologists now call "mind-wandering." Nicholas Carr and Sherry Turkle have done a fine job of explaining what's lost when we're reduced to a state of perpetual semi-distraction. But we're only now beginning to realize that mind-wandering is just as important for our mental health and creative lives.

Though we're not aware of it (or maybe because we're not aware of it), our subconscious minds treat those unfocused, undirected moments as a chance to go into creative overdrive, trying out new theories, sorting through novel combinations of ideas, and sometimes producing insights that burst into our consciousness as "a-ha" moments. Ancient philosophers, when confronted with tricky problems, used to say "solvitur ambulando," it is solved by walking. But it's hard for your subconscious to work on a problem when you're trying to crush candy or cut the rope. Our technologies are equally effective at eating into the concentration we need to be productive, and the mind-wandering we need to be creative.

I finish screwing on the laptop's lower case, turn it over, and turn it on. Soon it'll be up, running, and FAST; starting Microsoft Office used to be a molasses-slow grind, but now my MacBook opens it with the speed of a doorman at a luxury hotel. Learning how to get inside our technologies this way is a nice reminder that despite their best efforts, companies haven't yet created a perfectly seamless, frictionless, choice-free world. We can still open our devices, learn how they work, make them work better, and most important, make them work for us. Learning to be more mindful ABOUT our devices, I argued in my book *The Distraction Addiction*, helps us be more mindful WHILE using them; it makes it possible for us to practice what I call "contemplative computing."

Learning how to reclaim choice and regain control of our technologies is important today, but it's going to be even more essential in the future, as we move into a world of always-on devices that adjust their behavior to our presence, try to read our emotions, and anticipate our needs. We've already seen the beginnings of this movement. Today the Nest thermostat sets the temperature partly by using its camera to figure out who's at home. The latest generation of smartphones uses front-facing cameras to track your eyes, in order to create

3D effects (like on the Amazon Fire phone) or automatically scroll down when your eyes reach the bottom of a page (like on Samsung phones). These cameras already do a decent job of measuring emotional states; cheap EEG headbands like NeuroSky and Emotiv do an even better job. And devices like Amazon's Alexa and the "social robot" Jibo will be always listening for our next question or order.

Together, these technologies will enable a revolution in distraction. Games will be able to make moment-by-moment adjustments based on how excited or frustrated we seem, keeping us engaged and playing longer. Social media sites will be able to read our emotional states, and highlight different content depending on whether we're feeling generous or need an emotional boost. Today, Facebook, Twitter, and Candy Crush Saga tap into our natural, predictable attraction to shiny blinky things, our craving for social recognition, our curiosity and love of excitement. Tomorrow's technologies will take the fight for our attention to a whole new level: they'll be adaptive, responsive, and calibrated not just to our primate instincts, but our state this instant. Distraction will evolve in real time.

The good news is that these same technologies can also be used to promote focus, to better understand our own emotional states and energy levels, and to protect ourselves from external distractions. Today, for example, attention monitoring software can use eye-tracking technology and EEG headsets to detect when readers or drivers are distracted, and encourage them to refocus. We'll have more powerful diversions, but also tools that we can turn back against them. In an age of adaptive distraction, it will be more critical than ever to be mindful about our high-tech world—to open up the technologies, see how they work, and discover how we can get them to work for us rather than on us—if we hope to be mindful in it.

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Miniatures Day

Paige Dempsey

I remember the silence of Miniatures Day. I remember the taut breath of my peers in "Natural History: The Recent Years." I remember the weight of guilt on my shoulders. I remember waiting for, and dreading, the start of the day.

I was an undergrad at the University of Northton. It was the twenty-fifth of February. It was Miniatures Day. Any student even remotely interested in the Vital Sciences knew what that meant; I had that date marked on my calendar for the last three years. The silence of my peers thrummed with anticipation and the excitement of a dream almost realized.

As usual, Dr. Moore stepped into the lecture hall three minutes before class began. Normally, my fellow students and I barely noticed his arrival. We'd talk, finish homework, and play on our desk screens. We'd do some last-minute studying, click through lectures on our Glasses, or scroll through Memory Pens. Only when Dr. Moore stood before the class, presentation upon the wall, only when he gently cleared his throat and raised his eyes to his students, did we turn our attention to him.

But that day no one talked, our desks were dim, and our eyes followed the professor's back as he set up the day's lecture. The bones and skins were gone from the display at the front of the room. The wall shelves were empty, the many-sized microscopes cleared out. The 3D projectors were gone. And the holo-walls were disabled. That day, our surroundings weren't scheduled to be Yellowstone

National Park 2005, Sherwood Forest 1548, or Post-Arctic Iceland 2313. That day, our lecture hall wouldn't transport us to the past, but keep us in the present. That day, Dr. Moore set a compact black case on the front table.

We knew what it hid. All eyes were riveted on that black box—all eyes, that is to say, but mine. My peers sat there in reverent silence, waiting for Dr. Moore's lecture to materialize on the wall screen behind him.

I remember what it felt like to sit there with the silence of guilt weighing on me. The black thoughts that had plagued me throughout the previous months surfaced. More than ever before, the suspicion that my studies were a sham, and that I did not belong among my passionate and brilliant peers, occupied my mind. A voice whispered that I didn't deserve to be present on Miniatures Day.

Finally, the room went dark. Behind Dr. Moore, the words "Miniatures Day" floated, ghostly white on black. Our professor began his lecture: "Although the last thing any of you want today is a long speech, I assure you that if you don't give me your full attention for the next few minutes, I will halt today's proceedings."

He meant it. Rumor had it that Miniatures Day seven years ago ended with Dr. Moore carrying the black box out of the room unopened. And so my peers gathered all of their willpower, pulling themselves together, trying to calm their rapid heartbeats, and they reluctantly turned their eyes away from the box and to our professor.

"Growing up," Dr. Moore continued, "my family was a family of five. My parents founded the Midwest Animal Sanctuary and Retreat, a place I am sure you all have heard of and aspire to visit one day. My family, I admit, is very proud of our groundbreaking accomplishments there."

My roommate elbowed me, casting a sly glance and a smile my way. And I knew why: I, too, had grown up near a sanctuary. My roommate knew this, as did most of my peers—I suppose it gave me an impressive reputation. What they didn't know is that my childhood shared much more with the professor than they could guess.

"Because of my parents' profession," Dr. Moore was saying, "I spent my childhood roaming around a pristine forty acre area of preserved wildlife with my younger brother—and the fifth member of my family: Liam, our dog."

A picture of young Dr. Moore, his brother, and Liam appeared. A shock reverberated through the room around me. The professor's resemblance to the young boy in the right side of the picture was unmistakable. And to see the professor sitting next to—*touching*—a dog was astounding.

Rumors abounded about his childhood at the reserve, but they had always sounded too good to be true. No child—even a hundred years ago—had gardens or climbed trees, spent afternoons quietly stalking rabbits and butterflies, or studied animals while they still breathed. No child in living memory had the privilege of keeping a pet.

But the story about Liam was true. I sneaked a glance at my neighbors. Normally, Dr. Moore's slightly pedantic lecture style would prove challenging to their attention spans. But today, Dr. Moore held his students in thrall. My friend on the left was crying and smiling, her hands at her heart. My roommate was on my right, leaning forward, eyes bright. Seeing them like that, rapt and engaged in this story, the most passionate scientists of my generation, made my secret history even more unbearable.

"As I'm sure you can imagine," the professor said, "my brother and I spent many a beautiful summer afternoon with Liam. He was our best friend, our other sibling.

We loved him. He loved us. And he brought an untold amount of joy to my life. It was Liam, not my parents, nor growing up near a reserve, that lead me to the Vital Sciences."

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I don't remember all the ways I found to enter the sanctuary, but there were many. Trees whose branches towered over the wall. Fallen logs. A ladder I hid out there. Occasionally I'd find a hole dug by some adventurous animal, and spend an hour widening it before wriggling under the fence.

While the matter of entering the sanctuary undetected was challenging—I couldn't touch the wall or I'd be IDed, and I never stopped watching for cameras—I forgot these challenges once I stepped onto the grass in the reserve.

I, like Dr. Moore, had roamed the hills of a sanctuary; however, mine was much larger, surrounded by much more security.

And I was never given permission to enter.

Every time I visited the reserve, I spent my afternoons smelling flowers, climbing trees, stopping to watch every animal I saw, and dreading the possibility of being caught trespassing.

When I returned home, I hungered for the sights and smells of the sanctuary. Those sounds could never be replaced by a synthesizer. Nor could the most breathtaking array of splendid colors displayed on my ceiling imitate the life beyond those walls.

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"Liam died when I was fourteen," Dr. Moore continued. "It felt like my heart had been ripped out. My eyes punctured. The pain of losing someone so precious was nearly unbearable. And because mine was the only family in the country to have a pet, no one outside of my family understood our loss. I remember feeling as if I was surrounded by the heartless, by the sightless.

"It was then that I realized how much they lacked in their lives—they were blind to the beautiful things that had once graced our planet, and I was the one of the few who had known what it was like to live side by side with such beautiful things.

"I came to this field because I had known what it was to see, and I saw that the reason the world was dying was that no one understood anymore. And this, this is what your studies are about. Saving the world, yes. Saving what is not yet lost, yes. And, yes, as we all hope, perhaps reversing the mistakes we have made.

"But the only way to reach these goals is through *understanding*."

Dr. Moore paused, letting what he had just said sink in.

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I remember the one time I was caught by a patrol—found stuck to the wall, my left arm and shoulder caught like an ant in a trap, embedded in the adhesive that had slowly wrapped my limb.

I remember my tears, and the threats of the patrol, and the silent disappointment of my parents.

I waited half a year before returning to the sanctuary.

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"Now. You all. You students," Dr. Moore continued, sweeping his arm across the lecture hall seats.

"You all want to understand. You sit here before me because you know that you are blind, you know that there is something missing in this world. And you want, oh so desperately, to change that.

"You've taken steps toward that change. You've studied bones, skins, rocks, and leaves. You have gone to reserves, to retreats to observe the few living organisms that remain on this earth. Some of you might even travel one day to Antarctica, the Andes, and the depths of the ocean, where you will feast your eyes on sights you could never dream of.

"Yet these living creatures will remain at arm's length, far away, and seen only through glass. Only the very luckiest among you will touch the fur of a living mammal, will make eye contact with it, will connect with it.

"You all know this. None of you have ever had, or will ever have, a pet. None of you would dare break that code. You learned before you could walk that the possession of any living organism would destroy your life.

"And yet…the dream has lived in your heart. It's the lullaby your parents sang to you before you could even say the word 'dog.' It's the stories of cat and wolf, fox and rabbit, mouse and lion that you fell asleep to. You were constantly reminded of how far away they were, but you still dreamed of them, of their beautiful eyes, of their soft paws, of their giant claws, of their terrifying teeth, of their warm fur. And today, Miniatures Day, is the closest you have ever been to holding a living, breathing animal."

In the silence that followed that last sentence, I struggled to keep my bitter laughter inside.

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Dr. Moore was a student nearly half a century before Miniatures were perfected. So when he was faced with a particularly difficult obstacle in his research and restoration, the professor could not turn to a Miniature for motivation. But Dr. Moore did have his own spark of inspiration: a young child's message. The child was studying a certain type of owl—one of the few remaining—in school, and could not understand how they flew so quietly, or even how they flew at all. That week, the two had met in a holo-room, and the professor explained the principles of owl flight and anatomy. The image of the young and eager child warmed the heart of the professor.

I can only imagine his delight to find that same young child, grown up and on track to become an integral contributor to the field of the Vital Sciences.

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"You have the work of Dr. E. Cora, et al. to thank for what you will experience today. And it is my hope that Miniatures Day will lead you to the verge of understanding what you have loved."

And here, Dr. Moore paused for a long moment. "There is one more reason why what occurs here today is important: you have all chosen a very difficult field. It's challenging, and there are many who underestimate the value of what we do. The work can be slow. You may never witness the fruits of your labor. There will be days when all your work will seem to be for naught."

At this, I put my head into my hands, unable to endure guilt gnawing at the edges of my mind.

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The professor did not know the real reason that child had called him all those years ago. Did not know that the child, while exploring a forbidden part of the world, a walled-off paradise, had spent many an evening watching the Great Horned Owls that had nested in that part of the country centuries ago.

I had watched those owls with delight, with enchantment. Their silent wing beats awed me, and I was thrilled whenever they swiveled their heads to gaze at me.

After my interview with the professor, I started keeping notes on an ancient tablet found in a used tech store. I located all the owl pairs and nests, counted

the number of nestlings and fledglings. I made maps and crunched numbers and always knew where each of my owls could be found.

I even filmed them—but not in 3D; I could never have afforded those cameras. I studied the birds passionately, trying to determine why they, among all the owls, had survived so long.

After eight years of study, I knew the habits of the birds intimately. But then one spring came when most of the nests failed. I did not know why. The young that did fledge were small and weak. I was struck to the core as before my eyes, spring after spring, fall after fall, I watched the great birds die.

At night, I lay awake in bed, helpless. The old threats of the patrol rang in my ears. Guilty and terrified, I could not find the courage to ask for help.

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"But today, I give you Miniatures to bring you inspiration, to give you hope in the dark days when your work approaches meaninglessness." Dr. Moore fell silent. The great screen went black. Slowly the lights came up. He smiled at us, and very quietly said, "Who wants to meet their Miniature?"

And the box opened.

Even from the lecture hall seats I could recognize them all: there was a Golden Toad, an American Moose, a Pyrenean Ibex, a Polar Bear, a Black Rhinoceros, a Black Spider Monkey, a Nine-Banded Armadillo, a Passenger Pigeon, an American Beaver, a Cross River Gorilla, a Black Footed Ferret, a Green Turtle—there was even a Honey Bee buzzing around!

I remember the silence. I remember the room full of hope-filled young people. I remember some of them calmly wiping away tears, and others gazing open-mouthed. That day, they lived out one of their greatest dreams.

Dr. Moore began calling students' names, and one by one we received our Miniatures.

I don't remember hearing my named called. But I remember walking carefully, dizzily down the steps, towards the open black case.

I remember reaching Dr. Moore, and letting my eyes skitter across his face, worried that he might recognize the guilt in the eyes of his protégé. I looked at the wall, the floor, the ceiling. And then I was looking at my professor's hands, cupped gently around a tiny animal. Familiar, large eyes gazed up at me.

The world stopped moving. For one glorious, terrifying moment, I believed the dead had rejoined the living.

A Great Horned Owl.

My professor offered me the Miniature owl, hands unfurling around its diminutive wings.

I remembered that this was no living breathing animal, but the culmination of half a century of work: tiny solar cells, small circuits, minute feathers 3D printed to perfection.

My studied eyes could find no sign of the nanoskeleton underneath the fine skin and feathers. I couldn't see the lights behind its eyes, or the sensors embedded along its wings. The head, though much smaller than the original, was perfectly shaped. The coloring, perfect.

As I watched, the owl shrugged its shoulders, stretched out its wings, flapped once, twice, and flew. Even the flight pattern was exact. The bird flew a lap around the room, and I could not tear my eyes from it. I felt a quiet sob rise in my throat, and something lifted from my shoulders. As my owl finished its circuit, it flew in front of my face, hanging there for a moment, seeming a giant so close to me, before settling into my hands. When I felt its slight weight on my palms, my eyes, for the first time in months, met my professor's eyes.

And it occurred to me that perhaps Dr. Moore did know. The little Great Horned Owl took off again, and took a little more of the weight off my shoulders with it.

The Race

Saatvik Mohan

The man was walking briskly, a hoodie draped over his head. He was trying to exude an air of confidence, but even he knew that he was unsuccessful. Thinking that he was being followed, he stepped into a bar. The Chinese bartender was slightly surprised when the man removed his hoodie and revealed his Western heritage. "American, eh? What brings you to China?" The American looked up and considered the question.

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Three days earlier

"We're never going to get this!" shouted Chris. He banged his fist on the monitor. His partner, Li, looked up, smiling slightly. Chris Hanson was a recently graduated student with a degree in renewable energy. Only twenty-six years old, he seemed to have a bright future in his field. "I mean, seriously! It's 2264, and we've been hovering around twenty percent for two hundred and fifty years!"

For the past fifty years, the world's two dominant superpowers, China and The United States, had been locked in a race to perfect solar energy. Because of overuse over the course of three-and-a-half centuries, fossil fuels had almost completely run out. The situation was exacerbated by the millions of tons of fuel

required by the AGROS. The AGROS were ingenious machines invented in the twenty-second century. Although their mass fertilizing techniques cultivated the ground remarkably, the process required massive quantities of fuel. The People's Republic of China and the world's last remaining democracy, the United States of America, were rushing to find the right combination of elements that would unlock the near-infinite energy of the sun.

"We could try aluminum again," Li said, hoping that Chris wouldn't take out his anger on him. For years, everyone had thought that placing aluminum nanocylinders on the solar panel's light-receiving semi-conductors was the key, but fifty years of research convinced them otherwise. "Why? Just give up on aluminum. It's a dead end. This whole thing's a dead end…" Chris said with resignation.

Only extreme patriotism kept the United States' democracy alive. All other nations had already acceded to the necessity of a stronger federal government, something to moderate the world's exploding population. But retaining its democracy did not come without consequences. With bickering inside and outside of Congress, many people were objected to federal funding of renewable energy, because of the financial support required to manage the overpopulation crisis. Chris had realized that he would be jobless after he had graduated. But four months after the United States' decision to scrap energy research from its budget, the Chinese extended an olive branch. Despite both nations having guarded their progress in solar energy from the world for years, the Chinese suggested that the Americans send a few of their top scientists to work with the Chinese because no matter what, twenty percent was not nearly enough to satisfy the world's energy requirements. However, there was a catch. Since the Americans had shut down their research facilities, the scientists would have to

work together in China's twelve solar observatories. Each observatory would house one American and one Chinese scientist. Both countries had no doubt that the other would send its scientists with specific instructions to use their partner's knowledge only to the benefit of their own country.

The Chinese had the advantage, having cleverly required that the Americans come to them. But the Americans had no choice, with no funding for their own research program. But both countries knew that whichever was the victor, the world would be in its hands. It could sell energy to rest of the world and make an enormous profit. As the top graduate of his year, Chris Hanson was allowed to go as the twelfth American scientist; the other eleven were all older than fifty. Chris knew that the world had maybe six or seven months before its fossil fuel reserves would be completely depleted. Starvation was imminent.

So here he was, two months later. He and his Chinese partner Li Huang were slowly being driven insane by frustration and pressure. "Let's try a combination of beryllium and manganese on a lithium-based module," suggested Li. "Yeah, I guess we should try. Lithium has always been a possibility," Chris remarked. He jumped up and opened up the compartments. "Let's see…titanium…iron… radium…. Here they are," He said quietly to himself. Talking to himself was a consistent bad habit; not being able to help himself, he had been torturing Li unknowingly. Spending two months with another person can do that. Li put in his noise-eradicators. He went to take a nap with a distinguishable buzz in his ears.

Having come back to his desk, Chris began to assemble the module, deciding to apply a thirty/seventy percent proportion of the beryllium and manganese. He went and placed it on top of the domed aperture of the observatory. Then, following Li's lead, he went to the minuscule bunk beds in a dusty corner of the observatory and climbed onto his top bunk. "Lights off," he said, the

disappointment still evident in his voice. With that, he laid his head down and went to sleep, the light having been extinguished.

Chris awoke with a start. His shirt was soaked with sweat, so he got off his bed and went to change. Li was still asleep. Deciding just to check the panel's energy input, he grabbed it from its designated area and put it into the scanner. With his fingers crossed, he waited impatiently for the scanner to complete its inspection. The screen flashed a response, and Chris banged his fist on the monitor once again, waking Li. "Sixteen-point-four percent! We had more with vanadium!"

Li, not wanting to say anything, went to his monitor and started his work. Chris brooded for a couple hours. With absolutely no idea what to do, he decided to try the same elements. He tried a random proportion of beryllium and manganese. He didn't even remember what they were. He thought that one of the numbers started with a "six." Going to his bed again, he put on his gaming device and entered the virtual world. After a few hours, he went to get a glass of water. Li was still at his desk, but he didn't seem to be very energetic about his work. In between sips, Chris was recounting the elements of the period table, their atomic numbers, and their atomic masses to six significant figures. As elated as he had been to come to China as the youngest scientist with high potential, he had hoped that he would actually make a difference.

After a few minutes deep in thought, he was interrupted by Li. "Yeah, Chris, I'm going to go get something to eat from a street vendor," he said as he hurriedly left, not being able to bear past bromine and the rest of Group XVII. Chris realized that he had been speaking aloud, but before he could apologize, Li had left.

After spending another ten minutes looking at the wall, Chris got up to check the solar panel. Just to humor himself, he put the panel in the scanner. Then he

went back to his staring contest with the wall. After another hour, Li still hadn't returned. Chris finally went to check the scanner. Knowing that he was going to be disappointed, he slumped into his leather chair and immediately jolted upright as if he'd been electrocuted. Blinking on the screen was an unexpected ninety-three-point-seven percent. Chris had a thousand thoughts bouncing in his head. *Do I tell the Feds? I know those were my instructions, but I've been with Li for two months! Will I even be able to get out of the country?* Chris got out his two-inch transmitter and whispered, "I found it." Immediately, the holographic image started flickering. With anticipation, Chris was astounded to hear "connection unavailable." Surprised and anxious, he went outside and got the same result. He came to the conclusion that increasing budget cuts had affected the American satellites as well. As his transmitter was in a closed circuit with only these satellites, he couldn't use it in conjunction with anything else. He made his decision on the spot.

He would get across the Chinese-Indian border and contact the government by use of a primitive telephone. With widespread infrastructure improvements in the early twenty-third century, there were none of these devices left in China. But poorer countries such as India were bound to have some telephones. Knowing that Li was bound to come back soon, Chris went and packed his things quickly. Within three minutes, he was on a magnetic grappling carriage. Staring at the distant ground, he was cramped between an elderly woman and a middle-aged man. It was a long journey; it was late when he arrived in Lhasa. He was still quite far from India, but he was too tired to continue and spent the night at an inn. "By this time," he thought, "Li will have already alerted the Chinese government."

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Chris was lost in thought. The bartender once again asked, “So what brings you to China?” Smiling sadly, he said, “Just on business. Completed business.” A slip of paper containing a proportion of elements that would transform the world was sitting snugly in his back pocket.

Chris was walking the streets of Xigazê, planning to reach India by the next day. He could have made it there by now, but something was holding him back. He just did not know what to do. He was in an area dominated by both Indians and Chinese. Control of the region had been in dispute for over a century, but eventually Indian and Chinese people simply started living together without discord. As he saw an Indian couple and a Chinese couple walking and laughing together, Chris wished that he could achieve that harmony as well.

Just then, he became aware of two men following him. He turned left at the corner and checked if they had done the same. They had. He turned right at the next corner. Once again, they were behind him. Then he started running. He made a series of random turns, looking behind to see the men keeping up with him.

Now in a deserted part of town, Chris was sprinting, his long legs giving him a slight advantage. But the men chasing him were familiar with the town and were finding shortcuts, trying to cut him off. Chris heard a voice coming from an empty restaurant around the corner. “In here, quick!” it said. Turning the corner, he rushed through the door and closed it behind him, panting heavily. He turned and was astonished to find Li looking at him.

Before Chris could say a word, Li punched him in the stomach, knocking his breath out. Chris collapsed to the floor. “That’s for leaving without even a note.

Now get up, man," Li said, helping him up. Chris slowly got to his feet, more confused than in pain. But the pain still hurt. "Wha-what-where did you come from?" Chris asked, with his hands over his stomach.

"I've been following you ever since I saw you sneak out. Of all people, I never thought you would do that, Chris! I thought that you wanted to help all people, not just your country! But then I see you running away!" he said, shaking his head.

"I know. Li. Trust me, I know. But I was under direct orders. I didn't know what to do. Tell me that your government didn't tell you the same."

"Of course they did. But there are just some things that are above the influence of a single country."

"So what do you propose we do?" asked Chris. Li's only answer was a cold silence.

For hours the two of them sat quietly. Occasionally one would share an idea, just to have the other point out its flaws.

"Why don't we just do it?" Chris finally said.

"Do what?" asked Li, staring at the floor.

"Why don't we just put it on the VTC? Just put it online and let the whole world see! The whole world…do you know what that would mean? Everybody in the entire world will have the power of energy at their fingertips!"

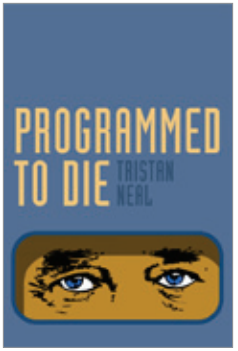
"But…what would that mean for us?"

"Doesn't matter. Like you said. There are just some things that are above the influence of a single country. We are merely two of a massive population—a population that's growing every day. Without energy, they won't stand a chance. Whatever happens to us, it'll be worth it," Chris said quietly.

Although he had felt passionate about his decision originally, convincing Li seemed to have the opposite effect on him. He had a sick feeling in his throat that didn't seem to be going away anytime soon. Their hearts pounding in their chests, the two recorded a joint statement using Li's transmitter. "I guess this is it," Li whispered, almost indistinctly. Chris replied, "I guess so." On that note, he pressed "post."

Programmed to Die

Tristan Neal



Our lives begin and end with darkness. From the darkness of the womb where we first gain consciousness to the vast darkness we drift into after the final closing of our eyelids, darkness has always been the destiny of the human being. It was, at least, until the year 2047. That was the year a revolutionary new drug, Telomeron, was released, enabling man to finally grasp the elusive dream of immortality. That was the year the destiny of the human being was forever altered.

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Bennett Fischer stood in the center of his small apartment, where the bed stood just feet from the kitchen, separated only by a small wall that could be pushed aside to make more space. Another wall running perpendicular to the divider was made entirely of glass, affording a panorama of the smog-free San Francisco skyline. Scattered underwear and ties littered the bedroom floor; the laundry basket, closet, television, and all other appliances were stored conveniently in the walls to conserve space. Cramped living was the standard in the overpopulated world of 2137.

Bennett, a thin, six-foot tall man with amber eyes and stubble covering his pronounced jaw, stumbled clumsily out into the hallway, keys and jacket in hand. The squeak of a mail slot caused him to look up in time to observe the peculiar

old and wrinkled face of Joseph Lowell disappear behind the slot; peculiar because no one *looked* old anymore.

"Good morning, Mr. Fischer," Norman the doorman greeted him, having already prepared his car.

"Good morning, Norman. Thank you. As always, you're a life saver," Bennett replied warmly, climbing into his vehicle.

"Where to, Mr. Fischer?" the car inquired.

"Geron Corporation." Bennett settled into his seat while the car pulled itself out and merged into traffic. He despised his car, the 2135 Dodge Accelerator. He found out only after purchasing it that the bottom of the car did not glow, and passengers always complained about how the speakers on the roof didn't make a complete three hundred and sixty degree turn.

Geron's San Francisco branch was a dominating steel and glass building, sitting on sixty acres of land and containing over ninety laboratories. The world's largest biotechnology company, it supplied over half of the world's telomerase enzyme. Bennett was the company's youngest and most promising research scientist, with his own laboratory which pumped out refined telomerase enzyme continuously, three hundred and sixty-five days a year.

Bennett was ambitious; he wanted to become the lead scientist at the San Francisco branch. However, he truly lived for the afternoons, which he spent buried in stories at the library. The drive he pulled from the shelf that afternoon was *Geron Corporation and the Discovery of Immortality*, which detailed a history of a company that he would hopefully lead one day. He plugged the tiny drive into the slot on his e-reader and settled in comfortably to read.

A series of successes for Geron Corporation started in the year 2016, when a group of researchers changed the company's direction forever. The team, which was searching for ways to cure cancer by deactivating the telomerase enzyme in tumor cells, discovered a set of genes that regulate the enzyme. As discussed in chapter one, telomeres are the non-coding regions at the ends of DNA strands. With each replication of eukaryotic DNA, the telomere shortens, a process known as aging. The telomerase enzyme, first discovered in tumor cells, is responsible for restoring shortened telomeres, essentially creating an immortal cell. After discovering that introduction of the enzyme into the body every other day can induce non-carcinogenic ageless cell reproduction, a combined telomerase and tumor-suppressing pill entered the production pipeline. The drug, Telomeron, finished clinical trials in the year 2047 and quickly gained popularity and full healthcare coverage in the world market.

A series of black lines obscured the words on the next half page before the text picked back up with a discussion about specific legislation regarding the overpopulation problem caused by the introduction of the drug.

"Something you're not supposed to see, eh?" a voice to his right rang out.

Jumping, Bennett turned to find the elderly Joseph Lowell perched in the chair beside him. He wore a simple pair of jeans and a t-shirt, and his smiling face was creased with wrinkles that stretched from his mouth and eyes, evidence of a long life of smiling and frowning, topped by a mess of gray hair. By all appearances he seemed senile, but his light blue eyes conveyed a kind of clarity that Bennett had never noticed before. He held a cup of yellow, mushy food in his hand.

"Applesauce?" he inquired, offering a spoonful.

"Uhm, no thank you," Bennett replied awkwardly. "Do you know about this book?"

"What book?"

"This book, *Geron Corporation and the Discovery of Immortality*," Bennett said, offering him the e-reader.

"That's not a book, that's an e-reader. I'm not blind."

"I wasn't saying you were blind, Mr. Lowell. The book is in the e-reader right now."

"Please, call me Joseph. But don't be fooling me now; your e-reader isn't even half an inch thick. How could it possibly hold a book? Is it a picture book?"

Bennett, getting frustrated, started again, "Do you know why this passage is censored? You said something earlier."

"Yes, I asked if you would like to try some applesauce. I made it myself."

"No, I meant to say you said something about why this passage is censored."

Joseph considered this a moment, and finally said, "No, I don't recall that. I'm sorry."

Bennett, now thoroughly flustered, decided to pointedly return to his reading, though the mystery of the passage bothered him. Joseph stayed a few moments longer, slurping irritatingly on his applesauce. Then, he rose and left. Bennett glanced at his hunched figure, and then at the table, where he spotted something on the seat beside him. He uncurled it, reading: "I have noticed your interest in that book. If you would like to know what is being hidden, give me a visit sometime." Joseph was gone when he looked up, so Bennett retreated to the apartment.

Hours passed as palpably as sand dripping through an hourglass. When Bennett finally heard movement out in the hall, it was quarter past eight and the city lights gleamed against the starry sky. He was out the door with the speed of

quicksilver, and found himself knocking on Joseph's door just as quickly. The man peered out the mail slot suspiciously before slinking back behind it and quickly opening the door.

"Did anyone see you come in?" the old man asked with concern in his voice.

"No," he answered.

Looking relieved, Joseph illuminated the small apartment and what Bennett saw made him question his decision to come here. The curtain had been drawn across the window and taped on all sides. On one side of the room, piles of shiny plastic circles that Bennett believed were called compact discs stood in stacks. Glimpsing into the fridge as Joseph closed it, he saw industrial sized cans of applesauce beside jars of peanut butter, jelly, and two loaves of bread.

The old man waddled into the bedroom to retrieve something, demanding Bennett wait for him, so he resolved to study the walls. Below an ominous looking Jesus on the cross, degrees in biotechnology and genetics held the seal of Johns Hopkins University. Beside it, a picture he recognized from the book.

"Why do have this picture?" he asked Joseph upon his arrival.

"That's me," he said, indicating his younger self in the photo amidst a crowd of six young men and women.

Bennett corrected him, "This is the original team of researchers who discovered a way of regulating the telomerase enzyme."

Joseph nodded, handing him a rectangular object made of paper wedged between rough materials instead of answering. Bennett had never held a physical book before, but he recognized what it was from the words on the front: *Geron*

Corporation and the Discovery of Immortality. Without hesitation he turned to the page and scanned the uncensored text.

An outcry against the use of Telomeron was immediately raised from religious and moral groups. The most rousing argument, however, was related to making the government too dependent on corporations. The worry was that death creates a cyclical motion in society, and by breaking the cycle there would be not only a stagnation of ideas and change, but an amassing of power of a grand scale. This argument was defeated in the case of Rockwell vs. California*, which ruled that Geron Corporation's partnership with the government was technically legal as long as Geron did not maintain a monopoly on the telomerase market. Other arguments arose on the basis of population issues…*

"Why would they want to keep that from the public?" Bennett wondered aloud.

"I cannot tell you—" Joseph paused. "But I can show you, if you'd like. Tomorrow evening."

Bennett considered for a moment, then agreed.

"Now get out. You've been here too long already; I know they're watching. Keep the book if you want." He offered Bennett more applesauce, and upon his refusal, promptly ejected him.

Despite how deep into the night he read, when Bennett finally shut out his lights, he couldn't sleep. The uncertainties of the next day, and his clear misgivings about the old man's sanity, both scared and thrilled him. When dreams finally came to take him away, they held only more questions.

Work passed in a distracted frenzy, and soon enough Bennett was telling the doorman to fetch Mr. Lowell. Moments later he emerged with the elderly man

in tow, sporting a large jar of applesauce and a bag of peanut butter and jelly sandwiches. Bennett decided not to comment, instead only requesting the location they were driving to. When the car had been set to its destination, Bennett looked away from the road and turned to face Joseph, something that Joseph could not do even after being free of manual driving for many years.

"How old are you?"

"155 years old, although I stopped aging when I was 65."

"That's a long time," Bennett said, dumbstruck. Silently he understood a bit of the man's kookiness. To be alive 155 years; that's a lot for the human brain to remember. "Do you still remember everything?"

"Oh yes, quite clearly," Joseph began. "I was born to a middle class family in Wisconsin. I remember very cold winters and that I was a paperboy, one of the last with the dawn of Internet news and e-mail. After graduating from Johns Hopkins, I moved to California and began working for Geron, which was at the time a much smaller establishment focused on advanced cancer treatments. That was around the time I met Annette, the most beautiful woman I'd ever seen and my best friend. She was unable to have children; it broke my heart to see how it hurt her. But we were happy together."

"Where is she now?" Bennett asked timidly.

"She was taken from me thirty years ago, by an unidentified neurological disease. I knew it was my punishment."

"Punishment? For what?" Bennett inquired, but Joseph remained silent, choosing instead to stare forward, lost in a kaleidoscope of images from the past.

"Do you believe in God?" Joseph finally asked.

"No. The idea of God is preposterous."

Joseph nodded his head. "I used to think so too."

The scenery in the background was changing. Glass and steel buildings were being replaced by brick houses and rickety wooden structures from Joseph's time. The smell of gasoline and body odor wafted in through the vents, prompting Bennett to turn on the air filtration. "Where are you taking me?"

"I am going to show you the real San Francisco: its rotten underbelly that has been hidden from you." Men, women, and children of all colors and sizes walked the streets, often barefoot, some watching as the sleek red car hummed down the streets.

"What is this place?"

"Have you ever considered what happens when you contaminate a batch of Telomerase and have to scratch it, or when your branch doesn't produce its quota? Someone has to go without telomerase, but it certainly isn't the rich upper class. Stockholders and CEOs say that all citizens are guaranteed access to Telomeron, but if there is a shortage, who do you think loses and goes without? Not their families and communities. Here in the slums, about fifteen people die from Telomeron withdrawal every day. And sometimes, there is a surplus of the drug, and that many still die. Telomeron gives the high-ups the ability to keep population in check and keep those who might otherwise disagree with them from having a voice."

"All this," he continued, motioning to the landscape, "because of me." He pressed his head to the glass.

The car rolled to a stop in front of a flimsy wooden house, prompting him to get out. He tucked the applesauce under one arm and balanced the sandwiches in his other hand, kicking the door shut with his foot. A beautiful black woman with polished-looking skin emerged from the shelter, with two children dressed in tattered jeans and shirts in pursuit, appreciatively accepting Joseph's gifts. He dug in his pocket for a dark green container of Telomeron pills, which he handed to the woman discreetly before following them inside.

Bennett spent an hour and a half reading and people-watching before Joseph re-emerged. He looked younger; not physically in the way a rejuvenation injection makes one look younger, but an almost imperceptible difference in the creases of his face. Bennett felt like asking what had taken so long, but instead asked, "Who is she?"

"The granddaughter of a friend. He was a far greater man than I could ever hope to be. The government pays for everything I need to keep me quiet, but Henry, he wouldn't be silenced. And so he was removed, and his family relocated, just as mine would have been if I had spoken out."

"Why don't you tell someone, someone who has authority?" Bennett demanded.

Joseph's eyes met his with icy purpose. "Why do you think I've brought you here?"

Left speechless, the car engine started in silence.

Despite his initial shock at the culture of the slums, Bennett returned with Joseph the next afternoon, and the afternoon after that, and the one following. It was not hard to let Joseph consume his afternoons, helping to move heavy things and unclogging his cluttered apartment. The man was both wise and insane, in a complex mix that Bennett was beginning to understand.

Joseph had been unusually contemplative, but happy, on the day that he asked Bennett to pick up his Telomeron prescription from the clinic. Before he left, Joseph made sure to stop him.

"Thank you, Bennett, for all of your help. You have no idea how much it has meant to me." Bennett took the thanks in stride, not understanding that these important words would be the last he heard from the old man.

The minute Bennett entered Joseph's apartment he knew something was wrong. He could feel it in the air. Underneath his foot was a crinkled letter, written on the same old paper Joseph had used to write the first note in the library. Bennett stooped and unfolded it, and began reading with a knot already twisting in his stomach.

Dear Bennett,

I am sorry for the pain I am about to cause you; the people of your generation are not acquainted with death, and this will surely be a rough introduction to it. In my natural lifetime, I was never a religious man. I was a man of science, and I believed that our genetic code was humanity's one and only law. But in the ninety years since I stopped aging, I have grown to understand that the day we discovered how to cheat death we crossed into God's domain, a domain that humans were meant never to enter. And as a consequence I have been forced to watch as society crumbled and corruption grew out of my mistake. I understand now that it was my punishment, my cross to bear.

I have prayed every night since my wife's death for a sign of forgiveness, some semblance of mercy. Then, God delivered you to me, and I understood. If I could go back in time and prevent my team's discovery I would do it without a second

thought. I would tell them to be cautious when surpassing the limitations of our species, but I cannot. But you are the future. I thought that if I could just show you the truth, maybe you could start to make things right, to balance my mistakes. God delivered you to me so that I could begin to correct the wrongs I have committed. Far more importantly, though, He gave me a friend, my first one in over thirty years. And for you, I am forever grateful.

I hope you will remember that we are not meant to live forever. Whether you believe in God or not is inconsequential. We were made to die. I am going to join Him, and my Annette. I hope that you remember what I have tried to show you in the days to come, and above all else, I hope that when you have lived a life as long and as rich as mine you will not fear death.

Thank you for being my friend,

Joseph Lowell

Bennett felt himself begin to suffocate as his throat tightened. Suddenly the comfortable room seemed cramped and confined. Hot tears stung his eyes and began to roll down, making *tap tap tap* noises as they hit the letter. The bottle of Telomeron slipped from his hand and clattered onto the floor. He did not attempt to pick it up. He never wanted to look at the green pharmacist's bottle again.

Science Fiction and Futurism: An Interview with Brenda Cooper

Joey Eschrich

Brenda Cooper is a science fiction and fantasy novelist and short story writer, as well as a technology professional and a futurist. Her non-fiction writing has appeared in *Slate* and *Crosscut*, and her short fiction has appeared in *Nature* and many other venues. Brenda's most recent novel is *Edge of Dark,* published by Pyr in March 2015. In February 2015, she sat down with me for a conversation about storytelling, futurism, smart cities, drones, and other things that ignite her imagination.

A lot of your speculative fiction stories are connected to actual emerging scientific and technological ideas and innovations. How do you conduct research and prepare to write on those topics?

I pretty much always read. I read *The New York Times* every morning, and often add in *Wired, The Seattle Times,* or *Crosscut*, a Seattle news magazine. I read *National Geographic* and other magazines, and I read non-fiction books. I read a lot of websites when I'm researching a non-fiction article or blog post. Most recently, I finished *The Sixth Extinction*, by Elizabeth Kolbert, and right now I'm reading *The Human Age: A World Shaped by Us,* by Diane Ackerman. If I need more details—and often I do once I'm actually writing—I use the Internet to augment my reading.

Recently you wrote a story, "Elephant Angels," for the anthology Hieroglyph: Stories and Visions for a Better Future. *The story is quite optimistic about something that we're usually pretty pessimistic about: drones. Do you hope the story helps to change people's thinking about how this oft-maligned technology could be a force for good?*

Yes, I do. Drones allow us to see things that we don't otherwise have easy access to, like the arctic or the deep jungle. They also give us a different visual angle—for example, they can provide a close look at the jungle canopy. Drones are a comparatively cheap way to conduct research, to get aerial photos and even stunning art photography, and perhaps, like in my story, to provide safety and surveillance for animals or places that we love. That doesn't mean I condone any and all use of drones. Frankly, they are like other technologies. They can be used inside of an appropriate moral framework or outside of one. GMO plants and animals, DNA-based medicine, cloning, de-extinction, and other emerging human capabilities almost all represent great promise and great peril, and we should be developing frameworks for all of them.

In "Elephant Angels," it seems that mechanization has put a lot of people out of work—in that future, we don't seem to need as many workers to keep the consumer economy running. Do you think that mechanization will lead to many people losing their jobs, and if so, how can we deal with that challenge as a society?

First, I'm not sure that assertion is true. A number of people have jobs watching the elephant herd in my story in spite of the fact that they are using drones to help them do it.

I've been in IT for my entire adult career, and we have never really replaced a single job. We have avoided some hires (but hired IT people!). We've avoided repetitive work, and this has created capacity for more interesting work for us and our customers. We've used technology to help our City Councils make better decisions. We've used it to communicate more widely. We create maps that model the real world and let us play out scenarios before we make choices.

With that said, mechanization is bound to change what jobs are available.

So let's imagine a positive way that might play out. Assume—whether because of mechanization or simple population growth or continued economic disparity—that we have a large percentage of people who are underemployed. We will almost certainly have a number of challenges with the environment. Today, there's more short-term profit in exploiting the environment than in saving it. But suppose we realized how dangerous that thinking is? If climate change doesn't teach us that lesson, well, we deserve whatever we get, which might be extinction. But assume that we can learn. Perhaps we'll design a system where using environmental resources generates money (from corporations) which is then used to pay people (via social programs or by those same corporations) to restore damaged environments and create rich habitats, clean wetlands, and wildlife corridors? We could use an army of people at all levels of education to help with the environment, but today we have no way to pay very many of them. We could create one.

The Hieroglyph *anthology challenged you and the other contributing science fiction authors to tell a story about the future from a hopeful, or even optimistic perspective. Was that challenging for you? Is it tough to tell a compelling optimistic story?*

No. I'm actually an intrinsic optimist, at least most of the time. Most of my stories have optimistic elements. I believe in our ability to imagine and create a positive future. Since creating a positive future will be challenging, it's easy enough to write stories with both nearly insurmountable obstacles and positive outcomes. Besides, even though I believe in us (humans), it's clear there will be pain and war and death and hatreds and harm on the way to any future. Just read *The New York Times*, any day. There's plenty of conflict to fill the story of us as we ride the arrow of time forward.

In addition to being a fiction writer, you're a card-carrying futurist. How is your futures work similar to your fiction, and where do the two diverge?

Actually, they are mostly complementary interests. In writing, they diverge across the fiction vs. non-fictional line, but that line itself is always blurred when talking about the future. It's not nearly so hard to be a science fiction writer and a futurist—and a technology professional, for that matter—as it would be to be a great chef and a competitive basketball player. Research for a futures topic has slid right into a fiction story and an article or a talk.

What education or training goes into becoming a futurist? And how did you get involved in futurism?

"Futurist" is a general term. I use it because I write and talk about the future—and people occasionally even pay me to do that! My education is primarily learning from other futurists, reading, researching, and being extremely interested in the topic. You might say I'm self-taught with a heavy dollop of great mentoring. I'm also a member of the World Future Society, and have been working with Glen Hiemstra over at futurist.com on and off for decades.

There are more formal paths to more rigorous jobs as a futurist. One can learn specific tools of foresight at the University of Houston, at the University of Hawaii, and in a number of other venues. There are people who act as the futurists for specific industries, and work very hard to understand those industries and the global trends that might affect them. Others are consultants who work with companies as part of their strategic planning processes.

You're also the CTO for the city of Kirkland, Washington. Does writing science fiction and working as a futurist influence how you think about the future of your city, and the role technology plays in people's daily lives?

Of course it does. We're interested in smart cities, which are the connected cities of the future where sensors tell city staff and equipment about problems, sometimes before they happen, and where services are connected and data flows securely among them. But my day job at the city is far less about the future than I'd like it to be. Most days it's about the budget, current project challenges, the art of leading staff, and rather a lot of meetings.

Could you talk a bit about your blog series, "Backing into Eden"? What are you hoping to accomplish with the series, and how did you get inspired to start working on it?

I got inspired when the World Future Society asked me to give them a talk, and I chose ecology as a topic. I'm fascinated by our changing relationship to nature. The more I research, the more I recognize that we have already altered nature so much that we can't correct our mistakes by taking a hands-off approach. While we do—of course—need to protect and preserve as many wild places as we can, we need to intervene as well. We need to re-plant monarch butterfly food, we

need to change the ways we eat and farm, and we need to consider the life and death of species.

"Backing into Eden" is on a bit of an enforced hiatus right now because so may people are asking me to write fiction at the moment, but as soon as I finish my next book deadline I'm hoping to dive back in to non-fiction and short stories for awhile. I'm actually going to study for my Master's soon, and I hope to focus on writing for social good as well as fiction, and I may even turn "Backing into Eden" into a non-fiction book-length work as part of the that process. We'll see.

What emerging technology or scientific breakthrough will have a huge impact on our future, but isn't being discussed enough today?

Wow—there's so many! Where do I start? De-extinction gives us very interesting powers and moral dilemmas. Quantum entanglement is still something we barely understand, and I suspect that if we ever really get it, we'll be amazed at how different the world actually is compared to what we've been taught. Personalized medicine may lead to many things—better health, deferred aging, cures for many cancers and other diseases. Solar is on pace to solve many of our energy problems. Then there's 3D and even 4D printing. And we are creating so many new materials that I can't keep up. Vertical farming, including vertical farming at sea.

This is what's so exciting about being a futurist today: there's no lack of material.

On the other hand, what technology or scientific concept that we're talking about a lot today seems overhyped to you? Is there something we're paying too much attention to?

Well, there are a number of technologies that I might discuss here. For example, we're perhaps unduly frightened by artificial intelligence. I suspect that if we create an AI with its own intrinsic motivations rather than just a smart computer that reflects our motivations, it will go off and do its own thing and not be overly concerned with slow, meat-space humanity.

If I take your question literally and talk about what we're paying too much attention to, it's got to be tomorrow. We're mired in short-term thinking and at risk of dying from it. It's time to pay attention to the day after tomorrow, and the year after this year. Climate change and extinction are happening to the world around us right now and will continue for at least the next twenty years even if we start mitigating both seriously today.

What can we do? We might stop punishing corporations for short term losses and reward them for longer-term bets. We could work hard on societal structures that allow us to flourish with less consumption or in economies with shrinking GDPs. We might identify, fund, and nurture start-ups that address the right problems. All of these things will be harder than worrying about tomorrow. But we do need them, and more.

One of the major ideas behind the Tomorrow Project is that science fiction can be used in educational, research, and industry settings as a way to prototype the future—to think about the social, cultural, and human aspects of technological change, and to make sure the things we're developing are things we collectively want and need. Do you think storytelling is a good way to explore these issues? Are there other methods that you use as a futurist for encouraging people to think more creatively and critically about the future?

Story is one of the most powerful tools that we have. It can take an idea that appears dry and boring on paper and transform it into something magical that makes us feel. When we engage our feelings, we remember what we heard and we internalize it more deeply.

The stories in this anthology, Living Tomorrow***, focus on biological and environmental science and technology. What are some great science fiction stories or books that tackle these issues in a thoughtful way?***

Kim Stanley Robinson's brilliant *Forty Signs of Rain* is one. He also refers to climate change as background history in *2312* as well as some interesting future biology projects. Paolo Bacigalupi's work almost always addresses these issues, and I'm very excited about his new book, *The Water Knife*, which is coming out soon.

Two books that could have gotten more attention than they did are *Seed* by Rob Ziegler and *Water Rites* by Mary Rosenblum. For an early book on the topic, there's David Brin's *Earth*, of course, and Tobias Buckell just did a very nice job with his novel *Arctic Rising*.

To learn more about Brenda Cooper and her work, visit brenda-cooper.com.

Bloodgivers

Molly Steen

"I…need…something," Joanne panted, semi-incoherently. Blood dripped from a gash in her upper arm. A battle raged in the trees around them, rebel guerilla warfare at its best—and its worst.

Next to Joanne, her best friend Sam ripped a wide swatch of cloth from his shirt. He brought the cloth up to his mouth, pressed one of his razor-sharp canines into the fabric, and cut a fray-less line down the middle of it, nearly to the end. With hands that worked almost faster than the eye could see, he tied the makeshift bandage around Joanne's wounded arm several times, looped a knot, and then paused. He quirked an eyebrow in her direction.

"Oh, just get on with it," Joanne replied, sharply, forced articulation on every syllable.

With a sympathetic grimace on his face, Sam pulled the knot tight, generating deep, even pressure over the entire injury. This gesture caused an extraordinary amount of pain to Joanne. In response, she opened her mouth wide, thrusting her fangs skyward, and let out an earth-shaking roar that was somehow lost amongst the sounds and vibrations of fighting around them.

Her breath now coming in quick, shallow bursts and her amber eyes glazing spectacularly, it took Sam shaking her shoulders to get her back on track.

"Come on," he said, urgency coating his every word. "We've got to get you back to camp."

"Yes," Joanne breathed, with every ounce of her willpower channeled into the singular task of maintaining her consciousness. "Get me to Natasha."

Genetic modification had become all the rage in the late twenty-first century; why go to a specialist for hair plugs, face lifts, and liposuction when you could get genetically altered hair follicles, epidermal transplants, and implanted fat-eating microorganisms on genetic leashes? And all at a low, one-time cost.

But of course, person X had to keep up with person Y, who definitely had to keep up with person Z—and it wasn't long before hair and skin treatments were merely a superficial skim along the surface. People were getting their genetic makeup altered at such a basic level—to achieve different skin pigmentation, to stop sweating, to alter sexual orientation, to create a mood ring effect on their skin to show when they were angry, aroused, apprehensive—that the face of the human race was bound to change in unforeseeable ways.

Joanne and Sam were examples of one subset of the populace that originally emerged around 2113 CE. Instead of having their genes altered after birth, they were born into a community in the Upper Ohio River Valley notorious for the performance of genetic alterations aimed at creating a superior, more powerful human race. In the process, the Creators brought into existence beings not quite human at all, but something different: a group of people with unsurpassable strength, speed, and agility, accelerated growth through adolescence, and one drawback that none of the Creators had seen coming—the inability to heal properly without a source of fresh blood and all of the components therein. Although this was a notable hindrance, it turned out that, with a fresh blood source, this new species could heal at a significantly faster rate; so it was seen as a hurdle, not a hard stop.

To overcome this minor roadblock, the Creators began new genetic experiments: not to create a subspecies of their own kind as slaves to fuel the war they were prepared to wage against their predecessors, but a slight variation on their creations, capable of protecting, supplying, and nurturing their warrior race. The main alterations made were involved in genes relating to symbiosis; oxytocin formation and release, bonding instincts, and, of course, rapid red blood cell and platelet turnover without the nasty side effects of stroke or myocardial infarction.

The experiments were successful. Instead of one race of super *not-quite* humans, the Creators brought two races into existence. In their new, ever-growing society, both of these subtypes were given boundless reverence, as the Creators had obviously brought them into being for a significant and meaningful purpose. They were known simply as the Great, and as the Givers—and often as every conceivable combination of yin and yang; chaos and order, war and peace, even life and death. For they lived together in complete symbiosis, one of the Great with one of the Givers, forever in a balancing act of dealing out death and restoring life.

The symbiosis, always initiated early in life, is active lifelong. Though Joanne and Natasha appear to be nineteen or twenty years old at most, they are actually well into their forties and have been bonded for over three decades. The Great and the Givers attend special schooling, always together, from their second year of age—which appears to be their fifth or sixth—and are in constant contact with one another until their twelfth year, at which time they appear to be in their mid-twenties. By this time, symbiosis has almost always naturally occurred between a Giver and their Great—a bond forged through friendship, through love, through sexual desire, and sometimes through all three at once. There are

no strict societal rules governing the relationships. When it happens, however it happens, it is not only allowed, it is welcomed.

Sam bonded with Noah shortly after their fourth year of schooling; Sam had gotten into a schoolyard brawl with another boy and had fallen hard, breaking his arm. Noah had been nearby, and had willingly run forward and opened his veins to his best friend. While this act alone was not necessarily enough for bonding to occur, their deep friendship sealed their relationship, and they've been paired ever since—and will be until they leave this plane of existence.

Joanne, on the other hand, did not bond with Natasha until just before the end of their formal schooling. There was a boy, a Giver, tall and kind-hearted, whom Joanne had fed from numerous times over the years after accidents in training or from facing the simple dangers of living, but they had never become bonded (against, many suspected, the desires of the boy). Joanne's relationship with Natasha was tumultuous at best—the girls were usually at each other's throats for one reason or another, be it the top grade in a particularly competitive class, or the annual track and field competition, or even the talent show that their school held each year. It was not until after their final field competition, when they were alone for a significant amount of time in the field house ladies' room, that they became bonded; the details of this encounter have always been a mystery.

The line between war and peace had been tipping precariously for over a decade, and it was only in recent years that it had escalated to full-scale warfare between the races of the Creators, and the remnants of the strangely altered, nearly unrecognizable human race. For eighteen months now, Joanne and Sam had been amongst their peers, their friends, and their loved ones on the front lines of battle in the Appalachian Mountains. Joanne's injury was not the first major one

either of them had suffered, but it had occurred at quite possibly the worst time, and in the worst place.

Night was falling. They were too far from camp. Sam cursed quietly under his breath, and it was just barely audible as they were getting farther and farther from the fighting. Joanne's ragged breath was easily discernible now in the growing darkness.

"Come on, Jo," Sam whispered. Joanne was still managing to walk along, but they were moving slowly due to her injury—her blood loss, her pain. "I'm going to carry you," he said, deciding it quite suddenly.

But Joanne had just enough mental wherewithal left to protest. "No," she said, breathing three heavy breaths before continuing, "there's too far to go. You're hurt yourself." Another few tormented breaths, during which Sam looked down and spotted the blossoming red stain on his side; he'd missed it in his rush of adrenaline. "It's not safe. We'll wait…" she trailed off. Sam shook her slightly, and she finished, "We'll wait here."

The plan formulated in each of their heads was identical, but unspoken: they would wait out the battle, let night reach its blackest hue, then travel as carefully as they could through the darkness back to Command. It wasn't ideal, but it was their only option.

Sam's enhanced vision permeated the dusk around them—Joanne's eyes were already cloudy and unfocused—and found an outcrop of rock that would provide enough cover for now, and hopefully for as long as they needed.

Pulling Joanne along with him, Sam lowered them both to the ground and covered them as best as he could. Joanne's head lolled, and Sam knew that he had

to do something to keep her conscious—to keep her alive. Natasha would never forgive him otherwise.

"Hey, Joanne, hey," he prodded. Her eyelids flittered, fluttered slightly open. "Tell me something."

"What do you want to know?" she responded. Her normally crisp articulation was muddy, sluggish, and slurred.

"Tell me about Natasha," he said, his voice soft. He pressed the side of his face to Joanne's overly-hot forehead. "Tell me about the bathroom. You never tell any of us about that, as if it's some big secret."

"'tis a big secret," Joanne replied, and there was the slightest lilt of a smile in her voice.

Sam chuckled. "Can't you tell me? I'm your best friend. No one has to know."

"She'll know," Joanne emphasized.

"I think she'll understand."

Joanne hummed in what Sam thought was assent, then fell silent.

"Joanne?"

A few seconds passed.

The stars were beginning to peek out from their black canvas. Joanne looked up through the boughs of the trees above them and wondered if Natasha was looking at them too.

"It was field day," Joanne reminisced. Sam's ears perked up; he hadn't expected her to actually tell the story. "Natasha was racing against the other Givers in her age group. She almost always came in first, you know." Sam nodded; he did know.

"When she started the race, a part of me just…knew: I was supposed to be standing at the finish line when she crossed it. So I went there. And I was. And she won."

"Right," Sam interjected lightly into the quiet, slightly masking the rasp of Joanne's labored breathing. "And I was…just standing there. And she crossed the line, slowed down, hands on her hips…breathing heavily. Her time, it flashed on the boards, and she looked at it. Then she looked at me. Because, you know, my time, my time was just above hers, like it always is."

"But since she's a Giver and you're not, we can't inter-compete. Yes."

"Mmm," Joanne hummed, "yes. But something happened…when she was looking into my eyes. I saw…I saw flames. I saw fire. Passion. But also anger, frustration. I…I'm not really sure what I saw," Joanne seemed to implore, "which is why I followed her when she stormed off. Her ponytail was bouncy."

Sam smiled, "I'm sure you just couldn't help yourself." He pressed gingerly against his wound to stanch the flow of blood, his smile morphing quickly into a grimace.

Joanne slightly shook her head. "No," she confirmed, "I couldn't."

"What happened then?"

"She went to the field house. To the bathroom. Probably to change. But I went inside right behind her, and she turned around so fast that she caught me off guard—me!—and she slapped me right across the face."

"No!"

"Yes."

"Really?"

"Yes."

"And then?"

"And then…and then I told her…told her she was the most miraculous thing I had ever seen in the world. I told her that she was…that she was *everything*." Joanne was crying now, silvery streaks from her augmented tear ducts that moistened the skin and evaporated quickly. "I don't know…I don't know who kissed who first. I don't. I just know…that it happened. And nothing…"

A new voice joined Sam and Joanne, finishing Joanne's sentence: "And nothing has been the same since."

"Natasha!" two voices—one much meeker than the other—exclaimed at once.

"Miss me, you fools?" she quipped, instantly dropping to her knees next to her counterpart—her lover, her friend, her bonded other half. She immediately began rolling up her shirtsleeve.

"Oh, you have no idea," Sam replied.

Natasha merely grunted in acknowledgment before unpacking the contents of the small bag she'd worn across her back. She gave a compress to Sam, which he immediately applied to his side. She pulled out everything she needed to do a blood transfusion there on the spot, prepping Joanne's arm to receive her supply.

As she worked, Natasha softly sang, the lyrics coming freely to her from a place in her heart with which only Joanne was familiar.

"Natasha," Joanne said again, this time with a blissful sort of sigh on her lips as she looked up at her Giver with adoring eyes.

"Hey, you," Natasha responded, stopping for only the briefest moment to stroke her fingertips down the side of Joanne's face. Then she finished prepping the infusion, and blood was began flowing from her arm to Joanne's.

No change occurred. Natasha quickly realized that Joanne had lost too much blood, and that another means of supplying her would be necessary.

"Sit up for me, Jo, baby," she murmured against the top of Joanne's head, pulling Joanne against her and getting them into a comfortable position. She felt Joanne's body shift, her muscles working to comply. "Good girl," she purred.

"How did you find us?" Joanne managed to ask, still just on the verge of coherence, of consciousness.

"What, you're surprised that I found you when you needed me the most?" Natasha gently chided.

A pause, then Joanne said, "Good point."

"Now," Natasha said, pressing Joanne's lips against her throat, "drink." And drink Joanne did.

In moments, Joanne's previously limp hands were pressing against Natasha's abdomen, moving gently against the warmth she felt radiating from her beloved. Joanne's fingers inched further and further upward, gracing over the soft fabric covering Natasha's torso, feeling the beat of her heart in her chest, brushing against her collarbone, before grasping firmly at the other side of her neck, pulling them closer together than before, if that was possible.

A groan escaped Natasha's lips. She felt her blood pressure lowering for a moment, then she could feel the telltale signs of her body's genetic alterations kicking in—more red blood cells were being produced, not in the usual span of seven days,

but in seven seconds; her heart was pumping more firmly, her bone marrow was working overtime. But her body was *made for this*, and she reveled in the touch of Joanne's hands, teeth, mouth, and gave herself completely to the experience.

Long moments passed. The sun had disappeared and complete and total darkness had fallen around them. The only sounds they could hear were the wind in the leaves, and the increasingly faint clamor of death in the distance.

Natasha, still in a daze, didn't even realize that Joanne's mouth had detached from her neck; the puncture wounds there were already closing, even as Joanne reached down and disconnected their transfusion ports.

"You're my angel, aren't you?" Joanne asked, her breath puffing sweetly against Natasha's lips. Her eyes still closed, Natasha only smiled in return, nodding her head just slightly, and only once. Joanne kissed her, then, with a soft swipe of her tongue and a gentle press of lips. "Now let's get our boy here home."

Within minutes, they were packed again; Joanne now sported Natasha's bag across her own back, as well as the full weight of Sam balanced as carefully as possible across her shoulders. Joanne's body had worked its own form of scientifically advanced magic with the help of Natasha's blood, and she was utterly rejuvenated. Likewise, Natasha had recovered quickly, her body already falling back into perfect homeostasis as the rush of sharing her life force faded.

"Shall we run?" Natasha asked, once again reaching up to press her hand against Joanne's face. Joanne turned her head, kissed the palm presented to her, and flashed her radiant eyes towards her lover in the darkness.

"We shall."

The Gene Dilemma

Paul Kim

Unsurprisingly, today was a warm, sunny day. It had been decided decades ago that all weather during March would be sunny. Given the technology available to meteorologists in this day and age, the sun was never obscured by unexpected clouds. Not that the two teens rallying on the tennis courts by the school minded. The weather was just right for a match.

"How unlikely," said the first boy, Conor Moore III. He practiced tennis every morning, studied diligently at school, and always did his chores before 9:00 pm. It was his nature to stick to a well-organized schedule. Upon birth, doctors had analyzed his DNA to completely figure him out, from his idiosyncrasies to his propensity for certain exercises. It wasn't uncommon for parents nowadays to learn what attributes their children would have as adults.

Conor grinned. The doctors had told Conor's parents that he would be great at tennis. Since that moment, he had been developing his strokes and playing with the very best. His teammates always marveled at his persistence; hours after practice, Conor would still be repeating the same shots to perfection. His time management and self-discipline complemented his physical capabilities in a tennis match. The genes fell into place perfectly.

"Are you going to twiddle your thumbs all day, or are you still doing your routine prayers before you serve?!" shouted Peter, the other teen. Peter Trew was tall, and that was about all the doctors had managed to predict correctly from their

tests. He had blond hair and blue eyes. Peter loved to joke that his parents were exasperated that he had ended up looking like everyone else in the city while he himself was happy with his appearance.

As Conor swung his racket, he saw Peter already running into position. Peter was supposed to play soccer; his endurance and leg strength matched a soccer player's. But he despised the constant running, and managed to persuade his parents to let him play tennis instead. This amicable stubbornness is why his friends always described him as being as air-headed as he was light-hearted.

Conor smiled. He believed the air-like quality was an accurate way to describe Peter, who always seemed to glide over the court with his long strides. Conor shook his head, remembering the score. Peter had been outmaneuvering him from the start of the match. Despite Conor's precision, his shots were always returned, as if Peter had memorized the path of the balls before the point had even begun. Maybe it's time for a chance of pace, he muttered to himself. Conor swung slightly harder; his arms lashed out like a snapped conveyor belt.

"Out!" cried Peter. Conor moaned in frustration. Peter called out, laughing, "I knew the machine had to make a mistake at some point!" Conor stuck his tongue out in response, already used to the teasing and banter. They had met numerous times in matches and had become devoted practice partners. Peter loved the idea of playing against someone as consistent as Conor, while Conor was just… fascinated by Peter.

The boys sat down for a break. Conor automatically drank five ounces of his bottled water, as he always did. Peter was sweating profusely, but otherwise smiling.

"Boy, am I having a ridiculous day!" Peter exclaimed. "Anyways, have you thought about who you're going to the Ball with yet? Knowing you, the machine's already analyzed the perfect match, right?"

Conor laughed. "I haven't put it in my agenda yet. I heard you had someone in mind, but then you got busted for eating lunch during class!"

Peter's smile never faltered. "Just because the school has examined my eating habits for the last seventeen years doesn't mean I can't decide when I get to eat!"

Conor almost snorted his water. Peter was popular in school; he was the one guy that even the doctors couldn't predict. Still, Conor was smart enough to realize something else was going on.

"Pete."

"Yeah?"

"Why did you pick tennis? I always hear the soccer coach complaining that you chose to pick up a racket instead of cleats."

He paused to collect his thoughts, but then shrugged.

"It just didn't feel right, I guess!"

Conor sighed. Peter was as notorious for his ambivalence and ambiguity as he was for his rebellious streak. It drove the teachers mad that Peter never gave them straight answers. But having known Peter for nearly four years, Conor had a better approach.

"Hmm…maybe you just don't have it in you to explain it. Must be some faulty gene…" Conor's tone dripped with sarcasm. Peter gave him an amused look.

"Is that a challenge?"

Conor smirked. Peter couldn't resist a chance to defy expectations. And given the fact that he had always lived his life against the current, Conor thought, there's zero probability he'll change now. Peter had to offer some explanation. That was the one trend Conor knew Peter followed.

"Give it your best shot."

"It's probably just luck."

"We stopped crediting luck decades ago after those doctors failed to find a trace of a lucky gene," Conor expertly recalled. "Not only are your tennis shots statistically improbable, your existence itself seems to oppose our mastery and understanding of the human genome. The math doesn't add up."

"To be honest, Conor, I don't think this is something your stats class is going to help with," said Peter, chuckling. "I can't really explain it, but when I play tennis, I feel like I have a sixth sense, you know? When you hit that serve, I just had this feeling. And since I've always gone with my gut, I took the chance and preemptively prepared for your serve."

Conor wasn't convinced. "I doubt your personal genome contains the code for a sixth sense."

Peter stopped, and for the first time all day he lost that relaxed smile. "Hey man, don't be like Mr. Lander. That guy thinks I'm crazy!"

Conor recalled the day that Mr. Lander had berated Peter for being a freak. All Peter did was guess an answer. Mr. Lander nearly lost his head, yelling about how Peter's brain wasn't yet ready to respond correctly. If it wasn't for the school's parent organization, Mr. Lander would've shipped Peter off to a mental correction facility.

"Yeah, you're right. I apologize: I crossed the line," Conor said, a little ashamed. Peter brightened up again, and chugged his water bottle, having already forgiven Conor. They sat quietly, watching the clouds roll in. Conor noted the odd shapes of the regulated clouds. He dismissed it as some mistake.

Eventually, Peter said, "You know how our parents always go to church together?" Conor groaned. His parents were very religious, and despite leaving their hometown church, had continued to faithfully attend Sunday sermons. Conor had never been very religious and was extremely relieved not to have inherited that particular gene.

"Don't remind me."

Peter laughed. "Well it's kind of like that. Only I believe in myself."

"When did we jump from tennis to vanity?" Conor joked. Peter's eternal smile sprang forth again. "Even if that was in that anomalous genome of yours, it sounds more like you're just really confident."

"It's kind of like that. But it's more, you know? Nothing has changed. I just don't have any doubts. My gut has never been more…self-confident."

"Shouldn't that originate from replication, though? You trust your shots because they're dependable, right? A player with a great forehand isn't great unless he can consistently hit that forehand." Conor's skeptical expression started to activate.

"That's the problem with you, Conor; everything has to have a reason. Everything has to belong in a book you borrow from the library or have a reason to exist on your schedule," Peter teased.

Conor still couldn't shake his dissatisfaction. "Well, maybe you can write a book about it!"

"Well…" Peter stammered, struggling for the right words. He began making vague circles with his hands. "Going back to churches, priests always talk about how God seems to do these miraculous things that can't be explained. I'm not saying I can make us wine from our water bottles, but I have that same willingness to believe, like our parents seem to know that everything those old priests say is true." Despite his speech on faith, Peter looked awkward and only more confused.

Conor stared at the court for a moment, collecting his thoughts. Then he looked back up at Peter, completely serious, and said, "So is it time to start the official Church of Peter Trew?" Peter burst out laughing, and Conor, unable to keep his usually straight face, also began to laugh.

"Listen, Conor," Peter managed to say in between laughs. "When you play tennis, do you feel comfortable? Like…do you feel right?"

"Of course. It's quite literally in my blood…and genome," Conor proclaimed proudly.

"Well listen. Tennis feels right to me too. I know exactly how you feel. But I'm tired of people telling me that my genome doesn't agree. I'm tired of the doctors trying to figure me out like some puzzle. Why can't I just be me?"

Conor felt guilty for pushing Peter for answers. "You make a solid point."

Peter, feeling more confident, continued. "I was doing some research in the library—yeah, I know, shocker—and I read in the Histories that the genome project was meant to help people maximize their abilities and help them embrace their true identities and those of others."

Conor remembered well the days he spent honing his management and tennis skills. "Okay, but I fail to see—"

"Scientists said that we could finally be our true selves. But I don't follow the doctor's orders, never have. So am I not my true self? It's hard to believe, but all the adults keep bothering me because I'm not who I'm 'designed' to be. Everyone in school likes me, but all the teachers think I'm a loon."

Conor was at a loss for words.

"It's either the global system of genomics is wrong, or I'm wrong about myself. Is it weird that I feel so comfortable not being the 'real' me?"

Conor hesitated before answering. "I never thought about that."

Peter frowned and said, more to himself than Conor, "Most people don't."

Conor was surprised. Peter sounded…bitter. Just a few moments ago, this was the same boy who had smiled at him from across the tennis court.

"It just makes you think. If I'm not my genome, who am I? Is who I currently am not the real me? If not, then what is real?" Peter looked like he wanted to continue, but then put his smile back on. "I think my brain is just fried from that tennis match. Never mind."

Conor nodded. He still had questions, but knew enough confidences had been shared for one day.

They sat in silence, watching thicker clouds slowly envelop the sky. A single sound pierced the peace: from far away, Conor could make out the unmistakably brown hair of Peter's parents in their car. Conor turned to Peter, who was smiling. Conor couldn't help but admire his friend's resilience and optimism. Anybody who puts up with that much unfair treatment and personal struggle deserves recognition.

"See you in class tomorrow!" Peter said. He began running to his parents.

"Class begins at exactly 8:01 am; don't forget this time!"

Peter winked. "Yeah, yeah."

"You never informed me of who you were asking to the ball."

"Amanda Hill!" Peter shouted. He was already halfway to his parents.

"Interesting. You two don't appear to be compatible."

"I have a good feeling about her!" he yelled before entering the car and flying off. Conor watched the car fade into the distance. He pondered what Peter saw in that girl, but then turned his attention to the empty court. It had been a long three hours of tennis. He recalled his doctors recommending that his ideal practice regime was pre-coded for a little over two-point-five. I really should stop, he thought.

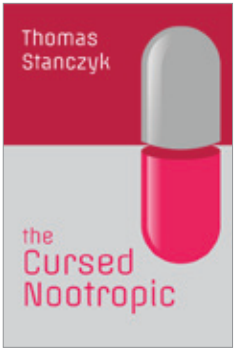
Instead, he grabbed a stray ball off the court and skipped to the baseline. Peter's comment replayed in his head. He threw the ball farther into the court and jumped into his serve. It slammed into the net. He looked at his grip on the racket: his hand had turned forty-five degrees from its typical position. Dark clouds started to form over him. It would rain soon. Conor briefly considered that the weatherman appeared to have made an error. Right now would be a good time to go home, he thought. Besides, spending time on this new serve could result in an injury (a sixty-four percent chance, Conor remembered).

Conor looked across the court. He imagined Peter's eternal grin, challenging him. He smiled to himself. As he prepared to spring into his serve once more, the first raindrops speckled the court a refreshing shade of dark green.

In a stunning turn of events, it was raining.

The Cursed Nootropic

Thomas Stanczyk



Across from me, the well-dressed Counselor sat high in his lavish chair, hands folded and brow furrowed. The second I had received his email, I rushed down to Kurt's office expecting bad news. I wasn't sure whether it was pure intuition or the presence of Ralretrox in my body that allowed me to sense it, but I was inclined to believe the latter.

Kurt opened his computer and was rapidly typing on a laser-projected keyboard when a crystal-clear image appeared on a touch-interface projection surface. Standing up, he walked past me uncomfortably to reach the brightly lit wall. He used both hands to zoom out and navigate the projection until he reached a large graph. Despite the cool temperature of the room, sweat was collecting on his brow when he turned to face me.

"This blue line here represents your car sales for the month of September," he said as he pointed to the graph. A blue line started at fifteen cars a week for the first two weeks of sales, then dropped to twelve cars by the third week. The line had fallen to eight cars per week by the fourth week of September. I was fully aware of my decreasing count. I simply assumed this was a bad month and that my sales would pick up next week. But I didn't think anyone, especially Kurt, the building's Counselor, would take notice. I was waiting for some form of chastisement or a disapproving comment from the reserved man when he said something unexpected.

"The red line you are about to see displays the sales of another employee who works at ElectroMobile," he said as he touched the screen for a second time. This sentence captured my attention. I had always been the best: no one ever came close to my sales count. My certainty was my shield, and it was smashed to pieces as I watched a thin red line begin at a higher point on the graph and continue to climb at a steady rate. I cursed inwardly.

"The deal is, I can't supply you with your usual allotment of Ralretrox," he said with delicacy after his presentation had concluded. I let his words hang in the air for a few moments before I locked eyes with him and asked him a simple question:

"Why?" I made no effort to mask the vehemence in my reply.

"Well, I-I don't think you deserve it either, Ben," Kurt stammered out. "But look at the facts..."

"The fact is I've worked at ElectroMobile for four years, long before Ralretrox Corporation created this partnership and started monitoring my progress," I said with cold fierceness. "You're right, I don't deserve this."

"I understand," he said with apprehension, "but this week, you've sold eight electric cars. Your competitor has managed to sell a total of twenty-three cars, nearly triple your units. You know that we have a strict policy, so you'll understand when I tell you that I have to cut off your regular supply of Ralretrox for a total of seven days." Kurt sounded more like an official Counselor by the time he finished his speech. He also looked the part with short-cropped hair, a crisp business suit, and vibrant green eyes that shone like two pieces of immovable jade.

"But do you have to completely cut me off? Why not give me a fraction of my usual dose?" I asked, relieved to find a reason to keep the conversation going.

"Ralretrox Corporation has decided that the best way to train our employees is to temporarily deprive them of their regular Enhancers," he replied. "Some say it is immoral, but it is an effective method to ensure employee success."

I sat in silence, letting the seriousness of the situation sink in. After four faithful years at this ElectroMobile dealership, I was being disowned by Ralretrox Corporation and deprived of the drug I needed to function. Ralretrox was a top-of-the-line nootropic. Without it, even for a week, my life would change drastically. Kurt's voice brought me back from my dark thoughts.

"This happened to me a couple times back in California during my training as a Counselor," he said, a trace of empathy slipping into his voice. "You'll be back on the job in no time, with a steady supply of Ralretrox waiting for you. But it's a peculiar experience. Without Ralretrox, time seems to move faster, and memories slip the mind frequently." His voice gradually drifted off, and when I looked up, I saw a man in a faraway place reliving old memories. "Days become less productive, less meaningful. And while you can't remember what you had for breakfast, you never forget the feeling of swallowing that red pill..." What he was saying scared me. I coughed and hastily changed the subject.

"Who is the red line?" I asked.

"What?" said Kurt with genuine surprise, slightly startled. His eyes were once again clear.

"My 'competitor,' as you put it. Who is it?"

"I can't tell you. Protocol." He tried to dodge the question. But after a few moments of looking into my eyes, he could tell that I wouldn't let it go.

"Why do you want to know?" he asked absently as he shut off the touch-interface screen via his sleek computer and settled into his comfortable seat.

"Why *wouldn't* I want to know?" I said with purposely added exasperation. "I'm insulted that the man who was criticizing my work ethic just seconds ago is now depriving me of information crucial to my advancement in this workplace! Don't you believe—"

"All right, all right," Kurt said, finally relenting. "I can see that you still have plenty of Ralretrox in your system. I was comparing you to Allie. Allie Goodroy." The name rang no bells. However, as I thought about it, I could remember seeing someone new around the dealership: a tall, dark-haired woman with light blue eyes.

"Thanks," I said. Rising from my chair, I left the office.

Leaving the joint building Ralretrox Corporation had constructed last year to "seal the deal" between our two companies was always a disorientating experience. Inside of the establishment, everything was so sleek and futuristic. It was like a set that you would see in a sci-fi movie: motion sensor doors glided open for you with a fluid whoosh and smoothly slid back into place. The place was bright and open, with half of the rooms composed almost entirely of glass and metal.

I reached the main lobby, a huge, empty room, and saw the late afternoon sun shining through tall windows. A frictionless door slid out of my way in an easy fashion, allowing me to step into the city...where all fantasies of a futuristic world were left behind.

A wave of noise hit me as a hundred electric cars sped down the road in either direction. While the overbearing presence of these small and nimble crafts would have been a disorientating sight for newcomers, it was all too common for a regular citizen of Philadelphia.

While waiting with a group of people for the light signal across the street to turn, I felt a cool breeze touch my face. But I realized the wind wasn't natural; the electric cars were providing a continuous blast of air as they zoomed by, barely feet in front of me. Even when they were moving at high speeds, I could easily tell which cars were products of ElectroMobile and which were built by our competitors. Again, it was impossible to determine if I could perceive these details due to the amount of experience I had dealing with electric cars, or because of the Ralretrox flowing through my veins.

Suddenly, silence flooded the streets as the crosswalk signal switched to Go and the cars rolled to a halt. Snapping out of my thoughts, I rushed into the street with a group of people. We moved like a school of fish, traveling together as a tightly packed unit until reaching the other side. By the time I arrived at my bus stop, the roaring chaos had commenced once again. After paying the old, wrinkled driver by swiping my bus card into a dusty processing machine, I chose a seat towards the back of the five-o-clock bus. Slowly, I felt myself drift deep into thought about the day.

My day had started as it normally did. In the morning, I reported to the administration sector of the establishment to receive my daily supply of Ralretrox. After swallowing a red capsule, I strolled through a connection hallway into the ElectroMobile dealership, where I sold two cars at my office via cell phone over the course of the morning. In the afternoon, I received an email from Kurt saying that he had to see me at once. What I wasn't expecting was the ambush he had planned for me in his office. I was still trying to wrap my head around the fact that tomorrow morning, I wouldn't receive a red pill from the administration office.

I could clearly recall the first time I experienced Ralretrox. It was nearly a year ago when our manager announced that ElectroMobile would be partnering with the prestigious Ralretrox Corporation, a company that started in California fifteen years ago. Created in 2017, Ralretrox was a groundbreaking nootropic that greatly enhanced intelligence, memory, and focus. Ralretrox Corporation made the promise that their product would increase worker efficiency and boost the overall value of any company that decided to partner with them.

On Tuesday of the third week of September, I was presented with a quarter of a red pill. I was told that if I ingested any more, I would risk releasing too much serotonin and dopamine into my body. Kurt, who arrived from California to become our Counselor and oversee drug administration, told me that death was a remote but not impossible outcome if I swallowed more than my body was able to handle. The drug was not a natural nootropic, but a mixture of ingredients that had been modified and capsulated for consumption. Looking at that miniscule pill, I remember feeling a moment of hesitation as I contemplated the consequences. But after deciding that I had nothing to lose, I popped the drug into my mouth.

At first, nothing. Then, about a minute later, a sense of clarity invaded my body like a ravaging disease. With all distractions behind me, I could focus my attention like never before. I saw the world in a new, brighter light. It was magic.

And tomorrow, it was going to be taken away from me.

At this point in the bus ride, I glanced out of my window to see large billboards hanging on the sides of tall buildings. They were electronic, and all of them bore bright red pictures featuring Ralretrox. Directly below those signs were large swaths of people protesting the nootropic. One person held up a white banner with crude black letters, reading: *Lost My Home, My Job, My Life Because of The Red Pill.*

What Ralretrox Corporation had not foreseen were the social effects that their drug would have on American society. As the size of their enterprise grew to be enormous—so large, in fact, that it spanned all fifty states—Ralretrox Corporation had trouble supplying all their partners with a sufficient amount of nootropics. The company was trying to provide for millions of working Americans on a daily basis, an act that they could no longer keep up. So rather than admitting defeat, the Executive Board decided that a partnership with Ralretrox would go to the highest bidder. This resulted in a great separation between the rich upper class and the less wealthy middle class. The companies that couldn't afford a partnership with the corporation paled in comparison to the rich businesses, whose employees ingested nootropics on a daily basis. Ralretrox Corporation, which originally set out to create a more stable, productive world, inadvertently assisted in the creation of a fractured and divided society.

When I felt a pair of eyes staring at me from across the bus aisle, I looked to my right and saw a shoeless teenage girl, skinny and haggard. By my clothing, she could tell that I had a warm bed to sleep in and plenty of food to eat. Her eyes, sullen and loathing, continued to glare at me even after I turned away. The girl's silent judgment was more powerful than any verbal assault could ever have been.

Finally, the bus rolled to a stop and the doors swung open, allowing a rush of people to get on. I slipped out into the streets of Philadelphia, escaping the teenager's gaze. Reaching for my wrist, I pulled off my watch and unfolded it into a cell phone. I had to make a call. As I dialed, I watched the small bus drive away, the homeless teenager's eyes following me through the window as she passed.

The skinny, balding man standing in the dark alleyway had his back turned to me. As I approached, I could see him rubbing his hands together and slowly shuffling his feet. When I was close enough to hear his shallow, wheezing breath, Joey finally sensed my presence.

"Agh!" He yelled, spinning around. "Oh, it's just you. Of course it is. I wasn't scared or nothing." Joey was a snake. My friend Rob told me that if I ever needed a favor, I should call him. But this man had a demeanor that sent chills down my spine and drew sweat to my palms.

"I guess you got my message?" I asked, indicating my wristwatch.

"Yeah, yeah," he said with slight discomfort. "By the way, where'd you get my number?"

"Rob gave it to me." No reaction. "Your second cousin." Blank, beady eyes continued to stare at me. "The one who says you have a supply of Ralretrox."

"Oh, that Rob," Joey said with sudden familiarity. "He and I go way back." He leaned in closely and whispered with rancid breath, "I hope you brought the agreed amount if you mean to deal with the red stuff." I frowned but nodded slowly.

"Let me see the pills first."

"No problem," said Joey. In a moment, he was pulling back his coat and reaching inside one of his many pockets. "They're right here." He tossed me a clear plastic bag with something inside. Eight tiny pills sat in my hands, each bearing the light engraving *Ralretrox*. I felt a quiver of excitement run through my body, knowing that I was holding the solution to my dilemma. Joey interrupted my moment of happiness with a cough that dripped with expectancy.

"Thanks for responding on such short notice," I said, handing him the tightly bound roll of three hundred dollars. Joey's eyes widened to an unnatural size, something that undoubtedly happened every time someone handed him cash. After fanning through the green bills, he looked up and grinned devilishly.

"My pleasure," he said before spinning on his heel and shambling away.

I stood in that alley for what seemed like hours, long after Joey had disappeared, just staring at the capsules in my hands. I wanted nothing more than to rip open the bag and grab one of them. Greedily, I began to do just that, breaking the bag's seal and slowly reaching inside the clear plastic. However, when my hand brushed one of the pills, a thought suddenly began to form in my head. *I should've given that roll of money to the teenager.*

Her wide eyes were still clearly blazoned in my mind, blaming me for my Ralretrox consumption. I could've helped her on that bus, but I had no choice, right? How else would I pay for the nootropics? But still, I could've done *something....*

Without realizing what I was doing at first, I drew a red pill out of the bag with deft hands and held it. Slowly twisting the capsule with my fingers, I silently unscrewed the tablet of Ralretrox...until a pink powder spilled out onto the ground. Then, I grabbed a second pill and began to do the same.

When the third pill's contents were lying on the pavement, I finally wondered what in the world I was doing. I was discarding the thing I desired most! But I couldn't think clearly. I could only remember seeing the crowds of people protesting under the Ralretrox billboards, could only remember the girl's eyes, desperate and sullen. By the fifth pill, I could only recall Kurt's far-off gaze and his solemn words as he recounted how Ralretrox Corporation had disowned him multiple times, and the struggles he had faced afterward. *And while you can't remember what you had for breakfast, you never forget the feeling of swallowing that red pill....*

When I was finished with the seventh pill, I finally figured out my motive. I was done with Ralretrox. The corrupt corporation was tearing the nation apart, leaving people to starve in the streets while the privileged lived a spoiled life. And I refused to be controlled by the nootropic any longer.

I grabbed the eighth and final pill, meaning to rip open the red capsule and be done with it, but instead I paused. I suddenly felt overwhelming regret, seeing the pile of pink dust that had formed at my feet. What a waste. The pill in my hand looked insanely tempting, and I could feel my will wavering.

Then I heard a chorus of voices from protestors in the street.

"Down with Ralretrox! Down with the cursed nootropic!"

I smiled, and abandoned the final pill in that dark alleyway to take up the cry.

Tunnel Vision

Ava Trimble

"By the sweat of your brow you will eat your food until you return to the ground, since from it you were taken; for dust you are and to dust you shall return."

– Genesis 3:19

The sounds never stopped anymore. The P.O.R.T.s (Portable Operational and Recreational Tablets) always beeped, alerting everyone to the news reports that seemed to be endless. There were excited whispers and shouts of protest everywhere he went: *hazy and suffocating.*

Carter Stone didn't know how he felt about the announcement the citizens of the Society received ten days ago. He had always thought he would die in a normal, ordinary way, maybe a car accident or old age, a freak heart attack or a random shooting in the street. And he had come to terms with that, as all living beings had to eventually, that death was inevitable and random, something gruesome and unknown, and there was no use trying to predict or stop it. Any other way of thinking was just wasting your time. Learning he could live forever, well, that was something he *hadn't* come to terms with. He wondered if he even *wanted* to live forever. It seemed creepy, unnatural. It was unheard of, unimaginable. At the same time, this was an amazing advance in society. How could he pass up this opportunity?

He sat down at the kitchen table with his P.O.R.T. and light blue, ceramic mug filled with black coffee, steaming hot, the same as every morning. He switched on the P.O.R.T., hoping to find a news article *not* relating to the Society's newest invention. He took a long sip of coffee and clicked on the mandatory bright red news alert flashing at the top of the screen. The P.O.R.T.'s screen flickered to black for a moment, then went to a shot of a video. Reluctantly, he pressed play.

The video showed a young newswoman talking to an older man, about fifty, with white hair and thick-rimmed glasses. Carter was slightly surprised to see that people even still *owned* glasses, much less wore them out in public. Glasses weren't cheap, and people didn't really need them after the corrective eye surgery.

"Hello everyone, I'm John Willow, coming to you live with a special guest, Dr. Carlos Vale, creator of the new and exciting invention. Tell us everything we need to know about your product, Dr. Vale: what does your new invention do, how does it work, and where can we find it? I'm sure we're all *dying* to know." John Willow looked very pleased with herself, flipping back her long blonde hair over her shoulder. Carter noticed that he hadn't seen her in any of the previous news reports, and she seemed fairly new at the job.

"Thanks for asking, Ms. Willow. I have invented, for those of you who have not been listening to your mandatory reports…I have discovered the chemical components to prolong life indefinitely. This chemical mixture has the components to prevent aging of the body developed from food preservatives, and doses of concentrated diseases to make the body immune to all known ailments, diseases, and fatal illnesses. Furthermore, any disease that can be manufactured from the known elements in other diseases is destroyed, rendering it unable to live, while causing extreme healing to body tissues. As long as another human does not harm you to an extreme degree, this tonic should keep your body in

perfect condition for as long as you take it. We call it *Lyve 5eVer*." The doctor reached behind his chair, and Carter's eyes widened as he brought out a glass vial filled with deep purple liquid that almost seemed to glow.

"This product is now available in stores for fifty occupationally earned service hours per bottle. It needs to be taken once a month for best results."

The doctor turned to John Willow and she nodded in acknowledgement. He seemed to breathe a sigh of relief, briefly losing his confident attitude. Then it was back, as quickly as it had gone.

"Thank you, Dr. Vale. If…" John paused and corrected herself. "When you start taking *Lyve 5eVer*, on behalf of the Society, please enjoy your new lifestyle, and report to administration to register as immortal, so your status can be changed in the citizen records." She smiled, but it didn't seem to reach her eyes, the way all news reporters seemed, sort of uninterested and fake, like melted plastic.

"Well, I think that about wraps this story up. Thank you, doctor, for coming down here today. Pick up your first bottle of *Lyve 5eVer* today."

The screen filled with black, then flashed to the home screen. Carter sighed and switched off the P.O.R.T. He knew that the rich would end up living the longest, and get the first supply of *Lyve 5eVer*, since they worked the most and contributed the most to society, obviously. But when it got released to the middle class, would he get it? He lifted the mug to his lips, only to find it empty. He sighed, unhappy at the thought of getting up, then pushed himself out of his chair, walked over to the green tinted counter, and poured the rest of the coffee from the clear pot into his mug.

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Carter heard a crash, like someone falling down the stairs, heard the familiar cursing, and a second later the kitchen door swung open.

"Hey, Carter. Do we have any food to eat? I'm starving!" announced Carter's roommate, R.M., rummaging through the pantry and then the *SUper FreeZe FriDge*. Carter sighed and ran his fingers through his hair.

"I don't know, R.M. I didn't go shopping yesterday. The stores are crazy." Carter paused for a moment, inhaled, then released a long breath of air.

"R.M., what do you...what do you think about *Lyve 5eVer*?" From his peripheral vision Carter could see R.M. pause, thinking.

"I don't know, Carter. I guess I'm going to buy it. The Society knows best, right? Do you know when will it be released? I want to get a supply before they run out." R.M. continued to go through the various containers of leftovers and now-empty boxes in the *SUper FreeZe FriDge*, at ease just as he had been before Carter had spoken. Carter mumbled an unintelligible reply, which earned him an eye roll from R.M., who exited the kitchen with his plastic container of Chinese food from the previous night. He bumped into the doorframe as he left, nearly spilling the food.

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Carter sat back down, switching on the P.O.R.T., which lit up with artificial light. He gulped down the rest of his now-lukewarm coffee, and clicked the shopping section.

The first item that popped up was *Lyve 5eVer*. Carter had to get this. He knew that if he didn't, he would regret it for the rest of his short life, watching himself age while his friends remained young. And he also knew that if he *did*, he would be the one watching everyone who didn't take it die, and he would live with the memories of that forever.

There's no way out for those who live forever. Carter shook that thought out of his head and checked the date of release:

ELITE: 2 days // CONVENTIONAL: 5 days // PLEBIAN: 10 days (if able to afford)

Carter knew that eternal life was a blessing, that the scientists had finally figured out a way to fight against the only true thing that can fight against us, the only thing that can rip a person apart and drag them into the unknown, silently and peacefully, or drawn-out and painfully. This was something that people previously had no control over. Now, by a miraculous scientific breakthrough, everyone did.

He also found himself thinking of the drawbacks. Living forever could also be a curse. To work forever, to have the same routine, to watch as others die around you and to find yourself intact, the same as the day you drank that vial of chemicals. To always live in a world where your most important contribution was making an average, forgettable cup of coffee at the brewery and getting through college with average grades. He almost thought all this was worse than the prospect of death.

Almost, but not quite. And so, still wrestling with his conscience, he ordered the cure.

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Five Days Later

> *"Even at our birth, death does but stand aside a little. And every day he looks towards us and muses somewhat to himself whether that day or the next he will draw nigh."*
>
> —Robert Bolt

Carter and R.M were sitting in the kitchen when the cure arrived. Carter was drinking herbal tea, because R.M. had thrown out all the coffee (*without* Carter's consent). He claimed the tea would be better for them, and that coffee was "the plague of the beverage world." Carter only went along because he was preoccupied. The cure was coming. *Today.* R.M. had been talking about how much he wanted to visit the Society's capital when they heard a loud clunk from the delivery system near the wooden doors of the pantry. They exchanged nervous glances. Carter slowly rose from his chair and walked to the delivery slot in the kitchen wall.

The slightly foggy plastic was cold as he slid the cover up, revealing a sort of landing pad made of silver metal. The package sat on the landing pad, still exuding the icy chill that for some reason accompanies packages down the chute. Carter assumed that the chutes were everywhere, that the Society had been connected to everywhere and everyone for a long time. For the citizens' convenience, of course.

Carter carefully lifted the package, with its brown paperlike covering over the box, tied with a rough beige string and the words *FRAGILE: PROCEED WITH*

CAUTION printed on the side. They had much more updated materials for the packaging, but the Society seemed to like the symbolism: relics from a time period they could barely remember; a world before the Fifth World War.

Carter walked over to the table with the package and carefully untied the rough strings. R.M. came over with scissors, and Carter used them to first cut open the brown paper, then unlocked the dark red, metal box with his citizen keycard. The Society had invented the keycard system as a way to keep track of everyone and to make sure that every person could open what was theirs, whether it was a new shirt or a government-issued mission file. (There had been a slight mix-up a couple years ago, causing breaches in National Security, and compromising many people's safety.)

Inside were just the two vials, pint size (as advertised), and surrounded by soft, white, feathery material made of thin, clear plastic. Carter carefully removed the vials from their packaging and held them up to the light.

The light from the bland white window in the bland yellow kitchen shone through the vial, illuminating the dark purple liquid inside. Carter thought the liquid was beautiful, and all it symbolized seemed extraordinary, impossible, unreal. It seemed to radiate life.

Carter could sense R.M. come up behind him, peering over Carter's shoulder at the two vials. Carter turned to face him.

"So," Carter said in a voice that sounded too calm to be his own. "Are you ready for immortality?" R.M. laughed.

"Yeah, I guess. Let's become immortal."

Carter handed R.M. one of the vials and took one for himself. He took off the clear crystal stopper, which came out with a small pop. He looked at the dark, almost black liquid once more. Now or never, he thought. He looked at R.M., who had already swallowed the cure. R.M. was never patient, and this was no exception.

"What are you waiting for?" R.M. asked, slightly annoyed at having gone first.

"Drink up." Carter took a deep breath, raised the vial to his lips, and in one swift motion, swallowed the slightly fruity-tasting liquid.

One Hundred and Fifty-Four Years Later

> *"All changes, even the most longed for, have their melancholy; for what we leave behind us is a part of ourselves; we must die to one life before we can enter another."*
>
> – Anatole France

Carter Stone was *tired*. His shift at the cafe was over at 10:00, and after the last employee left, he pulled out a chair on the closest coffee-stained, bleachscented table, and lit his light brown cigarette.

Carter had taken up smoking about five years after first taking *Lyve 5eVer*. Everyone did. Since the cure repaired the lung tissue almost immediately, there was no risk, leading the way for cigarette and cigar imports to be the number one item on demand. Behind *Lyve 5eVer*, of course.

There was now an age limit on *Lyve 5eVer*. People under twenty-two weren't allowed the cure, to supply the Society with enough working adults to cope with the growing demands of an evergrowing population.

Carter's life hadn't changed much, besides the fact that it was much longer now. He'd been promoted to manager of the little coffee shop with the stained counters and orange window frames fifty years ago. He helped with community service on Sundays, as required by law. Nothing new or exciting ever seemed to happen.

The earth had undergone major changes, though. About sixty years ago, overpopulation had become a serious problem, so many people decided to go live on the Moon, and even that had started to become overpopulated. Carter had opted out, choosing instead to stay on the smoke-filled, wilting earth, where the trees were irreversibly damaged and barely produced enough oxygen to keep the planet alive. Not that it mattered to humans, after a microscopic implanted device was invented to convert CO2 to oxygen from within. That was around the time he got the promotion, since the previous manager had left to help colonize the Moon.

Once in a while someone would die, and it would always be a huge deal on the news and blown up way bigger than it used to be. Because of the extreme levels of pollution, humans without the cure died much sooner than they used to. Carter could hardly remember what death was like, but he knew most people had died around eighty. Carter was well past the fear of death, and so was the Society, but some people had even more to fear: in extreme cases *children* without the cure died, whether it was from poverty or just exposure to the environment humans had created. Maybe those few deaths had made the Society more afraid, more desperate to keep *Lyve 5eVer* going. Humans had become the only species on the planet. No more undomesticated animals.

Carter took one last lungful of smoke and extinguished his cigarette. He reached into his bag and pulled out a light gray device, and turned on the old P.O.R.T. he had kept for all those years, the smooth metal a perfect rectangle in his hands. It was sadly outdated, with only standard holographic imaging and a smaller span of colors, options, and tools. He watched it for a moment and it flickered weakly to life. The P.O.R.T. still, miraculously, connected to The Online Store's database, and Carter went and bought the only thing worth buying he *hadn't* already bought in the last one hundred and fifty-four years. Something he'd never imagined he'd give in to buying.

He bought himself a ticket to the Moon.

Lurid Tales: An Interview with Vandana Singh

Joey Eschrich

Vandana Singh is a speculative fiction author and an associate professor of physics at Framingham State University in Massachusetts, where she is working on transdisciplinary approaches to climate change. Her short stories appear frequently in anthologies and fiction magazines; in 2009 a number of them were collected in *The Woman Who Thought She Was a Planet and Other Stories*, published by Zubaan Books and reprinted in 2013. She was born and brought up in New Delhi, India. In addition to science fiction and fantasy, she writes poetry as well as novels and short stories for children. In February 2015 she sat down with me for a conversation about climate change, technology, modernity, science fiction in India, and the importance of reading bad science fiction from time to time.

One thing that strikes me about your work is that it's as much about people and culture and community as it is about science and technology. How do you strike that balance of interrogating new and interesting technologies and new developments that might be on the horizon, while keeping the focus on people that are complex and relatable?

That's a great question. I think that, firstly, it kind of comes naturally to me because I've never really, at any deep level within myself, been able to separate arts and culture and science and technology. I had a kind of renaissance upbringing—I was encouraged to love and appreciate all of these subjects. So even in the lab, working on an experiment, I've always had an aesthetic

appreciation for what I'm doing as well as a scientific appreciation. It's all so mixed up and mingled inside me that I can't help but write in a way that brings out all these different aspects of reality.

Nature doesn't make a distinction between physics, chemistry, biology, art. These divisions are convenient and important but they are not essential under certain circumstances. One of the reasons I love science fiction is that it allows you some free play to work outside of or beyond these divisions.

Despite the strong focus on the people at the heart of your stories, you also build in well-developed scientific and technological elements. Your story in the* Hieroglyph *anthology, "Entanglement," for example, has a vivid cast of characters, but also what the science fiction theorist Darko Suvin would call a strong* novum*, a new technology ("Million Eyes") that sets this future apart from our own everyday reality. How does your own training as a scientist affect your process as a storyteller?

Being a scientist is an attitude towards the world. As a physical scientist, I recognize and appreciate that it's not just people who have stories to tell, it's atoms and molecules and protons and the landscape and the Earth itself.

Because of my scientific background, I'm especially sensitive to the fact that science fiction is all about the interaction of the human with the non-human, whether that non-human is the physical universe, an alien, or a different species of animal. The universe tells us stories, and one way to interpret those stories is through science. Another way is through mythology and various cultural interactions with the physical universe, and science fiction combines all of these.

One thing that's happened over time is that I get so many ideas when I'm immersed in teaching, because it opens up a space to ask new questions.

Students, especially those coming a position of relative ignorance about a topic—whether it's physics or climate change—often ask very deep questions. In attempting to answer them I get ideas that I can sometimes follow up on through an exploration of the physics, but other times it's more interesting to follow up through a science fiction story instead. So for me the two things feed off of one another; my literary side is stimulated by my scientific side, and vice versa.

I'm really struck by the point you made about relationships between human and non-human entities, and I think that's quite important in terms of our current and evolving relationship with the environment and climate change. We often think of humans being strictly differentiated from our environment—us over here, nature over there. Do you think that's changing with climate change becoming a more urgent concern, and a topic of public conversation? Is climate change alerting us to our embeddedness in, and reliance upon, the natural world?

Well, it had better, otherwise we're doomed. But I feel, I sense—and this is an entirely personal anecdotal observation—that a shift is underway, a reexamining of the things we take for granted. So I think that climate change is a big looming monster that's going to shake us out of our solipsism, out of our obsession with the exclusively human. We need to transform the dysfunctional relationship we have with the rest of nature.

The anthropologist Bruno Latour famously wrote, "We have never been modern." I think what he's trying to say is that modernity is an assumption that we don't need to care about the rest of nature, we don't need to care about landscape or time of year or local geography or anything like that. That's a dangerous illusion. We know from science and human history that the environment shapes human life profoundly. Modernity, in this sense, is a paradigm that's gotten us into a lot

of trouble. And I strongly believe that science fiction is one way of exploring our way out of that paradigm into something that's more realistic, and will hopefully help us save ourselves.

Right. Your* Hieroglyph *story gets at that point a bit, but it uses Million Eyes, an information and communications technology intervention, to connect people battling climate change with one another across great distances in a new way. Do you think those kinds of technologies are essential for giving us a broader sense of the world, beyond what we can experience directly? The countervailing argument is that these nifty communications technologies are a bad thing, that we get too immersed in them and forget that we're present as bodies in the world.

I think we need to make a distinction in terms of how we use technology. For any technology, there is a kind of "normal" usage and there is an addictive usage. I think that what determines whether the usage is normal or addictive is basically social relations. For example, if you are already living in an atomistic society that's very individualistic, it makes sense that you see more of this addictive behavior with regard to technologies like smartphones that can serve as a barrier between the user and people around them.

I'm not a psychologist, so I'm speculating here, but I think that some people's pervasive smartphone and social media use might be called addictive, and I think that it's related to this illusion that technology will solve all of our problems. I'm not a straightforward technological optimist, because I think that we have to interpret technologies and the ways that they are used in their social and cultural contexts. But I'm not a Luddite either; context is very important, and our immersion in these technologies is not necessarily bad or wrong *per se*.

But at the present moment, we're starting from a society where people are often isolated and alienated, and where there's a lack of global consciousness, and we don't have a healthy, robust sense of our relationship with other species. I think that technology could actually provide a way out of this situation, and the way I dream of that technology is not as a substitute for real human relationships, but instead technology enabling us to have real, deep human relationships with both humans and non-humans so that technology is a tool, not an addiction. And I think it's important to make that distinction.

This is all quite relevant to "Entanglement," in which the central technology, Million Eyes, acts as a connective tissue between people. It doesn't manage ongoing relationships, like Facebook; instead it enables you to have a face-to-face, serendipitous connection with someone you probably would never meet otherwise. Where did you get that idea? Was it a specific experience, or an existing technology that started you thinking in that direction?

One of the things that I'm fascinated by is this phenomenon of the kindness of strangers. Even if a person is a jerk to the people they know well, sometimes in a fleeting moment they can transcend that and be nice or decent to someone else. And that bit of kindness does have an effect on the person who is receives it, and maybe even on the person who gives it. I don't think that kindness to strangers is going to save the world, but I think it's a fascinating phenomenon.

So I was exploring that idea in the context of collective responses to climate change, and in the context of these "Hieroglyphs," these icons of the coming age. I would like to think that one of the Hieroglyphs, aside from things like space elevators and 3D-printed moon bases, that signals a new paradigm is the network. The image I used for the network is the butterfly, which stands then for the butterfly effect. We know that human societies and networks are highly

coupled and very interactive and that they are non-linear. So I was trying to explore one facet of that idea, that we could use technology to enable empathy to flow among strangers across the globe. Could we use that, at least for a moment, to create some kind of global consciousness?

When I was thinking in terms of these networks and non-linear effects I was thinking of a web—people with links among them, and links with other species and with the physical world as well. What if there was a device that, when you needed it, would connect you with a stranger with whom you may never be in touch with again? And that stranger could say, "Hey, it's all right. I feel your pain." What a difference that could make. You have the freedom not to be entangled with the person because they're a stranger, and will stay that way. But it takes you out of the moment and reminds you that you're not alone.

Traditional decision-making and consensus-building methods haven't been working very well with regard to climate change. International negotiations have been tricky, many of the proposed agreements are never enacted, the enforcement regimes don't work. Can storytelling and art help us work outside of these traditional channels and change our response to climate change?

I absolutely think so. What we need are stories that wake us up to what we're doing to the planet and to ourselves. Stories are powerful because they can work at so many levels: intellectual, emotional, psychological, metaphorical.

I often think of stories as enactments. When I was growing up as a teenager in India, I was greatly influenced by social movements, like environmental and women's movements, and one of the major features of those movements was street theatre—what we might call a flash mob-type situation now. People would

go to a bus stop or another crowded place and spontaneously enact a drama that had some sort of contemporary relevance.

I believe that stories in different forms, whether they're written or enacted in some other way, are really powerful ways to convey complex ideas. In a story the emotional, psychological, and intellectual contents are not artificially separated. They are interconnected, like in real life.

Have you ever tried writing any science fiction in Hindi?

I like to write poetry in Hindi, partly because Hindi, as my mother tongue, is a very personal language. So when I'm writing in Hindi, I'm usually writing just for myself. But I do hope to write science fiction in Hindi at some point, and I'm very proud to say that one of my stories, "Somadeva: A Sky River Sutra," was translated into Hindi for a science fiction magazine, *Vigyaan Katha*.

I learned English when I was about five years old, so it's not really a second language to me, and I started to write in English because I want to write for the world.

Does science fiction work differently in Indian culture than it does in the United States and the West? Or has the genre developed in similar ways?

I've done very limited reading in Hindi science fiction. There are a lot of science fiction writers who write in English in India whom I've read because it's simply easier to get their stuff. We have eighteen official languages, so we have writers in many other languages who are writing science fiction and I've also read some of them in translation.

When people write in India they don't necessarily imitate the genre or stylistic categories that you see in western literature, or stay within that set

of boundaries. You can have stories that are scientific, but also fantastical in some way. There are some great Indian science fiction stories that are somewhat imitative of Golden Age science fiction in the United States and the UK, in that they are kind of worshipful of technology or trying to convey some specific cool science idea. But you also have stories that would be unique and unrecognizable in the western publishing landscape. Indian writers often approach reality very differently than the ways we're used to reading in the United States.

In 2009 I ran a workshop in India with Anil Menon, a friend and fellow writer, and Suchitra Mathur, a scholar of science fiction, and we had about twelve writers participate. Only one or two of them had written science fiction before. And it was so mind-blowingly awesome. I cannot tell you the quality of writing that emerged from it. Based on that experience, I think that Indian science fiction, whether in English or in one of the many Indian languages, is going to be a rich contribution to world literature.

Did science fiction inspire you to pursue a career as a physicist, or did you come to science fiction writing through your work in physics? What came first?

The stories came first. I read science fiction as a kid, including really bad science fiction, kind of lurid tales, and there were, in fact, some books in Hindi that I remember reading. They were these little books with completely wild stories where spaceships and fairies mingled completely indiscriminately, and they stimulated my imagination.

When I read stories set in space, I used to look up at the stars and wonder, "What's out there?" And while the stories did come first, combined with the natural wonder and curiosity that children have, I was also raised in a typical

Indian middle-class family where education and knowledge are the most important things. So that led me very naturally to want to pursue science.

But I do owe it to science fiction, and not just the fact I ended up doing science, but also the particular kind of science I became interested in, theoretical particle physics. I want to know what the deep patterns are in Nature, and to understand the great generalities that pervade the universe. I completely honor scientists who sit in a lab and grind away at a very specific problem, but for me, I'm motivated by that same sense of largeness and wonder that science fiction captures so well.

When we talk with scientists, many of them remember being influenced by science fiction in various ways, but then when you ask them about what specific stories inspired them, you start to realize that there is something to be said for bad science fiction! People really get a lot out of these lurid stories you just mentioned. Maybe there's something about stories that are a bit bombastic that forces you reconsider your assumptions about the world.

Yes, I think you're right that the poorly written, overly melodramatic stuff does have its virtues. Maybe it's because it exaggerates certain things, and when you're young and unsophisticated and open to everything then you absorb that sense of limitless possibility. Later on maybe you're more discerning, but by that time you're already hooked.

Aside from the lurid tales, who do you remember reading when you were young?

I grew up on Isaac Asimov, who has some amazing ideas, but is really not much of a stylist. When I try to go back and read him now, it's really hard. When I was about eleven I discovered Ray Bradbury and *Fahrenheit 451* and I couldn't articulate it then, but I thought, "Wow! You can be literary. You can use this

gorgeous language to tell these incredible stories." I think it's good to read a mixture of high quality and trashy stuff, because the trash, in addition to being a lot of fun, helps you recognize the gems.

This anthology is concerned primarily with visions of the future based on biological and environmental science and technology. Can you think of any great science fiction stories or books—besides your own story, "Entanglement," of course—that tackle these issues in a particularly thoughtful way?

Two that come to mind immediately are Ursula K. Le Guin's *The Word for World is Forest* and Kim Stanley Robinson's *Pacific Edge*. And one of the best books I've ever read is *A Door into Ocean* by Joan Slonczewski. It's about a moon world that is entirely oceanic. Slonczewski is a biologist, and she's got the entire ecology of the world worked out down to the smallest detail, as well as the sociocultural aspects. It's an absolute jewel of a story, and it has biology at its core. With regard to biodiversity and climate change, Barbara Kingsolver's mainstream novel *Flight Behavior* is a must-read.

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To learn more about Vandana Singh and her work, visit vandana-writes.com.

The Fountain of Youth

Joshua Ferris

Looking back on that day, May 4, 2037, I should have recognized it would be the start of my decline, but you know what they say about hindsight. My fiancé and I walked towards a large, reflective building that towered over everything around it. We were escorted by two large security guards who held back dozens of angry protestors. This diverse conglomerate of people was united in their revulsion for what I represented. I, Isaac Heller, was the first human test subject in an experimental procedure that would essentially provide me with the proverbial fountain of youth.

The poor, evangelists, human purists, and a throng of other groups I failed to recognize banded together in a faceless mob that moved menacingly toward us, shouting epithets such as "You're a traitor to humanity," and "People shouldn't play God." At that moment, all I felt for them was pity. Little did they know I didn't want to play God; I just wanted to pay my bills. But the past fifty years have dampened my loathing for these people who despise who and what I have become. Initially, I assumed that this procedure would eventually translate into longevity for all of humankind. In my ignorance and zeal to line my own pockets, I failed to recognize that extending life came with a hefty price tag. Only those with substantial wealth could reap the benefits of living five times longer than the average person, further ostracizing the poor from the wonders of watching generations of their progeny grow and prosper.

Reexamining my past, I'm sure I would have felt the same as these people who abhorred me, if I hadn't been chosen as an experimental subject. Drowning in student debt, with an upcoming wedding that I could ill afford and no feasible job on the horizon, I felt that I had no choice but to accept my new role as a human guinea pig. Thank goodness for nepotism: my brother was a bigwig at Daedalus Laboratories and pulled some strings to offer me this gig.

Once we entered the building, we were ushered into a meeting room where I was given numerous forms to sign. Unconcerned about what was written on those papers, I focused on the prize. Imagine it, receiving five hundred thousand dollars just for having the right genetic makeup. Perhaps it was petty cash to Daedalus, but for me it was a cool half a million to pay off my loans and host a fancy wedding, with enough left to start a new life with the woman I loved. In this economy with so few jobs and an unemployment rate in the double digits, I felt like a king.

I was led to the laboratory, where a scientist debriefed me on the potential effects of the procedure. "I am legally obligated to explain to you how this process works, so please stay with me. We will manipulate specific genes to extend your life. Specifically, we will target two genes, mTOR and SIRT6. In general, mTOR affects your metabolism and energy balance. Inhibition of mTOR activity should increase the longevity of your cells, essentially extending your lifespan. The SIRT6 gene is vital to postnatal development and survival. We plan to increase the expression of the SIRT6 gene, which should also help in sustaining your longevity. In conjunction with these changes in gene expression, we will employ an innovative nanotech technique that utilizes stem cells to repair and generate new cells, greatly decreasing your risk of cancer and other illnesses. In addition to increased longevity, experiments with mice and chimpanzees suggest there

may be an increase in your cognitive functions, a possible loss in bone density, and decreased immune function, increasing the possibility of bone fractures and susceptibility to infections. Mr. Heller, do you understand everything I have just explained to you?"

"Yes," I answered, but truthfully, I couldn't focus on his words. I was consumed by the massive sum of money that I believed would solve all my problems. Quite candidly, I was trying to distance myself from the crazy reality of what was about to happen to me. It was scary, being on the cutting edge of humanity.

Nodding his head, the scientist asked me to initial more forms and reminded me that once I was healed from the initial procedure, I was required to return to the lab every two weeks for testing and nanotech treatment to keep my cells healthy.

We walked through a labyrinth of corridors into a white room occupied by a medical team in sterile white suits, complete with headgear. Lying on the operating table, I stared into the bright light above me. The last thing I remember was thinking about all the things I would do with my newfound money. That was fifty years ago, a sunny day in May that ruined the rest of my long, long life.

Today, I look across a small table in a tiny office. I stare sullenly at my wife, who sits across the table next to her lawyer. The divorce isn't easy on either of us, but it's for the best. While we are roughly the same age, Della now looks much older. Despite being seventy-five, I look like a young man, perhaps in my early thirties. Although we both know that looks are superficial, the differences in our

physical prowess were enough to strain our relationship. The last straw was the death threats, which started when Daedalus announced that plan to offer the "Fountain of Youth" for public consumption.

My continued existence as an ageless wonder has been controversial for fifty years. Despite the hundreds of other test subjects, I, Isaac Heller, am remembered because I was the first to undergo life-extending genetic modification. Of course, Della's safety is the reason we'd agreed to move forward with the divorce, but we're both too stubborn to acknowledge the underlying issue. Death by longevity, that's my new mantra when considering new relationships.

For Della and me, our minds are in completely different spaces. She is settling into her age and increasingly frail body. I am youthful and energetic. Our time together is more like a child taking care of an aging parent, rather than equal partners with similar dreams. I know this sounds harsh, but underneath it all, I know Della feels the same way. The love of my life is now my grandmother. How sad is that?

As far as friends, I have only one. I live in virtual isolation, except for the doctors from Daedalus, who I see frequently. Most of my friends have moved on; my agelessness reminds them too much of their own fragility. Finding new friends is just as difficult. We may share the façade of youth, but my thoughts and emotions are those of an older man. Maybe when the "Fountain of Youth" is a public enterprise, I'll be able to find someone who can relate to my struggles. For now, I'm alone.

The lawyers are finished; we sign the necessary papers. We embrace and Della says, "I wish you well, Isaac. Stay in touch." I do the same, but we both know that it's over.

While I'm ruminating on what I believe is the end my life as the old Isaac Heller, my phone vibrates. Jim, my only friend, invites me to meet him at a local bar. He knows what has just happened, and for once, someone is on the same page as me—which is good, because I need a drink.

I walk down the filthy, littered streets to the dive where Jim is waiting for me. There seems to be more homeless people around than ever before. With the economy in a downward spiral, the standard of living has plummeted. People are saving their tattered coats because they can't afford new ones, businesses and landowners can't pay to maintain their buildings, and there aren't enough police to care about minor indiscretions like vandalism. Restaurants are closing and fast food places are a dime a dozen, offering quick, cheap meals. I don't usually frequent this part of New York City, since I'm relatively well off. The half a mil was a nice jump-start for me, and being a household name, I was able to land a high-paying job that appreciates stability in their workforce. What greater stability can one offer than being an ageless employee? I've worked so long that my mind is tired, and cognitively, I'm ready to retire and experience some true rest and relaxation.

Unfortunately, Jim isn't so lucky; he was forced into early retirement and is barely making ends meet. The middle class is almost nonexistent as the gap widens between the wealthy and poor. It's no mystery why people despise the "Fountain of Youth." It's a luxury that only the elite can afford.

He looks old, and it's only exacerbated by the profound grimace on his face. "Hey," he says. "How are you doing?"

"Fine, Jim," I assure him, but he knows I don't mean it. We were once inseparable, but our relationship has waned with his growing bitterness over his forced retirement and sudden aging. His political activism doesn't help either.

"That's good. A positive attitude is great for the soul," He can see that I'm not willing to talk about the divorce. "Today is just another example of why this damned longevity stuff should stopped. But the bureaucrats and lobbyists in Washington won't allow that now.

"They just want to sit in their mansions and enjoy the effects of Daedalus' products for themselves. They've created an elite, wealthy oligarchy," he announces, staring at me with hooded anger.

Daedalus and the longevity project—this is what Jim really wants to talk about. Lately, it's all he ever wants to discuss. Since I'm not pleased with my current situation, I really don't have a problem with his ideas; I'm just more subdued about everything.

Now Jim is really seething. "See, only the rich can afford this crap." As he continues to rant, I find it ironic that at that moment particles are coursing through my veins, keeping me healthy and young. I am his friend; I am what he hates.

"So what are those people who can to afford this process going to do with their extra time? Keep hoarding all the wealth, making the poor poorer, if that's even possible. And what will become of the poor, you ask?" (I don't ask.)

Jim catches his breath and keeps on protesting. "The poor die young with no money, and their children follow suit. It's a vicious cycle with no end. Society has

never been more divided than it is now. Well, not since the time of slavery. I'll tell you, it's patricians and plebeians, bourgeois and proletariats. People are fed up; there's going to be a revolution. Mark my words. Maybe not during our lifetimes—strike that, you may still be around—but at some point the poor are going to stand up and demand their rights as citizens."

"I hear you." Although I do listen to Jim, I rarely process his words when he lectures me on the fate of humankind. Anyway, today is not a good day to delve into the finer points of Jim's tirade; I'm stuck in the midst of my own self-pity, though I loathe myself for feeling this way. *Poor little rich person who lives for a long time, life is so very hard for you.* These words buzz in my head like a fly caught between a screen and a windowpane. I try my best to be cordial. Without Jim, I'd be completely alone.

Jim's diatribe attracts a group of people who are all too willing to insert themselves into our conversation. I decide to excuse myself and take my chances on the street.

"Well Jim, I'll see you later. Thanks for the drink. It's been a long day." Jim responds with a smile. "See you later, pal. Good luck, and feel better." All in all, Jim is a pretty good guy, once he finishes venting his frustrations about "the system."

As I leave the bar, I notice that someone is shadowing me. I begin my walk to the monorail. The man heads in the same direction. Without warning, he starts jogging toward me and as I turn, he taps me on the shoulder. I turn warily as the man asks, speaking softly, "Are you Isaac Heller?"

As I answer that I am indeed Isaac Heller, the pit of my stomach yells *idiot*! I feel a sharp jab into my screaming gut as my attacker spits in my face and shouts, "Equal life for all!"

As I lay on the filthy cold concrete, crying for help, I think, "What an odd thing to say."

He definitely picked a good place to stab me. Not a soul in sight. Staring up at the dark night sky, my own vision fades into blackness.

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Fading in and out of consciousness, I hear the blaring of sirens. I feel the coldness of steel against my naked skin. I experience the sensation of being rolled along a brightly lit corridor. I realize that I'm in a room with a mechanical arm working on the wound in my stomach.

When I finally become fully cognizant, I find myself tucked comfortably in a white bed in a colorless room, not unlike the room where I spent my first few days at Daedalus. As I lay in my hospital bed, I realize what a fool I am. Nothing like a little near-death experience to remind me that life is precious. I've been so busy cursing my predicament that I'd forgotten what an amazing chance I've been given. An extended life for free! As I revel in my newfound optimism, several men enter my room.

"Hello, Isaac. I'm Dr. Ponce from Daedaulus. We came by to see how you were doing and to make sure that your stomach trauma did not cause any complications. You're a very lucky man. It would have been a shame to be given the so-called 'Fountain of Youth,' only to die young. If you remember, the nanotech treatments you receive compromise your immune system. Any type of bodily trauma can easily lead to systemic infections, so I'm prescribing strong antibiotics, and as a precaution, an intravenous drip of immunoglobulin IgG to strengthen your immune system. The effects of the IgG should last anywhere from two weeks to a few months, and will provide a boost to your immune

system in fighting any infections that may be present in your body. So, we're going to keep you here for a few more days for treatment and observation. Is there anything else I can do for you?"

"No, thank you. But if you don't mind, may I ask you a question about this whole longevity project?"

"I'll try my best to answer."

"How much does it cost to live longer?"

"Well, it is quite expensive. I believe the current price is seven hundred fifty thousand dollars—which, in my opinion, is a small price to pay to extend a person's life, by our estimates, five times longer than average."

Thinking about Jim, my assailant, and the countless protesters I've come across over the past fifty years, I grimace and ask, "How can you justify selling life to the rich and leaving the poor behind?"

Dr. Ponce is clearly taken aback. After he gathers his wits, he says, quietly but assertively, "I know it seems steep now, but as the process is refined it'll be easier to perform, decreasing the cost of treatment dramatically. Remember, once computers occupied entire buildings, and now they're small enough to be intertwined in our clothing, accessories, and bodies.

"With the public presentation of the 'Fountain of Youth' on the horizon, governments across the globe are already trying to ameliorate such issues. Banks are planning to tailor loans to individuals who can't afford the procedure; longevity is a safe investment, given the length of time that people will be able to work and lead productive lives. Of course, things like social security will have to be adjusted, and there may be government limitations on the number of children

couples may have. History demonstrates the adaptability of humanity in the face of change." He finishes this thought with a confident smile, proud of his answer.

I just grunt in response; he hasn't totally convinced me of this silver lining.

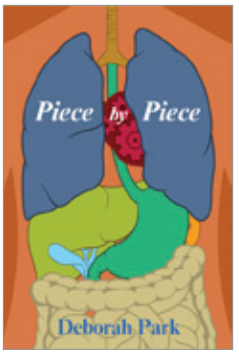
"Things may not be perfect, but this is going to happen, Mr. Heller. Nothing can stop progress. I'm sure some will try, but the Luddites won't succeed. They never do. You just have to have faith," he says reassuringly. He puts his hand on my shoulder and begins to walk away. As he leaves, he says, "If you need anything, just call."

Maybe he's right; perhaps things will work out. I hope they do. Everyone should have the opportunity to live a longer, healthier life. It should be a matter of choice, not economics.

As I stare out my window I see a bird walking on the ground. A car frightens it, and it takes flight toward the sun. I lose sight of it in the blinding light. I suppose it could have fallen back down, but maybe it kept flying.

Piece by Piece

Deborah Park



The numbing cold wakes him. Shivering, he grabs the thin blanket that had fallen onto the floor during the course of the night, and finds it miserably cold. Curling up into a ball, he feels a sharp pain shooting through his side. He yelps and gropes his chest, fingers sliding over metal, then smooth skin, then nylon, then skin again. Dried blood and a faint but prominent outline of stitches catch his attention, and he suddenly realizes where he is—the operating room, of course.

A soft beep politely informs him (the Syndicate is always polite) of an incoming message. A smooth, androgynous voice fills the dimly lit space.

"O-Cube 24, Piecetime Donor 503, please exit your O-Cube within one hour of awakening. We thank you for your business."

"You're not welcome!" he barks grumpily before falling into a painful coughing fit, a failed synchronization between his mechanical organs. Soft relaxing music oozes out of the speaker as the voice calmly repeats, "Omnia mutantur, nos et mutamur in illis."

Omnia mutantur, nos et mutamur in illis.

Omnia mutantur, nos et mutamur in illis.

Omnia mutantur, nos et mutamur in illis....

The phrase continues to echo in his mind long after the voice dies out.

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The billboards overhead shined in an array of dazzling colors. Night seemed like day in the crowded streets of the city, with tall skyscrapers and bright signs masking the starry darkness of the sky above. He played with the brochure in his hands as he crossed the street, looking over his shoulder for the umpteenth time before glancing back down to read the paper. By now, he had memorized nearly every word of the government-authorized pamphlet—and yet, he felt the sudden urge to read over the document again, to ask himself whether he could somehow scrape together the money to afford an authentic prosthetic.

His elbow hinge creaked alarmingly as he brought the brochure closer to his eyes to read it, and he winced. His mechanics had been getting worse and worse. Sometimes when he stood still, he could feel something in his chest expanding and deflating, his breathing slowly but surely wearing out the elasticity of his prosthetic lungs.

There was only one option for people like him. The only way he could ever get money was to donate, and even then, the Syndicate claimed most of the profit for themselves. He had been lured in by the Syndicate's promises, and though he regretted it, it was too late to back out now. The worst part, he thought to himself, was that if he died early, there was someone somewhere out there who would live longer as a result.

The city's Piecetime building almost glittered as he approached—the pinnacle of architectural innovation, he was told. He'd never been inside the upper levels himself—the Syndicate didn't look kindly on those who strayed from the loyalty they demanded. So instead of walking closer to the glamorous building, he

took a left, ducking into a dirty alley. A couple of children in ragtag clothes scattered upon seeing him, hastily scrambling for the money they had been counting before running. No implants, he noted as they ran off. Smooth skin. The Syndicate will kindly take them in when they are of age—or maybe earlier. He fished out small identification tag from his wallet. Whatever. He passed his tag in front of the small black box that extended from the side of the building. A section of the wall sank down to reveal a flight of gray stairs, and as soon as he had crossed the threshold, the wall rose behind him again.

"Welcome back, sir." The smooth androgynous voice made him jump, even though it was familiar to him from all of his previous visits. "On this lovely evening, please direct yourself to O-Cube 24." He smiled wryly, but the faceless voice paid no heed (there was a lot the Syndicate didn't care about). "Records show that you have taken the Blue Pill before. Excellent. No rejection of pieces or replacements should be registered. Your only requirement will be—"

"Anesthesia, yeah," he muttered knowingly.

"—Relax, your Piecetime will begin shortly."

His walk turned weary as he reached the antechamber at the bottom of the stairs, staring at the door in front of him. After taking a deep breath, he waved his ID card in front of the box on the wall, similar to the one outside, and the door slid open. His footsteps echoed lightly as he stepped into the small room. He could barely remember a time when he was apprehensive about coming, when he was actually scared to begin the process, afraid of what he'd become.

Now, he just sat on the edge of the bed and dry-swallowed the anesthetic pill, ignoring the glass of water that had been set out for him. The anesthetics in the pill hit almost immediately, and he—

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He attempts to roll over after a while. The aftereffects of the cheap anesthesia leave him stranded on the operation table. So he listens to the hum of conversation, click-clacks of metal feet and wheels on hard floor that seep through the door. Somewhere above him, he's sure, the beautiful ladies of Civitas are lying comfortably in their O-Cubes. Perhaps an old man is enjoying Piecetime recovery with a new young heart in his chest. He'll have a long life ahead of him with a heart like that.

"O-Cube 24, Piecetime Donor 503." The young man grunts in reply to the lovely androgynous voice that probably can't hear him. "You have thirty minutes remaining. We expect you may not have the heart to leave, however—"

His sudden hoarse laugh interrupts the voice, which continues to speak soothingly. The heart to leave? What's this? The Syndicate must have acquired a sense of humor. Oh-hoh, yes! The heart, indeed. He clutches himself through the twinges of pain with his arms—one nylon, one metal—wrapped around his oddly still chest.

"Omnia mutantur, nos et mutamur in illis," the voice repeats to signal the end of its message.

All things are changing, and we are changing with them.

At that moment, the city's motto seems ominous to him.

Carefully chosen magazine pages cover a wall of the operating room. Nearly every magazine in the country is emblazoned with some celebrity or another, all with the trademark look of having undergone the Piecetime Procedure. It's

hard to remember Civitas as anything besides a capital of beauty, art, and youth, though he is vaguely sure it hasn't always been that way. He's distracted from his thoughts and from the creaking of his new heart by a woman featured in one of the magazines for sporting eighty-four different patches of skin, varying in color and texture.

Eighty-four donors who now have nylon coverings.

The lifespan of those fortunate enough to receive the Piecetime Procedure improves by decades, causing elegance and wealth to eclipse health itself in importance. After all, why would one want to live for a long time without taking the opportunity to beautify themselves as well? He, however, is not one of those people. Progress is the future, to be sure, but it has outrun him. He has fallen behind to only be devoured and spit out by the world he finds himself in. Poverty is no longer considered a blight, but rather a resource. It offers a renewable reservoir of patchwork donors whose skin, organs, and lives are taken and graciously provided for others.

These thoughts had maddened him in the past, causing him to toss and turn on many a restless night. Strangely enough, apathy now takes the place of his frustration. He no longer feels anger. In fact, he no longer feels anything at all.

After all, he is heartless.

Ninety Stories High

Jessie Zhao

"GLORIOUS NEW OPPORTUNITY!" the flyer proclaims. "SOAR ABOVE ALL OTHERS!" I look out the windows. The towers of New York, almost a mile high, peek above the huge wall surrounding them, a birthday cake on the horizon. "CALL NOW!" The gentle, rolling hills are content with being dwarfed. I get up off the porch and hold the ad in the sun. Not one of those gaudy "color changing" ads. They're dead serious.

"So, what's the verdict, Jake?" Marissa had just come back from a trip to the city and picked up the flyer. "We could go to New York. Sell the farm, slaughter the livestock, and start fresh. Didn't you always talk about how amazing it is there? About how there are so many places to go in New York?"

"It's great! I would love to live there, but I can't find another job! All I know is farming, and the modified food at that." I look wistfully at the city. "New York doesn't have a niche for me." At least, the New York I see on TV and the news doesn't. It's a concrete jungle filled with cars and lights, but a jungle that always gives you something new.

"Well, this is an advertisement for a farm, isn't it?"

"Nonsense! How the hell could they have a farm in the city? There's almost fifty million people living there, and even if they bulldozed half the place, that'd barely feed half of them."

"They have a farm. I saw it," Marissa whispers. "Look again." She turns me around, back towards New York. There are the usual wind turbines, our acres of nigh-immortal rye, and the wall. The typical landmarks of New York are all there. The Cathay Tower. The new World Trade Center they built back in 2098 when the old tower was virtually destroyed by steel-eating bacteria. Marissa is pointing vigorously at something.

A barely visible spire had risen above the walls. It's almost perfectly clear, and the sun barely hits it. You can see each of the floors and the steel holding them up. How could such a large building be so nearly invisible?

"Jake, that's the new farm. A huge greenhouse, basically."

So maybe a farm in a city isn't that ridiculous after all. I regard the tower for a bit longer. Sort of like an office building, but with tomatoes instead of cubicles.

Later, in the afternoon, I continue with my chores, feeding the beef. They're not exactly cows, since they're engineered to have ridiculously tender meat, weak skin, and amazing milk. I pour the feed into the appropriate tubes. A brown beef bends down to eat and falls, a side effect of her breeding. I have to help her up. She staggers a little and dips her snout into the food and gives a little moo of joy. I couldn't afford to slaughter them all just to move. I'd have to sell them. Would the glass tower be able to support a herd of beef a thousand strong? Never. I could still support myself the same old way on the farm. Of course, the wheat and corn and rye…that's feasible in New York. We can think about it. By the time I fill the storage tank with feed, the sun is setting already. I leave the barn and go home.

The crops are starting to get taller and taller. It's mid-June and I can see ears of corn growing already. Marissa has rented a harvester for the weeks ahead. Ironically, the harvest takes longer than it takes for the corn to mature. I look

out towards the city that blocks out the sunset. I wonder how they're harvesting crops in the tower.

Marissa has made casserole for dinner. She must see that I'm not hungry, because she pokes me a bit.

"Don't worry too much about the move. That's for the future. Once the harvest comes in, and the cash is in, we'll talk." She cuts me another slice of chicken casserole. I sigh.

The next three weeks of driving a harvester around put the city out of my mind. Ironically, I'm facing the exact same conuncdrum as many people did more than three hundred years ago: stay in the countryside or move to the big city? Technology and society will always move forward, and people will always need food.

Eventually, after we've sold our crops and planted more, Marissa and I hatch a plan. We'll keep the land, get an apartment in the city, and see how it goes. There will always be a house and farm to return to. I've always wanted to live in the city, and this is my chance. When opportunity knocks, answer the door. At the same time, don't trust everything you see once you open it.

After a twenty minute trip by train into New York, Marissa and I wander through the enormous city, searching for our new home. Hovering vehicles zoom by, both on the roads and amid the skyscrapers. Marissa and I had rented an apartment. When we arrive, I crack open the door, sit down on the saggy couch, and start researching. I give my phone a little tap and it projects Monument Foods' website onto the wall. Right off the bat, I'm greeted by a short animation, followed by the company's slogan: "THE FUTURE IS HERE, AND IT GROWS NINETY STORIES HIGH!" After the animation finishes, I'm able to get some real research done.

Monument Foods Inc. had completed construction of their facility a month before. The upper eighty floors are occupied by crops, and the lower ten by livestock. The walls of the crop section are glass, to allow sunlight in. A glorified greenhouse to feed New York. Of course, it can't feed everyone, but it's better than shipping everything in from California. I begin to feel cautiously optimistic. This thing could turn an amazing profit, and that would mean a stable salary. Working for a large employer would be quite a change from running my own farm.

One week later, I've already submitted my resume and I'm called in for an interview. I hail a taxi and am quickly dropped off in front of a building that's simultaneously imposing and fragile. The delicate crystal walls and greenery are supported by a skeleton of steel and pipes. I step into the lobby.

"Hello, are you one of our job applicants?" The robot at the desk swivels around. She clearly has no lower body.

"Yes."

"All right, please take the second door to the left." She attempts a natural smile.

It seems like an eternity before they call my number for the interview. I'd been fiddling with my tie, buttoning and unbuttoning my coat, and glancing nervously at the other interviewees. Some of them were clearly very excited about this farm, while others wore the worried faces of people living a hand-to-mouth existence.

"Good morning, Jake! Glad to see that you're considering working with us. Now tell me, what's your experience with farming?" The interviewer was a bubbly hologram of Monument's mascot, an ear of corn.

"Well, I've been running the Westchester farm just outside of town for the past ten years, and grow mostly rye, wheat, and corn. I have a small herd of GM cattle."

"I've heard a lot about that farm!" Probably just programmed to say that. "Do you have any experience with small livestock?"

Do calves count as "small"? Whatever, I need the job. "Yes." The hologram sits there for a while, probably processing the old farm's information. It's rather awkward sitting alone in a room while an ear of corn stares into space.

"Please report to work tomorrow morning. Here is your check-in card."

The desk the corn was sitting at spits out a small plastic square. I get up and leave. Before stepping into the hovertaxi, I look up at the tower again. I can see some red and yellow fruits amidst the thick greenery. It's still mid-afternoon, so I wander around town for a bit. City Hall, a large, squat building, has various vines and leaves hanging off its roof. An adjacent office building is covered with the small yellow blooms of cucumbers. In fact, most of the buildings in New York have some sort of greenery on them, whether it's on the walls, the windowsills, or in glass pods attached to the building's side. It certainly makes up for the lack of trees. Considering that land is at a premium now, it's a smart choice. Large, sprawling fields like mine are becoming rare.

It seems that staple crops can't be grown in small amounts here in the city. But fruits and vegetables certainly can. With the sheer number of people living on Earth these days, I suspect that other cities are doing this too, making the buildings do double duty as farms. For me, it means that a farmer can live in his element in the city. Even my front door has a little pot of rosemary bolted to it, not to mention the pea vines crawling all over the building.

I open the door and walked into our small apartment. "Landed the job, Marissa!"

"Great! We'll be just fine. Don't steal anything, that'll drive your salary down." Marissa motions towards the card I got. There's a radio chip embedded in the

plastic, presumably to measure my work ethic. My salary will be adjusted accordingly. It'll be a change from being self-employed—a change that will take some getting used to.

That night we have an especially nice dinner. Marissa lets our meal sit on the counter to cool, and steam and the aromas of bacon and pasta waft through the apartment. I pour myself a glass of water and sit down. There's vague rock music coming from next door, but I don't mind. Having loud neighbors is better than being the only house for miles around.

"Honey, could you go open the window? It's getting stuffy in here," Marissa says. I slowly get up and open our small, water-stained window. A warm summer breeze blows in and shakes the curtains. New York shines and roars with traffic. It really is the city that never sleeps. There's always so much happening, you're never by yourself in a huge field with nothing to look forward to but more harvesters.

"Jake! Dinner's cool enough to eat now." I snap out of it and sit down to dinner. It isn't quite the same as food back on the farm, but that's the nice part about the city. I take a forkful of pasta and examine it a bit. The bacon looks a little…redder than one would expect. Once I taste a little, the sauce is so thick that it takes me by surprise.

"Honey, where did you get the ingredients for this?" I ask. Marissa sits down and takes a bite. She chews with a slightly worried expression on her face.

"I just got them at the supermarket down the street. I couldn't find the exact stuff we had on the farm. You can taste the difference!" The broccoli on the side is a dull green, unlike the fresh vegetables we used to have. Nonetheless, I clean my plate, satisfied and yet a little surprised by the meal.

The next morning I find out that the starting salary is rather low, just enough for our rent and food. *Hey, at least you can't get a worse paycheck. And it's not like you really need anything new right now*, I reassure myself, as I squeeze into an elevator filled with new employees. We all put on our sterilized suits and masks and get to work. Our level is flooded with sunlight and whirs gently. I ogle the pipes and tanks that cover the ceiling and probably ensure the tower's structural integrity. The grapevines in this particular level sprawl across a series of metal racks and never need additional watering, due to the hydroponics. As a trade-off, you have to give them bags and bags of nutrients that dissolve away in the tanks. Everything you'd normally find in soil has to be added. The only reason we can't add bugs was because they would drown.

By the time I finish my pile of bags, my hands are coated in a dusty layer of dormant bacteria and vitamins. Slowly, I walk over to a small service robot and ask it if the dust might hurt us.

"Do not worry, trusted employee! All substances used by Monument Foods conform to U.S. Agricultural Safety Code 54869K—" I kick it a little, and it resumes sweeping the floor as if nothing had happened. Lacking the patience to deal with artificial stupidity, I dust my hands off a bit and get back to work.

At the end of the day, all the harvested food is washed, weighed, and packaged by robots and loaded into trucks. I watch them drive off into the chaos of New York City, presumably to the markets. It hits me just how much food we had produced in a single day. Farming, the kind I used to do, was going out of style. It began with GM crops like on my farm outside the walls, and with hydroponics. Now they've ditched the concept of a farm entirely, and instead they grow crops in towers, walls, all over buildings. The huge glass tower has little friends.

The first thing I do when I get home is scrub my hands until they turn red. Despite my vigorous washing, it still feels like there is something under my fingernails.

We work on a new level every day, cycling through four different floors. Unfortunately, it's chicken day, and I have zero experience with anything except for beef. There must be hundreds of hens and roosters in the room, all kept in two huge cages filled with wooden platforms and ramps to keep them busy and lean. The birds go to the back of the cage, lay their eggs in the nests there, and then the eggs roll down the tube into a collection chamber. And of course, the birds are all engineered to lay eggs three times a day and are smart enough to keep their waste in a special box for the sake of hygiene. Regardless, the cramped, dusty cages are littered with feathers, dirt, and what appear to be two severed toes. I don't look long enough to tell for sure. The smell of chicken dung is choking, even under the cleansuit's mask.

I wonder why we even bother caring for the crops and animals; they're all bred to be incredibly hardy, and the individual layers on this building slowly turn to catch the sun's light. We don't do hard work, like you would on the farm; we just take measurements and flag stuff for harvest. A couple of hours later, robots armed with boxes and claws zoom in and harvest things. Now I understand the reason for our exceedingly low salaries. Machines and genetic engineering do more than any human can do. No wonder the city dwellers are so relaxed: the robots will always take care of them.

Dear science, take a break for ONE YEAR so we don't all lose our jobs. I pour a bag of soybeans into the food dispenser. The moment that one hen sees me with the food, the entire flock gathers near me, clucking madly. A hen with a chipped beak and spotted feathers tugs at my pant leg, like how the beef pull on your

sleeve. The birds are packed together so tightly that I can barely see the floor. They trip over one another in the mad rush for food, stumbling and falling. At least the beef on my farm had a clean, open barn to mill around in.

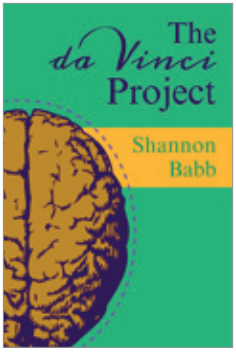
We finish early, since there are five workers and only two food tanks. I go upstairs for some sunlight and fresh air. The elevator doors open and give me a lovely view of New York, especially compared to the dusty, feathered air of the chicken level. People are still infatuated with this tower, and Monument Foods knows it. No wonder they're hiding the dark, solid floors among the streets and apartments, and letting the image of a crystalline spike piercing the sky show up on postcards.

The New York skyline is only more stunning against the pale concrete of the walls. I lean against a pipe and examine the street. Hovercars line up along the roads like ants, and helicopters buzz constantly through the air. Some of them carry packages, like bees dusted with pollen. My eyes follow a government helicopter's swooping circles to its landing place.

New York resembles a vast ruined city covered with vines and greenery, not the glimmering metropolis it is at night. I look upwards into the layers upon layers of pipes and plants. This glass tower is a gilded cage, but it's something I can escape. Peering towards the horizon, I imagine my little white farmhouse out there, waiting for me.

The da Vinci Project

Shannon Babb



Mapping the human brain led to the greatest medical achievements known to humankind. Within a decade of the project's completion, researchers had discovered cures for epilepsy, Parkinson's, Huntington's, and Alzheimer's. Not long after, scientists discovered ways to use cultured brain cells to repair brain injuries caused by tumors, lack of oxygen, and blunt force trauma. And when neurologists began dissecting the mystery of autism, they discovered the key to human learning.

Once the learning and knowledge processing centers of the brain were accurately mapped and understood, it was only a matter of time before the cures for various learning disabilities were discovered. Dyscalculia was solved in 2064. Within ten years, the cure for Auditory Processing Disorder was cracked. Attention Deficient Disorder and Dyslexia Complex Disorders took a bit longer, but were finally unraveled.

Soon infants worldwide were diagnosed and treated at birth for a host of learning disabilities, leading to a dramatic rise in test scores. Students across the planet not only excelled in school but thrived doing it. Special Education and remedial classes quickly became a sad piece of history from the dark ages of children's education. With all children sharing similar thinking styles, it was faster and easier to educate a classroom. Soon students were so effectively taught that it was common to have an entire graduating class receive perfect SAT scores, which eventually led to the exam being discontinued. By 2125, it was

normal to have nearly one hundred percent of students worldwide successfully pass their pre-collegiate exams and graduate from college with a bachelor's degree by the age of twenty.

Humankind had been freed from the burdens of ignorance and illiteracy. The species had reached the pinnacle of intellectual achievement. But not long after, innovation began to stagnate. At first, people weren't worried. In fact, few even noticed. After all, not every generation makes discoveries that change the course of history. Perhaps the world was simply going through another innovation dry spell.

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That was almost two hundred and fifty years ago, and society is still trapped in a technological and cultural standstill. Our species had made love and fought wars. It had delved into the genes of long-dead species and flown among the stars, but we hadn't made any major scientific discoveries since the end of the twenty-first century. And not only that: humans seemed to be losing their ability to create great music, literature, art, and dance. In short, the defining features of civilization were being lost.

This was the world I was born into. In school I remember being told that we already knew everything there was to know about the universe. In textbooks I was informed that there was nothing left to explore. At museums I was taught that there was nothing left to create. The overwhelming opinion was that our species had managed to bypass evolution by using science to engineer a perfect, flawless, linear brain.

The problem was—unlike many of my fellow students—my brain structure had developed on one of the tails of the bell curve. I refused to accept my teacher's explanation that all aspects of human creativity and innovation had been fully explored as a valid reason for why the most recent artist we discussed in class had been dead for over two hundred years. I was only in fourth grade, but my questions had been concerning enough that the school insisted my parents take me to a clinic for testing. After hours of scans and tests, I was diagnosed with Borderline Hyperactive Curiosity Disorder.

I wasn't allowed in the room when the doctor explained the treatment options to my parents, but that didn't stop me from listening in. The office door was metal, so I pressed my ear against it to hear the slightly muffled voices inside. I learned two things. First, while Hyperactive Curiosity was a brain condition of concern, it was possible to outgrow. Secondly, if I continued to show symptoms, a more drastic method of correcting my brain would be taken.

I may have been only nine years old, but I had seen other students who required medical attention to correct a flaw that their early genetic and neurological testing had missed. They would leave the classroom a happy, smiling kid and return a completely different person. I didn't want to become one of those sober-eyed children at the back of the classroom. I knew that if I was forced to undergo brain surgery or take the fancy pills I would be changed forever.

Over time, I was able to adapt. On the outside I was able to become the quiet, well-behaved student that the school system desired. I admit that sometimes it was painful for me to hold in the questions that I wanted so badly to ask. My façade was almost shattered in eighth grade. That year every student was required to select a hero whose footsteps they would like to follow in. I selected the meteorologist Alfred Wegener, who had successfully predicted

plate tectonics. Unfortunately, he became the laughing stock of the scientific community because he wasn't able to present a mechanism for his theory.

Given my diagnosis, my teacher viewed my selection of Wegener as an act of rebellion. I was dragged into the principal's office and asked to explain my choice. I lied. I didn't like it, but it was the only way I could save myself. I told them I loved his polar research. When they asked why I hadn't chosen a more famous polar explorer, I had to shyly counter that Wegener had been the first person to drill ice cores in the Arctic to understand climate change.

I was forced to live with my choice of Alfred Wegener through high school. I had to act excited when my teachers gave me climate models to calculate as a math assignment or when they dug out an obscure journal of a long dead polar explorer for me to do a book report on. I quickly grew to hate the Gulf Stream and started having a strong desire to move to the tropics. Finally my teachers began to relax because my endless curiosity had been focused in a government-sanctioned direction. So when I made a comment that I was struggling to understand the context of some of the journals I was assigned to read, they allowed me access to a treasure trove of historical documents, and I was in heaven.

With my newly instated clearance, I began reading any historical text I could get my hands on. Through them I experienced a world I could never have imagined. I learned about the plagues that spread across Europe before the invention of antibiotics and about how explorers searched virgin rainforests for new pharmaceuticals. A world filled with wilderness and free of urban sprawl. A place where polar bears prowled across dynamic ice sheets, gorillas played in the mountains of Africa, and passenger pigeons flew in flocks so dense they darkened the sky for miles. But most of all, I learned about the Changing Baseline Phenomenon.

The concept of baselines fascinated me because it explained so much about humanity's current situation. Basically, when innovation had first declined, people argued that it was just natural variability. When things continued to decline, the world's greatest minds gathered together to find a solution. Despite the numerous scientific conferences that governments organized worldwide, people kept coming up with the same conclusion: modern neuroscience should have removed all barriers to innovation that previous generations had experienced.

As a result, people believed that the reason innovation hadn't occurred was because there was nothing left to discover. Soon a world without exploration, without new discoveries, became the norm. We had become the frog who had jumped into a pot of cold water and had been too stupid to notice as things had gradually been turned up to a boil.

Now that I finally understood humans were never meant to be a stagnant species, I knew I had to do something about it. I had to find the key. The problem was, I knew I would never be allowed to study genetics or become a neurologist. It didn't matter that my grades often placed me at the top of my class; my views in school had been too radical. Luckily, I found another way. Instead of using neurology to understand how people thought, I decided to study a far more ancient science that relied upon behavioral observation.

When I was called into the school counselor's office to tell him about the program I had decided to apply to, I informed him that I was going to become a Cognitive Anthropologist. Of course I was told I was completely crazy. Next thing I knew I was sitting in the principal's office being lectured about how foolhardy my decision was to go into a scientific field that had been dead for over a century. I listened politely, but I had made up my mind and no one was going to change it.

Finally, once the school nurse had determined my choice hadn't been made due to a brain defect, they allowed me to sign up.

The first day I started college, I couldn't help but wonder if I had made a mistake. I was the only person on earth studying Cognitive Anthropology, and there weren't any live classes for me to attend, so a university official put me on an access interface at the school's data center. I was informed that classes on this subject hadn't been taught much after the end of the Brain Mapping Project, so the lectures would probably be fairly dated. They also told me that if I ever wanted to change majors to something more practical and respectable, I was welcome to make an appointment with one of the university's counseling staff.

I remember the first day when I clicked on my interface and saw a two-dimensional image pop up on the screen. The man was dressed in clothes from the mid-twenty-first century, with unkempt hair and a grumpy expression. To be honest, he was a terrible teacher. He constantly lectured to the e-board and ignored students' questions. Still, I instantly loved him because he was talking about thought, emotion, and personality without relying on the schematics of the brain.

By the end of the week I knew I was exactly where I needed to be. Even though it was sometimes boring, I kept at it. Every day I would spend my mornings watching lectures of long-dead professors. Then I would spend my afternoon reading, hanging out with friends, or working at my part-time job in the university archives. In the evening I finished the assignments that would be graded that night by computer. I was so enthralled by my studies that I was able to graduate a full two years ahead of my peers.

Unfortunately, attending graduate school proved to be a far bigger challenge. Unlike bachelor's programs, master's, doctoral, and post-doctoral programs aren't sponsored by the state. As a result they are very, very expensive. Usually the only way a student could possibly earn these higher degrees was to be hired by a company willing to sponsor them so they could continue their studies, or if a university decided to train them to become a professor. Due to my odd choice of major, neither of these options was viable. It seemed like my goal to become the scientist who unlocked the human ability to innovate was doomed.

As a university graduate, I was suddenly thrown into a world that I wasn't prepared for. I tried applying for various jobs, only to be rejected for everything. I was ready to resign myself to the fact that I might be stuck harvesting crops too delicate for robotic pickers somewhere in the Midwest when an opportunity to intern at the International Alexandria Archives popped up on my interface screen. I immediately applied and—to my surprise—was accepted.

I did well as an intern and was hired on as a junior archivist at the end of the program. To be honest, I kind of hated being an archivist. My days were spent running back and forth helping patrons access various documents and being yelled at when their interfaces acted up. Still, I couldn't complain. My job paid enough to make ends meet, and I was given unlimited access to the Archives' vast library to satisfy my desire to understand the past.

It wasn't until I started reading the original notebooks of Leonardo da Vinci on one of my lunch breaks that I finally made progress in my quest to understand human innovation. While painstakingly examining digital copies of his original documents, I realized that the information in them was organized haphazardly, unlike the neatly categorized version I had read about in my art classes. The actual document never seemed to stay on any one topic for long. At the top of

a page he might start by discussing anatomy or military equipment and end with a discussion of color theory. I'd been taught that da Vinci was obsessed with keeping his research secret, but this seemed excessive. Then the answer crystallized. The reason that these texts didn't always make sense wasn't because of a difference in cultural experience. It was because the author thought in a completely different way than I could imagine. Perhaps this different way of thinking could explain our loss of innovation.

The moment this insight hit me, I knew my hypothesis was radical and that the notebooks of a single individual weren't going to change people's minds. I needed more examples, more proof. To gather the needed support, I began going to the Archives an hour or so early each day to pull old journals, then stayed late into the night to read them. I was determined not to make the same mistakes that Wegener had. I wouldn't try to publish or even speak about my ideas until I fully understood the mechanisms which linked the historic Brain Mapping Project with the world's loss of innovation.

Unfortunately, spending my spare time in a library eventually took a toll on my stamina. One evening I was reading a particularly interesting series of notebooks written by a man called Thomas Edison, a man who had been able to invent thousands of new things while struggling with an inability to learn and also with damaged ears.

I stayed so late reading through Thomas Edison's writings that I fell asleep at my desk. I awoke to find my boss standing over me looking rather annoyed. At first she yelled at me. But then she noticed the book I'd been studying, and she asked to see what I was working on. I gave her my data disk. Honestly, I didn't want to, because it contained everything I had worked on so far, but I couldn't exactly tell her no.

It turned out to be a blessing. That afternoon she swung by my interface and commented that my overactive curiosity may be good for something. The data set that I had managed to develop was incredibly novel, and she had arranged for me to attend a conference on the Translation of Historical Texts. When she asked what I wanted to call my presentation, I paused, then answered *The da Vinci Project*. She gave me a strange look, but tapped it into the forms.

At my first conference I was considered an oddity, but I made sure my research was sound, and not many people found holes to poke in it. By my fourth conference, people were genuinely interested in hearing about some of the strange ways our ancestors thought. Following each lecture, I would smile and nod when people mentioned they were impressed with the ability of scientists from previous eras to overcome severe brain disabilities such as dyslexia or autism. After spending so much time with the data, I was beginning to think these disabilities might actually be related to the ability of these individuals to innovate.

I spent the next sixteen years fighting to fund the project, until eventually a fringe company that was interested in creating interactive holograms of famous people gave me a chance. With the grant funding, I was able to hire a group of researchers to work with me. After building simulated brains in our computers, we ran hundreds of simulations and were able to find the scientific proof that I had longed for my entire life.

Now it's time to share the findings. Today I will make an announcement on behalf of my research team about the key that unlocks the potential of the human mind, a solution which could lead to the discovery of so many more answers. Unfortunately, if the message is rejected, this announcement will destroy my scientific career forever. Part of me wants to run, but I know I have

gone too far to back out. My entire life has been leading up to this moment. I step to the microphone and take a deep breath.

"Ladies and gentlemen, citizens of the world, thank you for your attendance. Today's announcement marks the culmination of over three decades of research. The da Vinci Group has found the neurological key to innovation. It turns out the intellectual gifts we have been seeking are actually the cognitive curses our ancestors sought to destroy…"

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