A LOW-ENERGY NUCLEAR REACTION

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Richard Barnett's three colleagues in chemistry were all busy. One was on sabbatical. Another was up for tenure and needed to finish his current research and get published. And the senior member of the department who had just announced his retirement was such a goofball that nobody trusted him with anything. So, it made complete sense for a physicist to head the search committee that hired Jane Delgado for the opening in chemistry. Jane was something of a catch for CNW. Though she lived her entire life in the States, the daughter of a famous Mexican writer checked off a couple of significant diversity boxes – a woman and a Hispanic. But Jane was far from an affirmative action hire. The young chemist had gone immediately from graduate school at Cal Tech to a tenure-track position at the University of California, Irvine. But much to her surprise, she learned that, as was clearly stated in her application letter, the constant push to publish and secure grants was far from what had initially drawn her to chemistry and the academic profession in the first place. Jane discovered that she wanted to be a wife, a mother, and a teacher. So much to the dismay of her mentors at Cal Tech, she began a quest for a position at a so-called teaching institution, and she and Northwest were something of a perfect match.

Jane had been attending meetings of the Eastern Chemical Society in Boston, and the earliest she could get into Portland was nine-thirty. Richard agreed to meet her at the airport and drive her to Salem, where they had booked her a room. She had already Googled the entire search committee, so she spotted him as soon as she had picked up her baggage. "Professor Barnett, I'm Jane Delgado. Sorry, it's so late."

"Ah, Jane, nice to meet you," Richard extended his hand. "I hope the first name is okay. You're going to discover that everybody is on a first-name basis at Northwest. Even the goddamn President is Colin. And I'm Richard or Rich, or before it became so unpopular, Dick."

"Well, it's nice to meet you, Rich," Jane smiled at the slightly off-color joke and shook his hand. "I prefer first names."

"It'll take us about forty-five minutes to get to Salem," Richard said as he grabbed her bag, "but almost everything decent will be closed by then. If you'd like something to eat or drink, we should do it here."

"It's so late. It doesn't have to be elaborate," Jane looked embarrassed. "But I'm famished. I can't eat before I fly, and I sure as heck can't eat on the damn plane. Flying kind of freaks me out, you know?"

Richard offered a genuinely friendly smile. “I usually sleep like a baby when I fly. My only worry is snoring too loud. I have just the place in mind. Do you mind starting your day of non-stop interviews with even less sleep?”

“That would be great,” she returned the smile. “I doubt I’ll get much sleep anyway. Interviewing kind of freaks me out, too.”

“I hear you on that one,” Richard conceded. “I sometimes think I’m still here at College of the Northwest because I dread the whole job search process so much. Not that I have anything against CNW, you understand? It’s been pretty good to me. How’s this for a deal? We’ll go to Cassidy’s, where you can get a great late dinner. Tomorrow, you will run the gauntlet. Meet, talk, and answer questions from everybody from the students, to the dean and just about every other administrator they can round up, to say nothing of the search committee and your future colleagues. Tonight you can interview me. I’ll have a couple of scotches, enough so I’ll be completely candid but not too much to get you safely to your hotel.”

“That would be lovely,” Jane could feel the tension from the day of flying, and her apprehension about the interview tomorrow start to dissipate.

They drove silently for fifteen minutes to downtown Portland and found a parking place directly in front of the restaurant. “You must be good luck,” Richard bantered, “you never can find a place to park around here. We can eat in the dining room just over there or here in the bar.”

“Let’s just stay here,” Jane responded. “How about that nice little table by the window?”

Before he could answer, a middle-aged woman came from behind the bar, “Professor Barnett, how nice to see you. It’s been a while.”

“Great to see you, too, Ronnie. It has been a while. Can we take that table there?” he gestured to the table Jane had identified.

“Take any you’d like,” Ronnie answered. “I know you’d like a Black Label. What can I bring the lady?”

“A glass of chardonnay would be perfect,” Jane responded as she took her seat.

“I’d hate you to think that every bartender in Portland knows my name and what I’ll order,” Richard was visibly embarrassed. “For many years, my wife and I had season tickets at Artist Reparatory Theater, just around the corner there. We always came here for a late dinner after the play.”

“I think it’s nice,” Jane responded honestly. “For a big city, Portland already strikes me as friendly.”

Although he had promised not to be the interviewer, only the interviewee, Richard couldn’t help himself. “We don’t usually get candidates with your credentials. Two of your recommendation letters said they thought

you would certainly get tenure. Most of my colleagues can only dream about being tenured at the University of California, not trying to escape it."

Jane smiled, "I wasn't trying to escape Irvine. I quite like the place. I just came to realize who I was. I just turned thirty and couldn't see myself in a no-nonsense research position for the rest of my career. I love classroom teaching, though I don't get to do nearly enough of it. And to be completely honest with you, I want to have a family."

"That makes sense to me," Richard conceded. "There's much to be said for a career at a place like Northwest. You already probably have enough publications to earn tenure. And I can promise you that you'll get more than ample opportunity to teach. You do realize that our students aren't quite up to the standards of UCI? Though between you and me, the science majors outshine the rest of the student body."

Ronnie arrived with their drinks and took Jane's order. "I've thought about all this a lot. Before I got the research fellowship in my first year of graduate school, I was a teaching assistant for Intro to Chemistry. It was a general education course for non-majors. I loved turning on the English and History majors to the thrill of science. I've read a bit about your student demographics. I realize they won't have the same SAT scores, particularly in math. But I assume they're still smart kids who want to learn."

"Yes and no, Jane," Richard looked very serious. "I want you to listen carefully to what I'm going to say. Yes, we have plenty of the kind of students you just described. The science majors, but also the humanities types. Even the Education and Business majors. But CNW also has way too many students who could never have gotten into the University of Kansas. That's where you did your undergraduate studies, right?"

Jane simply nodded and gave the floor back to Richard.

"And certainly not Cal Tech or UCI. Most of them are good kids and not necessarily dumb either, though some of my colleagues can be tough on them. I have a friend who calls them mouth breathers. They're just not very well prepared for college and maybe still a little lost about why they're here in the first place. They'll be in your classes, a lot of the classes you'll have to teach. Are you ready for that?"

"I think I am, yes," Jane's tone was conversational but also deadly serious. "I'm going to brag a little. I'm a damn good teacher. I've known I wanted to be a teacher since I was a little girl. In grade school, I wanted to be a grade school teacher. In high school, I wanted to be a high school math teacher. As an undergraduate, I had no clue what I wanted to be, of course. But by the time I was applying to graduate school, I already knew I wanted to be a college teacher. I love research. Well, I love being in the lab and trying to discover something.

What led me towards this career was teaching, not grants or publications. I can handle your mouth breathers. I'll bring a lot of them out and even recruit a few as chemistry majors."

"My word," Richard was genuinely impressed. "Professor Delgado, I'll tell you something. You find a way to give that little speech tomorrow, and I can almost guarantee you you'll have a job offer. But I'm not living up to my promise. I said tonight, you could ask me the questions."

"You did," Jane replied. "And my big question concerns what we were just talking about. You're going to think I want it all, which I guess I do. I do want to stay active with my research. Is that realistic at College of the Northwest?"

Richard gave that some serious thought. "Yes, of course. The powers that be will be thrilled if you publish a lot of papers with the college's name on them. But there are going to be compromises you'll have to make. I'm sure you know this, but there are two huge impediments to serious scientific research at CNW or any place like it. You'll get a lab, but it'll be modest. And if you want to know the truth, its real point will be more to allow you to introduce your students to lab work than for conducting your own research. So you'll probably have to reach out to the University of Oregon or Oregon State and find a collaborator if you want access to a real research lab. Or maybe to industry. Some of my colleagues have gone that route. But the bigger problem will be time. They expect you to teach a couple of courses every term and a couple of labs. It's damn hard to maintain much of a year-round research agenda with that kind of workload. I'm sorry if this is news to you, but it's the truth."

"Thanks," Jane offered with genuine sincerity. "That doesn't surprise me, but it is kind of sobering. As long as that door's open, I guess it's my problem if my research goes nowhere. May I ask you something?"

Richard nodded, "I already told you. Tonight's your chance to ask all the questions."

"You've stayed active in your field," Jane began. "How did you manage it?"

"Well," Richard appreciated that she knew a little about his work, "here's my three secrets. First, I never allow myself to get caught up in that sandbox politics called self-governance. The only committees I ever agree to serve on are search committees, like yours, or ones that have half a chance of making me more money. Secondly, be a theoretician, not an experimentalist. All I need to keep my research going is a tablet and a sharp pencil. I don't even need to go to the library anymore. All the articles are available online. But the most important trick is to be flexible. When I was applying to grad school, I wasn't sure if it would be mathematics or physics. But the University of Virginia offered me the best deal in physics. So, I became a physicist. When I

was thinking about my dissertation, I couldn't decide between theoretical research, or experimental. But Don James got this great grant and offered me a chance to work with him, so I became an experimentalist. And finally, after I finished my post-doc and went looking for a full-time gig, my best offer was here at CNW. However, one look at the college, and I knew I'd never have the lab or grants to continue as an experimentalist. But it was still the best offer, so I just switched. Quit being an experimentalist and went back to being a theoretician."

"Wow," Jane was more than a little impressed, "you make it sound so simple."

"Nothing about it was simple," Richard continued. "I anguished about every one of those decisions. There was a lot of hard work involved as well. But, if you want to know the truth, there was also a hell of a lot of good luck. I can see now that I would never have amounted to much as a mathematician. And, Christ, I couldn't have gotten luckier with the grant and the post-doc. And how many people get to get up every Monday morning and truly look forward to going to work?"

The next day Jane did have the opportunity to make her little declaration about always wanting to be a teacher. And just as Richard had predicted, she had an attractive job offer before leaving Oregon. And so began a fruitful professional relationship based on mutual respect and shared affection.

# # #

Richard had an aversion to faculty parties. It didn't matter how a conversation began. It always came back to campus politics and usually the predictable academic class war. His colleagues were the virtuous soldiers for truth and enlightenment, and the goddamn administration was the penny-pinching enemy. Perhaps because he had briefly entertained a career switch to administration, Richard simply could not see things in those stark terms. If he were honest, he would have said that many of the colleagues he most admired at Northwest had been administrators.

But what the hell? For god's sake, it was New Year's Eve, and Wendy Boyd's party was a tradition in the Division of Science and Mathematics. Richard's wife, Martha, hated parties with his colleagues even more than he did. But she had been insistent. "Dick, listen to me. We have to go. It would be more than rude not to show up." And so they did.

Maybe it would be a good idea to get out. It sure as heck wasn't going to be a lovely evening at home. Richard and Martha were involved in a low-level fight for most of the holiday break. If you had asked either of them what it was all about, neither could have said. Richard didn't handle breaks that well. Most

of his colleagues saw the academic calendar as one of the most significant perks of the career. Two to three weeks at Christmas, another for spring break, to say nothing of the three months during the summer. Richard was a workaholic and a little OCD. He recognized that. The structure that academic life offered was his salvation. Set times for classes, set times for labs, and set times for his research. He survived the summer by creating an artificial regime. The mornings were for reading the literature. And the afternoons were devoted to doing the calculations and writing up his thoughts. And there was the travel. He and Martha shared little these days in what had once been a happy enough marriage. Sex hardly played any role any longer. And the simple, friendly affection between them that Richard could only dimly remember had ended years ago. What they did share, however, was a love of travel. So there was always a month-long trip somewhere. But winter break was always the hardest. Martha relished the shopping, decorating, and socializing that the season demanded. Richard simply endured as he would tonight.

Jane wasn't that big a fan of parties either. She liked most of her colleagues just fine and had no problem with the faculty gossip and campus politics. She was just naturally shy. Lurking on the sidelines, quietly nursing her glass of chardonnay, and observing more than participating was more her style. Her relatively new husband, Kyle Achenstein, was home in bed sick. So Jane had planned to merely make an appearance at Wendy's party and then plead the nursing duties of a good wife.

Richard noticed Jane from the moment she entered the door. "I'm sorry to hear that Kyle's not feeling too well," he began. "But it's nice to see you. Happy … no, wait. Let me get you a glass of wine. We can toast the season properly."

"Thanks," Jane smiled, "that would be great."

"You're a chardonnay lady, as I remember." Richard wasn't precisely flirting, but it was in the neighborhood. And he hustled off to retrieve the wine. Returning in just a minute or so, he handed Jane the glass, raised his tumbler of scotch, and, in his most formal voice, began. "Happy New Year! I hope it's a great one for you and Kyle."

"Thank you so much," Jane returned the toast. "Happy New Year to you." She already knew enough not to mention Martha in her response. "I think this may be a wonderful year for all of us. You know Kyle's up for tenure at the end of the year, right? He's feeling pretty good about it."

"As he should," Richard nodded. "From what I hear, he's a sure thing. His colleagues in English all like him, and he's got some publications and great teaching evaluations. CNW would be nuts to lose him. And, god forbid, to lose you as part of the bargain. You'll be surprised at how much tenure will change

things. The security is great. And a little more money doesn't hurt, either. But you'll be able to feel Northwest start to get its claws in you. You'll get tenure too, I take that as a given, and then the place will have the both of you until you die."

"But that was sort of our plan all along," Jane gave him a quizzical look. "We don't want to leave. We're both thrilled with what we've got. We'll raise a family, grow old and fat, and probably never leave Sweet Home."

"Then I am sincerely happy for you," Richard meant it but couldn't help himself from adding an addendum. "But you know what they say. Be careful of what you wish for."

The wine was relaxing, Jane. "Oh, I almost forgot, and congratulations to you. I saw in the newsletter you have another publication," she said, raising her glass again in a second toast.

"Thanks," Richard did appreciate the recognition. "But it's kind of chicken feed if you want to know the truth. There are so many young theoreticians out there needing to publish to get tenure or keep their grants. And some of the work is kind of sloppy. You'd think peer review would catch it. But not always, of that, you now stand assured. I just kind of troll around the literature and look for interesting things. I then redo the argument and the calculations. Sometimes, I have something to add, but often, I simply point out the errors. This latest one was in a respectable journal, but they didn't catch it. The guy had made a simple mathematical goof, and when you corrected for it, the whole theoretical structure just fell apart. They had no choice but to publish my commentary since they had published the original cluster fuck in the first place."

Jane chuckled a bit. "Do you miss being a hotshot experimentalist? I heard you came close to the big leagues with your post-doc."

"I don't miss the experimental side of physics in the slightest," Richard replied. "I should have written a theory dissertation in the first place. I have great respect for experimentalists. Physics wouldn't be a science if we couldn't empirically confirm the great ideas. But what I love is coming up with those ideas, not testing someone else's. What I do miss, however, is having a vision to chase. The thrill of my post-doc was pursuing something huge, you know? Like saving the planet."

"Yes, well, that would count," Jane conceded. "Okay, my turn to be the bartender. I want a refill. Can I get you another scotch? Then I'd like to hear about those cold fusion days."

"Are you kidding?" Richard reflected. "A chance to drink more of Wendy's excellent single malt and relive my glory days with a lovely colleague." He was now definitely flirting, but innocently, he hoped. "Think Bruce

Springsteen would have liked the lyrics? 'All I kept thinking about was cold fusion days.'"

"Uh, sorry, Rich," Jane actually laughed, "you better stick to science. There are too many syllables in that line. I'll be right back."

Refills in hand, they went out on Wendy's spacious patio. It was a very mild midwinter evening for this part of Oregon, but the only others outside were the handful of smokers. Finding a couple of lawn chairs, they began a conversation that would alter both of their lives.

"You're too young," Richard began, "to have lived through the heady days of the cold fusion extravaganza. How much do you know about that original work?"

"More than you might think," Jane retorted. "Don't forget that both Pons and Fleischmann were both chemists by training. We reconstructed the original experimental setup in one of my graduate seminars. Our professor had a good time making fun of how absurd the whole idea was."

Richard smiled knowingly. "Yes, there was plenty of making fun back in the 80s as well. But there was also some genuine excitement. Partly, the results were so intriguing. But everyone also saw the implications. Christ, if we had a safe, inexpensive way of generating energy, it would have been irresponsible not to explore the theory fully. Can you imagine the economic consequences, to say nothing, of the environmental? And there were some true believers. Melvin Epstein, at Chicago, was one. He's the one who hired me for my post-doc. Mel was convinced that the transition from hydrogen to helium should be approached as a problem in fundamental physics and not an interesting result in electrochemistry. He put together quite a team. A few theoreticians and a slew of us young experimentalists. He even allowed a couple of chemists to join us. You'll be happy to know."

Jane found herself both amused and a bit offended by the joke. "But the whole thing was a flop, right?"

"Pretty much, yeah," Richard smiled woefully. "We never figured out if the problem was with the basic theory or a lack of experimental ingenuity. Since I was an experimentalist back then, I preferred the latter diagnosis. But you know, I've always suspected it was theoretical. And that we were just missing something."

"I was just beginning to think about my dissertation when I was in that seminar," Jane took the floor. "I remember joking with one of my graduate buddies. The problem with this whole cold fusion protocol is that it's not cold enough."

Richard's interest brightened. "Oh, we thought of that. The problem was that maintaining those temperatures during the whole process would have cost

us way more energy than we had any hope of generating when all was said and done."

It was Jane's turn to smile knowingly. "Well, you know, the chemistry of ultracold atoms has come a long way since the 1980s. You can't believe the weird things they do at those extreme temperatures. And there've been great strides in evaporative cooling, as well. You might be surprised at how efficiently we can now generate ultracold conditions."

And so many more glasses of wine and scotch were consumed, and 2010 mutated into 2011. By the end of the party, a fruitful joint research project had commenced.

# # #

It was hard for Jane to imagine how things had changed in just a few years. She was now the mother of two beautiful children, married, and a newly tenured associate professor. At the beginning of the fall term, her colleagues elected her the first woman Chair of the Division of Science and Mathematics. Richard urged her to decline since their joint research was starting to take off. "Christ, Janie," he implored, "we just got another article published. We need to think about the sabbaticals and where we're going. And we've got to get going with some real empirical testing. You'll get caught up in the day-to-day campus bullshit."

But it was to no avail. "Look, Rich, I know you hate the administrative hassles. But this is part of why I came Northwest in the first place. I want to live the whole academic life. I was honored when they asked me to be the chair. And unlike you, I don't see it as all bullshit. There are times when a good chair or a strong committee can make a tangible difference. I promise you that I won't let you down. Our work together is my first priority, just not my only priority."

Looking back on it, Richard and Jane would have to admit they had been naïve and more than a little lucky. In the almost six years since Wendy's party, they had become internationally known research scientists. It had begun with a relatively short theoretical article outlining their proposed method of achieving a low-energy nuclear reaction published in *Physical Review C*. Instead of being victims of academic theft from prestigious research laboratories, they received encouraging and sometimes constructive advice from colleagues worldwide. Some of these connections led to offers to submit further articles to even more prestigious journals and finally to their invitation to a joint, yearlong fellowship at the Princeton Plasma Physics Laboratory.

The first month in Princeton had been an amalgam of excitement, panic, and exhaustion. Jane and Kyle had to find housing for themselves and the family. Kyle was not eligible for a sabbatical but had been granted a year's leave

of absence and secured a one-year teaching position at nearby Mercer County Community College. That meant they had to begin completely new professional responsibilities and share childcare duties for a four-year-old and a three-year-old. Luckily, a colleague at the lab told them about a recently widowed neighbor who was interested in becoming a nanny. Richard's transition had been predictably easier. He had no children, and Martha had no interest whatsoever in packing up and moving across the country for eight months. She was content to keep her comfortable house in Oregon and let Richard make do in faculty housing on the Princeton campus.

The first months in the lab had been promising indeed. Within the first four weeks, they succeeded in recreating their modest setup from Oregon and got even more robust results. However, they devoted the majority of their time to trying to realize their inspiration for producing the ultracold conditions necessary for sustaining low-energy nuclear reactions. The project was a microcosm of everything that made their collaboration such a success. Jane, of course, brought her background in evaporative cooling, and Richard proposed the genuinely original idea of using electromagnetic fields to mimic the zero-gravity conditions that seemed to be required. They each made practical innovations that turned their invention from a promising theoretical concept to an operating laboratory machine. Although Jane had no formal training in electrical engineering, she saw how using a widely available semiconductor laser platform rather than the original photonic crystal lasers in their prototype would save them untold costs and produce greater efficiency. And Richard envisioned a design structure that reduced the size of their invention from that of a small SUV to something no bigger than a microwave. When all was said and done, the "zero-gravity, semiconductor laser, evaporative cooler" was their paramount success. And the patent they secured was the single most crucial part of their sabbaticals. The irony, of course, was that the device had dozens of commercial applications that had nothing to do with their cold fusion experiments. So, they seemed destined for wealth and fame regardless of how things turned out in Princeton.

The wheels started to come off in early October. With the switch to the zero-grav cooler, the results were uniformly disappointing. It made no sense. How could simply changing the size and power of the electrolysis setup so drastically affect the efficiency coefficient? Richard took the setback particularly hard. He spent hours redoing his original calculations and then converting them to the newly scaled conditions required for industrial applications. When it finally hit him, neither laughing nor crying seemed appropriate. He called Jane in the lab and asked her to meet him for an early lunch.

Jane arrived at Henry's Pub first and ordered a Cobb salad and iced tea. Richard showed up shortly after and simply ordered coffee. "We're still getting wacky beta reads," Jane began.

"To be expected," he responded with a tone that sounded a bit like defeat. "We're so fucked. And it's all because of a goddamn printer's error. Remember the first draft of the *Physics C* article? I went back and looked at the typescript of what we submitted. Our original beta coefficient formula used a value of .006 amps per microwatt. Everything we got back from them, the proofs, the online pre-prints, and the final hard copy changed that to .06 amps per microwatt."

Jane saw the magnitude of the error immediately. "How could we have missed it? It was our calculation, well yours, Rich, in the first place. But I redid all the math right there at your side, so I'll take equal responsibility. Why were we so blind? Everything now, the article itself, all our subsequent work, the grant application, it all looks like fraud."

"Yeah, I know," he agreed. "I think we were guilty of seeing more with our hearts than our heads. Well, and believing our own press. There it was in black and white, in a pretty good journal, the beta coefficient was .06. No wonder our results were so great. An order-of-magnitude change in energy input pretty much guarantees a huge increase in energy output. Fuck!"

"So," Jane asked the obvious question, "what do you think we should do?"

"I don't know," he responded. "I want to redo all the calculations from the get-go. And I also want some time just to think. Can you get away after dinner? Join me while I get thoroughly plastered?"

Jane, an instinctive fixer-upper, just smiled. "I don't think Kyle will have a problem looking after the kids for a few hours. I'll tell him we've got an emergency with our experiment. God knows that's the truth."

By the time they reassembled at Richard's apartment a little after eight, he was in a much better mood. "It's not as terrible as I thought. Our original calculations still pencil out. But we've got a lot of work to do to make this sucker efficient enough for industrial applications. I don't mind the work or the additional time, but I do wonder how much we'll get accomplished here on the East Coast." And with that, he cracked the virgin bottle of Johnny Walker Black. "You know me, always scotch. I've got some white wine in the fridge. Care for a glass?"

"Yes, please," Jane nodded gratefully. "I guess that is good news. Though it still feels like today was a disaster."

"Sure," Richard concurred, "a huge disappointment. In about a dozen different ways."

"What in god's name are we going to do about all those earlier publications?" Jane cut right to the chase.

"We're going to notify every one of those journals and NSF, too." There was conviction in Richard's voice. "Just as soon as we can. Then it's sort of their problem what to do from there."

"I'm sure that's right," Jane didn't sound convinced entirely, "I just wish there was some other way."

Richard had already drained his glass and began pouring himself another. "Well, there isn't. We don't want to sit around waiting for the shoe to drop. Trust me. I've been there. It's better to face the music right now. It's intolerable to spend all your time worrying when you're going to be exposed."

"Okay, then that's what we'll do." The agreed-upon strategy seemed to help both of them relax a bit. "What did you mean when you said you'd been there?"

"Other than my colleagues in Chicago," Richard began, "not a soul knows what we did. We cheated during my fucking post-doc. Of course, Melvin Epstein was in charge, but we were all complicit. Our original error was innocent enough, not so different from our little decimal place problem. But it made our projections look so damn good. Our grant was up for recertification, and Mel was insistent. We were to keep our damn mouths shut until the grant had been renewed. Of course, when it was, we all just continued to remain silent. By the end, all the cold fusion experiments had gone bust, not just ours, so no one cared about anybody's calculations."

"Wow," Jane interrupted. "I can tell that scared you."

"I'm no goody-two-shoes," Richard reflected. "I've fudged on my taxes. And I even cheated on Martha once. But more than scared, I was just plain offended. It's one thing to cheat on your wife, but quite another to cheat on your whole profession, your whole life, really. I said a few things, but the whole team thought I was nuts. They all had their careers to think about. By the end, I was a pretty unpopular guy."

"Well," Jane reflected, "I guess I don't want to cheat on my profession and life, either. Hell, I don't even want to cheat on Kyle. So, I'm completely on board. You compose the letter to NSF, and I'll take care of notifying all the journals."

# # #

The evolution from close colleagues to lovers transpired with the same natural rhythm as had the transition from colleagues to collaborators. The physical intimacy was a natural outgrowth of the intellectual intimacy that had defined their work together for the past six years. Richard was simply in awe of

all of this. Who could have imagined sex in the evening that was interesting and genuinely fulfilling, followed by more sex the following day that was even more interesting and fulfilling?

Jane was more analytical. This iteration of their relationship fundamentally changed her perception of who she was. Being unfaithful to her husband and involved with a married man was bad enough. But where did she stand with Kyle? If you'd asked her even six months ago, she would have said she loved him. But, if the truth were told, she seduced Richard, not the other way around. What did it say about her? She recognized that there were parts of her that she had either been too blind to see or had managed to hide from herself. She had never been particularly adventurous in bed. Certainly not the one in charge. But from here on out, she could never imagine a sexual future where she was not the architect. It wasn't so much that Richard was exceptionally skilled in bed, though he wasn't too bad either. She wondered if it was all because she had never been with an older man before or perhaps because she had never really been attracted to Kyle in that way in the first place. It was probably a little of both. But more than anything, she finally concluded, Richard was something of her sexual soulmate. He was always hungry and ready but perfectly content to let Jane initiate, take charge, and basically control their amorous adventures.

Just three months into their affair, they craved their chances together, and this weekend had been handed to them on a silver platter. Jane's parents had taken the kids for a week to visit Disneyland. And Kyle's softball team was off to a tournament in Salem. He'd be playing ball with his buddies all day long, drinking beer and playing poker in the evenings. She doubted he'd even call or text. Richard could have probably finessed a few days but didn't need to try. Martha's mother had taken ill on the Fourth of July, and she flew back to Wisconsin to be with her. They would have the next day and a half just to themselves. Or so they thought.

Jane answered her phone in the late morning and immediately recognized the voice. "Hi, Jane. I hope your summer's going well and that you and Kyle are settling back in." A call from Joshua Haidt on a July morning couldn't be good news.

"Hi, Josh, yes on both counts," she replied, "thanks. It still feels like I'm on sabbatical. It's going to be weird to get back into the grind next month. What's up?"

Haidt had reluctantly agreed to serve as acting chair during Jane's sabbatical with the complete understanding that she would resume the duties on her return. "Uh, well, I'm not sure if I'm calling to ask your advice or to give you a heads up. A little of both, I think. It's about Devon Brooks."

"Yeah, I heard about the tenure review," Jane said. "Kyle's heartbroken. He plays on his softball team, you know? They're in Salem this weekend."

"Well, I'm afraid it's a little more complicated than just a negative tenure decision." Haidt continued in a worried but slightly conspiratorial tone. "Any chance I could talk you into coming to campus today? I know it's summer break, but I'm trying to talk to all the senior faculty before I meet with the Dean on Monday?"

"Sure, Josh," Jane frowned at Richard, "could we do it this morning? I was kind of counting on a couple of hours of hiking this afternoon?"

"Not a problem. I really appreciate this. Do you know if Richard Barnett is in town? I've been calling him all morning. He's the only other senior colleague I need to talk to."

"Funny you should ask," Jane began her lie, "We were just going over our latest results. Still trying to figure out what went wrong in Princeton. Here, let me put him on." And she handed Richard the phone.

Richard listened to the acting division chair for a few minutes and broke in. "I'll just come in with Jane. I'm her hiking partner this afternoon. We do our best physics and chemistry tromping through the wilderness."

And so, Richard and Jane found themselves back on the college of the Northwest campus a little before noon. They entered the office of their nominal boss and exchanged pleasantries. Haidt began, "I suppose since the two of you have security clearance with the feds, it's okay for me to discuss some highly sensitive personnel issues with you together."

"Well, I don't know how top-secret our work is," Richard responded, "but we can keep our mouths shut when it comes to campus bullshit."

"Good," the chair almost whispered, "this could well end up in court. You know that Devon Brooks was denied tenure in the spring?" They both nodded. "This coming year is his last. But he's not going quietly. He's already filed a formal union grievance. More troubling than that, however, is that he's been spouting off about a lawsuit."

"Isn't that pretty normal in these cases?" Jane asked. "Surely the college has the right to decide who should and shouldn't be granted tenure."

"So what's the deal, Professor Haidt?" Richard adopted his I'm the most senior member of the faculty voice. "Was there anything problematic about the case?"

"Oh yeah," Haidt conceded. "For one thing, he has solid teaching evaluations. And he's got a couple of decent publications, though they both came before he joined us. The real problem is that he's a little bit crazy."

"I thought that was a job requirement for academia," Jane looked embarrassed at her failed attempt at humor.

"It all started last fall," Haidt continued. "As you both know, neither the Biology program nor the Division of Science and Mathematics plays any formal role in personnel decisions. We interview colleagues as a courtesy, but there's no vote or anything. Well, Sheryl Macintyre and Denny Walser came to see me in September. They said that CNW just couldn't tenure Brooks. They said he was incompetent as a biologist."

"Really?" Jane interrupted, "he always struck me as a little flaky but never as incompetent. You just said he has strong teaching evaluations and a solid enough publication record."

"If only it were as simple as teaching and research," Haidt retorted. "For one thing, he's a religious zealot. And also a political whack job. He's a birther, for god's sake. And naturally, he's not at all shy about any of this. Christ, he tweets more than Trump. But the killer for Denny and Sheryl is that he believes in intelligent design. And he brings this into the goddamn classroom."

Richard may have considered academic administration a waste of time, but he would have made a good dean or provost. "Forget about the religion shit, and for sure the politics. You don't want to turn this into some First Amendment debate. Stick with the issue of competence. He doubts natural selection, so he can't teach biology at Northwest. Even there, I'd soft-peddle the intelligent design stuff and simply leave it with the very vague doubts about professional competence."

"I agree," Jane offered. "The biology major is the main conduit to medical school, dental school, and even veterinary school. Can you imagine sending our students to those environments where they have been taught to have doubts about the underlying paradigm of contemporary biology? It would be irresponsible. And in addition, we'd look like idiots. It's just unthinkable."

"You two nicely summarize the thoughts of most of your colleagues in the Division." And Haidt asked with sincerity, "Would you mind if I quoted you in my meeting with the dean?"

"Not at all," Jane replied.

"We'll write him a damn memo," Richard added, "if that's what you'd like. Deans just love memos."

"We'll see. It might come to that. I wish I were more confident that upper administration will be on board. I think they're scared to death of a lawsuit. Jane, I'm so sorry that I will be handing you this shitstorm when you return next month. I fear it's going to be kind of a hellish year."

"Thanks, I guess," Jane responded. "I think you're probably right about next year. I do appreciate the advance notice, though."

And as they left the chair's office, Richard turned to his colleague, friend, collaborator, and now lover and got in the good-natured, but also very

insightful, dig. “Well, madam chair, I think I’ve said this to you on more than one occasion. Be careful, be very, very, careful, what you wish for.”

Today’s hike was doomed to have a different agenda than what they had foreseen last night or earlier this morning.

# # #

It had not even been a year and a half since their discovery of the energy coefficient error in Princeton. What had seemed devastating at the time had turned out to be a godsend. The intellectual restart the episode necessitated caused both of them to look at the whole project with fresh eyes. Their basic strategy was unchanged. However, they realized now that they needed to alternate the energy input/output sequence to maximize the phase harmonics. This was yet another original discovery that led to three more publications and another patent that now looked to be potentially even more valuable than the zero-grav cooler. They had yet to produce an unambiguous low-energy nuclear reaction, but they were confident this was just a matter of time. So much of this kind of research was a matter of simple trial and error. Tweak the phase rate just the tiniest fraction, wait a month, and see the results. It was tedious, but such was the nature of laboratory science. They resigned themselves to the reality that industrial applications of their discoveries were probably decades out.

Richard had hired Barry Delbrück to represent him in what amounted to a nuisance suit over fifteen years ago. He liked and trusted him, and so asked him to help draw up the corporation papers for Ultra-Frigid Fusion, LLC. None of this was his area of law, and all the parties knew that things would need to change as the company grew. But right now, Barry was their lawyer, so Jane was a little alarmed when he called and said he needed to talk to them. Richard, of course, was dismissive. “I’m sure it’s just some detail. Don’t work yourself up over nothing.”

“I promise you I won’t,” Jane was annoyed, “as soon as I’m sure it’s nothing. I want to know what this is all about ASAP. Ask him if we can come in this afternoon.” Richard knew enough not to argue with Jane when her voice took on this edge, and he dutifully called Delbrück back. As luck would have it, the judge in the trial he was working had that very morning granted opposing counsel a continuance to track down a missing witness. So his calendar was clear, and he told them to come by his office at two-thirty.

He greeted them at the door. “Jane, how nice to see you. And you too, my friend. Come on in.”

"All right," Richard, never one to beat around the bush, "what's with all the official lawyer stuff?"

Not seeing any way to sugar-coat it, Delbrück just blurted it out. "You're being sued. Well, that might be premature, but you've been officially notified of a legal dispute."

"That's not good," Jane stated the obvious. "How serious is this? What did we do?"

"It's your colleague," Delbrück answered, "Marcus Alston. He says he contributed materially to your research and is entitled to an equitable share of the profits from any industrial applications of said research."

"That's a bunch of bullshit," Richard almost yelled.

"Well, he got himself a lawyer, Cindy Cartwright. She's a casual friend of mine. He told her his story, and she suggested reaching out to you directly. She knew I represented Ultra-Frigid and called me this morning. So, why do you say this is bullshit? He didn't provide any help?"

"He showed us a nice, elegant way of solving a mathematical equation," Jane answered. "We were appreciative and acknowledged his help in our first publication."

"The Churchland equation," Richard elaborated, "was central in the original Pons and Fleischmann research. I was telling him about what a mess the equation was in the gym one lunchtime, and he told me to drop by his office and he'd show me a cute trick. He's a good mathematician, and his solution was, as Jane put it, elegant. But that's old news. It goes back to the original Pons and Fleischmann paradigm, not what Jane and I created. We don't even use the goddamn equation in our current models."

"Okay," and Delbrück reached into his desk and brought out a legal pad, "let's get down to it. Does this equation ... what do you call it again?"

Jane and Richard started to answer simultaneously, but Richard deferred. "It's the Churchland equation," Jane stated. "It goes back to the Manhattan Project."

"Got it," and he noted this on his pad. "Does the Churchland equation play any role, whatsoever, in the zero-gravity, semiconductor laser, evaporative cooler? You really must find an acronym for that one. It's quite a mouthful."

"We thought about that," Jane chuckled. "ZGSLEC didn't seem much of an improvement.

These days, we just call it the zero-grav. The answer to your question is no, an unequivocal no. Churchland was trying to model mathematically what happened when hydrogen nuclei combine and fuse," and Jane did the air quotes thing "into helium. You know, like, what keeps the sun going? Or the hydrogen bomb. Evaporative cooling has nothing to do with any of that."

"Well then," the lawyer went on, "we simply go tell him to take a hike on that one. Cindy is too good a lawyer to let him go much further down that rabbit hole. And what about the elephant in the room? Is the Churchland equation at all relevant to what's going on with your cold fusion research?"

Now, it was Richard's turn. "Only historically. Pons and Fleischmann argued that their partial solution of the Churchland equation helped them set up their original electrolysis experiment using heavy water. What's weird about that is that a Swedish scientist tried something very similar much earlier in the late twenties. And the Churchland equation hadn't even been discovered back then. When Jane and I decided to try to replicate all of this, all we did was take the original Pons and Fleischmann protocol as our starting point. Shit, that's what every cold fusion researcher was doing. That's what my goddamn post-doc was doing! We didn't need Churchland for that. Neither did Tandberg back in 1927."

"So why did you ask Alston for his help with the equation?" Delbrück continued his interrogation. "Why was it ever mentioned in your article?"

"I didn't ask him," Richard grumbled, "I was just bitching on the treadmill about how messy the mathematics was. Mark is the one who invited me to come by his office."

"But I still don't see," Delbrück pressed, "why something you didn't use found its way into a scientific publication."

Richard was not hiding his displeasure. "That's because you've never been a nobody at a marginal institution trying to get something way outside the mainstream published. Referees in theoretical physics journals love a lot of mathematical razzle-dazzle. We argued that a preliminary look at the Churchland equation substantiated Pons and Fleischmann's contention. They were right, and it justified their original protocol. We were simply playing the academic game. Our idea was to go the ultra-cold route, and Churchland had nothing to do with our setup."

"I'm sorry, guys," the lawyer said, "but I want to be dead certain here. That original protocol, that's the correct term, right? Christ, you scientists use as much jargon as we lawyers. How different was your protocol from Pons, and what's his name?"

"At the start of things?" Richard conceded, "It was identical. That was the whole point. We argued that Pons and Fleischmann's experiment would have worked if they had only done the electrolysis under ultra-cold conditions. Of course, now … ."

"Hold on a second," Delbrück interrupted, "right now, I just want to hear about the original article."

"Look, Barry," Jane tried her hand since Richard looked on the verge of completely losing it, "our original research replicated their technique as closely as we could make it. Our theoretical contribution was to show how conducting their experiment with the deuterium and palladium at as close to absolute zero as possible would generate a low-energy nuclear reaction or cold fusion. The first draft of our article didn't even mention the damn the Churchland equation."

"What about the patents?" Delbrück had been busily annotating his clients' answers. "There are now six of them relating to cold fusion, right?" Jane and Richard simply nodded. "Do any of them make use of the Churchland equation?"

"Nope," was Richard's one-word reply.

"Okay, and what were you saying about the current state of your research?"

"Well, lots of things have changed from that original article. We now put much more emphasis on the phase harmonics. And we don't use natural palladium any longer," Jane continued. "It's too expensive and too toxic. We discovered that an isotope, ^{106}Pd, was a better conductor and had a larger covalent radius. As far as I know, no one has ever run 106 through the Churchland equation."

"You both realize, I hope," Delbrück smiled, "I have no idea what you've just been saying. But I heard you both categorically repudiate Professor Alston's claim. I will so notify his attorney. The ball's back in their court, then. We'll just have to see what happens. I do think, however, that we should bring a patent attorney on board just to be on the safe side."

"That sounds reasonable," Richard conceded, and both he and Jane rose and shook his hand, "thanks for your time, Barry."

But the lawyer got the last word. "I wondered when something like this was going to happen. You know everybody around here knows you're about to become very wealthy? Many people will try to get their hands on some of that money. Jane, you'll probably hear from an ex-babysitter back when you were six or seven, claiming that she gave you the whole cold fusion idea as a story to put you to sleep one night."

"Damn," Jane joined the game, "who told you about Carlota?"

# # #

The honeymoon was over, but not the intensity of the affair. The lovemaking was no longer as urgent or habitual, but it was still pretty darn good. What the last year had taught them only confirmed what they had each gleaned from Wendy Boyd's New Year's party. They were a great couple in almost every conceivable sense. They almost always complimented each other in bed, in the

lab, and now occasionally in the corporate office room. Common interests, of course, were part of the secret – not just the physical and professional, but recreational. They were both walkers, not casual strollers, but hikers. It's relevant to note that this did not mean backpackers. Neither had much interest in camping or nights in the wilderness. But to set out in the early morning and not return until time for Richard's scotch was the almost perfect day.

And what better place to hike than along the Oregon coast? Richard had discovered Manzanita years before the real estate boom. He could now kick himself for not grabbing one of the beachfront steals when he had the chance. But, of course, with the multimillion-dollar offers for Ultra-Frigid, he and Jane still had the opportunity. It would just no longer count as a steal. This was their third getaway in the magical last year, and this one had required only marginal lying. Richard's marriage was already in the hands of divorce attorneys, and Jane's seemed headed in that direction. All they needed to tell anyone who cared to know was that they were headed off to figure out some crucial business or research issue. And that was the god's honest truth. The fourteen-mile roundtrip trek from Neahkahnie to the Nehalem Bay jetty and back had previously led to decisions about impending lawsuits and changes, yet again, to their research protocol. This weeks' vacation would focus on the future. Should they sell the corporation or continue to manage it themselves? Was the cold fusion project leading anywhere productive? Should they cash in on that aspect of their research, too? And, of course, their future as a couple. Would they remain in Oregon? Would they marry? Could Richard adapt to being a stepdad to Sarah and Skip?

To say that two individuals make a great couple is certainly not to say that they are identical. Richard's highest priority remained to discover meaningful cold fusion. He continued to dream of the two of them in Stockholm accepting their joint Nobel Prize. He seldom mentioned any of this, even to Jane, but they both fully recognized that it was there. Jane also loved the prospect of fame and wealth, and she retained the true scientist's lust for discovery. But at the same time, she had never shaken the realization that led her from Irvine to the College of the Northwest in the first place. A part of her still desired the joys of marriage and motherhood. And she still loved classroom teaching.

"Alright," Jane began as they passed the Manzanita beachfront property, "tell me again about what Hawaii is offering."

Richard had made the initial contact. Not exactly behind Jane's back, but not with her full partnership either. Administrators at the big campus on Oahu immediately saw the advantages of taking on a couple of relatively young,

internationally-known researchers. The costs would be minimal, and the potential prestige unimaginable. It was pretty much a no-brainer.

"They are offering each of us full professorships. With tenure if we want it. All we'll be required to teach is a few graduate students. The lab will be adequate for most of our needs. However, we'll need to return to someplace like Princeton periodically. I told them that we'd only be available on a regular basis, Tuesday through Thursday, and they're cool with that. We don't want to live around Honolulu. It's worse than Los Angeles. I'd like us to get a place on the big island. We'll be able to return stateside anytime we want to. And even write off the airfare as a business expense. It's a dream come true. Well, at least my dream come true."

"God, Rich," Jane was genuinely considering, "I don't know. For the life of me, I don't know. We've talked about this endlessly, and I'm no closer to knowing what I want than when you first broached this crazy idea. Will you answer a couple of huge questions for me?"

"I can honestly say," Richard now turned thoughtful himself, "that I've truthfully answered every question you've ever asked me, going back to that first night at PDX. I'll be as forthright as I possibly can be. Ask away."

"What about the kids?" she began. "You've never had children. So if we're going to remain together, wherever that may be, are you ready to be a father at least half of every year? And if my lawyer is any good, almost all of every year?"

"Oh, I've thought plenty about that one," Richard considered. "Let's start with the easy part. I love you, Janie. I realize now that you're the only woman I've ever truly loved. So I get that loving someone means accepting everything about you, including the fact that you're a devoted mother. You're way younger than me, and contrary to the cliché, that's weird for me. We're both neurotic, but our neuroses are different, so we will be assuming a whole shitload of psychological stuff. And to get back to your question. I know how important Skip and Sarah are to you. I was never opposed to being a father. It just didn't happen for Martha and me. Which is a good thing now, I guess. I'll be learning as I go. There's no hiding from that. But, yes, I want you for as long as I live, and I understand it's a package deal. I once told you that part of the secret of my modest success was adaptability. I promise I will become the kind of stepfather you'll be proud of."

"Okay," Jane smiled, "you handled that one adeptly. And what about cold fusion? We hardly ever talk about it, but all of your discipline, as well as mine, think it's fruitless and already empirically proven wrong. So don't you worry that we're chasing a pipedream?"

"Sure, almost every day," Richard returned the smile. "Surprise, surprise, I can be pretty arrogant. I think we're right, and they're wrong."

"I prefer self-confident," Jane responded. "It's one of the things I've fed off from the very beginning."

"You know," Richard confessed, "that I'm overstating for dramatic effect. I'm very proud of the theoretical work we've done. I see it as my greatest achievement as a scientist. Sure, the zero-grav cooler will probably end up making us the most famous, to say nothing of the richest, but if I could only have one, I'd take our work on low-energy nuclear reactions even if it all does end in failure. But I'm not ready to admit defeat yet. I trust our calculations. I still believe we might get there."

"How does this sound as a deal?" Jane tried to make her tone sincere and a little playful. "I'll think about the Hawaii thing and give you an answer after we get back home. Let's just enjoy these last few days here, and we can figure out what to do when we get back home."

# # #

Those last days in Manzanita were not destined to be relaxing. The email had arrived late last night, but Richard only saw it as he was having his coffee early the following day.

> Professor Barnett,
>
> We are reaching out to you and Professor Achinstein with what we believe is a classic win-win proposal. We are interested in buying all of the relevant patents for the zero-gravity, semiconductor laser, evaporative cooler for fifty million dollars in cash.
>
> We completely understand that you will need a little time to carefully consider all of this. We must insist, however, that you notify us of your decision before the end of the summer. Both tax considerations and board policy dictate this abbreviated timeline.
>
> Our interest is exclusively in the zero grav cooler. We believe that the device has many industrial applications completely unrelated to your work with low-energy nuclear reactions. You and Professor Achinstein are encouraged to continue this line of research. Lonestar

Instruments will grant you unlimited use of your
zero-grav prototypes for the duration of research.
Please let me know if you have any questions.
Sincerely,
Joseph T. Robinson
Chief Executive Officer
Lone Star Instruments

"Jesus fucking Christ," Richard muttered to himself. "Janie," he half screamed to the back bedroom, "you better come have a look at this."

Jane was not at all pleased by being summoned like this. But something in his voice told her that she probably needed to look. "What's so damn important?"

"Just read it," Richard turned the laptop toward her, "please."

And she did read it. "What in God's name?" she asked of no one in particular. "Fifty million dollars? Do you think this is for real?"

"Damned if I know," Richard replied. "I don't know what I think about anything right now."

"Well, I guess," Jane considered. "maybe, we should call Barry and see what he thinks?"

"That, Professor Achinstein," Richard brightened, "is a damn good idea. I'll text him and see if he's available on the phone sometime this afternoon. But can we take a nice long walk this morning? I need to clear my head."

Jane smiled, "and lower your blood pressure, I suspect. You text him, and I'll get on my beach shoes."

Barry Delbrück returned the text almost immediately and said he would make himself available at three. Their routine was firmly established by now. The couple walked in silence for the first fifteen minutes or so. Simply absorbing the sights, sounds, and smells. It was low tide, and the seabirds were going nuts. This was mainly because a bald eagle was invading the cormorants' and gulls' territory. They stopped and quietly enjoyed the raucous quarrel and the aerial acrobatics. Finally, Jane began, "do you think we should just sell? I know it's corny, but maybe this is a sign."

"I guess it could be," Richard conceded, "but I'd like to see the next version with the varicap diodes. After that, I think we're going to see a dramatic upturn in efficiency."

Jane couldn't help herself. She flat-out laughed. "Oh, Rich, you talk about the zero-grav like a proud father. If we sell the patent, lots of really smart people will be playing around with it. We might not even recognize it when it goes into commercial production. I think that's probably a good thing."

Richard didn't exactly laugh at himself, but he thoughtfully smiled. "You know me too damn well. I don't even want to be an electrical engineer. And I sure as hell don't want to be a businessman for the rest of my life. Besides, it would make things a hell of a lot easier in Hawaii. Maybe we should take a few months off from the cold fusion stuff and thoroughly research zero-grav's true worth. Just because some Texas CEO says we've received a fair offer doesn't make it so. And perhaps there are other suitors out there, as well."

Jane nodded, "let's see what Barry has to say. Oh, look," she interrupted herself, "the eagle's back." And with that, they clasped hands and walked for a good hour and a half without hardly speaking another word.

Barry Delbrück listened attentively as Jane read the contents of the email. "My friends," he began, "that is an amazing offer. What do you intend to do?"

Jane now acted as the spokesperson. "We're seriously considering selling the patent. But we need to figure out what it's actually worth. We're also interested in seeing if other buyers might be out there. The offer from Lone Star Instruments sort of came out of the blue. So it's going to take a little while, I think."

"Okay," Delbrück responded, "that all sounds pretty reasonable. But, as your lawyer, I need to remind you of a couple of things. First of all, if you wait too long, Lone Star might just walk. Fifty million's some serious change, and it's pretty much just sitting there for the taking. And then there are the divorces. Oregon's not a community property state. But since it follows the equitable distribution model, and all of the research and all of the patents happened while you were married, your spouses are entitled to half of what each of you will realize when this thing goes through."

"Jesus, Barry," Jane continued. "What do you think we should do? We're sort of out of our depth, you know?"

"I hear you," Delbrück agreed. "This is a first for me too. I have never had clients in a situation like this. But I have seen enough people do foolish things in haste. So here's my best advice, both professionally and personally. I'm not sure you should take months to decide what you want to do, but at the same time, don't act rashly. Take these last few days at the beach and try to enjoy yourselves. But also find time to seriously talk about all of this. If you can, ensure you're both on the same page about how you want to proceed. When you return, we will all get together and hash this sucker out. In the meantime, I will take a little cash from the Ultra-Frigid account and hire a friend of mine to start assessing the real value of your company and your patent. I think he'll be able to give us enough data to start having meaningful preliminary conversations. How does that sound as a short-term plan?"

Richard and Jane looked at each other and nodded. Jane reported from their end of the phone, "fine, Barry, just fine."

# # #

Jane insisted that they hedge their bets. Rather than resigning from their positions at the College of the Northwest, they both requested and were granted one-year leaves of absence. The three months in Hawaii were a blur. They signed their contracts with the University of Hawaii, met some of their new colleagues, and purchased a lovely beachfront condominium on the Kona side of the Big Island.

Chihiro Hagihara called Jane the day after they signed the purchase agreement. Chihiro was Jane's first hire after she became Division Chair and the two had become close friends. "Hi Jane," Chihiro began, "I have a couple of important things to discuss. I hope now is a good time. But first of all, congratulations on the new position."

"Thank you," Jane acknowledged. "I wasn't sure that anything could ever lure me away from CNW. But look at me now. A new job, a new home, pretty much a new life. So, what's up?"

Chihiro gave a quite audible sigh. "They both have to do with Marcus Allen, I'm afraid. He's very sick. I don't think he has much longer to live."

"God," Jane responded with genuine emotion. "That's terrible. Everybody knows he's suing us, I suppose. But I always liked Mark."

"Oh yes," Chihiro concurred. "He's a very nice man, and he's been a great colleague. But, Jane, here's the glitch. He has asked me to be a witness in the suit against you and Professor Barnett. I feel awful about this. You've been a good friend. And I probably owe you my job at Northwest in the first place."

"Are you allowed to tell me why they want you to testify?" Jane inquired.

"Just some technical stuff in mathematics," Chihiro said. "No one said I couldn't talk to you. I don't know if you know this, and I am truly sorry, but almost every mathematician here in the northwest who knows anything about the details thinks Marcus was poorly treated by Professor Barnett. You know what he told me?"

"Do tell," Jane could feel herself getting angry. "I'm all ears."

"He said he didn't want to sue you guys," Chihiro began. "He told me that he secretly hoped you would see the justice of his claims and invite him to join you as a collaborator."

"Chihiro," Jane consciously changed the tone of her voice, "look, I'm sorry I started to get annoyed with you. I realize you were just doing what any good friend would – keeping me in the loop. I've known him a lot longer than you, but I suspect you know him better. Do you think I should try to talk to Mark? Is he even well enough to see me?"

Chihiro smiled her acknowledgment of the apology. “He’s pretty sick. But I believe he’d genuinely appreciate the chance to tell you his side of the story. I think it would be a very nice gesture. It might even make things a little easier for you guys.”

Richard was initially skeptical. “Why would you want to talk with that cocksucker who’s trying to shake us down?”

“Are we sure that’s what’s happening?” Jane countered. “It wasn’t that long ago that both of us would have considered Marcus a friend, not just a colleague.”

“Ah, Janie,” Richard softened, “you’re a nicer person than I am. Sure, go ahead and have your little tete-a-tete. I have no problem with that. But, I’m still going to be very curious how this could be anything other than a shakedown.”

# # #

Marcus Alston’s wife, Rebecca, met Jane at the door. “I’m not sure this is a good idea,” she began. “He’s been quite ill, you know? But Mark was pretty insistent. So, please, make this as short and stress-free as possible.”

“I will,” Jane nodded sympathetically. “I understand.”

Marcus Alston was sitting on the living room couch in sweatpants and a tee shirt. He did not look good at all. He motioned for Jane to sit down. “Well, Madame Chair, a lot of water under the bridge, wouldn’t you say?”

Jane smiled in spite of herself. Mark always could be a charmer when he set his mind to it. “I’m sure you already know that I’m no one’s chair anymore.”

“Yes,” he nodded, I’d heard that. Off to the big leagues, huh?”

“Time will tell,” Jane replied.

“Indeed,” he nodded again. “Look, I appreciate your coming by to see if we can clear the air a bit. Chihiro kind of leaned on you, didn’t she?”

“Not really,” Jane considered. “She’s just a good friend who felt obligated to let me know a little of what’s going on. I’m actually the one who proposed that we see if we could talk this whole thing out. Why don’t we begin with your telling me your side of things.”

“Sure,” Mark smiled sadly, “Although I have more than a few issues with the two of you, I always liked you and admired the job you did as chair. Also, and I hope you won’t take offense, I didn’t exactly like Richard, but I do respect him. Just to be clear, I never said that you stole anything from me.”

“That’s not what our lawyer is telling us,” Jane shook her head sadly.

“Well, then, you’ve been misinformed,” for such a frail man, this came out with resolve. “You see, Jane, I don’t have that long to live. I am responsible for leaving my wife and children in the best financial circumstances I can. And to be perfectly candid, I care about my reputation as well. I hate to sound vain, but I deserve to be recognized for my contributions to the cold fusion project.”

"And what exactly are those contributions?" Jane struggled not to sound skeptical.

"Much more than the two of you were willing to admit," it was easy to see that he was anxious to tell his story. "Your lawyer told mine that my contribution was simply demonstrating for Richard a way of simplifying a mathematical relationship first discovered by Emre Churchland. I did, in fact, show Richard how to approximate a solution to the parameter space of the Churchland polynomial. If that were the end of the story, I'd have had no quarrel with your footnote thanking me for the help that I provided. The Churchland equation, you see, is really a Mandelbrot set. That was the basic insight that Churchland first saw, though he never had the theoretical apparatus to so describe it. As soon as I started to work through the proof, I realized all of this. That was my single mathematical epiphany in an otherwise undistinguished career. I've read all of your subsequent publications, and although it's true, you never mention, let alone explicitly use, the Churchland equation, the mathematical underpinnings all assume that all instances of cold fusion occur at the boundary of a fractal curve. And you got all of this from me. God damn it, you owed me more than money. As far as I know, none of this has ever been published. I should be up there with you when you win the Noble Prize."

"That's quite a story, Professor Alston." Jane was taken aback. "I'm not nearly a good enough mathematician to assess its validity. But I can promise you that I will relay all of this to Richard. And, if need be, we will find someone with the expertise to either confirm or contradict your account. We're not thieves, Mark."

# # #

It took Richard about a minute to recognize the truth in what Marcus Alston had relayed to Jane. "God damn, I always knew I was missing something. I guess I must be some kind of a dickhead, huh?"

"I wouldn't say that," Jane rebuffed. "If he had come to us directly in the first place, instead of getting a lawyer, I doubt any of this would have ever happened. What do you think we should do now?"

"No," Richard ignored the question, "that's what I mean about being a dickhead. He did sort of tell me a few months later, but I'd already decided he was running a scam. He said something about fractal curves, but I completely dismissed him. I'm pretty sure I screamed at him. Like I said. Classic dickhead."

"Oh, Rich," Jane lamented. "You never told me that."

"I wasn't keeping secrets," Richard said in a downcast tone. "It didn't register that it was important. But what you told him is exactly right. We're not thieves. I guess we'd better," he paused. "No, correct that. I'd better go about

setting things right. Do you think it would be okay, though, if I take a week or so just to myself to do my theoretician thing? I'd really like to see what the calculations look like when we explicitly figure in the Churchland equation being a Mandelbrot set. Do you think this might be the breakthrough we've been looking for?"

"God only knows," Jane shook her head. "I need to get back to him, but I think I can buy you that week."

Richard's week predictably turned into three. During that time, two momentous events transpired. Jane got the call from Chihiro Hagihara early Tuesday morning of that last week. "Jane," she began, "I wanted to let you know that Marcus Alston passed away last night. I thought you'd want to know."

"God, I'm really sorry to hear that," Jane almost whispered. "I can't say I'm surprised, though. He looked terrible that last time we talked."

"Yes," Chihiro agreed, "I know. He told me that you contacted him, Jane. Thank you. I think it meant a lot to him."

"No, you deserve the thanks," the regret in Jane's voice was manifest. "I'm glad that I got the chance to talk to him. But, shit, if only he could have lasted just a little longer."

"Mark Alston died last night," Jane announced to Richard.

"Well, damn," Richard shook his head. "I would have liked to tell him I was full of shit right to his face. But at least he didn't have to hear the bad news. I'm afraid something else died last night. You'd already gone to bed when I finished the calculations. It's not just rest in peace for our colleague but for our life's work, as well. I think cold fusion at the level we were hoping for is impossible. Since cold fusion cold occurs at the boundary of a fractal curve, it's inherently unstable. We can sustain it for a couple of minutes, as we've already done in the lab. But the reaction will inevitably dissipate into chaos, just as I should have seen since we're dealing with a Mandelbrot set. For the life of me, I can't see any way for all of our labor to have any commercial applications, at least in our lifetimes. I think we struck out, Sweetie."

# # #

The meeting was guaranteed to be uncomfortable. But Barry had been insistent. "We need to get everybody around the table. I think all the parties are going to be pleased with the bottom line. If the two of you are ever going to be able to move on with your lives, I am convinced we need to see if we can get everyone on the same page. This is truly win-win-win-win."

After the obligatory round of introductions, Barry began things. "Thank you all for coming. What I am proposing this morning is just an initial session where we share some thoughts and information. I am assuming that Mrs. Alston will want to consult with her attorney. As will Mr. Achinstein and Mrs.

Barnett. At the same time, however, as Ultra-Frigid Fusion's attorney, and with the explicit approval of both Jane and Richard, I have been researching the corporation's real worth and what options all parties here today may have. I have to tell you, the news is pretty remarkable."

"Barry," Cindy Cartwright began, "when you invited us here today, you said you wanted to discuss a settlement in our suit against Ultra-Frigid Fusion. Could we please cut to the chase? What sort of figure did you have in mind?"

"All in due time, Cindy," Barry responded with more than a hint of condescension. "Here is my understanding of Mrs. Alston's case against the corporation. Her late husband claimed he contributed significant ideas to the cold fusion research program that Professors Barnett and Achinstein conducted. I think it is crucial at this juncture to distinguish between the research and patents dealing with cold fusion and the invention of the zero gravity evaporative cooler."

"We are not ready to concede that," Cartwright sparred. "All of those patents are the property of Ultra-Frigid Fusion, and our suit is against that entity."

"If I might interject at this point," Jane interrupted. "I had a long and candid discussion with Professor Alston just before his death. He was very explicit about his involvement with Richard and my research. He helped us solve an important mathematical problem involving the so-called Churchland equation. He felt very strongly that his contribution was foundational to all of our subsequent work regarding cold fusion. At no point did he ever even mention their invention of the evaporative cooler."

"Be that as it may," Cindy Cartwright, ever the negotiator, broke in. "Our position is that Ultra-Frigid is the defendant. We expect fair and sufficient damages for what we are confident we can prove are clear losses that Marcus Alston suffered at the corporation's hands."

Barry was in full combat mode now. "Well, that will be up to a jury to decide. We are willing to entertain talks regarding the worth of the cold fusion patents. But discussing a possible settlement concerning the cooler is a non-starter, as far as I am concerned. But all of that may be moot. If I may, let me tell you what I have discovered."

And everyone around the conference table nodded in agreement.

"Thank you," Barry Delbrück was clearly pleased with himself. "As I said earlier, I hired a consultant to assess the value of Ultra-frigid Fusion's patents. She said that in her estimation, the value of the zero-grav cooler was somewhere in the neighborhood of eighty million dollars. At that time, we were not asking about the value of the other patents."

This little tidbit took Martha Alston and Cindy Cartwright by surprise. "But I gather you have an update," Cindy inquired.

Barry smiled. "Well, as you so eloquently put it, Cindy, let me cut to the chase. I have had extensive discussions with Lone Star Instruments. They had made an initial offer of fifty million dollars just for the zero-grav cooler patent. I apprised them of what my consultant had said. I also explained how the lawsuit from Professor Alston and his wife might complicate things. We haggled a bit, and at the end of last week, they presented a formal proposal to purchase Ultra-Frigid Fusion, lock stock, and barrel, all of the patents for everything, for one hundred and sixty million dollars. Therefore, I am proposing that we take that first eighty million dollars off the table, take the remaining eighty, and divide it three ways. Professor Alston's estate would then be compensated to the tune of over twenty-five million dollars for whatever he may or may not have contributed to the cold fusion patents. I am proposing, therefore, a settlement of, say, thirty million dollars."

Cindy Cartwright and Rebecca Alston looked a little overwhelmed. As did Kyle and Martha. "I must say, Barry," Cindy composed herself, "that is a very interesting place to begin discussions. We would want to independently confirm all of this, of course. Mrs. Alston and I will discuss your proposal and get back to you within the week. I assume everyone would like to conclude this business as soon as possible."

Cindy Cartwright and Rebecca Alston excused themselves to mull over -- how had Barry phrased it? -- the pretty remarkable settlement offer. Barry turned to everyone else. "Shall we continue our discussion just a bit more?"

Barry looked at the soon-to-be-divorced couples for nods of approval and received universal approval. "Cindy will try to nickel and dime us," Barry proclaimed, "you can bet on that. But they're going to accept the offer. Did you see the expression on Rebecca Alston's face? I thought she was going to faint."

"Yes," Jane agreed. "She looked pretty taken aback. May I ask where this hundred-and-sixty million dollar offer came from? Why the dramatic change of heart from Lone Star? As far as I remember, their last offer was fifty million. Please don't misunderstand me. I'm not knocking fifty mil. But this is over three times that amount."

"God only knows," Barry considered, "when you're dealing with a huge company like Lone Star Instruments. But my guess is that there are at least three things going on. One is, as we initially assumed, that the original offer was candidly lowball. I think they knew all along that the zero-grav cooler was worth closer to a hundred million. I also think they immediately recognized that the Alstons' suit could totally muck things up. But the clincher is, I'm

betting, they saw the offer for the cold fusion stuff as almost risk-free. They probably have other buyers already lined up for those patents."

"Just to be clear," Richard interjected, "assuming we accept the settlement, Jane and I would each get sixty-five million dollars. Is that correct?"

"Yes and no," Barry hedged. "Your simple arithmetic is correct. But there's going to be some administrative costs. And I hate to be crass about it. There are also attorney's fees. Finally, of course, there are your impending divorces. But I'll let your attorneys worry about all of that. Don't quote me on this, but I'd guess that each of you is looking at something in the neighborhood of thirty million dollars. Not too shabby, I'd say."

"Dear God," Kyle's exclamation nicely summed things up. "I think we should agree to this. Or am I missing something?"

"No, Professor Achinstein," Barry concurred, "I don't think you're missing anything at all."

All attention, therefore, turned to Martha Barnett. "Any gut reaction at your end, Martha?"

It took her a couple of moments for her to respond. "I'm sorry. Yes, of course. I just can't believe this. I never really took Richard's work seriously."

"I know that feeling, Martha," Kyle agreed. "These past few months seem like some weird dream. You can't call it a nightmare when you end up with this much money. But it still doesn't seem real. All I want to do is put all this legal shit behind me and get back to being a father and a college professor."

# # #

Marcus Alston received the professional acclaim he rightfully felt he deserved posthumously. Chihiro Hagihara accepted a half-year sabbatical and helped Richard and Jane write up a professional article using Alston's prudently and meticulously kept notes. They all made essential contributions to the paper, but its foundation lay in Alston's insight. All nuclear fission reactions occur at the boundary of a fractal curve. They gave the dead mathematician pride of place as the lead author.

Chihiro was not a physicist, so she didn't see the most crucial result in the widely cited article, but the community of physicists and chemists certainly did. All of Richard and Jane's calculations had assumed that the equation describing the cold fusion reaction would be well-behaved, but the Alston *et al.* article conclusively showed that it was pathological. Achieving a sustainable, low-energy nuclear reaction would take much more than the zero-grav cooler. As Richard had predicted, it would be decades, if ever, for cold fusion to amount to anything more than an intriguing theoretical possibility.

Not that Lone Star Technology cared that much. The zero-grav cooler turned out to be a game-changer. It lurks behind the scenes in tons of research on pharmacology and manufacturing, food science, and countless less conspicuous academic and industrial applications. Lone Star would have made a fortune, even if they had had to eat the entire add-on for the cold fusion patents. But of course, they didn't. As Barry foresaw, Lone Star unloaded those patents at a handsome profit to startups and other smaller enterprises. So, the future of cold fusion lies where it belongs – in the hands of young, creative scientists.