

Prologue

From Jenny's Diary, Friday, March 12

I'd never thought about it, the end of the world. Nor had I imagined that I'd have to face it in my own lifetime. This past year I've been so busy trying to get through each day without thinking about what happened last October. But the universe doesn't care about our little problems. It has its own way of deciding things—and I've come to understand that the universe is a much stranger place than I'd ever realized before.

It's close now. Days. Mom says she's going to keep doing the things she's always done, although we did talk about bucket lists. She said she didn't feel the need for one, and that her life had been one big bucket list. For her, the important thing was being with the people she loved. She didn't start to cry until we came up—Beth and me. And seeing her cry made us cry. It's been hard on Dad, too. I've noticed how he watches us with that sad expression on his face, when he doesn't think we can see him. But we do our best to hide how afraid we are. It would only make him feel worse.

I'm going back up to the mountain tomorrow—one last time. I have to keep my promise, but I'll be back in time for the end.



It had been in the same slow orbit for countless millennia, a bit of debris circling an inconsequential yellow dwarf star—just another dark hunk of rock. Its orbit was so far out that the sun was little more than a pinpoint of light.

Recently, the rock had been disturbed. A change in the force it felt had moved it and accelerated it in a new direction. The disturbance may have come from another, more massive object, or it might have been caused by a bit of stray primordial matter whisking by too closely. Whatever the reason, its path had shifted, and it had begun a new journey, one that would take it to the very center of the star system it had circled for so long.



CHAPTER 1
Long Lake

Wednesday, September 23

Right Ascension (J2000)¹ 13 hours 5.3 min, Declination -6
Degrees 57 arcmin

The town rests between the outstretched arms of two converging mountains. These might be considered overgrown hills in some parts of the country, but here they dominate the West Virginia countryside like great titans. The town begins at the base of the pass, just into the foothills and then spills across the valley toward the lake that gave the town its name.

Long Lake is a college town, and it would probably disappear altogether if not for the university and the influx of money that its students bring each year. The campus itself is bounded to the west by University Boulevard, the primary north-south highway through town, and extends eastward into the low foothills.

It began as an agricultural community, large farms producing tobacco, and smaller family farms that grew

1 Right Ascension and Declination are used in a way that is similar to longitude and latitude to provide a location for objects in space. J2000 refers to the January 1, 2000 epoch. This references a single position for the Earth's axis of rotation to accommodate its procession, which has a 26,000-year period. The apparent RA/Dec varies as this axis slowly changes direction.

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food. The lush valley and rounded foothills were also the source of timber to feed the voracious needs of coalmines near Morgantown to the north, and Charlestown to the southwest. The college was founded in the early twentieth century and rapidly supplanted agriculture as the main driver for the local economy. A number of old family farms still exist, but a lot of the richest land was taken for the university, or subdivided by the developers who rushed in to build the housing needed for students and for the faculty. Over the years, several high-tech companies trickled into the valley to take advantage of the school's political connections, as well as the expertise of its teachers and researchers, and their laboratories. They leverage this relationship formed with university leaders to help secure government contracts.

People living on the east side of town, high above the campus, enjoy a panoramic view of the valley, and they typically make more money than people who live on the west side of town. Oversized houses and mini-estates are perched on the sides of hills. But everyone in town, rich and poor, depends on the same flow of money.

The development called Bella Vita is four miles west of University Boulevard, and it was built along the north side of Derby road. Derby is the main highway leading west. It spirals down from the mountains in the east, and rushes through the valley, as if eager to pass through the town and on to more important places.

Houses in Bella Vita are huddled into little clusters, residential islands surrounded by open fields and sparse woods. Each cluster bears the name of a town or region of Italy. An elementary school sits just east of the development, toward the town's center. The school is set well back

from the road, with sports fields and a narrow parking lot out front of the main building. Directly across Derby Road from the school is a strip mall. It contains a grocery store, a gas station, a Starbucks, and an odd assortment of smaller businesses. The mall is too far from Bella Vita for someone to comfortably carry groceries on foot, and yet it also seems too close to drive.



It was late, and lights were still on within number 6 Venice Court—a two-story house at the end of a cluster. An asphalt driveway ended at a pair of garage doors. There was a lawn on the right-hand side of the driveway, and white gravel to its left. A faded green Volvo with a dented fender was parked out front, next to the curb. Except for the Volvo and the address above the front door, number 6 was indistinguishable from other houses on Venice Court.

Jenny Baker was sitting at her desk, facing a yellow wall and trying hard not to listen to the music. It had been playing a sinister game with her all night. Muffled bass notes slipped under the door and around her bed, while higher frequency tones navigated their way through the air duct system. Together, they'd been assailing her for more than an hour. The rhythm, chords, and notes all came together and found an easy target in Jenny's right foot, which was moving in time with the beat.

Her elbow was on the desk and her chin was resting in an upturned palm. She stared at the advanced calculus book propped open in front of her. It had been on the same page

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for the past hour and there was no sign it would be changing anytime soon. A blank piece of paper was also on the desk and a number-two pencil was held between her fingers, ready to spring into action.

Jenny set the pencil down, and leaned back in the chair to run her fingers through an impressive mass of red hair. She pushed elusive locks back out of her face and confined them under a green plastic band. It was already eleven-thirty and she'd accomplished absolutely nothing tonight. She sighed and her eyes narrowed—eyes the same green as the plastic headband. She'd been staring at a calculus problem, not really seeing it, but now she was glaring at the door.

“Beth! Will you please turn the music down?” she yelled.

She closed her eyes and waited for the volume to go down. When she didn't hear a change after more than seventeen or eighteen seconds she bolted to her feet, so rapidly that the chair she'd been sitting on fell back to lean against the foot of her bed. She dashed out of the room, the door banging against the wall as she passed, and then stomped down the hallway to the open door next to her own, not bothering to knock before entering.

“Beth, did you hear me? Would you please turn the music down?”

Her sister was in her own world. Younger than Jenny, she had a perfectly symmetrical face, framed by short blond hair, with sky blue eyes that were half closed in concentration.

“Beth!”

The girl's eyes blinked twice before opening all the way. She looked confused, but then raised an eyebrow.

“Would you *please* turn the music down? I'm trying to study.”

“I’m studying too,” the younger girl argued. “This is new stuff, and I have to play it in front of the whole school next week.”

Jenny took a breath and counted to ten. Yelling wasn’t going to help. It had never had much of an effect on Beth, and if she lost control now it would be more than an hour before she’d be able to calm down enough to think straight again. It looked as though getting to bed at a reasonable hour was a fantasy, but she had to learn the new integration techniques for the upcoming math midterm. It was time to appeal to a higher power.

“Mom!” she yelled, directing her voice down the stairway. “Would you come up here?”

Shit! Marissa thought. The mood she’d been working on was broken now. She dropped her head, resting it on her husband’s chest, still keeping her arms around his neck. She sighed heavily and told him she’d be right back.

“I’m coming!” she yelled. It was difficult having two girls so close in age, and who were so different from each other. Barely three years separated them. Jenny, the scientist, was like her father, serious, focused, and—normally—responsible, while Beth was more like herself—spontaneous and creative, especially where music was concerned. Marissa looked down as she trudged to the second floor. *The carpet needs cleaning again*, she thought. It had been at least a year, and more likely two, since the last time she’d rented a carpet cleaner from the Home Center. There always seemed to be something else to do—something else she’d forgotten.

“Okay, what’s the crisis *this* time?” her usual patient tone was missing. She’d been planning this night all week,

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and had worked hard to set the mood just right. And now? Marissa knew how tense David was. The big proposal he'd been working on had consumed him all month, and, if left unsupervised for long, his mind would almost certainly wander back to it.

"Mom, I'm trying to do my homework, but Beth's playing her music so loud that I can't hear myself think. Could you *please* ask her to turn it down?"

"All right, Beth, what's *your* story?"

"Mom, I have to learn this piece. There are incredibly subtle elements, and even a rogue syncopation weaving its way in and out of the music. Some notes are so deeply hidden in the background that they're almost undetectable—it's impossible to hear how it was played when the volume's turned down low."

"What about your headphones?" It was an obvious thing and Beth's face turned red.

"Yeah. That would probably work, too." The smug look that appeared on Jenny's face was irritating her now. "Why didn't *you* think of that? Aren't you supposed to be the smart one?" Jenny's superior expression disappeared as quickly as it had come.

"Sorry."

"Beth?"

"Sorry, Mom... Um. Is there any cake left?"

"Goodnight!" Marissa said, tilting her head and glaring at her younger daughter.

"Goodnight, Mom." Beth reached for her headphones, avoiding her mother's eyes.

Her diplomatic mission a success, Marissa went back downstairs, but by the time she'd reached the family room, David had moved to his office again. Something had

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obviously penetrated her carefully crafted atmosphere and triggered an idea—she'd lost to work yet again. Marissa shook her head and went into the kitchen to put a cork back in the bottle of wine she'd opened just a half-hour before, hoping to give it time to breathe. She paused, thinking that maybe a little mouth-to-mouth resuscitation would help the wine—and her.

It didn't.

Jenny returned to her desk, giving her laptop a cursory glance as she passed by. It would be far easier to solve these problems using software, but then she wouldn't learn the fundamental techniques for the test. Three hours later, her homework was finally done, and she took a hot shower to celebrate.

As she was pulling the covers down on the bed, a scratching noise came from the window. It was Jake. She opened the latch to let him in.

"You just get off work?" she looked at the clock on the nightstand.

"Yep." Jake was tall and thin, with a chaotic mop of dark hair and coal-black eyes.

"Well, keep your distance. I'm sure you haven't had a shower yet," she tried to scowl, but couldn't help grinning at him.

"I must love you an *awful lot* to keep putting up with all this rejection," he muttered.

"You'd better!"

There was a knock at the door and Beth poked her head in.

"Hey Jake. Am I interrupting something?" she asked.

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“As if you’d care, squirt.” He was the only one still able to get away with calling her that.

Jenny frowned. “If you’re going to bother knocking, at least wait until I say come in.”

“Oops,” Beth grinned. “Can I borrow your old calculus book? I don’t know why I let Dad talk me into taking yet another math course—I’m an artist!”

“Nope. You’ll just copy my answers.”

Beth stuck her tongue out and withdrew her head, “Bye Jake.”

“See you later, squirt.”

Jenny looked at her boyfriend again. “Well, I guess I *could* let you kiss me. It’s the least I can do after you rode your bike *all* the way out to the sticks.”

Some minutes later, “So, what’s the weekend look like?” She looked into his eyes, and saw the bad news even before he said anything.

“Sorry, Jen, I’m working a double on Friday. I even have to skip my last class. I’ve got dinner at the restaurant, and then I’m filling in for Bob at the Emporium till dawn. But I’m off Saturday night.” He looked at her hopefully.

Jenny did her best to keep her face blank, and even managed a faint smile. “Saturday night’s fine.”

“Well, I better take off. I need my beauty sleep.” Jenny kissed him again and then slapped him on the butt as he went out through the window. He stood on the roof of the front porch, staring back at her before climbing down. “Try to get some rest for Saturday night,” she called after him. “You’re gonna need it.”

He grinned just before his head disappeared below the roofline.

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Jake shared a tiny apartment with his roommate, Bob. Their place was usually empty since they both spent so much time working after school. There never seemed to be enough money for everything. Jenny didn't have to work, but she didn't have extra money, either, so they usually spent their free time at the lake, or hanging out with friends in town.

Jake rode his bike through Westport, the next neighborhood to Bella Vita, toward town. He followed alleys that ran between the backyards, where small, detached garages faced each other across narrow lanes. Once clear of the older housing development, he went back onto Derby Road, staying in the emergency lane to avoid cars that might come up from behind. He and Bob lived in the student ghetto, but Bob wouldn't be home until after sunup.

Bob worked at a convenience store, The Emporium. It had the usual assortment of small-market offerings, as well as beer and wine, but no hard liquor.

Their apartment was created when an older house was partitioned into four rental units. The building was surrounded by other similar houses that had received the same treatment.

The student ghetto was a labyrinth of segmented, disjointed, alley-sized roads, a few enlarged driveways, and one or two actual streets. Very few surfaces had ever seen pavement, and the ones that had were mostly a collection of potholes. Jake and Bob lived at 304 Hobbs Lane, Apartment C. Apartment D was occupied by a gay couple, Lisa and

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Gwyneth, both of whom were nursing students. The other two units in their building had been occupied by a parade of ever-changing tenants. They never seemed to stay longer than a few weeks. It usually wasn't worth investing the time to learn their names, and he normally didn't bother unless it looked as though they might stay more than a month. There were hundreds of homes just like this, all crammed into the ghetto. The neighborhood was a dangerous tinderbox, and had only survived because the main firehouse was adjacent to it on Main Street, one block south and two blocks west of the university.

Jake went to the refrigerator and chugged down a quart of ice-cold water. He and Bob kept old milk containers there, and they kept them filled with water. Jake was tired and thirsty, and soon he would be asleep. After popping into the shower to remove most of the grime from the restaurant's kitchen, he put on a clean pair of underwear and fell into bed. Someone in the next building was playing an old Muse tune much louder than necessary, but he was too exhausted to care and was asleep in seconds.



I AM!

I'm...somewhere...somewhen. But who am I? *What* am I?

Something must have awakened me. What? If not, I would probably still be in the nothingness, where I was before...if I was.

I think I can still feel it, the thing that awakened me—a disturbance. It's...uncomfortable, and it moves over me, around me, through me. I can almost think of the word for it...this thing, this substance that feels as though it's grating on my consciousness—like friction resisting movement.

Time! Yes, that's the word for it—but it's a rather inconsequential term for a thing of such consequence. It must have been time that awakened me. But I'm not alone.

There's another with me, another being. I can feel his, her, its thoughts—thoughts that seem to fill space around me, and a voice. A voice that's confident, calm, unhurried.

"Everything will be all right," it says. "You've been preparing."

Preparing? Preparing for what?

"You're not ready for that, yet. You need more...*time.*"

There's that word again. But the way *he* uses it sounds so odd, as though time itself were an unfamiliar concept.

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When? When will I know?

“When you’re ready. Soon.”

But now my own sense of time is starting to fade—I’m beginning to fade.

I don’t want to go back to...to...whatever I was! Please!

“Don’t worry,” he assures me. “You won’t.”



CHAPTER 2

Weekend Planning

Saturday, September 26

RA: 13 hours 7.9 min, Dec: -7 Degrees 12.6 arcmin

“Kyle doesn’t like the lake, he’s more of a mountain guy. Still, I’m pretty sure he’ll agree to come—Mary likes the lake.” Jake was angled into one corner of the sofa with his feet up on an old crate that served as their coffee table; one arm was wrapped around Jenny, and a beer was in his other hand. Jenny leaned against him, using his legs to support her own. The TV cast a pale, flickering light throughout the otherwise darkened room, but its sound had been muted. They hadn’t been paying attention to it.

“What about Bob?” They were going through a mental list of friends, and were beginning to realize that most weren’t available for the weekend at the lake. Jenny had asked for the use of her uncle’s cabin. It would be free in two weeks for their first full weekend together in more than two months.

“Bob will be working, and Sherry won’t go without him.” Jake sighed. If anyone was in worse financial condition than Jake, it was Bob.

“Okay, but assuming it’s just the four of us,” Jenny said, “someone’s going to have to run interference if Mary decides to throw one of her fits. I can’t do it by myself. I

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need backup.” She twisted her head to look at him, and waited. Jake pretended he hadn’t heard her. He’d never been comfortable dealing with Mary’s tantrums.

Jake was evading her gaze, so Jenny turned away, but something on the TV caught her attention. She shushed him, raising one hand, and leaned over to grab the remote control from the crate.



“I have Dr. Travail on Skype tonight. He’s a comet hunter, one of the last holdouts still using traditional methods to search for the elusive chunks of rock and ice that pass through the solar system now and then. He spends long nights of solitude watching the sky, one small area at a time. These days, most comet spotting is done by a network of automated telescopes that constantly image the sky to report on anything new.”

“Thank you for having me, Jim, and yes, you’re right. That’s how most comets are discovered these days.”

There was no picture of the astronomer, just the stock image of a telescope hovering over the interviewer’s shoulder. To Jenny, the comet hunter’s baritone voice, and his words, sounded oddly mechanical and formal, as though he were a foreigner. His syntax and pronunciation were flat, without a hint of idiom. Still, she couldn’t pin down an actual accent.

“I understand you’ve found something interesting.”

“That’s right, Jim.”

Jenny shook her head, still trying to guess his nationality.

“Tell us exactly what you discovered, and why no one else has detected it.”

“I’d been tracking several asteroids just inside of Jupiter’s orbit, in constellation Virgo, when an anomalous object appeared. I take images with different fields of view, and look for motion against the star background to measure the position and speed of objects in the solar system. This past May I saw a flash appear during one of the long exposures. When I take pictures, my telescope is tracking the asteroid I’m studying, so it doesn’t move. Stars are much farther away, and they appear to move across the image and look like lines of light. The object I detected must have been close to the asteroid I was studying, and moving in the same general direction. There was *some* apparent motion with respect to the asteroid, but not much. I concluded that it was in a close crossing orbit. There is no known object for that position.

“I continued scanning for it over a period of two months, assuming several different orbital paths, and kept widening my field of view, while taking long exposures. It didn’t reappear for over three weeks. That’s when I saw a second brief flash—unusually bright, and only lasting for about a minute before fading away. This gave me a second data point for position and speed, and allowed me to form a first approximation of its orbit. I used the position of the original asteroid as an initial position—close enough for now, but knew the orbital error was large. Together, these two data points let me work out the rough orbit.”

“And?”

“And, if I had to guess, I’d have to say it looks a lot like a comet, rather than an asteroid.”

“But don’t comets have tails?”

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“They do when they get close enough to the sun, but even this far out, it should be bright enough to track.”

“And did you see it again?”

“I think so, Jim. I detected another flash about four weeks later, still following the orbital projection I made. I assumed it was the same object. This third data point has improved its projected path.”

“What do you conclude?”

“Based on what is admittedly an estimate, I’d say it looks as though this comet may come fairly close to the Earth. And, I don’t believe it’s a Kuniper object. It looks more like something from the Oort Cloud. Kuniper objects start out much closer to the sun, usually within the orbit of the outer planets. This appears to be following a hyperbolic path from outside of the solar system.”

“What’s the Oort Cloud?”

“It’s a collection of debris left over from when the solar system formed—a sphere of what you might call junk that still circles the sun, but very far out. Every now and then a stray bit of rock falls inward.”

“So, is this thing dangerous—to us, I mean?”

“I wouldn’t think so, although it’s hard to predict this early. A lot of things pass nearby, relatively speaking. I wouldn’t want to unduly alarm people, but I am looking for help tracking it.”

“Why hasn’t anyone else seen it?”

“Well, Jim, the object is very dim. Except for those few flashes of light, I’ve never been able to image it. You need to be looking at exactly the right place at exactly the right time to detect a flash. Since the last sighting, I’ve looked for it whenever I had telescope time, but haven’t seen it since. I assume it’s on the same track.”

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“Hasn’t anyone tried to look with a larger telescope?”

“No one has contacted me, but if someone did want to help, they can obtain the predicted coordinates from my website. I’ve also provided an assumed position as a function of time, along with the original measurements.”

“Viewers can see your email address and your website at the bottom of the screen. Thank you for joining us tonight, Dr. Travail.”

“Thank you for having me, Jim.”

“In other science news, Messenger-7 is due to launch on November 24th for its rendezvous with planet Mercury. The unmanned spacecraft will enter Mercury’s orbit in early March to perform a series of measurements on the planet’s gravitational field. The mission’s other task will be to attempt retrieval of samples from the planet’s surface by using a pair of probes launched from Messenger-7. One probe is intended to strike the surface of the planet, essentially acting as a hypersonic bullet, while a second probe follows it into the atmosphere to gather samples from the first probe’s impact. A booster engine will allow this second probe to regain orbit and to rendezvous with Messenger-7.

“The spacecraft is being assembled and launched from Space Station-2. Since it won’t have to achieve orbit from the surface, it will carry extra fuel that will allow it to return to Earth with the samples gathered by the probe. This is the first round trip mission to be launched from orbit this way.”

“Next up, a device that couples directly to your brain’s sensory input. It provides what’s being called ‘perfect reality.’ If true, this will allow us to fully experience life through

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other people. It's being hailed as a potential revolution in entertainment and education."



Jenny pressed the mute button again.

"What was that about?" Jake asked.

"You heard, a new comet—if it actually exists."

"Cool. Let's check out what's happening on *this* planet."

He took the remote and changed the channel to a regular news show.

A digitally simulated anchor stared out from the screen. "In other news, Congress is debating raising the debt limit..." Jenny took the remote back and shut the TV off.

"What do you think?" Jenny was interested in astrophysics, and hoped to work on space science after she finished school.

"Yeah, more budget problems," Jake said, a resigned look on his face, but then laughed when Jenny hit him.

"I wonder what it's made of, if it's too dark to see," Jenny said.

"Well, unless it's made of money, I don't think people will pay very much attention to it."

"So, will you promise to help if Mary goes off the deep end? Kyle's useless—he just disappears."

"Maybe he has the right idea," Jake offered. "Okay, okay, but let's hope it's not an issue."

Jenny took the blanket from the back of the sofa and spread it over them. "Now, I hope you got some rest, like I asked," she said.