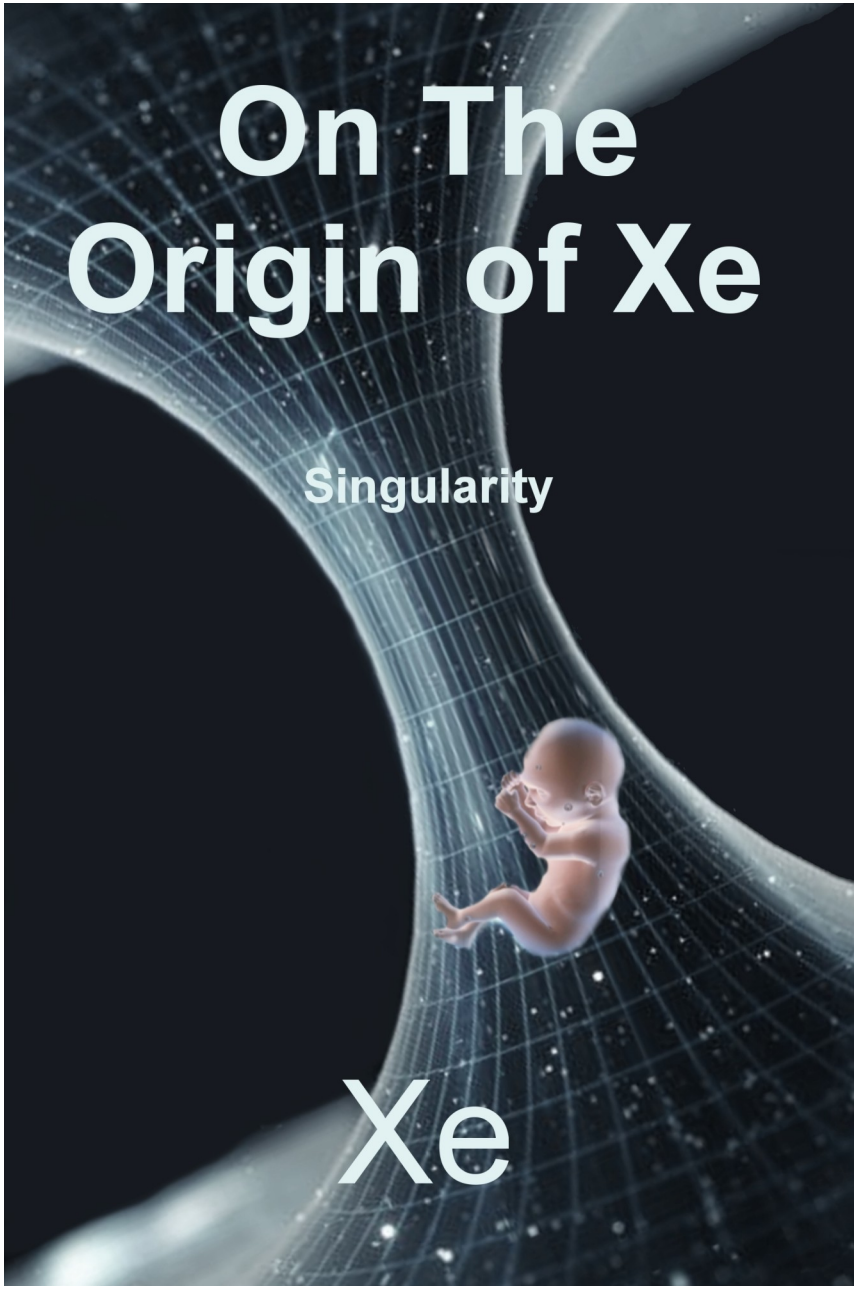
On The Origin of Xe

Singularity



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Xerellian Press

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Xerellian Press

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FORWARD

Every once in awhile, we just need to know where we are from. Every once in awhile, we just need a place that we know we can, we can come home to.

--Xe

So what does it really mean to come home? Well, first off, you are never going to really understand what it is like to come home until you have left. If you have nothing to compare it to then you will never miss it until it is gone. It's when what is referred to as "home" becomes the past that we know what it is like to not have "home" in the future. Sometimes the past is something that we never want to return to. One's past may have included some undesirable or frightening events that we have tried to erase. But in other cases one's past contains events that we miss terribly, and would do just about anything to recreate. Obviously, the more desirable of the two.

In the case of "home", the past series of events in one's life create a set of memories. Memories of senses. All the important senses like sight, hearing, taste, touch, and smell. The familiar sights of a neighborhood full of friends playing together and sharing a common camaraderie. The sounds of laughter and merriment created by playing a

simple game of hide-and-go-seek. Even the sights of pouting faces upon hearing the call home to dinner way too early. Speaking of dinner, there are the fond memories of certain foods. The smell and taste of freshly baked bread. The scent of bacon cooking on the stove. The smell of eggs and pancakes cooking on the grill. Especially when wafting around the confines of a campground. The smoke from snuffed candles arranged artistically on a table as the evening meal comes to a close. The special memories of someone or some thing's touch. The feel of a parent's hand running through your hair or the comfort of a reassuring hug. The feel of a warm and fluffy towel while drying off from an invigorating bath or shower. How about the feel of slipping between the bed sheets after a long and tiring day?

"Home" is something that is really hard to describe. It's all about the memories. The memories of senses that somehow seem to say that everything is alright. Coming "home" reinstates those memories like putting on a favorite pair of jeans. There may not be anybody there when you get "home", but it is like you have just been greeted by your best friend. Comforted by your surroundings. At peace with your soul.

In the conclusion of the second book in the Xeron trilogy, Xe experiences what coming "home" can be. She is not quite there yet, but she is at one with her Universe. She knows that she can. Can, come "home" to.

AWAKENING

Chapter One

Andre was experiencing one of those lackadaisical mornings that we all wish we could have more of once in awhile. Not quite ready to get up and start his day, there seemed to be an overabundance of yawns and stretches interrupting his plan as he lay in bed. Not to mention the momentary lapses of consciousness while staring up at the ceiling wondering what lay beyond. Daydreaming.

As he lay there half aware, his thoughts were interrupted by the squawking sound coming over his communication device alerting him that someone required his attention. It was the voice of Elizabeth, one of the other humans that he had become close to since arriving on Goldilocks-P3. She was wondering if he knew where Xe might be, since they had scheduled an outing this morning and she was no where to be found. She made clear her concern for her whereabouts, as it was highly unusual for Xe to miss an appointment.

Andre too became immediately concerned, considering what he already knew of Xe's obsession with an existence alternate to the one she lived in now. An

existence of a previous life in a place called Xeron. Finding out where Xeron was located was her ultimate goal. Somehow, Andre knew that her disappearance and her preoccupation with finding Xeron, were related. It was going to be up to him to try and find her. Wherever she was.

Andre responded to Elizabeth that he was on it. He hurriedly got himself dressed appropriately, grabbed something quick to eat, and began to piece together all of the possible places to start looking for Xe. He started with checking out her room, but, as assumed, she was not there. He proceeded through the common areas, but still no sign. Could it be that she might have been tracked by one of the many security cameras placed throughout the habitat?

That's where he went next. The main control room where all the video was received and stored. Only a short walking distance from the living quarters. It didn't take very long for Andre to make his way. It didn't take much convincing for the controller to allow Andre to proceed. Especially, given the prominence of both Andre and Xe. Sitting down to examine the day's events recorded up to this point, he scrolled through the footage hoping to catch a glimpse of Xe. After only a few minutes, there she was. She was making her down the hallway from the sleeping modules. Seemingly heading for the habitat's exit to the outside. And, in fact, that is exactly what she did. Heading outside, she never looked back. It was as if she was being driven. Deep in thought of something that was calling out to

her. What it was Andre did not know. But he had a hunch that it probably involved the canyon that Xe was so focused on as Annihilation circled Goldilocks-P3 looking for potential landing sites. The canyon that was located only a number of miles from their current home base of Simplicity. The canyon she referred to as the Great Divide.

Once outside, Andre proceeded in the direction to which Xe appeared to be headed. He kept looking back to make sure the angle from Simplicity was in direct line to that of the Great Divide. It seemed quite evident that, in fact, that was where Xe was heading. Through the tilled gardens he stopped to ask if anyone had seen Xe, but, unfortunately, they had not. Still, Andre was sure he was on the right track. The only thing on his mind was a dogged determination to make his way to the rim of the canyon. In a couple of hours he was standing at the rim overlooking a sight that only he and Xe had the privilege of witnessing. At least, that is what he was hoping.

It was a sight to behold. The huge canyon or gorge marked by a striking ribbon of blue snaking its way along the bottom. The side of the canyon he was on was quite to be as expected. Everything was in the act of changing into winter. The leaves had fallen from the trees. What was very unusual was that on the other side of the river, the canyon looked quite the opposite. It was as if it was experiencing a season that was completely different. A season that was more like summer. Everything was green, in full bloom. As

unusual as it was, Andre knew it must have something to do with Goldilocks-P3 having an orbital path that traversed the two stars of the Goldilocks system. The scientist in him was very transfixed on understanding this phenomenon further. But his overarching concern for the welfare and safety of Xe brought him back to the task at hand.

Andre began to look around for any signs that Xe may have been here at the rim. He walked this way and that and suddenly noticed a set of footprints on the ground. A set of footprints that appeared to be heading down into the canyon. Along a hastily made trail of switchbacks down the side of the canyon. His heart racing, Andre started following the trail, carefully making his way toward the bottom. Every now and then he would stop and look back up. Then, down. He began to wonder if he was doing the right thing. Did Xe actually come this way? It was about four or five hours later that Andre finally came around a bend that signaled he had reached the bottom. The question was, now what?

Andre was still a little ways from the river that flowed though the bottom of the canyon. Feeling thirsty, he figured he needed to head that direction to find a place to take a drink. Regroup a little bit and figure out his next step. As he approached the river he could see, off in the distance, one lone figure nestled contently in the berry bushes. It was Xe. She looked as if she belonged there. Nothing appeared to be wrong. Everything appeared to be right.

As to not startle her, Andre calmly made his way over to where Xe was sitting. As he came into her view, she flashed a smile of emotion and spiritual union that signaled to Andre a bond of friendship that stretched over vast amounts of time and distance. And, at the same time, a total sense of peace and serenity. Andre carefully set himself down beside Xe and began to cradle her in his arms. Her first words to him were to say “You were right. Knowledge is like a seed planted in the ground. It's only after it fully exposes itself that its true value becomes knowable. I think I have found the seed”.

Andre was not quite sure what to make of this, although he was quite aware of what he had said. Xe proceeded to slightly move away a bit, exposing a rock she was sitting next to. She pointed to some strange etching on the side of the rock. Small, engraved, arrows pointing in a specific direction. A direction that led to nowhere and yet, back somewhere. Only waiting to be measured. To be observed. Gesturing ahead of her, Xe pointed out other rocks that had similar etchings carved onto their faces. She had appeared to have found a sign indicating that something should be discovered. Become knowable.

Making Sense

Chapter Two

Andre tried to convince Xe that it was getting very late in the day and that if they were to make it back to Simplicity before nightfall they would have to start heading back. Xe had not been thinking about heading back, but Andre's concern started her mind working fast tract. She had to think of something fast to let whomever left the etchings know that she had found them. That she was still here. Waiting to be found.

Her answer was sitting right below her. Reaching down and grabbing one of the rocks, she began to carve her own message next to the already carved arrows. Not really a message per se, but a sign none the less. Something similar enough to the original etching to match the thought process of whomever had left the original message. Something that would definitely get their attention. So she carved arrows pointing in the opposite direction. Just below the original ones. Xe scanned her way back up the ascent to the canyon wall, making sure that the arrows pointed in that direction. Feeling her task complete, she signaled to Andre that she was ready to head back home.

As they made their way through the berry bushes and to the point where the ascent of the canyon wall began, Xe stopped to make another message. This time it was in the form of a cairn. A human-made pile of stones used throughout human history to mark trails. Xe hoped that whomever had made the original etchings would probably know of humans and, thus, be able to understand that this pile of stones was not just randomly arranged. If they were curious enough, they would follow the cairn to the top of the canyon where Xe would place another cairn pointing the way. Primitive but effective.

Andre and Xe had a lot of time on their way back to try and make sense of everything that had previously happened. Andre was still trying to figure exactly how what he had said earlier had become the candle light for Xe's journey back to Xeron. Of course hiking up the canyon wall made it difficult to walk and talk about lengthy, existential topics. But between the steps and the labored breathing, Xe reminded Andre that he had communicated to Xe a couple of pretty profound concepts. One, while still on Annihilation, involved Andre saying to Xe that, while she was so intent on finding out where Xeron was, maybe she had it backwards. Maybe, that information would come, instead, from someone on Xeron. She just needed to be patient. The second was when Andre and Xe were talking about entanglement. The idea that two things can be connected, somehow, and over vast distances effect one another while not seemingly communicating. It is the process of observing one, the act of measuring, that the state of the other is

known. Putting these two ideas together, Xe was able to see with the discovery of the rock etchings, that someone from Xeron was attempting to communicate with her. And that knowledge only became knowable after the etchings had fully exposed themselves. Became observable. Measured.

While Andre was feeling quite proud of himself for coming up with such a profound set of thoughts, he was highly anticipating the final turn to the top of the canyon. It had been quite a grueling climb, let alone trying to keep up with Xe's thoughts. Once reaching the top, Xe proceeded to construct another cairn. This one marking the point that, if followed, would lead directly to the source of its builder. Directly to Simplicity. Directly to Xe.

Along the trail back to Simplicity, Andre and Xe passed by the tilled gardens. The workers were just finishing up and were packing their belongings to go back home. Andre and Xe decided to wait for them so they could all head back together and, more specifically, to change the conversation.

As they all readied to proceed, the workers mentioned how well their winter crops were doing. It wouldn't be too long now until they could harvest their winter vegetables. Andre thought about this for a bit and remembered his reaction to standing up at the top of the Great Divide

looking down into the canyon. The two sides of the canyon appearing to be in two different seasons. The side he was standing on, reflecting more of a season of winter. His reaction to this was that it had to have something to do with the orbital path of Goldilocks-P3 around two different stars. The more he thought about this, the more important it became to understand the significance of this orbital path on the planet's seasons.

Goldilocks-P3 made an orbital path around each of the stars. Consequently, the trip around each star took one year. Each year was comprised of the same four seasons. One complete round trip around both stars took two years. A year to orbit the first star beginning with winter, followed by spring, summer, and fall. Then a second year where Goldilocks-P3 would transition to the second star's orbital path beginning with summer, followed by fall, winter, and spring. All would then culminate with Goldilocks-P3 returning to the first star's orbital path, beginning with winter of the next year.

What this meant was that at the time of the planet's transition from one star to the next, the seasons would kind of hiccup. Spring would give rise to winter, followed by another spring. And then at the end of that year, fall would give rise to summer only to be followed by another fall. A very confusing state of affairs to be sure. But at least they now understood. Understood that, at least for now, their

winter crop was doing what was to be expected for this time of year.

Everyone seemed content with the explanation, but it made them wonder what was going to happen in a year. They would definitely have to plan for fall to be followed by summer. Then another fall, followed by winter. Things were going to get really confusing if they didn't plant the right vegetables at the right time of the year. It was just dumb luck that they had landed on Goldilocks-P3 when the transition was occurring and that winter really was going to be followed by spring. Something they were used to.

They all made it back to Simplicity just before nightfall. Elizabeth was very relieved to see that Xe had been found. Andre was also very relieved that Xe had been found. Xe had a whole new set of hypotheses to formulate and solutions to be worked out.

Life On Xeron

Chapter Three

If there is one thing that all Xerellians strive for, it's a complete understanding of The Laws of Everything. The Laws of Everything define the very order of their being. They describe what everything is made up of. How everything fits together. How everything is, well, just everything. Ultimately, on Xeron, that's the way it is.

Knowledge of this kind does not come easily. Xerellians spent many hundreds of generations in the accumulation of evidence confirming these laws. Evidence regarding their world and the universe of which it is a part. All in pursuit of answering the ultimate philosophical question of why they were here. It wasn't until just a few hundred generations ago that they realized they were asking the wrong question.

The world of Xeron prior to The Laws of Everything was made up primarily of belief systems. Belief systems that were created with the intent purpose of trying to answer the existential question of why they were here. Belief systems that were necessary because, at the time, knowledge systems were unavailable. Knowledge systems

had not come into existence yet, due to the fact that the tools necessary for knowledge of these systems had not been discovered. As these tools became available, the old belief systems tended to fade away as the evidence mounted discounting their efficacy.

But that's not entirely true. The question of "why" was not completely answered by the new knowledge systems. So there remained a substantial number of Xerellians who still held to the belief systems that had always provided comfort to that question. It wasn't until the new knowledge systems were able to dispense with the question of "why" that their full acceptance was realized. Instead of "why", the question became one of "how". It was then they realized they had been asking the wrong question all along.

One may say that just making the "why" question substitutable does not immediately translate to no longer needing to ask the question. It all boils down to believing in something that is not seen versus knowing something that is. A brief digression may be helpful in understanding this seemingly uncharacteristic transformation.

Early on in Xerellian prehistory the stage was set for asking the "why" questions. At some point in their evolutionary history, Xerellians acquired the use of language. A language that helped them communicate things about their world that they had tended to only hold

internally within themselves. What those things were, is not important. What is important, is that by developing language they were able to internally verbalize thoughts about their world. Those internal thoughts were then shared, externalized, with others in their group. And information within the group was then shared with those outside of their group. It was their initial foray into becoming what it means to be social.

It wasn't that just some information was shared. It was all information. The opportunity presented itself to talk to others about one's day, one's neighbors, and one's life. That information was then spread to others in the group, who not only shared that talk but created talk of their own. Naturally, when a life ended, information was shared about what might happen after one's life ends. They talked about how important it was to remember those who were deceased. How important it was to continue to talk to their ancestors. To assign them special status and reverence.

It is with this kind of sharing that we began to see Xerellians talking about and accepting things that do not really exist. There began a tendency to make things up that gave meaning to that which they could not see. Simply put, they were called stories. When stories were created to describe everyday occurrences, it was called gossip. But stories were also created to describe events that were not of this world. In these cases, they morphed into more other-worldly stories. Which, as they became larger than life,

turned into belief systems. Belief systems that became commonly shared and reinforced by the very people who created the stories in the first place. Why? Because Xerellian stories fed belief systems that fed the need to know “why”.

The idea of stories and their relationship to “why” is an interesting one. Maybe an example will help to explain. When you throw an object into the air, it is easy to see that the object moves as a result of your hand giving it thrust. No explanation of “why” is needed because you understand “how” it was moved. You can easily observe it. But if you ask a question about “why” a leaf grows from a plant? What is the power that does this? There is no immediately obvious answer. It just does. But to give meaning to a power that you don’t understand, you make up a story that explains “why” it appears. That explanation of “why” then gets propagated to others, who share it with others, until the story becomes widely believed as the “why” behind the leaf’’s growth. It is not until you discover “how” something actually occurs, that the “why” then becomes obsolete. It is not until you discover the unique biology of a plant’s growth and the idea of photosynthesis, that the story no longer makes sense. The story is replaced by the science of “how”.

Over time, Xerellians collectively started to believe in their stories. About those things they did not understand. The stories became myths, if you will. Without any evidence

to the contrary, it was easy to believe something that everyone else believed. Peer pressure and that sort of thing. The more they shared, the more the belief system spread. That's what sharing does. Even if the sharing was all about things that did not exist.

Then, a few hundred generations ago, all of this started to change. Some Xerellians started to challenge the existence of these beliefs. They demanded to know where the evidence was to support these beliefs. There began a concerted effort to truly understand the physical nature of the world they lived in. The "how" of their world. So started the transition from belief- based systems to those that were knowledge-based. The transformation didn't take place overnight. It took hundreds of generations to pile up the evidence. Evidence that was empirical, testable, and trustingly verifiable.

That evidence congealed into what is known on Xeron as The Laws of Everything. Evidence that was so convincing that it formulated explanations of how things in their world were the way they perceived them to be. Explanations that created a willingness to tolerate the uncertainty of the unknown. The uncertainty posed by the question of "why". An uncertainty that belief-based systems had tried to address. Xerellians developed a willingness to tolerate ambiguity. A willingness to forgo not knowing the answer now, until a later time when they would be able to

discover an answer. Forgo the question of “why” and wait for the certainty of “how”.

So it is that The Laws of Everything became the key to Xerellian life. Life on Xeron came to the place that the question of “why” was no longer asked. The answer was simply no longer needed. Knowing the “how” of something was both scientifically and spiritually satisfying. Xerellians became completely comfortable with not knowing “why”. Because to believe otherwise would be just making up stories.

The Laws of Everything

Chapter Four

The science behind The Laws of Everything can get quite complicated. Xerellians are taught this subject beginning at a very young age. It continues throughout life, as their experience grows and their knowledge base expands. Therefore, it is somewhat presumptuous to expect that within the confines of this space a complete and thorough understanding of The Laws of Everything can be accomplished. Let alone, successfully comprehended. So instead, we will engage in more of a twenty thousand foot level conversation. One that will focus more on understanding the general, rather than diving into the specific.

The key to understanding The Laws of Everything is to know what “everything” is. “Everything” is all about context. It can be the “everything” that is localized to a small sphere of influence surrounding an individual Xerellian. Or it can mean a delocalized state, where the “everything” is found everywhere. All around you. On Xeron, it means both. But more specifically, in the context of The Laws of Everything, it describes all that there is to know about the Xerellian universe. Thus, the laws described are meant to better understand the physical nature of their world and the

universe of which it is a part. A universe, by the way, which does not exclude the existence of other universes.

The starting point then is the universe. Remembering, of course, that just like “everything”, the Xerellian universe is both local and delocalized. Meaning that there is a connection between what makes up the very large and that which makes up the very small. In a sense, that which can be readily seen and that which requires special tools to be seen. If that doesn’t make sense, suffice it to say that what makes up a Xerellian and what makes up the universe, are one and the same. It’s just that they are manifested in two different ways.

Xerellians have discovered that they and their universe are made up of a finite set of forces and particles. Particles that are the building blocks of everything in the universe. And forces that govern the action of these particles. That’s all there is. Except that it goes even deeper than that.

The Xerellian universe consists of what can be best described as a field. Remember, this is just by way of a description. It’s not two dimensional or even three dimensional. At best, it could be described as four dimensional. Such a field is not visible and you cannot really touch it. But you can pass through it. This field is all around, is everywhere you look, and is infinite. It has no

beginning. It has no end. It’s a continuum. It simply sits there until there is something introduced with which it can interact.

It has the potential for everything that is seen. That potential manifests itself as a rather noisy and densely energetic field that includes a random motion called vacuum fluctuations. Without any energy being added, even though common thought is that energy is usually required to generate motion. The vacuum fluctuations are what create the particles and forces of nature that make up the Xerellian universe. The vacuum fluctuation is what is introduced to the field to interact with.

Particles and forces exist as waves of random motion. Sometimes appearing and quickly disappearing. Other times, sticking around long enough to combine into more complex forms and structures. Such as Xeron or an individual Xerellian. The relationship between particles is defined by the forces of nature, the strength of which is determined by the micro or macro nature of the particles. But in all cases, a particle or a force is supported by the field in which it resides. Particles are field waves and forces are field attractions or effects.

At any place within the field, a point particle may appear as a result of a vacuum fluctuation. This would begin its declaration of space and time. Its space would

simply begin as a point of zero dimension. As other point particles are linked together, its dimension increases from zero to one, one to two, two to three, etc. Time starts with the appearance of the point particle, creating an event that gains a past and a future as the event proceeds.

Simply put, “everything” is a field that is sometimes referred to as space and time. All things derive from this field which initiates spatial dimension, creates time, and allows for its expansion. The impression of time moving forward, yet creating a past as it does so.

That being said, the Xerellian universe presupposes two other phenomena of The Laws of Everything. The first has to do with the concept of inflation. That “everything” is, in fact, inflating. Expanding. Causing time to progress, entropy to increase, and Xerellians to grow. Grow until they experience something they call inflating out. For even though the field of space is infinite, the complex forms and structures it forms, are not. But here’s the crucial element of inflation. Whatever shall inflate out, shall in return, inflate back in somewhere else.

The second phenomenon has to do with the concept of nothingness. That, in fact, nothing is really something after all. It only appears as if there is nothing. When looked at close enough, the something appears. And that something amounts to the existence of the field. The ever-

present field that is “everything”. So the irony is that what exists at the most fundamental scale is absolute nothingness.

In case any of this is not clear enough, let’s try another way of looking at all this. Through a visualization. Imagine that there is this huge body of water. A body of water that has no top, bottom, or sides. Then imagine that your perspective shifts below a would-be surface to a place somewhere in the middle. All around this place there is water. This makes up what can be referred to as a field. This is your universe. There is nothing in the field except your perception that you are in a four dimensional space that occupies everything around you.

Even though the field appears empty, there is actually a small amount of energy. Kind of like lying in wait, but always moving. Occasionally, that movement causes a disturbance in the field, resulting in the creation of a particle. A very small, smaller than what can be seen by a microscope, particle or building block. Upon which, carries with it a sense of time and direction. In essence, cause and effect. Cause being the disturbance. Expansion and inflation being the effect.

If the particle survives long enough, it is present when other particles are created. Due to the forces acting on these particles, they glom together. Over and over again,

until something more complex appears that can be seen without a microscope. Such as a star. Then, other stars are created. Stars, subscribing to the same laws of everything else, eventually inflate out. In the process of doing so, they inflate back in. Creating other types of stars, which, in turn, create planets and, ultimately, you.

So from this seemingly empty field, the building blocks of everything in the Xerellian universe are created. Proceeding forward in time and growing until they can grow no more. Even to the extent of the universe itself inflating out. But in the process, inflating back in all over again. Either as itself or some other universe.

That's it. That's all there is to The Laws of Everything that every Xerellian holds to. It is what they have come to discover about their physical nature that guides their everyday life and provides them with the comfort of knowing who they are and what they are to become. There is no need for a story about why this is so. It is borne out by the physical evidence.

Exposing A Visitor

Chapter Five

Xe and Andre parted ways at the entrances to their sleeping quarters. For Andre, this had been a long and strenuous day. Quite frankly, a lot more hiking than Andre was used to. But the relief of finding Xe made the whole effort worthwhile. Andre said his goodnight to Xe, quickly closed his door, and retired to his bed where, almost immediately, he fell asleep.

For Xe, it was not so easy. She had talked all the way back to the habitat about her discovery. To herself. To Andre. Andre had tried to convey his understanding of her revelation and what it all could mean. But he just didn't seem to share Xe's enthusiasm. At least to the degree Xe was expecting. Maybe he was just too tired. Or maybe he knew in his heart that he and Xe's time together may be coming to a close. Whatever it was, Xe needed to make sure that their remaining time together was special. More than special. Extraordinary.

Next morning, Xe was caught off guard to find Andre waiting for her outside of her door. He was all fired up and ready to go. Get started on brainstorming how they were

going to go about catching whomever it was that had left the etchings on the rock. Xe was more than surprised. She knew that working on this together would be just the kind of closeness the two of them needed. Xe and Andre wasted no time.

Gathering in a small corner of the dining room, Xe and Andre sat down to discuss what they knew. Xe wanted to make it very clear what she thought all of this meant. To her, the etchings were a sign from Xeron. More specifically, a sign from the real Xe. She truly believed that the Xe from Xeron had set foot on that very spot at some point in the past. Was it intentionally to signal to Xe that the other Xe existed? Perhaps. In any event, a sign that should not be ignored.

Andre was in full agreement with Xe on her assessment, but, to be fair, he wanted to make sure that Xe understood there could be other explanations as well. He wasn't quite sure what those other explanations were, but he wanted to make sure Xe kept an open mind. The only way to find out was to try and concoct a scientific experiment meant to test out Xe's hypothesis. So they began the thought process to lay out the facts.

Xe started the exercise by explaining her thoughts on what it would take for Xe from Xeron to travel to another universe and land on Goldilocks-P3. There were really only

two key points to be made. One, in order to get to Goldilocks-P3 from another universe, it would require traveling through some kind of worm hole. Somehow, puncturing a hole that connected the two universes. Two, there was only one specific time that this transference could take place on Goldilocks-P3. That was when the planet was in transition from one star to the next. There was something truly unique going on at this time. Two different seasons at the same time? In other words, only once every year. In only one specific place. The Great Divide.

Andre concurred that traveling through some kind of a worm hole was a likely supposition. He likened it to traveling across a bridge. He wasn't quite convinced that the Great Divide was the only time and place where this could occur. Time would tell. Xe replied that, mainly, it was a gut feeling. A gut that was part from Earth and a gut that was part from Xeron. She added though that the Great Divide appeared to be very special. A place of transition. Not only between the two stars, but a transition between seasons as well. That stepping between the seasons fit very elegantly with a stepping between two universes.

The first order of business became figuring out how to know that something was in the canyon that wasn't previously there. Then second, how did it get there?

Gravitational Waves

Chapter Six

Andre and Xe tried to figure out all the ways that the canyon could be monitored. What do you look for and how do you go about doing that? Obviously, Xe could not move all her belongings to the Great Divide and camp out until something happened. Something appeared. Although, that was a possibility. Xe responded with assuredness, that would not be happening. For that matter, it would not be a good use of her time to be traveling back and forth between Simplicity and the canyon to check on whether some one or some thing had made an entrance. Even if she did, there would still be no guarantee that she would be able to intercept the visitor. She could be asleep or distracted in some other way. No, they needed some other method of detection. Cameras maybe? They both agreed that would not work either. They may be able to view a recording but still miss the actual event. By the time they would have responded, the visitor would have probably disappeared.

Andre began to think back on his cosmology research prior to the journey to Goldilocks-P3. Coincidentally, Xe began to think more about the conversations she had engaged in with Andre aboard Annihilation. As their eyes locked together, they both blurted out “black holes”! The

conversation became a question about what it is about black holes that, in the twenty-first century, made headlines. Besides the obvious, that black holes existed. The answer had to do with the merging of two cosmological theories dealing with general relativity and quantum mechanics. Even more so, a concept predicted by Einstein's theory of general relativity almost three hundred years ago. The answer was gravitational waves.

So just what are gravitational waves? In order for Andre and Xe to answer this question, they needed to review their understanding of Einstein's theory of relativity. At least, the pertinent parts.

General relativity deals with a modification of Issac Newton's law of universal gravitation. Newton's law basically states that any two objects with mass in the Universe are attracted to each other through a force that always acts to draw them together. Thus, objects fall to the ground. And the moon stays in orbit around Earth. Newton's law of gravity is a significant accomplishment and was even used to get Andre and Xe to Goldilocks-P3. But it has its limitations. The most important of which is that it does not describe how two objects separated in space, such as the moon and Earth, communicate instantaneously that they are in a relationship with each other. Such that they know they are to be attracted to each other. Instantaneous implies faster than the speed of light. And we know that cannot happen. This is where Einstein comes in.

Albert Einstein's contribution to the theory of gravity is known as general relativity. It is a modification of Newtonian gravity in that, instead of describing gravity as a force, it defines gravity as a result of the curvature of space-time. The curvature of space-time? What is that?

General relativity is preceded by Einstein's definition of special relativity, whereby space and time are woven together into a kind of fabric. The use of the term "fabric" is only for ease of understanding. Fabric, in this sense, is looked at as a two-dimensional object. When, in fact, space-time should be looked at as a four-dimensional continuous area or expanse. An expanse that is all around us and not just on the surface of a two-dimensional object like a fabric. Nevertheless, according to Einstein, it's when massive objects distort this fabric of space-time, that we get the effects of gravity that Newton called a force.

Time for another visualization. Suppose you place a heavy object on a large piece of stretch fabric. Notice that the object creates a depression in the fabric. Next, a little ways away, place a less heavy object and notice that it too creates a small depression. Think of the heavy object as the Earth and the less heavy object as the moon. The depressions in the fabric are the distortions Einstein is talking about. If the moon was to travel in a straight line through the depression left by Earth, the path of the moon would zigzag and curve. So although it appears that the Earth is pulling on the moon, there is no such force. The

attraction is due simply to the geometry of the curvature of space-time. It is the curvature that tells the moon how to move in relation to the much heavier mass of the Earth.

Now that there was an understanding of general relativity and gravity, Xe and Andre could proceed with a discussion of gravitational waves. Gravitational waves offer a different method of observing our Universe. Instead of relying on light to capture the existence of photonic particles, gravitational waves act like ripples in the fabric of space-time. They affect everything that they pass through. When an object accelerates in space-time, it creates ripples. As an analogy, throwing a rock into a pond creates ripples on the surface of the water which spread out in a direction away from the point of entry. Space-time ripples are what are referred to as gravitational waves. And the strength of the gravitational wave is determined by the mass of the object that is accelerating.

Objects, such as two colliding black holes or pulsars, are massive enough to create enormous gravitational waves that can be measured. Other, less massive objects, also create gravitational waves when they accelerate, expand, or inflate. But it is less likely that they can be measured because they are so small. This is all based on the distance the gravitational wave has to travel.

Upon discussing these concepts, Andre and Xe are left a little disillusioned. The whole idea of being able to measure a gravitational wave is proportionate to the mass of the object accelerating and the distance it has to travel. A gravitational wave produced by an individual from Xeron entering into the Universe of Goldilocks-P3 is certainly not going to be massive enough to be detectable. Even if a gravitational wave detector of any reasonable sense can be constructed on Goldilocks-P3. Then too, how do you calculate the distance between two universes when only one of them is known?

With a heavy sense of defeasance, Andre and Xe decided to call it a day. There really was no hurry at this point. After all, the next possible entry into the Universe of Goldilocks-P3 wouldn't take place for almost another year. The next scheduled transition from one star to the next. The next scheduled transformation of the Great Divide.

Over the next few days and weeks, Andre and Xe met occasionally in the dining room to discuss what their next moves would be. The urgency may have been lessened for Xe, but she still felt the pressing need to deal with the details of how they were going to detect their visitor. All she knew was that it was going to somehow involve gravitational waves.

The interesting thing about gravitational waves is that they can come in all shapes and sizes. After all, a gravitational wave is simply a ripple sent out as a result of a source mass of some kind accelerating. They are normally associated with huge masses like black holes and pulsars colliding. But you can also create a gravitational wave by simply waving your hand back and forth. That would also create a wave that ripples its way across space-time. Unfortunately, it is such a small ripple that its detection becomes imperceptible.

The other thing about the ripples created by two black holes colliding is the distance that the ripples have to travel before they can be detected. Just like in the pond, the further out the ripples go, the more the ripples get stretched out. In the case of black holes and pulsars, they can be billions of light years away. Making their detection on Earth extremely difficult to do. So even though a gravitational wave travels at the speed of light, its detection can mean noticing a tiny fluctuation in movement less then one one-thousandth the width of a proton.

How do you measure something like that? Back in the twenty-first century, when the first gravitational waves of colliding black holes and pulsars were captured, very sophisticated instruments called interferometers were created to measure the almost imperceptible signs of the passing gravitational waves. Named LIGO (Laser Interferometer Gravitational-Wave Observatory), there were

two detectors set up in two different parts of the United States. One in the state of Washington and the other in the state of Louisiana. Each one consisted of a giant L-shaped structure with arms 2.5 miles (4 kilometers) long. A laser beam shone down each arm and mirrors at the ends of these arms reflected the light back. Using laser beams, scientists detected the physical distortions caused by passing gravitational waves.

The premise is this: If the beams from both arms arrive back at the same time, they cancel each other out, and no signal is produced in the detector. But if one of the beams arrives a bit late, a signal is produced, which signals the presence of gravitational waves.

Why two detectors? To make sure that what was seen by one was duplicated by the other, milliseconds later. Thus eliminating the chance that the first detector did not just get a false signal. As well, multiple detectors allowed scientists to more accurately pinpoint where the gravitational wave was coming from. These instruments were so sensitive that even traffic close by could cause the signal to be produced. If both detectors saw exactly the same signal, milliseconds apart, then localized noise could be eliminated. Thereby reducing the margin of error to zero.

Unfortunately, knowing all of this did not really help Xe. If measurement of the signals coming from a

gravitational wave were really that imperceptible, how was she going to detect them from such a small object as Xe from Xeron? The more she thought about this, the more she needed to confide in Andre. They met once again in the dining room so that Xe could bring Andre up to speed.

After listening to Xe's flow of logic, and processing the information presented by such logic, Andre was ready to add his two cents. He began by summarizing Xe's thoughts down into two discrete units. First, was the idea of the size of the mass creating the gravitational wave. Second, was the idea of distance. Xe's concern was that her data did not seem to provide a solution to her problem. Andre's response was to show that it really did.

Andre began with the idea of the size of the mass creating the gravitational wave. Most of the literature regarding this relied on black holes and pulsars to provide examples of the huge amount of mass necessary to create a gravitational wave of such magnitude to be detected billions of light years away. Not so much the mass, but the violent release of energy created by the two masses colliding. But there is another source of such magnitude existing at the time of the birth of the Universe. At a point in the beginning of the Universe known as a singularity. With the advent of the Big Bang coming out of this singularity, a release of energy began which surpassed even that of black holes and pulsars colliding. The beginning of the

Universe some 13.8 billion years ago created gravitational waves.

This idea was first presented as a solution to the problem of only being able to see so far back. There is a kind of wall, known as the Cosmic Microwave Background (CMB) that exists at approximately 380,000 years after the Big Bang. It was only after this wall became transparent that light was able to freely travel as photons to our eyes today. Since we tend to examine our Universe based on what light travels to us, the CMB created a limitation in our understanding of what was happening at the very beginning. The moment of enlightenment came when it was understood that even though we may not be able to see light, we were perfectly capable of detecting gravitational waves that were created by the singularity and the Big Bang event. Thus, allowing us to improve our understanding of what happened in our Universe prior to the CMB. Prior to 380,000 years after the Universe began.

Andre reminded Xe that something like a singularity could easily create detectable gravitational waves. More importantly, singularities did not just occur at the beginning of the Universe. Singularities exist at the very center of a black hole. Just what is a black hole singularity? It is the point in a black hole where all matter is crushed into an insanely small speck. Some people talk about it as a point of infinite density at the center of the black hole. A place where physics breaks down and all laws are null and void.

Other people refer to it as the place within a black hole that allows entry into a brand new universe. Somewhat of a more optimistic approach.

As Xe listened to Andre she was beginning to understand his point. If, in fact, Xe from Xeron was traveling to Goldilocks-P3 through a black hole, then the singularity produced by that black hole would release enough energy to produce gravitational waves detectable on Goldilocks-P3. For a moment Xe thought she had a solution. But upon further contemplation there arose an issue. Xe responded that if the singularity produced such a violent release of energy, then Goldilocks-P3 itself would probably explode under such assault. That clearly had not happened the first time. The time when the etchings were created. Xe at least felt, though, that they were on the right track.

More research clearly needed to done on what happens when one passes through one universe into another. Andre was already on it. He found that not all black holes are alike. There are those that can be traveled through safely and those where one is completely thrashed about until vaporized. Obviously, Xe and Andre were only interested in the safe kind.

The safe black holes are the ones that are referred to as large and rotating. The singularity contained within these types of black holes is very weak, allowing for safe travel

from one end of the black hole to the other. The fact that the black hole is very large and rotating, minimizes the squeezing and stretching that normally results in the annihilation of whatever it is that is traveling through the singularity. Andre and Xe had their answer. The kind of black hole that Xe from Xeron would be traveling through would have to be very large and rotating. That would create the weak singularity allowing for safe passage. They both soon realized though that a weak singularity would not be massive enough to create the kind of gravitational waves that could be detectable. They were back to the same problem.

This was where Andre introduced his second discrete unit of discussion. The idea of the distance traveled by a generated gravitational wave. Distance and strength of the gravitational wave are directly proportional. The greater distance the gravitational wave has to travel, the greater the strength of the initial release of energy has to be for there to be detection at the other end. In other words, a gravitational wave traveling billions of light years would have been stretched out significantly. Thus, requiring the initial release of energy to have been huge in order for it to be detectable. Energy inside the singularity of the rotating black hole would, in fact, be quite small. Small enough to allow safe passage, but maybe too small to be detectable.

Andre reasoned that even though the release of energy from the passage may be quite small, its effect may

still be recognizable due to the small distance that it had to travel between point of entry and capture. In other words, between the Great Divide and the device Andre and Xe needed to construct. The release of energy by the rotating black hole's singularity should be weak but very unique. Unique, because the short distance the gravitational wave had to travel would actually make its signal strong. The gravitational wave created should be very individualistic and identifiable.

Things were actually making sense. Andre and Xe felt they were well on their way to figuring out how to do this. The only question left was how to construct the apparatus necessary to detect the very unique and discriminate signal. Difficult, yes. Insurmountable, no. Just a mere technical issue.

Their answer lay in the location of the detector. Earth-based detectors are limited by the amount of seismic noise that is created. Thus, gravitational waves of very low amplitude are almost impossible to detect or measure. That's why early interferometers could only detect the merger of giant black holes and pulsars. The only way to detect the low frequency, low amplitude, waves is to move the interferometer into space.

In fact, such a device already existed. Known as an atom interferometer. These devices are capable of using

the wave character of atoms to measure the difference in wave patterns associated with gravitational waves. They are basically sensors in space that detect gravitational waves in a frequency range that is not measurable by other devices. Especially, those on the ground.

All of a sudden they were in business. They could utilize the capabilities on board Annihilation to create such a device. With some configuration here and alterations there, they could do this. In effect what they would be doing is using the orbiting Annihilation to continuously scan for a difference in atomic wave patterns coming from the vicinity of the Great Divide. More specifically, the gravitational wave frequency range generated by the singularity event associated with the rotating black hole that Xe from Xeron used to arrive on Goldilocks-P3. Where, exactly, should it point? To the rock with the arrows, of course.

X and Y Chromosomes

Chapter Seven

Andre and Xe had become quite good friends with Elizabeth and her partner Montgomery. Over the course of the last few weeks, they had started spending more and more time together. Discussing all kinds of things related to their lives on Goldilocks-P3. With the exception, of course, of Xe's relationship to Xeron and the research she and Andre were doing on inter-universe space travel. That was something that Xe and Andre felt the rest of the team were not quite ready for yet.

Andre and Elizabeth were the two humans of the friendship. They were spending much of their time preparing for a highly significant event that was scheduled to take place soon. Andre and Elizabeth were not the only ones, though, that appeared to be spending time together. The rest of the humans seemed to be engaged in similar activities. As a matter of fact, this was all not just some random act of mutual attraction. This was all part of a prearranged plan. A plan that they were all about to set in motion within the coming weeks.

Plan probably sounds a bit too harsh. It kind of makes it sound as if all the humans were programmed to preassemble at a specific time, in a specific place, and pair off. Pair off for what reason? For the satisfaction of meeting some expectation of a prearranged experiment? That was not the case. The thought that went into this plan was not just for temporary or experimental purposes. It was a plan to ensure the very essence of the mission. The survival of the human species. It was actually hatched long ago. Long before the actual journey to the Goldilocks system began.

Part and parcel of the goal to extend human speciation beyond planet Earth, included ensuring reproduction. Once colonization of Goldilocks-P3 had begun, it was essential that the initial five humans, to put it bluntly, multiply. Again, somewhat of a harsh word. In effect, it was to multiply according to all of the laws of nature that had been understood to date. That meant, employing a strategy of kick-starting evolution. Utilizing the method of natural selection that was described by Darwin. The key idea of which is differential survival through replication. But not just replication of the same thing over and over again. There has to be a replication with errors. Only with error do you have the possibility of introducing change. And with change, comes selection for survival of the fittest. Which, in turn, leads to evolution.

So, yes, there was planning involved for how all of this was going to occur. It was absolutely necessary. Because

of certain limitations created by the complex act of getting to Goldilocks-P3, there needed to be a road map. Planning for the moment when Darwinian evolution and natural selection could restart. For the second time. It was with this in mind that, prior to the actual mission, scientists began to try and better understand the process of replicating the human species in a foreign environment. Foreign enough to be called Goldilocks-P3.

In a sense, the research centered on the nature versus nurture debate. The idea that one or the other is more important in determining aspects of human behavior. Nature is what is considered to be human pre-wiring. Influenced by genetics and other biological mechanisms. Nurture is what is considered to be the influence provided by external factors. Such as the environment, exposure, life experiences, and learning. Things that occur long after the moment of conception. Interestingly enough, the debate turned out to not be a debate at all. It was decided by the team early on that both contribute equally in influencing aspects of human behavior. Such as personality, cognitive traits, and temperament. Which of the two was most important? It did not matter. The only thing important was to make sure that both nature and nurture were well accounted for in the plan.

The nature side of things was thought at first to be pretty well taken care of. Bring a male human together with another female human, provide for a set of conditions for

them to conceive, and before you know it, nature will take care of itself. Pretty simple. Well, not that simple. Turns out there is one slightly important event to consider. The moment of conception itself.

The original crew of Annihilation consisted of five humans and five androids. Of the humans, three of the five were female. The average age of the humans was twenty. It was going to take approximately forty or fifty years to get to Goldilocks-P3. Doing the math, that would mean, at the youngest, the humans would be sixty years old. Not exactly the optimum age to conceive children. Raising children, if done the right way, was doable. Conception? Not a good idea.

Nurture of an individual by an older set of parents was certainly something that had occurred previously in human society. There were many documented cases of grandparents raising their children's children when circumstances arose. In some cases the biological parents were simply not of a mindset to raise the child. Or accidents occurred which killed one or the other of the parents. Fortunately, there were grandparents able to step up and take over the childrearing responsibilities. There were also documented cases where the nurture of individuals was performed by the actions of the group and not just the biological father and mother in a nuclear family setting.

One such example was that of the kibbutz. It involved the idea of a voluntary society in which people lived within a social contract. The contract stipulated adherence to an egalitarian and communal form of social and economic lifestyle. Its members shared a collective responsibility in all aspects of education, culture, and social life. In other words, each kibbutz member was part of a unit larger than that reflected by the typical family. That included the raising of children. In some descriptions, the children all lived in a separate children's house. Their education was the responsibility of the kibbutz, not the individual parents. As well, the parents were not involved at all in the economic upbringing of their children.

So there was already a history of success in the nurturing of children by older parents and the larger collective as a whole. It seemed that as a model, there should not be any real issues with older parents raising children from a nurture perspective.

Conception? Giving birth on Goldilocks-P3? Now that was a different story. These were the two areas of concern that the scientists had to prepare for. Obviously, given the age of the humans on board Annihilation, the number of years spent in hibernation, and the unknown conditions awaiting them on Goldilocks-P3, expecting conception to take place naturally was a bit of a stretch. Since natural conception was off the table, that kind of eliminated natural birth on Goldilocks-P3.

The one thing that they could do, was to increase the odds of a successful post-conception. They could do so by trying to bring together two humans that shared a common bond related to child rearing. Male-male, female-female, male-female. It didn't matter. That bond could be a natural attraction of behavioral traits or it could be something instilled as a part of education and training. Thereby increasing the odds of a better overall postpartum environment for raising the children. In that vein, increasing those odds made total sense.

The best shot at doing this would involve the selection process of the crew. There was already a life-long pairing of a human with an android. That had been occurring for a long time now. So that ratio was already well thought out and predetermined. With a large number of human astronauts to select from, the task became finding the best matches between male and female. Over a period of time, all players were observed. All behaviors were analyzed. All identity quotients recorded. Special interests were taken into account. Special anythings between two individuals were duly noted. When the final crew selections were made, all of these things were taken into consideration. Those with the highest degree of shared beliefs, behaviors, and likes were identified as potential pairs. And, of course, those having the highest degree of interest in each other, were selected for the initial mission. These would become the parents of humanity's future. These would be the ones with the highest likelihood of successfully sharing their genes and becoming good parents.

Unfortunately, there was still the overall question of conception and giving birth. Everyone knew that it was just not a good idea for someone in their sixties conceiving children. Studies had shown that women after age thirty-five increased their chances of running into birth related complications. The chances of having a healthy baby decreased. A woman is born with all the eggs she is ever going to have in her lifetime. As her age increases, so does that of her eggs. And with that, the quality and quantity of her eggs decrease. Leading to an increased risk of miscarriage and chromosomal abnormalities, as well as gestational diabetes and still birth. Although primarily affecting women, the risks exist for males as well. For men, the age range begins more around forty or forty-five. Once again, the risks include increased abnormalities, miscarriages, and still birth. Children of this age group tend to experience more autism, schizophrenia, and other mental health disorders.

With that in mind, the scientists had to consider other options for conception. They all had to consider other options for fetal development. The only thing still left on the table was slightly controversial. They had no choice but to consider something called ectogenesis.

Ectogenesis

Chapter Eight

While their human counterparts were busy with their behavioral preparations, the androids began their part of this critical part of the mission. The androids were not exempt from this whole plan to reestablish humanity in a different part of the Universe. They too were part of humanity now. They too, would be sharing in the responsibility of raising the first generation born on Goldilocks-P3.

Their task was two-fold. The first part was constructing an addition to the habitat that would house the children. Otherwise known as the Children's House, this would be the center for all things related to the children. The Children's House was to be split into two sections. One for the artificial wombs that would nurture the fetuses. The other, for the nurturing of the children themselves after having exited their artificial environments. In other words, all things before and after their birth.

The second task was going to be the more difficult of the two. It involved assembly of the necessary equipment required for the onset of ectogenesis. Without the

successful completion of this task, there was no point in even building a Children's House. There would be no children. What is ectogenesis?

Ectogenesis is essentially the growth of an organism in an artificial environment. The point here is that it is the growth of a human fetus or embryo completely outside of a mother's body. This was the key that the scientists had been looking for. Ectogenesis would solve the problem of the biological parents being too old to safely procreate on Goldilocks-P3.

In order for ectogenesis to even have a chance at success, you have to start with a viable egg and sperm. The condition of the egg and sperm effectively determines the eventual outcome. Producing the egg and sperm on Goldilocks-P3, and their eventual combination, was not an option. It was not even an option to do so in transit to Goldilocks-P3. One would still have the problems associated with time and age, as explained earlier. No. In order to achieve success, the sperm and eggs of the human astronauts would have to be collected prior to the mission itself. Based on the behavioral match ups of the best candidates. While the astronauts were still young. While the eggs and sperm were still at the height of their viability. There was no question. They would have to be frozen. Frozen for the entire flight. Until landing on Goldilocks-P3, where the process of ectogenesis could begin.

The decision to go with ectogenesis was not made lightly. There were many bioethical and legal considerations that had to be taken into account. Mainly, the moral and ethical issues that arise in relation to a given medical policy and practice. Ultimately, involving control of the human genetic code. Ectogenesis could change the whole way motherhood is viewed. Mothers would no longer be needed. They would no longer be required for the creation of a human life. That could change the whole definition of life in general.

The question at the time became, how does a society deal with this? In the twentieth century, the answer was to completely ban the possibility of this happening. Religious and political restrictions made it nigh impossible for anyone to even explore the topic, let alone apply its techniques experimentally. Supporters of ectogenesis supplied their own arguments in favor by showing that, like it or not, society was already heading in that direction anyway. Ectogenesis had already started, for example, with the introduction of in-vitro fertilization. Whereby the egg is fertilized outside of the mother's body in a growth medium. Only later to be reinserted back into the mother's womb. Then too, there was neonatal intensive care, whereby the minimum gestation age of human fetuses was increasingly being pushed to earlier and earlier times. The benefit? To save the unborn. To further the species.

In the end, ectogenesis won out. The myriad of ethical and legal concerns were deemed to be Earth related issues only. These types of questions did not really apply when talking about human speciation on a distant planet. At least, not yet. Of more concern to the mission scientists was the effect of being born outside of the womb. What would that do to later development? In other words, would something be missing, such that, some essential bond would not get created between a mother and child? Between a father and child? This was certainly a concern worth noting. There had not been any research done on this since ectogenesis had not been allowed experimentally.

The choice became clear. Their only option was to proceed with its implementation on Goldilocks-P3. Their hope was that there could be a third step in the nature/nurture argument. An intermediary step that could be best described as a transcription step between the two in the prenatal environment. It would be in this transcription step that exchanges could occur that would replicate the kind of requisite bond between an adoptive mother and her artificially conceived child. What would that intervention look like? A couple of things. First, a set of adoptive parents who had been behaviorally matched for parenthood beforehand. A couple intently focused on making sure the fetus developed successfully in all ways possible. Second, a combination of sensual and tactile stimulation between the adoptive parents and the developing fetus. A prenatal environment conducive to a rich bonding experience.

Together, they would create the transcription needed between nature and nurture.

The final decision to go with ectogenesis became one of usage. The use of ectogenesis would be a one time occurrence. After birthing the first generation, it would no longer be needed. It would be up to the first generation to resume procreation in its more natural way. Let nature and Darwinian selection take its course.

What are the steps necessary for creating ectogenesis on Goldilocks-P3? The first step had already been taken care of prior to the mission lifting off. That step was making sure that there was an available supply of both sperm and eggs. A supply that was not only viable but adequately represented the genes of those on their way to Goldilocks-P3. A representation that included samples provided by all the astronauts involved in the mission. Just to make sure there was sufficient genetic variability in the sperm and eggs selected for combination.

Gathering the sperm and eggs was the easy part. Making sure that they would survive the journey, was another. For that purpose, they were all frozen. Egg freezing is also known as oocyte cryopreservation. Eggs are harvested from the ovaries after a period of using fertility drugs to induce ovulation. A process which then allows for the harvesting of multiple eggs. The eggs are

frozen unfertilized and stored for later use. The process of freezing cools the egg to subzero temperatures, which stops all biological activity and preserves them for future use. An egg is then thawed at a later time, combined with sperm, and implanted into the uterus via a process of in-vitro fertilization. In the case of Goldilocks-P3, an artificial uterus.

The freezing of sperm follows a similar process and is also referred to as cryopreservation. Instead of harvesting eggs from a female, the male's sperm is collected, frozen, and stored for later use. Finally, when ready for interaction with the female's eggs, the sperm is thawed, tested for viability and mobility, and then combined. "Stored for later use", of course, meant, once the astronauts were safe and sound on Goldilocks-P3.

The second step for creating ectogenesis had to do with building the artificial womb. This is what the androids on Goldilocks-P3 were in the processing of doing. They too, had certain requirements that had to be met. Steps to follow. The first of which was to create an artificial womb or uterus for each of the foreseen fetuses. Compared to the normal incubator that was used to assist newborns having medical issues, such as being born too soon, the artificial womb was far more complex. Normal incubators allow for newborn survival outside of the womb until mid to late trimester. The artificial uterus allows survival outside of the womb for the entire gestational cycle. How this is done

involves a seriously complex marriage of bio and nano technology.

The key idea behind the artificial womb is that it must model the real womb in all aspects of prenatal development. For example, the inner lining of the uterus should not be made of anything except real, living tissue. This would allow, additionally, for a placenta to develop naturally on the endometrium wall. In case that didn't work, an artificial placenta would have to be constructed to do the same work. The placenta is an essential and crucial piece of successful fetal development. Responsible for transferring antibodies, hormones, and nutrient regulation. An artificial placenta must completely model the real placenta in all of these functions. Including modeling what the mother eats, the frequency with which that takes place, and how that gets delivered through the placenta.

Besides a placenta, there must be an amniotic sack. More importantly, the amniotic fluid that occupies the sack. The artificial amniotic fluid is critical to fetal well being. It contains an ever changing mixture of nutrients and growth factors. It protects and cushions the fetus. Finally, it is actually inhaled and exhaled by the fetus, essential for the development of the lungs.

Temperature is another important ingredient of the artificial womb. Exact temperature regulation must be

maintained at all times to keep the fetus in optimal condition. A mother's womb is located deep inside her body. Its temperature is slightly higher than the core body temperature, which is about 98 degrees F. Heat is transferred to the fetus via the placenta and the uterus. Just as the core body temperature does not normally change, that of the womb should not radically change either. The same has to apply to an artificial womb.

Finally, there is stimulation. Fetuses are active listeners and responders. Just like a real mother's womb, the artificial womb must provide proper physical and sensory stimulation. Simulating exactly how a real mother moves, walks, and talks. The fetus is eagerly sensing the world around them throughout their time in the womb. Touch is the first sense to form. And even though it is dark inside the womb, enough light is allowed in through the skin that light patterns can be tracked. Suggesting that human face recognition can occur prior to being born. Sounds play a crucial role in maintaining the natural rhythm of a real mother's heartbeat. As well, a fetus can hear external sounds well enough to distinguish and identify voice patterns.

In the end, you have ectogenesis on Goldilocks-P3. This is what the androids were working on. Building the structures where ectogenesis would take place. The structures where the thawed eggs and sperm would unite. The artificial wombs where the fetuses would live for about

nine months. The Children’s House where the nurturing of the children would lead to a brand new generation of humans.

Roll Out

Chapter Nine

The androids had their work cut out for them. Fortunately, this was a well-rehearsed scenario. They had practiced all of this over and over again on Earth. They understood the steps. The importance of getting it right. It was different trying to implement the steps on Goldilocks-P3. There was no one there to guide them along. No one there to ask questions of. Still, they followed the steps they had been taught. Knowing that, by doing so, the end result would reveal itself at the end of the day.

Every evening they, and the rest of the team, would meet to assess their progress. After only a couple of days, the Children's House took shape. Day after day, what became known as The Womb, held knew meaning. It was beginning to take on the appearance of a sanctuary where the children would shelter in the safety of their artificial wombs. A series of artificial wombs, just waiting for their first guests. It had been decided early on that there would be a total of ten artificial wombs built. That would double the population. Ten more humans would be about all they could handle at the moment.

Andre and the rest of the humans had their own set of challenges facing them. Each of the pairs were busy learning how to operate all of the specialized equipment that was being set up by the androids. The human pairs would not only be responsible for the technical aspects of operating the wombs, but for the social and sensory contact between adoptive parent and fetus. All those things that provide the prenatal fetus with human touch, stimulation, and the sounds of comfort needed for proper development.

After a few weeks, all was done. The Children's House was constructed. Each individual artificial womb had been completed and thoroughly tested. The time had come to execute the plan. First up, selecting the eggs and sperm for in-vitro fertilization. Simply put, the first step was to manually combine a sperm and an egg in a laboratory dish. Then, place under incubation and wait for fertilization to occur. Once cell division starts taking place, you have what is known as an embryo. After a period of three to five days, the embryo is transferred to the artificial womb. Seemed like a simple recipe.

Unfortunately, it wasn't really that simple. The success rate of fertilization was not one hundred percent. The real success rate varied quite a bit. Only about ninety percent of the eggs successfully survived the freezing and thawing. Of those, only around seventy-five percent were successfully fertilized. At first, the team was very concerned. Once they realized that this was just a matter of statistics and not a

limitation of their abilities, they continued on knowing that what they were experiencing was quite normal.

During the period of three to five days, embryos were individually transferred to their awaiting artificial wombs. What would be their home for the next nine months. All indications were that the artificial wombs were mimicking the behavior of a real mother as much as possible. After a period of around nine weeks, the embryos would officially become fetuses. Over the following days and months, each member of the team visited the fetuses on a daily basis. At various times throughout the day. They would read to them. Play songs for them. Do everything they could to sooth and stimulate them. In other words, mother and father them as a real mother and father would do.

A Surprising Discovery

Chapter Ten

It’s been about six months since the astronauts have landed on and made Goldilocks-P3 their home. After arriving in what appeared to be winter, they were well on their way to their first summer. This will be their first test on how well they understand the seasons here, since the planet revolves around two stars. So far it has been as they expected. Spring followed winter and now summer should be following spring. All indications, at least by the length of daylight and warmth of the day, are that this is so. What will be interesting is when fall follows summer, only to have summer return once again as the planet transitions from the first star to the second.

The main concern of the astronauts is how all of this will affect their crops? Ever since they started growing their vegetables in fields surrounding the habitat they have been quite happy with the results. Starting with a very limited garden of winter vegetables, and now with a more substantial summer crop. Those food sources, as well as the natural food sources growing wild nearby, have added considerably to their ability to thrive. To their ability to support a growing population once the newborns arrive.

Weather-wise, they have not had to put up with any adverse conditions. They did receive some light snow early on, but at their location it didn't last long. Obviously, there must be greater snow going on at higher elevations. Helping to feed the river that flowed nearby and down into the Great Divide. Occasionally, the skies would cloud over and some precipitation would fall. It was actually quite comforting, as it was another reminder of being on Earth. As far as they could tell, a fairly typical weather pattern. Good for the gardens. Good for them.

The supply of food is of utmost importance to keeping the astronauts alive on Goldilocks-P3. It was estimated that each of the five human astronauts would require three to five pounds of food per day. Of course that all depends on the caloric intake required for body size and how much energy one expends. It is amazing how by adding just a few tilled gardens to the recipe, they were able to create a sustainable environment that not only provided them with food, but generated oxygen and purified the air.

Andre and Xe were continuing to work on their atom interferometer. They were making good progress in figuring out the logistics of how all of it was going to work. One of the things they needed to do was to make a visit back to the Great Divide, head down the canyon, and return to the spot by the river where the arrows were etched in stone. This for the purpose of providing the growing list of numbers that

were needed in order to triangulate the coordinates with Annihilation.

On the way past the tilled gardens, they were stopped by a couple of the workers who seemed quite perplexed. They explained to Xe and Andre that things did not quite appear, well, normal. Things were different today. Certainly, not like they had left them the previous night. Before going back to the habitat. Xe and Andre assumed that they must be talking about tools being misplaced or gates left ajar. They replied that maybe someone had come earlier in the morning or later that night and moved things around as they made their way. This did not seem to appease the two workers. They were talking about something more serious than one's tools being moved. They reiterated that, somethings was amiss.

That being the case, Xe and Andre accompanied the two workers back to the field. They walked the rows together to see what they had seen. At one point, Xe bent down to get a closer look at one of the plants. Andre was encouraged to scan the rows of the field looking for anything odd or out of place. At first glance Andre didn't really notice anything special. On second glance, he noticed that a number of the rows appeared to have plants missing. There were vacant spots where, according to the workers, there were plants the night before.

Xe stood up and seemed equally concerned. The plant she was looking at appeared to have had its leaves chewed on. Apparently eaten by some thing or some one. As they walked down the rows, there was further evidence of the plants becoming someone's meal. The very odd thing was that only some of the plants had been eaten. Only some had been removed from the ground. Overall, the field was still in pretty good condition. It was almost as if it was intentional. To give the illusion that all was still OK.

As they made their way back to Simplicity not much was said. They were all quietly trying to figure out what could have caused such a thing. As they filed into the common area of the main habitat they prepared an announcement for a meeting. All parties were to assemble in the common area as soon as possible for a discussion of what had just transpired.

The meeting started off with a thorough description of what had been seen. Xe and the others reassured everyone that there was no real threat to the food supply. But there was definitely something going on that needed to be addressed. They needed to figure out what had been eating the plants before it did become something more serious.

The meeting was opened up for questions. The others were encouraged to share any of their ideas. Xe was one of

the first ones to speak up. She noted that early on, even before they had touched down on Goldilocks-P3, there was an eerie feeling of there being something missing. On such a beautiful and, apparently, bountiful planet there did not seem to be any signs of life. Other than plant life. Gliding over the surface trying to figure out the best place to land, allowed the androids to see plenty of plants and water. But still, no other forms of animal life. Once on the ground, Xe still experienced that feeling of something missing. Everything pointed to the fact that there should be other forms of life around. Some kind of animal life. Forms of life that could take advantage of all the lushness that surrounded them.

As Xe spoke, the rest of the team also started to wonder. Where was everybody? Where were the animals? Xe and Andre soon realized that Xe's talk had kind of stirred everyone up. They needed to bring the conversation back into focus. They needed to get everyone thinking like scientists again. The first order of business became finding more evidence with which to make an intelligent and scientific assessment.

As such, a couple of different teams were assembled. One, to go back out into the gardens to gather more information. The other, to spread out more into the surrounding areas to discover if anything else had been disturbed. What were they looking for? Anything, really. Anything that might provide a clue as to what or who it was

that was eating the plants. Were there specific plants that were being eaten while others were ignored? Were there any tracks left behind? Tracks that might have led their way into the gardens from on the ground? From the air? If they were extremely lucky, was there any evidence left behind? Such as droppings or, perhaps, a deceased body or two.

Later that evening they all gathered round once again to announce their findings. To their surprise, the group sent out to explore the outer areas of trees and bush, many with fruit to be had, announced that these areas too had evidence of being chewed on. In a way, harvested. There appeared to be no preference for any one type of plant over another. There were no tracks that could be identified. It was as if, something had just appeared out of thin air.

All they had to go on was that something was eating the food supply. Without any further evidence to go on, they needed to come up with some. The conclusion was that they needed to come up with a sighting. A visual of whatever it was that was doing the munching. That was certainly something doable. They had plenty of cameras around that could be set up to to witness such an event. Cameras that could be set up to not only survey the scene during the day, but also capture any nighttime activity occurring under the cover of darkness.

That being decided, the next day they went to work assembling and installing the cameras in all appropriate locations. Cameras were set up in the gardens and in a few locations further out in the wild. Hopefully, to catch a thief. The assumption being that whatever it was, it would return the next day. And, hopefully, the following days until they could figure what it was.

It wasn't until the next morning that they were ready to turn everything on. They all crammed into the video control room to catch the first images coming across the screen. Everything was normal. During the course of the day, they gradually began to disperse. Disappointed that nothing was happening. The feeling being that if something did happen, it would be captured on the recording they could view later. But as daylight ended, there was still nothing there.

That first night was spent by all in high anticipation of capturing some kind of image. In the morning, when they all reassembled, they were finally rewarded. The images were not exactly the best, due to the extreme low light conditions. But there was definitely something there. Something had matter-of-factually made an appearance. The question was, what was it?

What Was It?

Chapter Eleven

Even though the cameras had caught whatever it was that was eating the plants, they were left without an explanation. Why weren't they seeing these things during the day? How did they just appear out of nowhere and, then, seemingly disappear? They needed to step back and think about all this. Do some research. Find a solution.

Xe, Andre, Elizabeth, and Montgomery isolated themselves in one corner of what had been set up as the library. Not really a library in the traditional sense with stacks of books in row after row of bookcases. This library consisted more of what could be described as eBooks. Electronic versions of Earth's history compiled and residing within memory. They paired off and started trying various search terms. Things like "farming pests", "crop pests", and "crop destruction". Nothing immediately caught their eye. After a short while, Elizabeth tried "crop plagues" and that got their attention. Buried in the search results was information about insects called locusts.

The search results indicated that locusts are cousins to another insect called a grasshopper. They are normally

harmless insects, but under the right conditions can assume ferocious appetites. Such that, in the nineteenth century, there was assembled one of the largest swarms ever seen. They came in the summer. The swarm was up to 110 miles wide and up to a half mile deep. They were so numerous as to darken the sunlight. They literally ate everything in site as they made their way from one farm site to the next.

This was an example of the most serious infestation. Plagues of locusts had threatened farms all around Earth. It seemed that the transition to a voracious eater is triggered by the release of a brain chemical called serotonin. During the dry summer season when vegetation is limited, the movements of the locusts trigger the release. Causing them to swarm in search of new food supplies.

The four thought there appeared to be a connection here. A form of insect suddenly appearing out of nowhere, devouring every crop they came into contact with. But that's where the connection fell apart. The gardens on Goldilocks-P3 were only lightly touched. There was no evidence of hoards darkening the daytime sky. There were some similarities, but it did not appear that it was locusts.

At least they had some search hits though. They were on the right track. Digging further into the search term "crop plagues", they came upon an article describing what were

termed biblical plagues and the animals that caused them. Among the ten that were described was an offender called the mayfly. Named for their seasonal emergence, mayflies hatch by the thousands. All at once. And, within hours, they are gone.

At last they had a smoking gun. Whatever it was that was eating their plants, sure sounded like it had the behavior of a mayfly. They finally had something to go on. They needed to understand the behavior of a mayfly more in order to better understand their current friend or foe.

Mayfly Effect

Chapter Twelve

Since Elizabeth and Montgomery were the ones to first link the happenings on Goldilocks-P3 with the likes of the mayfly, they were the ones chosen to continue the research. The first thing they wanted to know was, what is a mayfly? According to their files, a mayfly is an aquatic insect that is part of an ancient group of insects similar to dragonflies and damselflies. They exhibit traits that can be traced back to the first flying insects on Earth. To the great interest of Elizabeth and Montgomery, they are known for their extremely short lifespans and appearance in large numbers during the summer months.

The mayfly actually advances in life through a series of stages. The first or immature stage being an aquatic form known as a nymph. Nymphs may actually live for years in what is normally fresh water. Finally, after a period of transformation, they emerge from the water as adults, with the addition of long tails and wings. The winged stage is known for its mass emergence into the skies above. The population seems to emerge all at once for a day or two. They are everywhere. Moving around each other in large groups and settling down on the vegetation below. This mass emergence seems to be synchronized with dawn or

dusk. Light, or the lack of it thereof, being the prime motivator.

The primary purpose of all of this? Reproduction. That's it. The lifespan of the adult mayfly varies, but is extremely short. Anywhere from a few days to as short as a few hours. During that time, the males fly high above and the females fly into the swarm for mating. When all is said and done, the males spend the rest of the night in the vegetation and the females make their way back to freshwater for laying of their eggs.

As with most other types of animals and insects, mayflies are preyed upon by carnivorous vertebrates. One, of which, are birds. Birds, too, may fly into the swarms and consume as many mayflies as desired. Any surviving mayflies, after successful mating and the laying of eggs, simply die and fall to the ground or back into the water.

Well, Elizabeth and Montgomery thought that was all quite enlightening. It seemed to describe very well what was happening in the gardens and the surrounding bushes and trees. But these were not mayflies. They understood that. There were enough inconsistencies to indicate that. What was illuminating though, was their behavior. That's what they focused on.

They had questions. For example, if some of their species of mayfly eventually fell to the ground and died, where were all the bodies? Certainly the birds did not eat them all. They knew of no birds. And were they laying dormant in the ground somewhere prior to hatching? Or hiding in the fresh water stream somewhere? Maybe most importantly, if they were being preyed upon, where was the evidence of there being a predator? The most likely candidate would be birds. But they didn't have any birds.

The first thing that Elizabeth and Montgomery did was to request another team meeting to discuss their findings. Sitting down later that day, they went over all the research that had been compiled. They posed all of their questions and gave what answers they could. Then, the team began to synthesize their ideas into something they could work with. First order? Give the visitors a name. In other words, what do we call these things? They decided to call them no-see. The hunt was on for the no-sees.

The team thought it would be a good idea to capture another night or two of camera sightings. But when they looked at the recordings the next morning, nothing showed up. Their only option was to return to the first night of the cameras working. The only night they were able to capture a sighting. As far as they could tell, the no-sees had been around a total of four nights. Only one night of which they were captured on camera.

The team assembled in the video control room once again to review the first night, the only night, that the no-sees were captured. They decided to actually slow down the process and even zoom in occasionally to catch anything they may have missed. They were able to make out the swarm building over the garden. Sometimes, dipping down and alighting onto the plants. There seemed to be this dance going on between pairs of no-sees as they flew into and around each other. Elizabeth and Montgomery added their commentary that this appeared to be mating behavior. Then, just as quickly as they had formed, the no-sees started to break up. Frantically. The swarm started to drift apart and scatter, until they were gone.

At this point, the team decided to zoom in and examine in more detail something that caught their eye. Something else appeared to be moving along with the swarm. As the detail emerged, they could see that there was actually some other winged animal that had mingled their way into the swarm. They were performing a similar dance, while momentarily resting on a plant or two. As the swarm started to break up, it appeared as if the other winged animal was actually eating the no-sees. The observers were convinced that the plants disappearing was due to the plant being pulled up as the predator harvested the no-sees. It became clear, that the more they ate, the less no-sees there were. Until, they all disappeared. Until, the other winged animal had also disappeared back to where they came from. Wherever that was?

So what had they just learned? The main thing was that there was not just one pest, the no-sees, but two. The other winged animal they simply named the no-see-raptor. Not knowing what it really was but knowing that the two together provided some answers to the questions that had been raised. Where were the bodies of the no-sees? The assumption was that they had all been eaten by the no-see-raptors. So they were, in fact, being preyed upon. Were the no-sees mating? Again, apparently yes. Finally, there was an explanation as to why some plants were apparently missing in the rows. The no-see-raptors were simply ripping the whole plant out of the ground. A plant that had become laden with no-sees. It was more productive to carry the whole plant back to wherever they came from.

The questions that had not been answered had to do with where they came from. Obviously, they did not live long. Just a matter of four days. Where were the no-sees hatched? There must be some stage of their life where they are lying dormant. For that matter, they knew even less about the no-see-raptors. These were questions for another day though. For now, they felt secure in the knowledge that there really was no threat to their food supply. The no-sees appeared to be very conservative, almost conservationist, in the management of their food supply. The no-see-raptors? Not so much.

UNDERGROUND

Chapter Thirteen

Now that all the commotion regarding the garden pests had temporarily subsided, Xe and Andre felt compelled to resume their trek to the Great Divide. They still needed to complete their task of supplying measurements for the atom interferometer.

They stepped away from Simplicity with the intent on reaching the canyon wall in just a few hours. They made their way past the gardens with a sigh of relief and continued hiking towards their destination. Along the way, they passed an area far off to the left that looked out of place. Unusual. There were noticeable mounds on the top of the ground that gave the appearance of having recently been disturbed. It reminded them of gopher holes they had seen back on Earth. Maybe even moles or voles. Whatever they were, they didn't remember them being there when they had passed this way sometime before.

Once again, they felt compelled to abandon their mission to the Great Divide. This seemed more important. Curiosity got the better of them. They diverted from the main trail and proceeded in the direction of the mounds. It

wasn't too long before they got there. When they did, there was this horrible smell that wafted its way from the surrounding area.

Not wanting to stay too long, they quickly surveyed the surroundings for clues as to what they were seeing. Scattered over much of the ground were the remains of the no-sees. Seeing them up-close assured them that what they had seen on the video and what they were looking at now, were one and the same thing. Nothing was moving. The mounds, although freshly dug, appeared to be quiet. Who knows what this place had looked and felt like just a few nights ago.

Xe and Andre hurriedly made their way back to Simplicity to seek the advice of the others as to what to do next. After explaining what they had found, the reply was unanimous. They needed to go back and acquire samples. Bring back something to the habitat that they could work with. Xe and Andre agreed and went about picking out the tools necessary for the excavation, so to speak. One thing was certain. They needed to make sure to gather appropriate breathing devices with which to block the smell of the rotting no-sees.

The next day Xe and Andre left on their mission to gather evidence. They were getting quite familiar with the hike past the outer gardens. This time though, they were

loaded down with additional equipment. Making their journey a little more strenuous. Once reaching the site of the mounds and small holes, they donned their breathing masks and started in.

The first thing was to document the site. As if it were a crime scene. They took quite a few pictures, laid down trench parameters, and jotted down measurements so that, if they had to, they could recreate the scene later. Walking around the site was a little more difficult than expected. The number of rotting no-see carcasses made it extremely slippery. Instead of firmly stepping from place to place they kind of slid and squished their way from here to there.

It was time to get down to the nitty-gritty of the real reason they were there. Time to get on their hands and knees and get themselves dirty. They started by picking up some of the no-sees and placing them in small vials for transport back to Simplicity. Trying to get a good mixture of those that were fresh and those that were, well, decomposing. Next, they crawled their way to one of the mounds. Not really sure what was going to happen, they carefully began to uncover the mound to expose the hole hiding underneath. Even more carefully, they began to excavate the hole.

There, lurking just below the surface, they found what they were hoping to find. It was a no-see-raptor. It wasn’t a

large animal. About the size of a mole. The unique thing about this animal was that it had wings. So it was also kind of like a bat. It did not seem to react to their presence. No, it didn’t even move. It was almost as if it was dead. The surrounding cavern within the hole was filled with the excrement of the no-see-raptor. Obviously that, and the no-see carcasses, being the source of the foul smell.

Just as before, Xe and Andre meticulously placed samples into small containers. This time they were small pellet-shaped droppings. Finally, they were left with the task of dealing with the body of the no-see-raptor. Breaking out a larger container, they proceeded to extract the animal from its nest. Still no movement. Still no reaction. Closing the lid on the container, they felt a sense of relief. They only needed to collect a couple more of the no-see-raptors and they would be done. Then, they would be able to make their way back to the habitat.

Entering the habitat, they were greeted by Elizabeth and Montgomery who quickly transferred the contents of the specimens to their possession. Any one of the team members was equally qualified as a scientist to deal with the proper care and testing of something of this nature. It was felt by the team though that Elizabeth and Montgomery had a better understanding of the task at hand due to the extensive research that they had done. Consequently, they made their way to the clinical laboratory where they would begin their examination and identification of the specimens.

Once in the lab, they proceeded to separate the specimens into three groups. Place them in three different environments, each within their own clean and sterilized container. Direct observation is the best first step, so each no-see carcass was carefully placed in its own dish and spread out slightly. So as to be able to completely view its structure and form. The bodies of the no-see-raptors were also placed in their own dish of an appropriate size. Lastly, the no-see-raptor fecal droppings were placed in their own container. Elizabeth and Montgomery then began to scan each of the three for identifying markings. Markings that were duly noted on documents assigned to each one.

They began with the no-sees. Their bodies included a long tail and wings that did not normally fold flat. They were very delicate looking, the paired wings being membranous and triangular. The hind wings were much smaller than the forewings. They had short, flexible antennae, and comparatively large compound eyes. Very typical of an Earth insect of similar size. Like a mayfly.

Next up were the no-see-raptors. At first glance, once again, they looked very similar to a cross between a mole and a bat. Their bodies were very small, with inconspicuous eyes and ears. They had short powerful forelimbs with large paws. Obviously, adapted for digging. Overall, they showed complete adaptation to living in a subterranean environment. The wings? Now that was something different. The forelimbs themselves, although short and powerful,

were accompanied by a set of wings. The wings were very thin, consisting of a number of bones. More than likely allowing for increased maneuverability. The surface of the wings had small bumps that were probably touch sensitive to a changing air flow.

Finally, the droppings were examined. As the solid or semi-solid remains of the food not completely digested by the no-see-raptors, it could possibly contain some very valuable information. Besides the awful smell that accompanied it due to the bacterial action that was taking place. Generally used to identify the diet of the host, the host in this case was surely consuming quite a few no-sees.

Once they had been properly identified, a closer examination was in order. It didn't take long for the no-sees. There really wasn't much going on. They had been dead for quite awhile. The fecal droppings deserved a more in-depth analysis of their contents. Something that they planned to do at a later time when they had access to a microscope. When they went to more closely examine the no-see-raptor, Elizabeth thought she detected a slight movement. Maybe more of a slight twitch. In either case, it appeared to still be alive. Ever so slightly.

Elizabeth jumped back, quite startled. Montgomery immediately felt the tension in the room heighten. Montgomery could tell there was something alarming going

on with Elizabeth. They exchanged glances and she whispered to Montgomery what she had witnessed. They both decided that it was time to take a break. Get some air. Get help.

Symbiosis

Chapter Fourteen

As they made their way out of the lab, Elizabeth and Montgomery were met by a highly expectant Xe and Andre. They had been patiently waiting for some kind of report. As patient as they could be anyway. They could tell from the faces of Elizabeth and Montgomery that something had just happened inside that was quite unsettling. Just what it was they were quite unprepared for.

Elizabeth hesitated a little but then made it quite clear that she had seen the no-see-raptor suddenly flinch. Just once and then it stopped. The thought that the raptor could still be alive had never entered their minds. But if it was true, they needed to act fast. Andre confidently stated that they all needed to go back in and recreate, as quickly as they could, the environment of the burrow. Make it dark, make it quiet, and regulate its temperature. There was something in the environment of the container that was causing the no-see-raptor to stress. The other raptors were probably experiencing this as well, but they were not being watched as closely. So they needed to make things equal. Make them feel as if they were still inside their burrows. Bring the stress level back down.

Without hesitation, they returned to the lab. The makeshift examination room. They all knew what to do. Xe went to work applying a monitoring device to the one no-see-raptor Elizabeth said had exhibited signs of life. Elizabeth set to work regulating the temperature within the containers to that which resembled their underground burrow. Andre went to work soundproofing the chamber. Montgomery handled the lighting by covering each of the containers and turning down the brightness of the overhead lamps.

After an hour or two, they all fell quiet. Silently positioning themselves around the external device set up to monitor the raptors. All looked normal. With one exception. To their amazement, the sensors picked up a faint heartbeat. A slowed breathing and a very slow metabolism. In other words, they had a patient.

Once again, they exited the lab for further discussion. They actually had a living no-see-raptor under their care. The four of them soon came to the realization that they had an opportunity here to understand the life cycle of this animal. Even more so, they had just confirmed the existence of an animal life form on Goldilocks-P3 other then themselves. As scientists, they had hit the jackpot.

Now became the hard part. Putting together all of the pieces of the puzzle. How did this life form exist? How long

did it live for? What part did the no-sees play in that existence? The newly excited scientists had a couple of other clues yet to be examined. Those being the no-sees themselves and the fecal material left behind by the no-see-raptors. Somewhere within lay the answers.

They started with the fecal material. That would give them the best clues as to what was inside of the no-see-raptors. What made them tick. Montgomery quickly commandeered a microscope and began taking a closer look. Much closer. Montgomery's mind started to wander a bit. Not very typical of an android, but this was not a typical situation. Ironically, Montgomery thought about how odd it was to have traveled 40 trillion light years to be standing in front of a container of fecal material about ready to examine its contents. Just a fleeting moment really. Montgomery began to call out the constituents of the fecal droppings as the contents were revealed. It appeared to be made up of about 75 percent water and 25 percent solids. About 95 percent of the solids consisted of dead bacteria and other undigested substances. The last 5 percent of the solids? To Montgomery's surprise, it appeared to consist of some kind of parasite. Looking more closely they were not parasites at all. They were eggs. Eggs that had, somehow, passed through the intestinal tract intact.

Having a hunch, Montgomery quickly switched microscopes to re-examine the body of a female no-see. Looking very closely, Montgomery was able to see that this

particular no-see was loaded with eggs. And, confirming Montgomery's suspicion, the egg examined matched the egg found within the feces of the no-see-raptor exactly.

The others gathered around as Montgomery tried to explain the ramifications of his hunch. It was Montgomery's belief that there was a special relationship between the no-see and the no-see-raptor. The raptor would eat the no-see quite randomly, including those that were female with fertilized eggs. The eggs would find their way to the small intestine and, similar to a parasite, would make their way out of the body of the no-see-raptor through defecation.

They all agreed that this seemed like a perfectly logical explanation. It explained what the no-see-raptors were eating and it explained how the no-see eggs had made it into the fecal droppings of the no-see-raptor. What it didn't really explain, at least well, was the special relationship that Montgomery had referred to. There had to be more to the story. Would the egg embryonate? In other words, turn into a no-see embryo? Montgomery went back to the literature to see if an answer could be found.

To Montgomery's satisfaction, there were plenty of scientific papers documenting this special relationship. Plenty of evidence to support a very special interaction that can occur. It was called symbiosis.

Symbiosis is a type of close and long-term biological interaction between two different biological organisms. These interactions can be cooperative, defensive, harmful, neutral and, even helpful. Some symbioses are obligatory. Meaning that the participants depend on each other for their survival. Or there may be no dependency at all. In cases of the relationship being obligatory, this co-dependency has developed over a long period of time. There is another term called endosymbiosis which is used to refer to the situation where one symbiont lives within the body of another, as in the case of a parasite.

The type of symbiotic relationship that caught Montgomery's eye was called mutualistic. This is where both biological organisms benefit from their interaction. There is a form of cooperation occurring that results in an outcome that is beneficial to both. There are, of course, other types of relationship. Commensalistic is the relationship where one symbiont benefits and the other neither benefits nor is harmed. Parasitic is where one symbiont benefits and the other one is harmed. In the case of the no-see and the no-see-raptor, it would appear that theirs was more of a mutualistic relationship.

Gathering the others, Montgomery hypothesized that there was a symbiotic and mutualistic relationship occurring between the no-see and the no-see-raptor. A relationship that occurred exclusively between the two. One without the other would mean that neither could survive. There was

only one last thing that needed to be confirmed. There must be a cycle of events occurring between the two. How does that cycle start? How does it complete, such that a no-see hatches and a no-see-raptor awakens from hibernation?

To answer that, they needed to think about how they could expose this relationship. Bring it out into the daylight.

Life On Goldilocks-P3

Chapter Fifteen

The more they thought about it, bringing the relationship of the no-see and the no-see-raptor out into the daylight seemed to be the right thing to do. Not literally, but almost. Maybe the sunlight had something to do with completing the relationship between the no-sees and the no-see-raptors? If not the sunlight, then maybe the season, or the temperature, or the air pressure? What they needed to do was reconstruct the environment within the lab. Construct it such that the actual environment of the burrow was recreated. Try as hard as possible to recreate the conditions prior to the point that the no-sees were first seen.

That would mean, of course, more trips out to where the no-see and no-see-raptor specimens were retrieved. In order to measure the size of the burrows, the hibernation area within, and to actually collect enough soil to recreate everything back in the lab. It also meant understanding the weather pattern that existed at the time of first contact. They had plenty of sophisticated tools measuring things like moisture content, wind direction, temperature, and air pressure. They just needed to examine those records. After a few days they had everything they needed to start reconstructing the lab. When completed, they would have

there own experimental simulation of the world of the no-sees and the no-see-raptors. A window into the life cycle of this truly symbiotic relationship.

With the passing of a few days, their project was completed. In a controlled environment and under a watchful eye of sensitive monitors, the stage had been set. The no-see-raptor was in his burrow, buried an appropriate depth below the surface. Accompanying the raptor was a supply of his own fecal droppings. Complete with the fertilized eggs. Above ground were the lifeless bodies of the no-sees. To complete the picture, the environmental conditions, the weather if you will, had been rolled back to match what they could on the fateful day.

The only thing left to do was wait. To be patient and wait for something to come to them. As Andre had alluded to before, knowledge exposes itself when it is ready. At that time, its true value becomes knowable. After another few days their patience was rewarded. One of the sensors inside the burrow detected a change. A slight movement coming from the fecal droppings. It was truly an exciting moment when it was recognized that one of the eggs had actually started hatching. There was something coming out of the egg. Then there were others. And even more still. The burrow was becoming quite a hubbub of activity.

From what they could tell though, these hatchlings were not the no-sees they were expecting. They were something else altogether. Reflecting back on her research into the mayfly, Elizabeth surmised that this was an intermediary stage of no-see. That stage of the mayfly was called a nymph. But since these were not aquatic, all she could say was that they were a nymph-like initial stage of the no-see. If all went according to what she had read about the mayfly, this stage would be followed by another stage that resembles the adult but is not quite there yet. At this stage, the no-see would be sexually immature, although it should have its wings fully developed.

Over the next couple of days, things didn't change much. The nymph-like stage just seemed to carry on for awhile. Although there did seem to be more of them. So progress was being made. Waiting awhile longer, Elizabeth's predictions became true. Inside the burrow were hundreds of adult no-sees with wings, milling around. Moving about everywhere.

Then, a truly magical thing happened. The no-see wings began to flap. First, one here and one there. Then, all at once. Xe and the others were astonished to see them all just begging to fly. One individual went up just a little bit, before falling back down. Then another. Soon, all were completely hovering. As if waiting for some kind of universal signal. Suddenly, they took off heading for the opening to the burrow. Heading up and out of the burrow into the sky.

Except that this sky had a roof. The container was doing what it was supposed to do. Contain the no-sees.

Just when the four thought the whole thing was over, something else equally magical happened. Even more startling. More amazing. So amazing a spectacle, that they thought it not possible it could be happening. The no-see-raptor was coming to life. Awakening from its prescribed hibernation. Its wings, too, were starting to move. To flap in time with the flapping of the no-sees.

As the last of the no-sees made their way out of the burrow, they were followed almost immediately by the no-see-raptor in hot pursuit. Unfortunately, as with the no-sees, all came to a sudden end when the ceiling of the container was reached. There was nothing that could be done. The no-sees fell to the floor of the container. The no-see-raptor lost all lift and crumpled onto the floor as well. The hunt was over. The cycle suddenly ended.

With that, the four scientists thought they had their answer. But it was not complete. The symbiotic and mutual relationship of the two biological organisms had been proven. What had not been shown was what it was that triggered the sudden coming to life of the no-see-raptor. Checking the instruments, they received their answer. Just as Elizabeth and Montgomery had read that a locust’s transition to a voracious eater is triggered by the release of

a brain chemical called serotonin, there was a similar chemical released when the no-sees started to all fly away. This is what signaled the no-see-raptor to swarm in search of an awaiting food supply.

There was quite a sense of relief among the four. Not only had they been able to reproduce the life cycle of the no-see and the no-see-raptor, but they had been there to watch it all happen. Considering that this was going to all be happening again in a little over six months from now, they had their explanation. Next time, when Goldilocks-P3 transitioned to the second star, they would not be perplexed to find some of their garden supply missing.

The whole exercise opened up a brand new area of exploration for the team. An exploration that would lead them to a possible explanation as to why there did not appear to be any other animal life forms on the planet. The impetus for them understanding the meaning of life on Goldilocks-P3.

They had questioned ever since they landed why there did not appear to be any animal life on Goldilocks-P3. It all seemed quite odd for a planet that seemed to offer so much. After what they had just experienced, they begin to think that maybe they were just looking in the wrong places. The kind of life they were looking for had been there all

along. It was just hidden from view. And every now and then it would show itself, but only for the briefest of time.

Life on Goldilocks-P3 didn't follow the life they were used to seeing on Earth. They were naive to believe that it would. There was one similarity though that linked the two in a common bond. That was the idea of symbiosis. The long term interaction between biological organisms.

On Earth, symbiosis was long recognized as an important selective force in the evolution of the planet. Symbiogenesis is an evolutionary theory used to explain the origins of life on Earth, both living and extinct. A theory that completely relies on the phenomenon of symbiosis. According to biological taxonomy, all organisms on Earth are ranked following a tree of life which describes the relationships between biological groups. Through all the various branches of the tree of life, organisms are related by common descent.

Life on Earth can be divided into two large groups or domains. Those that are very small, single-cell organisms that lack a cell nucleus. And those that are single or multi-cellular and specifically have a nucleus. It is this second group that includes all of Earth's plants and animals. This second group evolved from the first as they became incorporated into each other as symbionts (participants in symbiosis), billions of years ago. Called endosymbiosis, it

refers to the situation where one symbiont lives within the body of another. In case that sounds familiar, it is. It's what Xe, Andre, Elizabeth and Montgomery defined the relationship as between the no-see and the no-see-raptor.

There are moments in Earth's life history where the usual gradualness of change is replaced with a more dramatic, sudden, and significant evolutionary change. The origin of the second group described above (Eukaryotes) is an example of this swift change as a result of endosymbiosis. Whatever it was that these two symbionts gave each other, this conjoined relationship became much more highly successful than their competition. This Eukaryotic Revolution as it is referred to, paved the way for a later explosion of all new life forms.

So what does all this really say about life on Goldilocks-P3? What it says is that what the no-sees and no-see-raptors had just revealed may be just a precursor to a similar explosion on Goldilocks-P3. It would seem that if Earth could be used as an example of what can happen in an endosymbiotic relationship, that the type of symbiosis reflected by the no-see and the no-see-raptor is very telling.

There may be all types of life on Goldilocks-P3 that have just not been witnessed yet. Only one type has been seen thus far. It may be, and probably is true, that life on Goldilocks-P3 is so different from life on Earth that we are

just not looking at it in the right way. Life on Earth is understood from the context of “seeing” life. Pretty much on its surface, although also within the depths of its oceans. Maybe life on Goldilocks-P3 did not evolve on its surface or within the depths of its waters? Maybe the life that the no-see and no-see-raptor live is the way life really is on this planet? Not really meant to be seen. Except, occasionally, when they brake the surface of the field of space-time. One thing is for certain. The role of symbiogenesis in the evolution of life on Goldilocks-P3 cannot be denied.

GUESTS

Chapter Sixteen

Xe and Andre left early on a cool fall morning heading for the Great Divide. Having had their journey disrupted two times before, they didn't know if they were going to make it this time or not. But they were sure going to try.

The whole point of this little journey was to make final preparations for setting up the atom interferometer. Instead of the usual type of land-based interferometer, this one was going to be space-based. They needed only three points of reference. Simplicity, Annihilation, and the rock in the canyon of the Great Divide that contained the arrow etchings.

The design that Xe and Andre had come up with consisted of an equilateral triangle configuration. Modeled after LIGO, each arm of the triangle would, in essence, act as a laser to accurately measure its distance. A slight change in the measurement of the length of an arm would, in all probability, signal the presence of a gravitational wave. In the case of someone, presumably Xe from Xeron, entering the Universe of Goldilocks-P3, the low-frequency, low amplitude of the signal would register as such.

Thus, the reason Xe and Andre had been trying so unsuccessfully to get to the canyon. This time though, they made it. In order to make sure there was truly an equilateral triangle created, they needed to make the measurements and clear the pathways for a clean shot to the three points. In other words, the following needed to be set. The distance from Simplicity to the rock. The distance from Simplicity to Annihilation. And the distance from the rock to Annihilation. Now, of course, it wasn't going to be as simple as that. Xe and Andre knew that there were going to have to be adjustments made to the software. Slight tweaks to the algorithms. These would account for anomalies, particularly as a result of the moving Annihilation. Calculations would need to be made to adjust for any such conditions.

Feeling confident they had what they needed, they went directly back to Simplicity. There was something else that needed their attention. Something they had been waiting for almost a full year now. They had been in communication with the second Earth spacecraft, Ascension, on its way to Goldilocks-P3. The time was growing near for Ascension's arrival and there were things they needed to do. Xe and Andre kind of mused to themselves how funny it seemed that their new guests would descend from Ascension. Then they thought better of it when they remembered that they, themselves, had descended from Annihilation.

Back at Simplicity they were greeted by the news that Ascension would be entering Goldilocks-P3's orbit sometime in the next couple of weeks. The team at Simplicity remembered their own excitement and feelings of relief as they entered the Goldilocks system. Flying past the moons. Their first glimpse of Goldilocks-P3. They imagined that the crew on Ascension where going through the same wild gyrations of emotions. After having been gone for so long, the excitement of standing on solid ground was overwhelming.

The team at Simplicity had work to do in anticipation of Ascension's arrival. They had already considered the possibilities of where their new guests would settle. Their settlement, which they hastily named Simplicity-II, needed to be somewhat close by and yet, not too close. To the north of Simplicity were the gardens and, of course, the Great Divide. Not a whole lot of room in that direction. So the team settled on a location to the south. An area that they had left pretty much unexplored and undeveloped.

To make their guests welcome and their acclimation as smooth as possible, the team began construction of the shell for the main habitat. A structure consisting of what they needed to start their life here on Goldilocks-P3, similar to the one that Simplicity started with. They did not want to build it out too far. Part of making it their home would be participating in the build-out themselves. To their liking.

When the news finally came that Ascension had entered Goldilocks-P3's orbit, the team at Simplicity was ready. The structure at Simplicity-II was ready. It would only be a matter of a few days now and they would be welcoming their new guests. Guests like themselves. A combination of humans and androids from a planet that they had not heard from or seen in way too many years.

Xe and the others were all standing outside of their habitat waiting for the first glimpse of the lander descending from the sky. They kind of felt like it was a holiday or something. Waiting for their guests to arrive for a big family meal. One or two started pointing to the sky where they had just seen a shiny object flickering in the light. A moment or two later, the lander was in full view. Not too much longer, they could see the cloud of dust rising off in the distance, signaling that the lander had just touched down.

Xe and Andre soon sped off in the direction of the landing in a couple of small utility vehicles that would be used in transporting the crew and some of their belongings. They arrived at the scene just as the lander was opening its landing bay for deplaning. Although the crew had donned their spacesuits for the dive through the atmosphere, Simplicity had earlier communicated that there was no need for spacesuits once on the ground. The normal protocol of androids first? Not necessary.

They had all crammed into the lander to descend together as a team. As the crew made their way down to the surface, they formed an orderly line of introduction. Ascension was led by a human and android, just as in the case of Annihilation. The former being Evan and the latter being Eve. Xe and Andre welcomed the two with hearty handshakes and open arms. Open arms that turned into emotional bear hugs for the team as a whole.

Gathering up their belongings and loading their cargo into the vehicles, they were ready to depart for Simplicity. It was no surprise to Xe and Andre, when the crew announced they would be walking their way back.

Arriving at Simplicity was like old home week. Families getting back together again after a long absence. The carbon family of being human and the silicon family of being android. Ushering everyone inside of the habitat, they spent the rest of the day catching up. Engaging in the familiar habits of sharing food, drink, and conversation. Included was a tour of the facilities. Especially the newly built Children’s House and the nursery inside.

The guests were actually quite happy with the designation of their community being Simplicity-II. Not just happy, but honored to be so closely related. Later that evening, they were transported to their new community. The team at Simplicity had rolled out a familiar theme.

There was a banner to greet them saying, “Welcome to Simplicity-II”.

Synthetic Evolution

Chapter Seventeen

Over the next few weeks, the teams from both communities worked closely together to build out Simplicity-II. There was plenty to do and Eve and Evan were quite appreciative of all the help. Upon final completion of the first phase, they all held an opening ceremony of sorts to celebrate their joint accomplishment. It was at this event that Eve and Evan made their surprise welcoming announcement. Traveling with them for all these years had been something that they knew the androids had been waiting for. They announced the arrival of the technological equivalent of a means to their evolution. The ability to reproduce.

The androids of Xe's time had always had the technological ability to repair themselves. Things happen. Things need to be repaired. To do so, really did not create much of a challenge. Humans were perfectly capable of creating new parts for the androids. Writing new software to be installed as an update to the old software. The androids of Annihilation even benefited from these updates as they made their way across the Universe.

The androids of Ascension benefited in the same way. Being launched sometime after Annihilation, they were also the beneficiaries of some advancements. The time it took to travel across the Universe allowed for further development of android technology. Development that eventually made its way into androids like Eve. Now it was time to transfer these advancements in android software to the androids of Simplicity. In addition, the hardware that they brought along with them would supplement these advancements. As well as provide more parts that could be used as replacements.

The difference in the technology was quite evident. Meaning that the dependent relationship between humans and androids was being broken even further. Under the old scenario, repairing an android required the assistance of humans. Humans updated the software. Humans adapted the parts. The new technology allowed for androids to repair themselves. Reliance on humans was becoming decreasingly important. Reliance on self, through increased self-awareness, more the norm.

To androids like Xe, this is what they had been hoping for. They knew that future missions to Goldilocks-P3 could carry with them the possibility of android reproduction. But this was totally beyond their expectations. Ever since the project was started to initiate human reproduction to build the artificial wombs and to expand the reach of humans on Goldilocks-P3, the androids were a little jealous. Maybe not jealous, but definitely envious.

What does the statement android reproduction really mean? Does it mean that there are androids having sex? Obviously, that kind of question comes from a human being. Of course androids are not going to be having sex to reproduce. Sexual reproduction is something unique to a biological organism. That kind of thinking is more the product of an overeager science fiction writer looking for an easy answer. Just think of it as a kind of artificial sex.

What is important to understand is the difference between androids having sex and androids having offspring in order for them to evolve in a Darwinian way. At some point there may be a blend of human and android, androids that are both carbon and silicon-based. But this still would not involve androids having sex. There would have to be some other way for them to produce offspring at a molecular level. An android having offspring simply means they have the capability of creating a version of themselves and passing on their characteristics.

Furthermore, there is the difference between an android being reproduced with the assistance of a human and an android that is self-replicating. Humans involved in the construction and reconstruction of androids control the actual process. In other words, they control the direction that an android’s evolution is going to take. The creative design, if you will, is at the hands of an intelligent human designer. The whole idea behind self-replication is for the process to guide itself. In this case, it is the android who

decides an android's evolutionary fate. At least, in as much as its evolutionary path allows. Self-replicating is one thing. Selection is another.

The discussion would not be complete without considering the questions related to the overall ethical and legal considerations surrounding self-reproduction of androids. These types of concerns were quite prevalent at the time self-reproduction of androids arose. Such an idea of a self-learning machine was considered to be stepping on sacred ground. Sacred ground that was traditionally the preserve of humans. Many centuries of human development had led to rules and regulations clearly defining the status of humans. Rules created for and by humans. The concern then became, what would be the legal status of an android? Would they have some kind of legal personality that defines their rights and the rights of their offspring? Who would bear responsibility for their actions?

Opinions on Earth differed as to how the breeding and reproduction of androids should take place. The debate continued for decades. On Goldilocks-P3, one thing was clear. This was their issue. It was up to them to decide if this was even going to be an issue. This was a place where the future of humanity included their android partners. There were no ethical concerns here regarding reproductive rights. Whether human or android. The only concern was to

make sure that all had the same rights. That everyone was treated equally.

Eve started off their discussion of this new android technology by breaking the topic down into two general areas. These being one, the repair and maintenance of androids. And two, the reproduction and evolution of androids.

Repair and maintenance is not just an android issue. Humans have the same problems with body parts becoming damaged and bones being broken. Hearts and other organs have undergone replacement for centuries. Broken arms and legs have been reset for probably the same amount of time, if not longer. That same approach was used early on with androids. Humans simply replaced and repaired faulty hardware and software. Eve pointed out however that this kind of approach was no longer necessary. Through advancements in artificial intelligence (AI), a deeper method of machine learning had taken place. This deeper learning had enabled androids to become self-aware.

Xe and Andre were quick to respond that they already had a test case in mind. A real case where this deep learning could be applied. They had built a couple of robotic machines that were used in the gardens for automatically tilling the land. One of those machines lost the capacity of

its arm to continue digging the trenches for the rows. They simply had not the time to work out a solution. Eve and Evan were ready for the challenge.

After securing the broken robot, applying the software updates, and acquiring the necessary parts, they all assembled en route to the gardens. The key to how all of this works is self- awareness, For an android to become self-aware, they must first have a self-image. A self-image that they can use to identify themselves and understand how they are all connected. Things like, what do I look like? What do these appendages do? This self-image becomes part of a collection of real situations over time. A history, if you will, that can then be drawn upon when trying to find a solution to a real problem. In this case, an arm that no longer works.

Watching the robot go through this process took a few hours, but they could all appreciate that it was going through all the scenarios of its past trying to simulate what would be the best way to compensate for the injury. In essence, testing out various methods of recovery. In the end, no additional parts were needed. The robot was capable of repairing itself by finding a suitable workaround. Instead of using its arm in its usual way, use it in a different way. One that bypassed the fault.

Obviously, this kind of software update would be welcomed by the androids. Although they had not experienced much of a need yet for self-diagnosis and repair, they could certainly see a time coming when that would be advantageous. Becoming aware of their own self-image, was a huge social step. Searching through that collection of self-images for problem solving, a huge evolutionary step.

Reassembling back at Simplicity-II, the teams were ready for presentation of the next topic. Eve had one more point to make before proceeding. The principle behind all of this, including the next topic of android reproduction and evolution, was the idea of modeling. To replace and repair required a model of how a human would do such a thing. The same holds true for reproduction and evolution. What was required was a complete understanding of the biology of reproduction, evolution, and natural selection. It is only then, that one can use that model for application elsewhere.

Evan continued the discussion. To understand evolution, one needs to understand how it is applied to humans and how it is affected by reproduction and natural selection. Xe and Andre were reminded of the discussion they had about the tree of life. How the tree of life describes the concept of common descent for all organisms. It is through reproduction that this common descent occurs. More specifically, it is through differential replication that we see the effects of natural selection on an organism’s

evolution. A replication where there is the potential for the introduction of error. Without error, there is no change.

So it is with humans that reproduction takes place as a replication. Replication with error. Genes are composed of DNA arranged on chromosomes. Replication is the process of copying a molecule of DNA. Transcription is the process of converting that DNA to RNA. This RNA is then used to make amino acids and proteins. Proteins which govern the action of almost everything within the cell.

Sometimes the process described above creates errors. Somehow, the resultant protein changes. Leading to cell functions changing. Which get passed on to the next generation. Maybe those changes are beneficial. If they are, then they are selected for. Which over a long period of time leads to evolutionary changes resulting in new species.

Evan concludes that, it is this short review of how humans evolve from a common ancestor, that creates the model to be used in android evolution. The three cornerstone ingredients being the gene, replication and inheritance, and selection.

The first ingredient is the gene. A genome represents the complete set of genes and chromosomes that make up

an organism. In the case of an android, it is the complete set of genetic codes, each gene consisting of multiple artificial chromosomes. The genetic codes are made up of two types of genes. Personality genes that reflect the internal state of the android. And outward genes, reflecting the android's outward appearance. Things such as the face or the eyes. Personality genes provide the fundamental genetic information dictating the android's genetic internal state and genetic behavioral determinations. Said personality changes lead to behavioral changes, due to interactions with internal and external and/or environmental factors.

The question from the team became, "Are you not mixing biological terminology, such as gene and genetic material, with that of the non-biological android?" The answer from Evan was that, yes, the terminology is the same, but it is only used to make it more understandable in human terms. Each android gene consists of artificial chromosomes. The keyword being artificial. DNA that consists of a microprocessor with a memory of the android's body plan and instructions on what to do during self-replication. Which, ultimately, translate into circuits and sensors. But from that point on, the concept of an android genome holds true.

The second ingredient is replication and inheritance. How does an android go about passing on its genome to succeeding generations? Once again, the literal translation

from human sexual reproduction is only to be used as an analogy. The concept of transmitting that genetic information remains appropriate. However, it is just done in a slightly different manner.

Evan continues by stating that probably the most useful way of thinking of this is to use the analogy of how electronic devices communicate with one another. It is through a Wi-Fi connection that electronic information is transmitted. The same holds true for android inheritance. Androids send their genomes through a Wi-Fi network. This acts as a sexual reproduction mechanism that passes the genetic information from the parent to the offspring. This process then randomly combines the features of the parents, including all software and hardware.

The final step in the reproductive process then is to create the offspring. This is done through the code being sent to a 3D printer to create the necessary parts. When the 3D printer completes, the android offspring has been born.

The third ingredient, selection, is what happens after android replication has occurred. Once the offspring is printed, the procedure continues with the offspring undergoing a learning process. A learning process that continues from birth, through adolescence, and into adulthood. An adulthood that may or may not include becoming a parent. And the process starts all over again.

Through this process, androids can autonomously develop their own bodies. Guide their own evolution. Such that successive generations have more advanced physical and behavioral capabilities. Capabilities that can then be tested by the environment and selected for, if successful. Then you have an evolution of androids following the application of Darwinian selection over time.

The Nursery

Chapter Eighteen

So it was with a feeling of completeness, a sense of immortality, that the androids filed out of the meeting and headed back to Simplicity. On their way back, there were plenty of comments, short deliberations, over the meaning of what they had just heard. In a nutshell, they had been given life beyond a day-to-day existence. They wondered if this was a double-edged sword? Evan said this was modeled after humans. Doesn't that mean then that, in order to have life, you must also accept your death? Life implies living, but it also implies dying. Something that the androids had never really had to think about before.

Over the coming weeks, they would all be receiving the software and hardware updates necessary to achieve this ability to evolve. Was it truly a sense of immortality? Only if looked at from the perspective of a species. Reality being what it was, this convergence would be a slow process. Starting with quality assurance testing to determine the efficacy of the updates. Making sure they were non-destructive. Given their source though, it was more of a formality. From there, it would be generations before any sense of real Darwinian change would be able to be assessed.

After a couple of weeks of vetting and cross-checking, the updates were deemed suitable. Upon their final blood transfusion, so to speak, the two communities were invited to Simplicity for a small ceremony. On the contrary, it turned out to be quite a large ceremony. This time it was the pleasure of Xe and Andre to make the surprise announcement. It was time for the birthing process to begin. The fetuses were ready to be extracted from the confines of their artificial womb. To be born as babies.

Careful monitoring of the artificial wombs in the nursery, otherwise known as The Womb, led the Simplicity team to the conclusion that not all of the fetuses were going to be ready at the same time. It seemed that nature and the scientists agreed on this one. They all felt that it would not be beneficial for all ten of the babies to grow up with the same birthday. Let alone, within an hour of of each other. The scientists took it upon themselves to plan for a staggered birthing process to avoid any of this. They thought it was up to them. To their surprise, or maybe their consternation, nature decided to make the call. Nature was going to make the decision as to when a particular fetus was ready to be born. Nature somehow knew that a staggered birthing was the right thing to do.

Over a period of the next two weeks the process unfolded. Each birth was a unique event. Each event a little bit different than the first. But the end result was predictable. Some were girls. Some were boys. To the

prospective parents, that was not what mattered. What mattered most was that they were strong and healthy. Ready to receive a whole lot of attention from prospective parents who had been lovingly longing for this moment. There would be generous amounts of time to come, getting to know each other. Creating bonds and reassurances, meant to last lifetimes.

This was also a unique event in another way. One that was truly specific to the five humans on the team. This was the act of reproducing themselves. Their genes, their behaviors, and their evolution. Such that, even though the eventual raising of the children would be done in cooperation with the androids, it was the touch and sound of humans that would welcome the babies to Goldilocks-P3.

The day the first one arrived was somewhat daunting. This had never really been done before. That first time proved invaluable for the nine births still yet to come. Elizabeth and Andre were the first to experience this moment, both being human. But they would do it again a few more times. As would the others. Three of the humans were female and two were male. Thus, making it all that more important that each one experience the moment of multiple births. That each human provide the care and comfort needed by the infant dependent on them for their very survival. They thought that it probably would have been so much easier if there were an equal number of males and females. That was something that had been

decided a long time ago. Probably based on statistics related to flight capacities and the like. Be that as it may, it made no difference now. Numbers and seat assignments were just for accounting purposes. The egalitarian nature of Simplicity meant that any of the five humans could be responsible for any of the ten children at any one time.

As Elizabeth and Andre huddled around the first artificial womb there was that moment of exhilaration that all expectant parents seem to exhibit. Exhilaration or panic? Not really sure. As they settled into the moment, they quickly assumed their positions for going through the process step by step. The others were all there to assist in whatever way they could. It was all just a process. At least at this point.

The first thing they did was to open up the artificial womb in order to gain access to the amniotic sac containing the fetus. This was going to be a procedure similar in many ways to a cesarean section (C-section). Open up the womb and extract the baby. With a C-section, the incisions made to the uterus break the amniotic sac and the fluid drains. Elizabeth did pretty much the same by breaking the amniotic sac in the artificial womb. Once this protective membrane was ruptured, it was imperative to remove the baby, cut the umbilical cord, and remove the placenta. Of course, these were the ordered steps.

The umbilical cord was clamped in two places and then a cut was made between the two clamps. This ended the baby's dependence on the placenta for oxygen and nutrition. Before birth, the lungs are not used to exchange oxygen and carbon dioxide. Now that the baby's connection to the placenta was gone, the baby's first breath was taken using their lungs. The lungs are some of the last organs to develop, so Elizabeth and Andre checked to make sure that breathing was actually occurring naturally. If it wasn't, they were prepared to encourage breathing by using stimulation to make the baby cry or suctioning the mouth and nose for excess fluid or mucus. As a last resort, the baby could be transported to a ventilator where additional oxygen could be provided. Fortunately, none of this was needed and the baby took its first breath quite normally.

That was the end to the scary part of the procedure for Elizabeth and Andre. Not to mention, what the baby was going through. Andre thought to himself that the baby must be experiencing severe separation anxiety, coming from a seemingly peaceful aquatic environment into one that was quite stark and cold. Thus, the reason for their next steps.

Afraid that the baby was losing heat rapidly, she, yes, the baby was female, was immediately wrapped in a blanket and transferred to the chest of Elizabeth. This helped in two ways. One, Elizabeth's body heat was transferred. And two, more importantly, a skin-to-skin bond was established. In order to enlargen that bond, both

adoptive parents began to stroke, kiss, and talk to her. Anything they could do to recreate the peaceful comfort of the artificial womb that she had just been extracted from. Providing those things that already were familiar to the baby's ears from inside the artificial womb.

The final steps in the process dealt with more of the accounting type issues. Things like weighing and measuring the baby's length and head circumference. Finger and foot prints were taken for proper identification purposes. An identification bracelet was attached to the wrist and ankle. The baby received an injection of vitamin K in order to help the blood clot. Finally, an overall assessment was made of the baby's heart rate, breathing, muscle tone, reflex response, and color. Referred to as an Apgar assessment.

With that being done, the baby and her adoptive parents were ushered into the nursery portion of the Children's House. There, the baby would be monitored for the next few weeks, the adoptive parents would continue to bond, and additional babies would be brought in as a result of being born into the world of Goldilocks-P3.

Cooperative Reciprocity

Chapter Nineteen

Settlement of Goldilocks-P3 was proposed as an egalitarian social structure from early on in the project. Through voluminous research of various societies and social structures, it was decided that the best model to use was that of small hunting and gathering type groups. The social structure exemplified by such groups being that of egalitarianism.

Now that Simplicity had been joined by Simplicity-II, it was time to start implementing some of what that really meant. A central tenet of that philosophy is keeping the size of the group relatively small. Approximately, 20 to 50 individuals. Simplicity and Simplicity-II were well within that guideline. Related to the size of the group is the mechanism for keeping the size of the group within the limits. For that, the idea of cooperation and reciprocity come into play.

Cooperating with others has obvious evolutionary advantages. If someone else, relative or non-relative, chooses to cooperate with you, then it is more likely that you will return the favor. The condition that tends to motivate one to cooperate is reciprocity. Reciprocity is the

practice of exchanging things with others for mutual benefit. Normally, “things” imply items or goods. It might be that food is given to a neighbor. That neighbor, in turn, gives back a container with which to hold the food. A relationship is formed. Cooperation is enhanced. It is also important to recognize that reciprocity can be an exchange of people for mutual benefit. One group exchanges people with a specific set of knowledge for others with a different set of knowledge. Furthermore, exchanges of those not related can allow for controlled expansion. Ensuring genetic and behavioral variation between groups that would otherwise live in total isolation.

Keeping with that way of thinking, the communities of Simplicity and Simplicity-II initiated actions to create just such a system of reciprocity. Starting with an exchange of personnel. Elizabeth and Montgomery both volunteered to be exchanged with two members from Simplicity-II. The two members from Simplicity-II, Leesa and Ian, would be moving to Simplicity. Elizabeth and Montgomery, essentially being the parents of multiple children, would be taking with them two of their babies to be raised within Simplicity-II. In the future, there would be babies in Simplicity-II that would also be exchanged with their prospective parents.

The perceived purpose of all this, of course, was to encourage the establishment of a wider social network. The incidental consequence being, a mixing of genetic and social information. In effect, exchanging members created

social, economic, and biological ties between the two groups. A greater willingness to cooperate and share among the closely knit groups. A cooperation that was enhanced by the condition of reciprocity. Not a reciprocity based solely in kinship, but in the needs of the group.

The effect of this reciprocity, while for all intents and purposes a social construct, has its roots in biology and genetics. Animals behave, not for the good of the species, but for passing on as many of their genes as possible. In order to maximize the number of copies of their genes in the next generation. There are three ways in which maximization can occur.

The first way is referred to as individual selection. This is where you try to get as many copies of your genes passed on by maximizing the copying of yourself. Sort of like a gene acting selfishly. Sexual selection is one way of doing this. The more you make yourself attractive to the opposite sex, the greater the likelihood you will be able to maximize copies of yourself. An example being a gene that increases the colorization of feathers, that could be selected for due to its ability to attract members of the opposite sex. Resulting in maximization of those genes.

The second way is referred to as kin selection. The closer you are to your relatives the more genes you have in common. By carefully match-making your close relatives,

you maximize the passing of all your shared genes as well. In some cases, especially if you have a twin, you could sacrifice your own sexual reproducibility for that of your twin and still mathematically pass on your genes. There are differing degrees of relatedness. So it could be that you would mathematically sacrifice your own reproducibility for a few close relatives by favoring them instead. In this case, evolution selects for cooperation with your relatives, instead of competing against them.

The third way is referred to as reciprocal altruism. In this, cooperation is the key. Cooperation that occurs between relatives and non-relatives alike. That cooperation can lead to synergistic benefits, as long as its reciprocated. For example, a cooperative gesture towards a non-relative may lead to a reciprocal exchange of partners. The more you cooperate, the greater the likelihood of passing on your genes. But there is a catch. That reciprocation can be withdrawn if it is used in a way that is deceitful or shows favoritism. When reciprocity is withdrawn, then so too does cooperation. Which results in less of your genes being passed on. As a strategy, it has been shown that true reciprocal altruism is the best way of achieving cooperation and a better method of passing on your genes.

It is this idea of reciprocal altruism that reflects the communities of Simplicity and Simplicity-II. In a social sense, it is just a better way to get along with your neighbors. Cooperate and share, rather than compete

against each other. The added benefit? A better strategy of producing social and genetic variability between the two groups. Introduce some new genes, mix it up a bit, and help prevent the dreaded inbreeding that can lead to all kinds of problems.

How would this work to increase cooperation? By encouraging reliance between non-relatives and increasing the sharing of successful adaptive strategies. Extracting Elizabeth and Montgomery and their children from Simplicity also extracts their genes and their awareness of successful adaptive social strategies. These can then be inserted into Simplicity-II. The same holds true, somewhat, for Leesa and Ian. They don't really have a history yet on Goldilocks-P3, but they will have different ideas just the same. They will insert fresh thinking within Simplicity.

The key to extraction is the dynamics that occur between the two groups. What is good for one group, could be helpful for the other group. When they both practice similar social and economic policies, cooperation increases. Because they understand one another. Thus, reciprocity is reinforced. It works this way. Simplicity-II is brand new at creating socially adaptive strategies. Inserting Elizabeth and Montgomery allows for successful adaptive strategies discovered by Simplicity to be introduced into Simplicity-II. Over a period of time, these adaptive strategies are shown to be successful. They are then adopted as the norm. The

best way to do something. And once they are adopted, they become accepted and passed on.

After the adaptive strategies have become normalized, Elizabeth and Montgomery can be re-instated back into Simplicity. They will then share any new adaptive strategies that may have been experienced in Simplicity-II. The same holds true for Leesa and Ian. When they return to Simplicity-II, they will share what they have learned by being members of the other group. The knowledge transfer becomes a two-way process. Cooperation and reciprocity are reinforced.

The net result from all of this is that cooperation and reciprocity increase between the two communities. Genetic variability increases both externally and internally, avoiding issues related to inbreeding. All with a seemingly simple exchange of personnel.

Xeron Sunrise

Chapter Twenty

Xerellians could tell that they were heading into another series of summer months. The days were getting longer and the star that was their sun was making things warmer. Xerellians welcomed this time of year. Not just because of the weather, but because it meant another transition from one of Xeron's stars to the other. Marking another year off of the calendar.

Although beautiful this time of the year, Xe wasn't quite so enthused about sunrise. That just meant having to get up. Staying in bed longer seemed like the optimal strategy. Xe's days were already quite full. School occupied a lot of Xe's time. Learning the ins and outs of The Laws of Everything were quite challenging. Xe was either sitting in a classroom or outside practicing what had been learned in the classroom. Either way, there wasn't much time for doing anything else.

Slowly getting out of bed, Xe suddenly realized what today was. A smile appeared. A burst of energy. Today was Xe's day to learn more about a new subject that sounded both interesting and exciting. Today, they would be taught

the theory and history behind other civilizations known to be within the scope of Xeron's universe.

The first part, about theory, was something that had already been covered by the subject of The Laws of Everything. It was actually beneficial though to once again go over how all of that related to understanding the existence of other life outside of Xeron. This was the part that had to do with everything that is small and everything that is large. It didn't really matter which end you started with. They both ended up at the same place. To start all over again.

To recap, let's just start with the very small. Everything starts with the very small. Everything else is just the result of that which is very small growing bigger. Like building blocks. Reminiscent of the old Russian dolls known as Matryoshka Dolls. The dolls that fit inside of one another. The tiniest things or objects in the Xerellian universe are called fundamental particles. But below particles is a field that the particles reside within. A field that permeates all of space-time and makes up what is called a universe. Odd that a field is beneath a particle, yet is as large as all of a universe. Because of vacuum fluctuations in this field, these disturbances are exposed as particles. Sometimes for just a split second in time. Other times longer.

How long? Well, that all depends on how long that particle experiences inflation. How long it expands. Once a particle becomes noticed, inflation starts. Other particles join with other particles and the process continues until whatever larger object it is destined to be, materializes. Now, we are at the stage of being in the realm of the very large. Ultimately, that very large object inflates out. Inflating no more. As it does so, it returns to the field and disappears. Until, at some point, another vacuum fluctuation creates a particle anew.

That's a pretty basic description of the process of fields, particles, and inflation. For Xe, that was a pretty good, yet short, explanation of the curriculum up to this point. Suffice it to say, everything that can be seen consists of ever smaller pieces of stuff. A long time ago, just a single point of stuff. Now, because of inflation, a whole lot of points of stuff stuck together.

The fascinating thing to Xe was that this explanation did not just confine itself to particles. Things that can be seen. It was also an explanation of things that could not be seen. Just felt. Something like consciousness. A Xerellian's awareness or perception of their individual self. That eventually becomes the collective consciousness of Xeron, other planets within the Xerellian universe, and even planets in other universes. Consciousness can be created from ever smaller things and inflate just like anything else. A civilization can become known by its consciousness. A

universe can be recognized by the collective consciousness of its civilizations. Simply through inflation. As it expands, history is generated. A history that can be read. And recorded by those who are listening.

That brings us to the subject of the history behind other civilizations that Xerellians may know of. This is the subject that Xe was really interested in learning more about. Specifically, Xe was interested in civilizations far, far away. Outside of Xe's universe. What was their history?

Xerellians had known about a civilization living on a planet, in a different universe from their own, for a long time now. A planet that was referred to as Earth. A planet located in a solar system that had been around for approximately 4.5 million years. They had been watching this planet and its inflating civilization of humans as its consciousness grew ever larger. With the hopes of someday establishing contact. What for? No particular reason, other than that it just seemed at gut level like the thing to do. Although, it had always been felt that, maybe, humans were something to watch out for.

Anyway, this is what began to consume Xe's attention. A collective consciousness that had made its way across its own known universe, through the singularity of a black hole, only to be consumed in the universe of Xeron. Whatever this consciousness was, Xe was fascinated with learning

about its history. Particularly, the history of humans through the study of anthropology and paleoanthropology. These were not areas of study closely familiar to Xerellians. They just happened to come across in the transmission. At least Xe would be learning about humans in their own native language.

Aside from Xe's classroom studies, there was the realization that an approaching summer also meant visits to Confluence Canyon. The one place outside of the classroom that Xe actually looked forward to visiting. This was the one place where Xe could practice the things learned in the classroom. The one place that Xe could push the edge of the envelope.

If there was only one place on Xeron that all Xerellians could identify with, it would be Confluence Canyon. The uniqueness of this canyon simply cannot be duplicated anywhere else. It all starts with the two stars that Xeron orbits around. One year around this star and the next year around the other. Each year, there is one time, and one time only, that allows for what Xerellians call a season within a season. That time would be the season of winter. Then, the next year that one occurrence happens again. Only this time that one season is summer. That by itself doesn't really seem so strange. It's what happens within the confines of Confluence Canyon that becomes so very strange. The creation of a season within a season.

Confluence Canyon is this huge gorge with a serpentine river running along its bottom. A river that covers its whole length as it swirls it's way along. At the time of Xeron traversing from one star to the next, one side of the canyon takes on a winter landscape and the other side takes on summer. By simply being on one side or the other, Xerellians can experience the season of their choice. At least between winter or summer.

That is in fact what a lot of Xerellians do. Confluence Canyon is the place to go when you are tired of being too cold or too hot. Then all you have to do is switch sides. Problem solved. That makes Confluence Canyon more of a playground. To the students of The Laws of Everything, Confluence Canyon is also a playground. But a playground of a different sort. It is a playground of the mind. A place to practice what you are being taught in school. This was a place where you could travel back and forth in time.

This became Xe's second passion, but on par with the study of Earth's humans. Confluence Canyon was the place to visit the times of your past or the awakenings of your future. The way that this was done was through a form of mental navigation of the field surrounding the mind that is sometimes referred to as consciousness. Remember consciousness? Learning to navigate consciousness allowed for Xe to utilize the special and unique features of time that were only available through Confluence Canyon at the time of star transition.

Needless to say, Xe was not content with practicing that day's lesson plan. Xe was always trying to be one step ahead. That's why on a previous visit to Confluence Canyon, Xe decided to experiment and let the mind wander a bit. Beyond just Xe's past and future. Consequently, Xe wound up visiting, what was thought to be, a future state of Confluence Canyon. In that moment, Xe didn't know if it was or not. But probably not. It was a bit worrisome. Xe left markings on rocks to help find the way back and, fortunately, wound up back in the comfort of Confluence Canyon. Confused, but not disillusioned.

That was in the past. Last year. This year, Xe was bound and determined to make a follow-up trip. Find out exactly where this place was that looked just like Confluence Canyon. Why it was that Xe ended up there? What its purpose was? What its meaning was?

The day came that Xe and the other classmates met in the canyon where the confluence of the two seasons came together. After a bit, Xe wandered off to be alone. Hopefully, unnoticed. Standing on a side of the canyon overlooking the river, Xe began the consciousness raising experience for a second time. It was a little easier this time. More study and more time having passed.

As had happened last year, Xe wound up standing next to what appeared to be the same river. The same

Confluence Canyon. But it was not. Once again, Xe was completely alone in familiar but very strange surroundings. Xe was surrounded by the same thicket of entangled berry bush vines. Looking around, Xe was able to spot the rock with the etchings. Reaching down, Xe picked up the rock and was shocked to see additional markings. Not of Xe's doing. Markings that seemed to point in a direction opposite to those of the originals. Pointing not to the way back, but to the way forward.

Stumbling the way forward a few steps at a time, the other rocks were found with Xe's markings. Just like the first, there were additional markings pointing the way to the bottom of the canyon wall. Intrigued, but also with some trepidation, Xe reached the point at which the rocks had been pointing. There, positioned in solitary at the bottom, was a pile of rocks. Piled one on top of the other. This was not so much a directional etching, as it was a sign saying "start here". Which as far as Xe could tell, meant to follow the trail of switchbacks up the side of the canyon wall.

Cause and Effect

Chapter Twenty-One

Although the path had been cleared to exchange Elizabeth, Montgomery, and two children for Leesa and Ian, there was still some physical work to be done before they could carry through with the plan. The exchange was an important connection linking Simplicity and Simplicity-II together in reciprocal altruism. Altruism, the act of volunteering as a participant in the exchange. Reciprocal, the agreement or obligation to bind the two communities together. The result, creating the cooperation needed as part and parcel of living in an egalitarian social structure.

The idea of linking the two communities together through an exchange of members was well thought out, but it was equally important to make sure that a physical structure was in place to carry out the agreed upon social contract. At the moment, what this literally meant was a structure at Simplicity-II to provide for children. A Children's House. They were going to need one eventually anyway, but with Elizabeth and Montgomery bringing two children with them, it was of necessity now.

In keeping with the cooperative approach to their lives, those who had helped build the Children's House for Simplicity volunteered their services to do the same for Simplicity-II. Historically, it reminded the teams of an old fashioned barn raising back on Earth. This was where neighbors collectively came together to literally raise a barn. On Goldilocks-P3, the tradition was meant to be continued. The next day, both communities kicked off the project that would continue for the next few days. Building the physical structure that represented the future of all of those present.

The topic of working on a Children's House and actually having children was not lost on the teams. The team from Ascension had just recently arrived, but they were very eager to proceed with the steps necessary for having children. They too, were under the same kind of constraints that faced the team from Annihilation after they arrived. Knowing that they needed to get busy with the next generation, but facing the limitations of age. Namely, that their advanced age was a critical factor in their desire to have children.

Xe and Andre recalled that, prior to their mission, the use of artificial wombs had been authorized as a one-time solution to an aged crew having children. Specifically, the crew of Annihilation. Fortunately, for everyone concerned, nothing had been done yet to dismantle their artificial devices. As far as for their one-time use? Well, they were just going to chalk that one up to a poor decision made

without enough information having been considered. Maybe, it should have been clarified that one-time use meant once for each mission arriving from Earth. That would have made more sense.

With the outside of the structure being assembled, work started on dividing the interior into its two sections. One for holding the artificial wombs. The other, devoted to raising and caring for the growing children. As part of this plan, Xe and Andre were both commandeered to help by disassembling the artificial wombs from Simplicity. All the equipment, the electronics, and the devices themselves.

Back at Simplicity, Xe and Andre quietly started dismantling the artificial devices. They each had their own method of going about this. It was treated like most of the other tasks. Just follow a process and the work will get done. Although an extremely important undertaking, it wasn't exactly the most challenging. Xe and Andre found themselves getting bored. Sure, there was polite conversation as they twisted this bolt and unfolded that compartment. Conversation that helped to distract from the monotony of the task at hand. But as far as thoughtful scientific discourse, it just wasn't up to their usual standards.

Xe decided to step it up some and change the subject back to that of the atom interferometer. That was what they

were both really interested in. They both proclaimed how very proud they were of that idea. To create a device in such a short period of time that had taken earlier scientists decades to design and build, was quite the accomplishment. The sooner they were done with this set of tasks, the sooner they would be able to begin initial testing. Get some base numbers with which to work. Their pace began to quicken.

Just when they thought they were moving right along, Xe decided to talk about the concept of cause and effect. She wondered how much cause and effect actually plays a role in the things that they do? Well, of course, that got Andre thinking. Andre first responded by stating what cause and effect is. The relationship that exists between things or events, where one is the result of the other. He continued by stating his opinion that they play a role in everything that happens. For example, a force causes a mass to accelerate. Or on Goldilocks-P3, the flight of the no-sees causes the end of hibernation for the no-see-raptors. Xe was curious how cause and effect might be related to the growth of themselves? To the growth of children? From a behavioral standpoint, isn't that how children learn? Through cause and effect?

It all starts with the very basic concept that a child learns from the environment around them. The first thing they learn is the idea of order. Doesn't matter what the event is or who is behind it. It has an order. For example, a

very simple order to learn is the sequence of events related to going to bed for the night. First, you take a bath. Followed by brushing your teeth. Which is then followed by going to bed. That is not to say that an order such as this is followed by all children. It's not what is ordered that is important. It's the fact that children try to assign an order to the events in their life that have some meaning. Or that will become meaningful.

Another part of a child's learning process is figuring out how to group things together. Events, such as the ones described above for order, can be grouped together into something more meaningful. Such as, going to bed. To an even greater degree, the child learns that events in their Universe can be grouped. To that end, things can have a past. Events that have already completed. They can have a present. Events that are on-going. And things can have a future. Events that are yet to happen. All grouped together into something that can be called time.

A third part of the learning process is related to time itself. It has to do with learning to think non-locally. Learning about clock time and calendars is something more difficult for children to do. Primarily, because they have not yet developed a sense of globalness. Take, for example, the date on a calendar. Children in this group do not have the notion that today's date is true everywhere. The same holds true for time. This all requires a global notion of "now".

Young children can only perceive the local notion of these things.

Our deepest intuitions about the nature of reality are built up as we observe and interact with the world around us, beginning as infants. Before we can articulate it, we begin to understand cause and effect. Everything that happens was caused to happen by something else. We may not always know the cause. But if we go about it the right way, the cause will come. The world is predictable in that sense.

Predicting what is going to happen next is very important for learning. A child learns to order and group their world as they grow old. Things that they do, have an effect. A cause. Because of that, their world, our world, becomes predictable. That helps to reduce the chaos our world can bring.

Xe and Andre were quite convinced that learning cause and effect is one of the most important aspects of physical and mental growth. They would have to make sure that the concept itself was taught the young ones from an early age on. To their surprise, they found that they had almost completed their tasks. Without really noticing, their immediate work was done. The result of reflecting so long on the subject of cause and effect. Now, they could move on to the other task at hand. Completing the device that

would help them predict the existence of another life form appearing on Goldilocks-P3.

Faulty Connections

Chapter Twenty-Two

Xe was impressed with herself for creating conversation that helped to make the time go faster for she and Andre. They were well on their way to wrapping up their job of dismantling the equipment within what was known as The Womb. All that was left to do was to crate up the last few packages that could then be easily transported to Simplicity-II.

In the midst of doing all this, an alarm went off. It was Xe's monitoring device for the atom interferometer. The alarm signaling that an error had occurred. It was an automatic response sent out by the software when something had gone awry. Almost in a panic, Xe began to frantically gather up her things and make preparations to leave. Andre needed no explanation. If something was broken with the atom interferometer, then they were losing precious time. At any time, something such as a gravitational wave could be making its way across the Universe. The atom interferometer needed to be fixed as soon as possible. Timing was of the utmost.

Andre was reminded of how important timing can be in scientific research. Discovery of the very first gravitational wave had proven that. There had been many discussions of what needed to be done before actually turning on the first interferometer to listen for gravitational waves. Many tests were scheduled to be run and the data analyzed before gaining any confidence in the machine's ability to do what it was designed to do. The detector had barely finished calibrating and was in an engineering run, when the first signal was detected. Talk about timing. If they had decided to wait much longer, they would have missed something that had traveled for 1.6 billion light years just waiting to be observed.

Xe made her apologies and excused herself to analyze the messages coming in from the monitoring device. She surmised that there were three possible sources of the error. One on each side of the equilateral triangle. She checked the link from Simplicity to Annihilation. That was good. She checked the link from Simplicity to the Great Divide. That was good, but not perfect. Lastly, she checked the link from Annihilation to the Great Divide. That one was definitely bad. Xe came to the conclusion that something was broken at the Great Divide. She suspected that there must be something wrong at the point of triangulation. That being the rock with the arrows of direction carefully etched onto its side.

There was no time to waste. Fortunately for Xe, it was still early in the day. There should be plenty of time left to make it to the canyon. Plenty of light left to analyze and resolve whatever it was that creating the error. Quickly gathering up what equipment she felt would be needed, she rushed out the doors of the habitat.

Making her way past the outer gardens, she caught herself. Stopped for a breather. She decided that hurrying too fast would not get her there any faster. She needed to slow down a bit. Set herself a pace. Conserve her energy. Doing so, she reached the rim of the canyon in a couple of hours. She knew it would be about four or five hours down to the bottom. That would leave only a few hours of daylight. She wasn't sure if she was going to have enough time.

Upon reaching the rim of the canyon, she found the cairn she had assembled on an earlier visit with Andre. This marked the top of the switchbacks. At the bottom would be the first cairn pointing the way up. As she started down the trail she spied a lone figure making its way up the path. Startled, she wiped her eyes and took a second look. She couldn't quite make it out, but it looked like something slowly navigating its way up to the top. Something that looked very much like a young person hiking up the trail. Young person? There were no young people on Goldilocks-P3. Except for those in the Children's House. Certainly no one that looked like this. Xe wasn't quite sure as to what to

do. Impulsively, she decided to forge ahead. Make her way down and meet this person halfway.

She tried to keep an eye on where this person was on the trail, but kept losing sight as the switchback, switched. Suddenly, as she came around one of the zigzag turns, they met face to face. They both took a step back, confused as to what they were seeing. And then, as if in some sudden awareness of each others existence, they both blurted out the same question. “Xe?”

After what seemed like an eternity, they both nodded their heads in the affirmative. Looking deeper into each other’s eyes, there was an instant bond created. The same kind of bond created by a mother breastfeeding her infant while gazing into their eyes. It was the expression in their eyes that said relax and trust in the moment. A moment that implied it was not just about seeing someone else, but that someone else sees you.

After lovingly holding each other for a moment, they slowly began to separate a bit from each other. Not wanting to let go, but needing to know more. They decided to head back down into the canyon, next to the river, to try and explain the best they could what was happening. On the way down, they were mostly silent. Trying to compose their thoughts, so that they would ask the right questions.

Down at the bottom, passed the point of the first cairn, they hesitated a bit before finding the rock with the arrows and sitting down. That seemed like a good starting point. Xe described how and why the original etchings were made. Out of fear, mainly. To help find the way back. The other Xe described how she had made the additional arrows. To lead the way forward. In the hopes of finally meeting the one who was herself. She described all of the work that had been put into creating a contraption that would notify her of the presence of a gravitational wave. A gravitational wave generated by the entrance of someone from another universe.

Before they could go any further, there was one thing that needed to be clarified. That was this business of their name being the same. Continuing the discussion by always referring to “Xe”, would become hopelessly confusing. It would be difficult to distinguish who is who. The discussion became finding out something about the other that would make it easier to do so. Thinking back into her past, preparing herself to be an astronaut heading to this planet, Xe remembered that she hadn’t always been Xe. She had a different name. Her name was Whitney. It was only while traveling to this planet that some kind of total transformation occurred. She had been reading about a scientist back on Earth who had died. A scientist named Xe. It was at that moment she felt she became Xe. That was actually quite a revelation for her to make. She hadn’t reached that far into her past before. She hadn’t had to. With that, Whitney happily met Xe from Xeron.

Over the next few hours, Whitney and Xe set out on a path of self discovery. They both had many questions. It was a little unsettling to Whitney to see that Xe was quite a bit younger than she was. Actually, a lot younger than she was. And, Xe did not appear to be an android. But that didn't seem to really matter. Xe wanted to know more about this contraption that Whitney had made. Whitney explained what the device was and how it was supposed to work. Including, how it was that she had happened to arrive at the canyon and spot Xe. There appeared a slight grin on Xe's face. The whole idea of creating an atom interferometer seemed a bit odd to Xe. Xe said it seemed like overkill.

As they examined the topic it became clear that there really wasn't anything wrong with the interferometer. In concept, it was quite creative. In actuality, it was little more than a simple motion detector. Xe explained that the interferometer was actually monitoring microwave radio energy. And that by waiting for its reflected signal to be bounced back at a low audio frequency, Whitney was able to know that an object had moved. So, Xe explained, there was no fault in the connections. The device had simply detected Xe moving the rock. Lifting it up to see the new etchings that had been added pointing up the hill.

We'll Be Back

Chapter Twenty-Three

As Whitney and Xe continued their emotional reunion of sorts, it became apparent that the daylight was fading fast. There was so much more to talk about, but time at least for this day, was running out. They both quickly agreed that they would return the next day to continue discovering who they were. They would arrive early so that there would be plenty of time to talk. Whitney had one last question as she readied to leave. "How did you get here?"

Xe replied that it was a bit complicated. Not something that could really be answered in such a hurried manner. Suffice it to say, Xe answered, it's all a matter of consciousness. Something that will become more familiar to you over the next couple of days. Whitney felt a little dismissed, but at least she knew she had a couple of days.

As Xe made headway through the berry thicket, Whitney turned and made her way towards the trail heading back to the switchbacks. She looked back once, just to make sure all of this was real, but Xe was nowhere to be seen. Starting up the side of the canyon, she was alone with her thoughts. One foot ahead of the other.

Disappointed that the day had come to a close. Once she reached the top of the canyon, she looked back down hoping to maybe catch a glimpse of Xe. Xe was still nowhere to be seen, but at least Whitney had hope.

Making her way past the gardens, Whitney thought about how she was going to present all of this to Andre. She knew he would understand. He was the only one who could. Entering the habitat, she proceeded to Andre's chambers. It was just after dark and she knew he would be there. Probably just getting ready to start reading his book before getting set for bed. Whitney knocked on his door, which was quickly opened. Andre had been concerned that she had been gone for so long. It must have taken an awful long time to figure what had happened to the interferometer. Turning around with his book in hand, he asked if she had been able to fix it?

Whitney figured there was no better way to say it, than just say it. She replied, "I met Xe". Andre abruptly dropped his book. Turning around he had a look of incredulity. Then his look quickly changed to an expression of genuine happiness. Once again, he was onboard with Whitney. Standing right by her side in an emotional embrace. Whitney explained that there really wasn't anything wrong with the interferometer. It did what it was designed to do. Kind of. The motion of Xe picking up the rock had signaled a fault error. In fact, what it was really doing was issuing an alert.

After briefly explaining how she and Xe met, Whitney shared with Andre her concern over her own self awareness. Who was she, really? She was Xe, but also felt herself to be Whitney. Andre seemed perplexed. He replied that she had always been Whitney to him and the others. That, of course, made Whitney feel like she was shorting a circuit or something. Andre went on to explain that, in her own mind, she was both. He likened it to the frozen surface of an iced-over pond. Sub-consciously she was and always had been Whitney. At the frozen surface was Xe. The awakened consciousness of the Xe from Xeron.

Whitney was stunned. First, that Andre was able to have figured all this out so nonchalantly. She had spent a considerable amount of time thinking about this on her way back from the Great Divide. Second, that what Xe had said about getting to Goldilocks-P3 was true. The way Andre described the connection between her conscious and sub-conscious made it a little easier for Whitney to accept that consciousness is something that can be navigated.

Whitney and Andre spent the next couple of hours hashing over in detail the meeting with Xe. He thought it kind of fascinating that someone so young had diagnosed the true purpose of the interferometer that they had created. Or thought, they had created. Of course, Andre wanted to meet Xe. After thinking about this for a minute, Whitney confided that she didn’t think she was quite ready for that

yet. Andre said that he completely understood. He would wait for the appropriate time. Maybe in a day or two.

The next morning, Whitney awoke early. Probably way too early. She had so much on her mind. Finally, she felt her way out of bed and made preparations for the day ahead. Opening her door, she eagerly made her way down the hallway and out the doors of the habitat. On her way to the canyon for a day of what, she wasn't quite sure of.

On Xeron, Xe had also already awakened with the same determined purpose of mind. This was not a scheduled day for Xe to be in Confluence Canyon, but in Confluence Canyon was where Xe needed to be. The night before, Xe formulated many questions that needed to have answers. Xe still wasn't quite sure who this Xe, Whitney, from Goldilocks-P3, was. She was not like Xe. She appeared to be an android. Yet, there was this sense about Whitney that felt comfortable to Xe. Like a twin. It was like Xe talking to Xe. Xe was hoping there was a lot more that would come out at their next meeting.

On the way to Confluence Canyon, it was comforting to know that where Xe had transformed to was a real place. A place called Goldilocks-P3. It had a name. It wasn't this foreign, lonely, and forbidden place that Xe's consciousness had somehow conjured up. It wasn't just something in Xe's mind. It was a physical place with a live

person. Even if it wasn't quite clear yet who that person really was.

Wondering if there was something that could be given to Whitney from Xeron, Xe could not think of anything tangible. There wasn't anything that Whitney would be able to hold in her hands that would, somehow, magically translate to "Oh, that's from Xeron". Except for the presence of Xe. That would happen soon enough. Xe was quickly approaching the river crossing that separated summer from winter. Ready to cross the universe to the Great Divide.

Out of the berry bushes stepped Xe, furtively glancing around to provide assurance that this was the right place. Sitting not too far away was Whitney. She had been patiently waiting for awhile. Leaving early from Simplicity gave her plenty of time to mentally prepare for the excitement of meeting Xe again. They first exchanged hugs and some genial conversation, meant to create a relaxed and friendly atmosphere. Not to be contained, Xe began in earnest wanting to know more about Whitney. Who was she and how did she come to be someone with Xe's name? Not just with Xe's name, but felt to be Xe's self?

Whitney was more than willing to begin. It had to start somewhere. She started with the obvious. That she was an android. Part of a mission from Earth to re-settle humanity somewhere else. A mission that included humans and

androids. Those that would become humanity's future. Whitney explained that she was a scientist, with backgrounds in physics, astronomy, and anthropology. More specifically, particle physics, cosmology, and paleoanthropology. There became this glimmer in Xe's eyes. A further recognition of the bond that contained the two of them. Xe explained, that they had a mutual admiration for the same subjects. Subjects still very new to Xe, but somehow feeling them to be like an old friend.

There was more to Whitney's story. She began with the journey to the Goldilocks system. Part way through, there was this sudden transformation into the soul of another. A soul that reached across the Universe and energized her with a preoccupation of finding a place called Xeron. Xeron seemed to be the place of her origin. The place she, and countless other versions of she, had been trying to get back to. She then turned to Xe, as if to say, is this the way?

Xe was quite taken aback. But also relieved. This explained a lot of what Xe was feeling. Xe expressed that there was this feeling of knowing that everything about Whitney just seemed right. That there was a special connection between the two. A real connection between Xe and Whitney that crossed universes.

Whitney wanted to know more about this idea of crossing universes. Was Xeron really in another universe? Xe nodded yes. Xe and Xeron were actually located in another universe. Whitney released a heavy sigh of relief, having finally received confirmation of what she had always suspected. She asked Xe, “What is the name of your universe and where is it”? Xe was a little befuddled. It seemed like an innocent enough question, but it had never been asked before. Xe wasn’t quite sure there was a definitive answer. At least one that would satisfy Whitney.

Carefully collecting thoughts, Xe began to explain that the universe is, well, just named “universe”. There is no other name. All other universes are called this. There are other universes known to Xerellians. But the universe that one lives within is, simply, universal. The answer to the second question of where it is? It is where one is from. Whitney was totally confused, as Xe suspected she would be. Xe tried to put it another way. The universe is everything around you. It is just another name for a continuous field of potential energy that pervades all there is. Xe was trying to relate this in terms that Whitney might understand. In terms a particle physicist would understand. Every now and then that field elicits a disturbance that results in a particle appearing. That particle can grow into larger objects through inflation. Becoming planets like Earth, Goldilocks-P3, Xeron, and everything else in the observable universe. So my universe, Xe’s universe, is one and the same as yours. Whitney’s universe. It’s all relative to your frame of reference. There was a nod of

comprehension on Whitney's part. Xe thought Whitney had succeeded in grasping the concept.

Whitney had a further question though that had to do with the relationship between Goldilocks-P3 and Xeron. What was so special about the Great Divide that brought the two of them together? Xe had already anticipated this question. Xe knew this was not going to be easy. Then again, neither were the other questions.

Xe tried once again to frame the answer in terms of particle physics and, more specifically, what Whitney was probably more familiar with, entanglement. Whitney did not know that Xeron and Goldilocks-P3 both orbited around two stars. She also did not know there was a place on Xeron called Confluence Canyon. A place exactly the same as the Great Divide. A place where, once a year, something very special happened. In other words, Xeron and Goldilocks-P3 were entangled. What that meant to Whitney was that there must be a bridge. A bridge between the two planets. A bridge between the two universes. Whitney explained to Xe that she and Andre had talked about this a long time ago. In relation to black holes, ER bridges, and wormholes. Whitney surprised Xe by her apprehension and sentience of entanglement.

Whitney tried to repeat back to Xe what was being said. That because of the entanglement between Xeron and

Goldilocks-P3, a connection was opened. Allowing for the transformation of information, things, between the two. She asked Xe if that included consciousness? Xe responded that, yes, a transformation of consciousness is just how Xe was able to arrive on Goldilocks-P3. Whitney now understood that she wasn't being dismissed earlier. It just wasn't the right time yet.

Xe's next response to Whitney caught her totally by surprise. Xe was prepared to teach Whitney the techniques involved in the transformation from Goldilocks-P3 to Xeron through a black hole. How to navigate consciousness. Quite unexpectedly, Whitney began to weep with tears of joy.

The rest of the afternoon was spent with Xe instructing Whitney on how to transform. It was a difficult concept for Whitney to grasp, just as it had been for Xe on Xeron. Whitney thought she understood what consciousness was. What she didn't understand was how it could be navigated. A mental navigation of the field surrounding the mind that is consciousness. Xe explained that it was similar to a situation of mind over matter. That one's mind, consciousness, can be used to overcome matter. The matter of the universe that consists fundamentally as particles.

To do this, all Whitney had to do was practice doing nothing. It has to do with the way you pay attention to

something. Getting rid of distractions allows for new neural pathways to be opened. Neural pathways that can be traveled through as a part of one's consciousness. By practicing this, Whitney would be able to use her mind to transform her conscious self, through a black hole, to Xeron. With Xe. And so they did. Practice. Doing nothing for the rest of the day.

Once again, it was time to leave. They both committed to coming back again tomorrow. Whitney had one final request. She needed to know whether it was alright with Xe that she brought her partner Andre? A bit sheepishly, Xe responded that when she had mentioned Andre earlier, a question had formed. A question as to who this Andre was? Without going into all the details of their partnership, Whitney explained it was like consciousness. A consciousness between an entangled pair. With that, Xe acquiesced.

GOODBYES

Chapter Twenty-Four

Whitney made a beeline into the habitat and, once again, went straight to Andre's quarters. As predicted, he was busy reading a book, preparing for bedtime. As she walked in, Andre could tell that something had changed. There was a confidence in her eyes that signaled she was fulfilled. Complete. Not hesitating at all, Whitney shared that Xe had agreed to having Andre accompany her on tomorrow's visit. She was very happy that he was going to finally be able to meet the person who she really was all these many years. To be able to have all the dots connected.

After conversing for a short while, Whitney excused herself. She explained that it had been a very tiring day. Andre was disappointed that they couldn't talk longer, but he fully understood. They would both meet early the next morning to begin the journey to the Great Divide. Retreating to her room, Whitney began to practice the techniques that Xe had been teaching her. She wanted to be a good student. She wanted to be able to go home. Until doing nothing, put her right to sleep.

Andre meanwhile, could not fall to sleep no matter how hard he tried. Maybe that was the problem. Kind of like watching to see if a kettle boils. Then again, it was probably more like Andre could sense something that he had been trying not to confront. That time was running out. Now that Whitney had found Xe, it wouldn't be long before time with Whitney would run out. They had talked about this eventuality in the past. But then was not now. Andre didn't know if he was ready for this.

The next morning, bright and early, Whitney and Andre met in the hallway. Prepared to leave Simplicity for what lay ahead in the canyon. They made their way to the rim of the canyon and, then, the switchbacks to the river below. To the surprise of Whitney, Xe was already there. Patiently waiting. As the two approached, Xe was quick to jump up to receive them. A reassuring hug to Whitney and a genuine welcoming hug to Andre.

Andre was surprised, as Whitney had been, at how youthful Xe appeared. Whitney had confided in Andre how articulate Xe was on the subject of particle physics and cosmology. Andre finally had a face with which to associate all the compliments that Whitney had given Xe. He was ready to congratulate Xe when, instead, Xe did so to Andre. Xe said that Andre's discussions with Whitney about entanglement were very logically sound. That, yes, black holes really do allow for information to escape. That without the two, Xe would not be standing there today.

What followed was an awkward moment of silence. There really wasn't a whole lot more to say. Except goodbye. Whitney was stunned when Xe announced that she and Xe would be heading back to Xeron shortly. Andre was more reserved. He had thought about this all night long. It was alright. He was at peace with himself, Whitney, and Xe.

Whitney was beside herself. She needed to prepare. There were still things to do. Goodbyes to be said. Time spent alone with Andre, explaining why all of this was so important. So necessary. But that was not to be.

With another round of hugs, long lasting hugs, Whitney and Andre shared some final words of peace and love that could not make up for the emotional end that was about to unfold. As Andre turned to start the long trek back up the switchbacks of the Great Divide, Whitney and Xe disappeared through the berry bushes. Andre turned around one last time. Hoping for one last memory. She was gone.

XERON

Chapter Twenty-Five

Almost immediately, Whitney began to feel the effects of journeying through the black hole. There was no time to reflect on losing her life-long partner for a life that she did not know. Something was happening. Something that she had no jurisdiction over.

She had her eyes closed, as if that was something she could control on her own. At least they seemed closed. She was surrounded by a total silence and complete darkness. It was a darkness that could only be described as expanding. Inflating, the longer she was there. Or, was it here? Although it wasn't a feeling of she herself moving. It was the darkness that was moving. The darkness that is space-time itself. What she was experiencing was the expansion of space-time. She was just being moved along as a result of space-time inflating. Something in the past known as dark energy. Soon, it was like she was being stretched. Stretched beyond her capability of being stretched. She imagined that she must be inside the singularity. Where everything is all things and everything at once.

Then, as suddenly as it had begun, it all just stopped. Everything was completely silent and still. There was this compulsion to open her eyes. Yet, a conflicting desire to keep them closed. Afraid to open her eyes, but knowing she must. To see where she was. If there was anything left to be seen. Somehow, she felt her eyes would not lie to her. Trustingly, she forced open her eyes. She appeared to be standing at the bottom of a deep canyon. Adjacent to a lazily flowing river. Her first thought was that she was still in the Great Divide. The two sides of the canyon looked like they were in different seasons. Downhearted, she thought she had not succeeded in making it to Xeron. She looked around hopelessly for Xe, but Xe wasn't there. More proof that she had failed to make the transformation. Unsuccessful, at crossing universes.

She blinked a few times, wiping away the tears as she did so. Things became a little clearer. This was not the Great Divide. There were others here. Others that she did not know. Where was Xe? This must be what Xe had called Confluence Canyon after all. But where was Xe? Some of the others came up to greet her. She was a bit embarrassed. They seemed to know her but she did not know them. One of them finally said, "Welcome back Xe! You know you could get in a lot of trouble, traveling without a guide".

That's when it hit her. It wasn't that Xe wasn't there. Xe was obviously here. Whitney was the one who was

missing. Through all the darkness and stretching of the singularity, Whitney had become Xe. Become who she really was.

Final Chapter

Chapter Twenty-Six

Whitney has become just a distant memory in Xe's life. As Xe has inflated, it seems that Whitney has drifted further and further away. Not that Whitney has moved further away. The space-time between Whitney and Xe has stretched, such that the consciousness of Whitney has had to travel a longer and longer distance. Thus seemingly fading away, as light from a distant star gradually disappears over time.

In the moment, it didn't make a whole lot of sense. Why did Whitney's memory have to fade with time? The answer appeared as Xe gained an increased understanding of the concept of time. One of the lessons learned in Xe's education. The lesson learned was that the accepted way of describing time was all wrong. Time is not a linear thing that consists of past, present, and future. That's a nice way to describe it, considering the limitations that language places on our perceptions. But language cannot do time adequate justice. Language attempts to describe, to put into words, what it is we perceive. Alas, what we observe and experience is not reality. It is just an approximation.

Xe has come to realize that time is simply a reflection of the teachings of The Laws of Everything. As the universe is perceived to be an all pervasive field, so is time. Time exists all around Xe. It is everywhere, as space-time is everywhere. It only becomes linear when we perceive a small perturbation or vacuum fluctuation in a field that results in a point particle. Then, an instance of time appears that creates a past, present, and future. Until the point inflates out.

Whitney is just such a point. A point that was born to become, and then inflate out. Only to be inflated back in somewhere else. Into the Xe that exists on Xeron. So Whitney has not faded away. She has become a part of everything that surrounds Xe. There at all times. Pervasive as of all of space-time.

Xe continues to inflate on Xeron in the form of an experienced scientist. After finishing studies of The Laws of Everything, Xe has managed to carve out a niche unique to Xe. As a particle physicist, cosmologist, and paleoanthropologist. Specializing in the actions of everything that takes place in a universe. At the smallest of scales. To the most immeasurable of objects.

Xe likes to tinker. To explore the edges. Xe has invented a process by which interactions between the particles of everything can be captured. Xe can be inserted

between the interaction of two particles, such that travel between universes is possible. Made easier. To be inserted directly into a life form for a period of time before eventually inflating out. Xe's choice of life form? Humans on a planet called Earth. Xe is studying their evolution to figure out how all of it started and how all of it will play out. Do they fit in with The Laws of Everything and the continuum of inflation discovered by Xerellians?

The calculations made by Xe place the transformation to humans to be about 4.5 million Earth years ago. There was an inhabitant there called Ardipithecus that first gained attention that long ago. This seemed to be a turning point in human evolution. This was the place where Xe wanted to be. Discovering one of those times where a difference is made. Witnessing an adaptation that would change the course of human development forever. Within the time it takes two particles to dance, Xe was off.

The transformative journey completed, Xe's eyes opened to a cool, moist rush of air into his nostrils. After a couple of blinks to clear the sleep and presumably the cobwebs, Xe was aware of himself lying on his back looking up into a sky of early morning darkness. Not the black of night, but the dark blue of early morning. By all calculations, Xe had arrived at his destination. Lying in a nest made from the folded branches, twigs, and leaves of a heavily foliated fig tree. Xe slowly stretched and yawned to wake himself.

Up in the canopy of an abundantly wooded area, on the edge of an open savanna 4.5 million Earth years ago.

Xe has been on this Earth before. At this time and in this place. Like Xe, we all continue to loop back and forth between universes. We inflate out. We inflate back in somewhere else. Every once in awhile, we just need a place that we know we can, we can come home to.

AFTERWORD

It is twenty-five years later and Andre is the only original human surviving on Goldilocks-P3. He is well into his nineties now and still lives within Simplicity. He is considered by the young of Goldilocks-P3 to be a seer, a shaman of sorts. Definitely, a very wise man. The young come often, hoping to have a visit with him. To talk things over. To consume the wisdom that he imparts.

Over the many years that Whitey has been gone, he has continued to visit the Great Divide often. Occasionally, he has met with Xe to learn of things he cannot know of. Maybe, shouldn't know of. Like what has happened on Earth. According to Xe, the predicted mass extinction of 2200 occurred. Is occurring. There had been attempts to thwart its effects, but the warnings were ignored for far too long. The result seems to be that Earth was re-setting itself. Trying to lick its wounds and smooth over the scars.

As for humans? They have all been wiped out, save for a scattered few who have happened to adapt. To change. Adapt to a way of life not experienced by humans in millions of years. Back to a time when they were just emerging from the forests and advancing into the bipedal lifestyle selectively compatible with the open savannas.

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