WHAT CONTINUES … AND WHAT FAILS …

by

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Black. As deep as night is black between the stars.

Deeper than that. Night isn't really black, but a solemn, utter shade of red.

As black, then, as Tenembro Nought, which drinks all colour, texture, substance, from around it, giving back only its awful depth of presence.

But no. She had found redness of an immeasurably profound hue, emerging from that awful pit in space. Not even the singularity was pure enough to typify true blackness. Nor was Isola's own dark mood, for that matter – although, since the visitors' arrival, she had felt smothered, robbed of illumination.

In comparison, a mere ebony lustre of skin and hair seemed too pallid to dignify with the name 'black'. Yet, those traits were much sought after on Pleasence World, one of many reasons a fetch ship had come all this way to claim the new life within her.

The foetus might know blackness, Isola thought, laying a hand over her curved abdomen, feeling a stirring there. She purposely used cool, sterile terms, never calling it 'baby', or a personalised 'she'. Anyway, when is a foetus's sensory innervation up to 'knowing' anything at all? Can one who has never seen light comprehend blackness?

Leaning towards the dimly illuminated field-effect mirror, Isola touched its glass-smooth, silky cool, pseudo-surface. Peering at her own reflection, she found at last what she was looking for.

That's it. Where light falls, never to emerge again.

She brought her face closer still, centring on one jet pupil, an inky well outlined by a dark iris – the universe wherein she dwelt.

"It is said nothing escapes from inside a black hole, but that isn't quite so."

Mikaela was well into her lecture when Isola slipped into the theatre, late but unrepentant. A brief frown was her partner's only rebuke for her tardiness. Mikaela continued without losing a beat.

"In this universe of ours, the rules seem to allow exceptions even to the finality of great noughts …"

Isola's vision adapted and she discreetly scanned the visitors – six space travellers whose arrival had disrupted a quiet, monastic research routine. The guests from Pleasence World lounged on pseudo-life chaises overlooking Mikaela and the dais. Each sleek-furred settee was specially tuned to the needs of its occupant. While the three humans in the audience made little use of their couch amenities – only occasionally lifting fleshy tubes to infuse endorphin-laced oxygen, the squat, toadlike Vorpal and pair of slender Butins had already hooked up for full breathing symbiosis.

Well, they must have known they were coming to a rude outpost station, built with only a pair of humans in mind. Isola and Mikaela had not expected guests until a few months ago, when the decelerating starship peremptorily announced itself, and made its needs known.

Those needs included the use of Isola's womb.

"Actually, there are countless misconceptions about gravitational singularities, especially the massive variety formed in the recoil of a supernova. One myth concerns the possibility of communicating across a black hole's event horizon, to see what has become of all the matter which left this universe so violently and completely, long ago."

Mikaela turned with a flourish of puffy sleeves towards the viewing tank. Winking one eye, she called up a new image to display in mid-air, above the dais. Brilliance spilled across Mikaela's fair skin and the visitors' multi-hued faces, causing several to flinch involuntarily. Isola smiled.

Titanic fields enveloped and deformed a tortured sun, dragging long shreds of its substance towards a spinning, flattened whirlpool – a disc so bright it searingly outshone the unfortunate nearby star.

"Until now, most investigations of macro black holes have concentrated on showy cases like this one – the Cygnus A singularity – which raises such ferocious tides on a companion sun as to tear it apart before our eyes. In galactic cores, greedy mega holes can devour entire stellar clusters. No wonder most prior expeditions were devoted to viewing noughts with visible accretion discs. Besides, their splashy radiance makes them easy to find."

Isola watched the victim star's tattered, stolen essence spiral into the planate cyclone, which brightened painfully despite attenuation by the viewing software. Shimmering, lambent stalks traced magnetically directed plasma beams, jetting from the singularity north and south. As refulgent gas swirled inward, jostling and heating, it suddenly reached an inner lip – the edge of a black circle, tiny in diameter but awesome in conclusiveness. The Event Horizon.

Spilling across that boundary, the actinic matter vanished abruptly, completely. Once over the edge, it was no longer part of reality. Not *this* reality, anyway.

Mikaela had begun her lecture from a basic level, since some of the visitors weren't cosmogonists. One of these, Jarlquin, the geneticist from Pleasence, shifted on her chaise. At some silent order, a pseudo-life assistant appeared to massage her shoulders. Petite, even for a starfarer, Jarlquin glanced towards Isola, offering a conspiratorial smile.

Isola pretended not to notice.

"Most massive noughts don't have stars as close neighbours, nor gas clouds to feed them so prodigiously and make them shine." Closing one eye again, Mikaela sent another command. In a flickered instant, the ostentatious display of stellar devouring was replaced by serene quiet. Cool, untroubled constellations spanned the theatre. Tenembro Nought was a mere ripple in one quadrant of the starry field, unnoticed by the audience until Mikaela's pointer drew attention to its outlines. A lenslike blur of distortion, nothing more.

"Solitary macro-singularities like Tenembro are far more common than their gaudy cousins. Standing alone in space, hungry, but too isolated to draw in more than a rare atom or meteoroid, they are also harder to find. Tenembro Nought was discovered only after detecting the way it bent light from faraway galaxies.

"The black hole turned out to be perfect for our needs, and only fifty-nine years, shiptime, from the colony on Kalimarn."

Under Mikaela's mute guidance, the image enlarged. She gestured towards a corner of the tank, where a long, slender vessel could be seen, decelerating into orbit around the cold dimple in space. From the ship's tail emerged much smaller ripples, which also had the property of causing starlight to waver briefly. The distortion looked similar – though on a microscopic scale – to that caused by the giant nought itself. This was no coincidence.

"Once in orbit, we began constructing research probes. We converted our ship's drive to make tailored micro-singularities …"

At that moment, a tickling sensation along her left eyebrow told Isola that a datafeed was queued with results from her latest experiment. She closed that eye with a trained squeeze denoting ACCEPT. Implants along the inner lid came alight, conveying images in crisp focus to her retina. Unlike the digested pap in Mikaela's presentation, what Isola saw was in real time … or as 'real' as time got, this near a macro black hole.

More rippling images of constellations. She sub-vocally commanded a shift to graphic mode; field diagrams snapped over the starry scene, showing Tenembro's mammoth, steepening funnel in space-time. An uneven formation of objects – miniscule in comparison – skimmed towards glancing rendezvous with the great nought's eerily bright-black horizon. Glowing traceries depicted one of the little objects as another space-funnel. Vastly smaller, titanically narrower, it too possessed a centre that was severed from this reality as if amputated by the scalpel of God.

"… with the objective of creating ideal conditions for our instruments to peer down …"

Columns of data climbed across the scene under Isola's eyelid. She could already tell that this experiment wasn't going any better than the others. Despite all their careful calculations, the camera probes still weren't managing to straddle between the giant and dwarf singularities at the right moment, just when the black discs touched. Still, she watched that instant of grazing passage, hoping to learn something –

The scene suddenly shivered as Isola's belly gave a churning lurch, provoking waves of nausea. She blinked involuntarily and the image vanished.

The fit passed, leaving her short of breath, with a prickle of perspiration on her face and neck. Plucking a kerchief from her sleeve, Isola dabbed her brow. She lacked the will to order the depiction back. Time enough to go over the results later, with full-spectrum facilities.

This is getting ridiculous, Isola brooded. She had never imagined, w hen the requisition request came, that a simple clonal pregnancy would entail so many inconveniences!

"… taking advantage of a loophole in the rules of our cosmos, which allow for a slightly offset boundary when the original collapstar possessed either spin or charge. This offset from perfection is one of the features we hope to exploit …"

Isola felt a sensation of being watched. She shifted slightly. From her nearby pseudo-life chaise, Jarlquin was looking at Isola again, with a measuring expression.

She might have the courtesy to feign attention to Mikaela's presentation, Isola thought, resentfully. *Jarlquin seems more preoccupied with my condition than I am*.

The Pleasencer's interest was understandable, after having come so far just for the present contents of Isola's womb. *My anger with Jarlquin has an obvious source. Its origin is the same as my own*.

An obsession with beginnings had brought Isola to this place on the edge of infinity.

How did the universe begin?

Where did it come from?

Where do I *come from?*

It was ironic that her search would take her to where creation ended. For while the expanding cosmos has no 'outer edge', as such, it does encounter a sharp boundary at the rim of a black hole.

Isola remembered her childhood, back on Kalimarn, playing in the yard with toys that made pico-singularities on demand, from which she gained her first experience examining the warped mysteries of succinct event horizons. She recalled the day these had ceased to be mere dalliances, or school exercises in propulsion engineering, when they instead became foci for exaltation and wonder.

The same equations that describe an expanding universe also tell of a gravity trough's collapse. Explosion, implosion … the only difference lay in reversing time's arrow. We are, in effect, living inside *a gigantic black hole!*

Her young mind marvelled at the implications.

Everything within is aleph. Aleph is cut off from contact with that which is not aleph. Or that which came before *aleph. Cause and effect, forever separated.*

As I am separated from what brought me into being.

As I must separate from what I bring into being …

The foetus kicked again, setting off twinges, unleashing a flood of symbiotic bonding hormones. One side-effect came as a sudden wave of unasked-for sentimentality. Tears filled Isola's eyes, and she could not have made image-picts even if she tried.

Jarlquin had offered drugs to subdue these effects – to make the process 'easier'. Isola did not want it eased. This could be her sole act of biological creation, given the career she had chosen. The word 'motherhood' might be archaic nowadays, but it still had connotations. She wanted to experience them.

It was simple enough in conception.

Back in the eighteenth century, a physicist, John Mitchell, showed that any large enough lump of matter might have an escape velocity greater than the speed of light. Even luminous waves should not be able to escape. When John Wheeler, two hundred years later, performed the same conjuring trick with mass *density*, the name 'black hole' was coined.

Those were just theoretical exercises. What actually happens to a photon that tries to climb out of a singularity? Does it behave like a rocket, slowing down under gravity's insistent drag? Coming to a halt, then turning to plummet down again?

Not so. Photons move at a constant rate, one single speed, no matter what reference frame you use. Unless physically blocked or diverted, light slows for no one.

But tightly coiled gravity does strange things. It changes *time*. Gravitation can make light pay a toll for escaping. Photons lose energy not by slowing down, but by stretching redder, ever redder, as they rise from a space-time well, elongating to microwave lengths, then radio, and onward. Theoretically, on climbing to the event horizon of a black hole, any light wave has reddened down to nothing.

Nothing emerges. Nothing – travelling at the speed of light. In a prim, legalistic sense, that nothing *is* still light.

Isola spread her traps, planning tight, intersecting orbits. She lay a web designed to ambush nothing … to peer down into nowhere.

"You know, I never gave it much thought before. The whole thing seemed such a bother. Anyway, I always figured there'd be plenty of time later, after we finished our project."

Mikaela's non-sequitur came by complete surprise. Isola looked up from the chart she had been studying. Across the breakfast table, her colleague wore an expression that seemed outwardly casual, but studied. Thin as frost.

"Plenty of time for what?" Isola asked.

Mikaela lifted a cup of port'ha to her lips. "You know … procreation."

"Oh." Isola did not know what to say. Ever since the visitor-ship announced itself, her partner had expressed nothing but irritation over havoc to their research schedules. Of late her complaints had been replaced with pensive moodiness. *So this is what she's been brooding about*, Isola realised. To give herself a moment, she held out her own cup for the pseudo-life servitor to refill. Her condition forbade drinking port'ha, so she made do with tea.

"And what have you concluded?" she asked, evenly.

"That I'd be foolish to waste this opportunity."

"Opportunity?"

Mikaela shrugged. "Look, Jarlquin came all this way hoping to requisition your clone. You could have turned her down –"

"Mikaela, we've gone over this so many times …" But Isola's partner cut her off, raising one hand placatingly.

"That's all right. I now see you were right to agree. It's a great honour. Records of your clone-line are on file throughout the sector."

Isola sighed. "My ancestresses were explorers and star messengers. So, many worlds in the region would have –"

"Exactly. It's all a matter of available information! Pleasence World had data on you, but not on a semi-natural variant like me, born on Kalimarn of Kalimarnese stock. For all we know, I might have what Jarlquin's looking for, too."

Isola nodded earnestly. "I'm sure of that. Do you mean you're thinking –"

"– of getting tested?" Mikaela watched Isola over the rim of her cup. "Do you think I should?"

Despite her continuing reservations over having been requisitioned in the first place, Isola felt a surge of enthusiasm. The notion of sharing this experience – this unexpected experiment in motherhood – with her only friend gave her strange pleasure. "Oh, yes! They'll jump at the chance. Of course …" She paused.

"What?" Mikaela asked, tension visible in her shoulders.

Isola had a sudden image of the two of them, waddling about the station, relying utterly on drones and pseudo-life servitors to run errands and experiments. The inconvenience alone would be frightful. Yet, it would only add up to a year or so, altogether. She smiled ironically. "It means our guests would stay longer. And you'd have to put up with Jarlquin…"

Mikaela laughed. A hearty laugh of release. "Yeah, dammit. That is a drawback!"

Relieved at the lifting of her partner's spirit, Isola grinned too. They were in concord again. She had missed the old easiness between them, which had been under strain since that first surprise message disrupted their hermit's regime. *This will put everything right*, she hoped. *We'll have years to talk about a strange, shared experience after it's all over.*

The best solutions are almost always the simplest.

Within a sac of amniotic fluid, a play is acted out according to a script. The script calls for proteins, so amino acids are lined up by ribosomes to play their roles. Enzymes appear at the proper moment. Cells divide and jostle for position. The code demands they specialise, so they do. Subtle forces of attraction and repulsion shift them into place, one by one.

It is a script that has been played before.

A script designed to play again.

The pair of nano-noughts – each weighing just a million tons – hovered within a neutral gravity tank. Between the microscopic wells of darkness, a small recording device peered into one of the tiny singularities. Across the room, screens showed only the colour black.

Special fields kept each nought from self-destructing – either through quantum evaporation or by folding space around itself like a blanket and disappearing. Other beams of force strained to hold the two black holes apart, preventing gravity from slamming them together uncontrollably.

It was an unstable situation. But Isola was well-practised. Seated on a soft chaise to support her overstrained back, she used subtle machines to manipulate the two funnels of sunken metric towards each other. The outermost rims of their space-time wells merged. Two microscopic black spheres – the event horizons themselves – lay centimetres apart, ratcheting closer by the second, as Isola let them slowly draw together.

Tides tugged at the camera, suspended between, and at the fibre-thin cable leading from the camera to her recorders. Peering into one of those pits of blackness, the mini-telescope saw nothing. That was only natural.

Nothing could escape from inside a black hole.

A special kind of nothing, though. Nothing that had formerly been light, before being stretched down to true nothingness in the act of climbing that steep slope.

The two funnels merged closer still. The microscopic black balls drew nearer.

Light trying to escape a black hole is reddened to non-existence. Nevertheless, virtual light can theoretically escape one nought, only to be sucked into the other. There, it starts blue*-shifting exponentially, as gravity yanks it downward again.*

Between one event horizon and the other, the light doesn't 'officially' exist. Not in the limiting case. Yet ideally, there should be a flow.

They had not believed her on Kalimarn. Until one day she showed them it was possible, for the narrowest of instants, to tap the virtual stream. To squeeze between the red-shifted and blue-shifted segments. To catch the briefest glimpse –

It happened too fast to follow with human eyes. One moment two black spheres were inching microscopically towards each other with the little, doomed instrumentality tortured and whining between them. The next instant, in a sudden flash, all contents of the tank combined and vanished. Space-time backlash set the reinforced vacuum chamber rocking – side-effect of that final stroke which severed forever all contact between the noughts and this cosmos where they'd been made. In the moment it took Isola to blink, they were gone, leaving behind the neatly severed end of fibre cable.

Gone, but not forgotten. In taking the camera with them, the singularities had given it the moment it needed. The moment when 'nothing' was no longer nothing but merely a deep red.

And red is visible …

This was what had won her funding to seek out a partner and come here to Tenembro Nought. For if it was possible to look inside a micro-hole, why not a far bigger one that had been born in the titanic self-devouring of a star? So far, she and Mikaela hadn't succeeded in that part of the quest. Their research at the micro end, however, kept giving surprising and wonderful results.

Isola checked to make sure all the secrets of the vanished nano-nought had been captured during that narrow instant, and were safely stored in memory. Its rules. Its nature as a cosmos all its own. She had varied the formation recipe again, and wondered what physics would be revealed this time.

Before she could examine the snapshot of a pocket universe, however, her left eyelid twitched and came alight with a reminder. Time for her appointment. Damn.

But Jarlquin had shown Isola how much more pleasant it was to be on time.

The temperature of the universe is just under three degrees, absolute. It has chilled considerably, in the act of expanding over billions of years, from fireball to cosmos. Cooling in turn provoked changes in state. Delicately balanced forces shifted as the original heat diffused, allowing protons to form from quarks, then electrons to take orbit around them, producing that wonder, Hydrogen. Later rebalancings caused matter to gather, forming monstrous swirls. Many of these eddies coalesced and came alight spectacularly – all because the rules allowed it.

Because the rules *required* it.

Time processed one of those lights – by those selfsame rules – until it finished burning and collapsed, precipitating a fierce explosion and ejection of its core from the universe.

Tenembro Nought sat as a fossil relic of that banishment. A scar, nearly healed, but palpable.

All of this had come about according to the rules.

"We've liberated ourselves from Darwin's Curse, but it still comes down to the same thing."

The visitor made a steeple of her petite hands, long and narrow, with delicate fingers like a surgeon's. Her lips

were full and dyed a rich mauve hue. Faint ripples passed across her skin as pores opened and closed rhythmically. A genetic graft, Isola supposed. Probably some Vorpal trait inserted into Jarlquin's genome before she was even conceived.

Fortunately, laws limit the gene trade, Isola thought. *All they can ask of me is a simple cloning*.

Over Jarlquin's shoulder, through the window of the lounge, Isola saw the starscape and realised Smolin Cluster was in view. Sub-vocally, she ordered the magni-focus pane to enlarge one quadrant for her eye only. Flexing gently, imperceptibly to other visitors across the room, the window sent Isola a scene of suns like shining grains. One golden pinpoint – Pleasence Star – shone soft and stable. Its kind, by nature's laws, would last eons and never become a nought."

"You see," Jarlquin continued, blithely ignorant of Isola's distraction. "Although we've pierced much of the code of Life, and reached a truce of sorts with Death, the fundamental rule's the same. That is successful which continues. And what continues most successfully is that which not only lives, but multiplies."

Why is she telling me this? Isola wondered, sitting in a gently vibrating non-life chair across from Jarlquin. Did the biologer-nurturist actually care what her subject thought? Isola had agreed to disrupt her research and donate a clone, for the genetic benefit of Pleasence World. Wasn't that enough?

I ought to be flattered. Tenembro Nought may be 'close' to their world by interstellar standards, still, how often does a colony send a ship so far, just to collect one person's neonate clone?

Oh, the visitors had also made a great show of scrutinising their work here, driving Mikaela to distraction with their questions. The pair of Butins were physicians and exuded enthusiasm along with their pungent, blue perspiration. But Jarlquin had confided in Isola. They would never have been approved to come all this way if not also to seek her seed. To treasure and nurture it, and take it home with them.

As I was taken from my own parent, who donated an infant duplicate to Kalimarn as her ship swept by. We are a model in demand, it seems.

The reasons were clear enough, in abstract. In school she had learned about the interstellar economy of genes, which prevented the catastrophe of inter-breeding and spread the boon of diversity. But tidal surges of hormone and emotion had not been in her syllabus. Isola could not rightly connect abstractions with events churning away below her sternum. They seemed as unrelated as a sonnet and a table.

Two pseudo-life servitors entered – no doubt called when Jarlquin winked briefly a moment ago – carrying hot beverages on a tray. The blank-faced, bipedal protoplasmoids were as expressionless as might be expected of beings less than three days old … and destined within three more to slip back into the vat from which they'd been drawn. One servant poured for Isola as it had been programmed to do, with uncomplaining perfection no truly living being could have emulated.

"You were speaking of multiplication," Isola prompted, lest Jarlquin lose her train of thought and decide to launch into another recital of the wonders of Pleasence. The fine life awaiting Isola's clone.

"Ah?" Jarlquin pursed her lips, tasting the tea. "Yes, multiplication. Tell me, as time goes on, who populates the galaxies? Obviously, those who disperse and reproduce. Even though we aren't *evolving* in the old way – stressed by death and natural selection – a kind of selection is still going on."

"Selection?"

"Indeed, selection. For traits appropriate to a given place and time. Consider what happened to those genes which, for one reason or another, kept individuals from leaving Beloved Earth during the first grand waves of colonisation. Are descendants of those individuals still with us? Do those genes persist, now that Earth is gone?"

Isola saw Jarlquin's point. The impulsive drive to reproduce sexually had ebbed from humanity – at least in this sector. She had heard things were otherwise, spinward of galactic West and in the Magellanics. Nevertheless, certain models of humanity seemed to spread and thrive, while other types remained few, or disappeared.

"So it's been in other races with whom we've formed symbioses. Planets and commonwealths decide what kinds of citizens they need and requisition clones or new variants, often trading with colonies many parsecs away. Nowadays you can be successful at reproduction without ever planning to."

Isola realised Jarlquin must know her inside and out. Not that her ambivalence was hard to read.

To become a mother, she thought. *I am about to … give birth. I don't even know what it means, but Jarlquin seems to envy me.*

"Whatever works," the Pleasencer continued, sipping her steaming tea. "That law of nature, no amount of scientific progress will ever change. If you have what it takes to reproduce, and pass on those traits to your offspring, then *they* will likely replicate as well, and your kind will spread."

What came before? And what came before that?

As a very little girl, back on Kalimarn, she had seen how other infants gleefully discovered a way to drive parents and guardians to distraction with the game of 'Why'. It could start at any moment, given the slightest excuse to ask that first, guileless question. Any adult who innocently answered with an explanation was met with the same simple, efficient rejoinder – another 'why?'. Then another … Used carefully, deliciously, it became an inquisition guaranteed to provoke either insanity or pure enlightenment by the twentieth repetition. More often the former.

To be different, Isola modified the exercise.

What caused that? she asked. Then – *What caused the cause?* and so on.

She soon learned how to dispense quickly with preliminaries. The vast, recent ages of space travel and colonisation were quickly dealt with, as was the Dark Climb of man, back on old Beloved Earth. Recorded history was like a salad, archaeology an aperitif. Neanderthals and dinosaurs offered adult bulwarks, but she would not be

distracted. Under pestering inquiry, the homeworld unformed, its sun unravelled into dust and gas, which swirled backwards in time to be absorbed by reversed supernovas. Galaxies unwound. Starlight and cold matter fell together, compressing into universal plasma as the cosmos shrank towards its origins. By the time her poor teachers had parsed existence to its debut epoch – the first searing day, its earliest, actinic minute, down to micro-fractions of a second – Isola felt a sense of excitement like no story book or fairy tale could provide.

Inevitably, instructors and matrons sought refuge in the singularity. The Great Singularity. Before ever really grasping their meaning, Isola found herself stymied by pat phrases like 'quantum vacuum fluctuation' and 'boundary-free existence', at which point relieved adults smugly refused to admit of any prior cause.

It was a cop-out of the first order. Like when they told her how unlikely it was she would ever meet her true parent – the one who had brought her into being – no matter how far she travelled or how long she lived.

Subtle chemical interactions cause cells to migrate and change, taking up specialities and commencing to secrete new chemicals themselves. Organs form and initiate activity. All is done according to a code.

It is the code that makes it so.

Isola took her turn in the control chamber, relieving Mikaela at the end of her shift. Even there, one was reminded of the visitors. Just beyond the crystal-covered main aperture, Isola could make out the long, narrow ship from Pleasence, tugged by Tenembro's tides so that its crew quarters lay farthest from the singularity. The imposition chamber dangled towards the great hole in space.

"Remember when they came into orbit?" Mikaela asked, pointing towards the engine section. "How they pulsed their drive noughts at a peculiar pitch?"

"Yes." Isola nodded, wishing for once that Mikaela were not all business, but would actually talk to her. Something was wrong.

"Yes, I remember. The nano-holes collapsed quickly, emitting stronger spatial backwash than I'd seen before."

"That's right," Mikaela said without meeting Isola's eyes. "By creating metric-space ahead of themselves at a faster rate, they managed a steeper deceleration. Their engineer – the Vorpal, I'q'oun – gave me their recipe." Mikaela laid a data-sliver on the console. "You might see whether it's worth inserting some of their code into our next probe."

"Mmm." Isola felt reluctant. A debt for useful favours might disturb the purity of her irritation with these visitors. "I'll look into it," she answered noncommittally.

Although she wanted to search Mikaela's eyes, Isola thought it wiser not to press matters. The level of tension between them, rather declining since that talk over breakfast, had risen sharply soon after. Something must have happened. *Did she ask Jarlquin to be tested?* Isola wondered. *Or could I have said something to cause offence?*

Mikaela clearly knew she was behaving badly and it bothered her. To let emotion interfere with work was a sign of unskilled selfing. The fair-skinned woman visibly made an effort to change tack.

"How's the … you know, coming along?" she asked, gesturing vaguely towards Isola's midriff.

"Oh, well, I guess. All considered."

"Yeah?"

"I … feel strange though," Isola confided, hoping to draw her partner out. "As if my body were doing something it understood but that's totally beyond *me*, you know?" She tapped herself on the temple. "Then, last night, I dreamt about a man. You know, a male? We had some on Kalimarn, you recall. It was very … odd." She shook her head. "Then there are these mood swings and shifts of emotion I never imagined before. It's quite an experience."

To Isola's surprise, a coldness seemed to fill the room. Mikaela's visage appeared locked, her expression as blank as pseudo-life.

"I'll bet it is."

There was a long, uncomfortable silence. This episode had disrupted their planned decade of research, but now there was more to it than that. A difference whose consequences seemed to spiral outward, pushing the two of them apart, cutting communication. Isola suddenly knew that her friend had gone to Jarlquin, and what the answer had been.

If asked directly, Mikaela would probably claim indifference, that it didn't matter, that procreation had not figured in her plans, anyway. Nevertheless, it must have been a blow. Her eyes lay impenetrable under twin hoods.

"Well. Good night, then." The other woman's voice was ice. She nodded, turning to go.

"Good night," Isola called after her. The portal shut silently.

Subtle differences in heritage – that was all this was about. It seemed so foolish and inconsequential. After all, what was biological reproduction on the cosmological scale of things? Would any of this matter a million years from now?

One good thing about physics – its rules could be taken apart in fine, separable units, examined, and superposed again to make good models of the whole. Why was this so for the cosmos, but not for conscious intellects? *I'll be glad when this is over*, Isola told herself.

She went to the Suiting Room, to prepare for going outside. Beyond another crystal pane, Tenembro Nought's glittering blackness seemed to distort a quarter of the universe, a warped, twisted, tortured tract of firmament.

There was a vast contrast between the scale human engineers worked with – creating pico-, nano-, and even micro-singularities by tricks of quantum bookkeeping – and a monster like Tenembro, which had been crushed into existence, or pure *non*-existence, by nature's fiercest explosion. Yet, in theory, it was the same phenomenon. Once matter has been concentrated to such density that space wraps around itself, what remains is but a hole.

The wrapping could sometimes even close off the hole. Ripples away from such implosions gave modern vessels palpable waves of space-time to skim upon, much as their ancestors' crude ships rode the pulsing shock-fronts of antimatter explosions. The small black holes created in a ship's drive lasted for but an instant. Matter 'borrowed' during that brief moment was compressed to superdensity and then vanished before the debt came due, leaving behind just a fossil field and spatial backwash to surf upon.

No origin to speak of. No destiny worth mentioning. That was how one of Isola's fellow students had put it, back in school. It was glib and her classmate had been proud of the aphorism. To Isola, it had seemed too pat, leaving unanswered questions.

Her spacesuit complained as pseudo-life components stretched beyond programmed parameters to fit her burgeoning form. Isola waited patiently until the flesh-and-metal concatenation sealed securely. Then, feeling big and awkward, she pushed through the exit port – a jungle of overlapping lock-seal leaves – and stepped out upon the station platform, surrounded by the raw vacuum of space.

Robotic servitors gathered at her ankles, jostling to be chosen for the next one-way mission. Eagerness to approach the universal edge was part of their programming – as it appeared to be in hers.

Even from this range, Isola felt Tenembro Nought's tides tugging at fine sensors in her inner ears. The foetus also seemed to note that heavy presence. She felt it turn to orient along the same direction as the visitor ship, feet towards the awful blackness with its crown of twisted stars.

Let's get on with it, she thought, irritated by her sluggish mental processes. Isola had to wink three times to finally set off a flurry of activity. Well-drilled, her subordinates prepared another small invasion force, designed to pierce what logically could not be pierced. To see what, by definition, could not be seen.

The colour of the universe had once been blue. Blue-violet of a purity that was essential. Primal. At that time the cosmos was too small to allow any other shade. There was only room for short, hot light.

Then came expansion, and a flow of time. These, plus subtle rules of field and force, wrought inexorable reddenings on photons. By the time there were observers to give names to colours, the vast bulk of the universe was redder than infra-red.

None of this mattered to Tenembro Nought. By then, it was a hole. A mystery. Although some might search for colour in its depths, it could teach the universe a thing or two about fugitinal darkness.

For all intents and purposes, its colour was black.

"I thought these might intrigue you," Jarlquin told her that evening.

There was no way to avoid the visitor – not without becoming a hermit and admitting publicly something was bothering her. Mikaela was doing enough sulking for both of them, so Isola attended to her hosting duties in the station lounge. This time, while the other visitors chatted near the starward window, the nurturist from Pleasence held out towards Isola several jagged memory lattices. They lay in her slender hand like fragments of ancient ice.

Iola asked, "What are they?"

"Your ancestry," Jarlquin replied with a faint smile. "You might be interested in what prompted us to requisition your clone."

Isola stared at the luminous crystals. This data must have been prepared long ago: inquiries sent to her homeworld and perhaps beyond. All must have been accomplished before their ship even set sail. It bespoke a long view on the part of folk who took their planning seriously.

She almost asked, *"How did you know I'd want these?"* Perhaps on Pleasence they didn't consider it abnormal, as they had on Kalimarn, to be fascinated by origins.

"Thank you," she told the visitor instead, keeping an even tone.

Jarlquin nodded with an enigmatic smile. "Contemplate continuity."

In school, young Isola had learned there were two major theories of True Origin – how everything began in that first, fragmentary moment.

In both cases the result, an infinitesimal fraction of a second after Creation, was a titanic expansion. In converting from the first 'seed' of false vacuum to a grapefruit-sized ball containing all the mass-energy required to form a universe, there occurred something called *inflation*. A fundamental change of state was delayed just long enough for a strange, negative version of gravity to take hold, momentarily driving the explosion even faster than allowed by lightspeed.

It was a trick, utilising a clause in creation's codebook that would never again be invoked. The conditions would no longer exist – not in *this* universe – until final collapse brought all galaxies and stars and other ephemera together once more, swallowing the sum into one Mega-Singularity, bringing the balance sheet back to zero.

That was how some saw the universe, as just another borrowing. The way a starship briefly 'borrows' matter without prior existence, in order to make small black holes whose collapse and disappearance repays the debt again. So the entire universe might be thought of as a *loan*, on a vastly larger scale.

What star voyagers did on purpose, crudely, with machines, Creation had accomplished insensately but far better, by simple invocation of the Laws of Quantum Probability. Given enough time, such a fluctuation was bound to occur, sooner or later, according to the rules.

But this theory of origin had a flaw. In what context did one mean '… given enough time …'? How could there have been time before the universe itself was born? What clocks measured it? What observers noted its passage?

Even if there was a context … even if this borrowing was allowed under the rules … where did the rules *themselves* come from?

Unsatisfied, Isola sought a second theory of origins.

Black.

Within her eye's dark iris, the pupil was black. So was her skin.

It had not always been so.

She looked from her reflection to a row of images projected in the air nearby. Her ancestresses. Clones, demi-clones and variants going back more than forty generations. Only the most recent had her rich ebony flesh tone. Before that, shades had varied considerably around a dark theme. But other similarities ran true.

A certain line of jaw …

An arching of the brows …

A reluctant pleasure in the smile …

Women Isola had never known or heard of stretched in diminishing rows across the room. Part of a continuity.

Further along, she found troves of data from still earlier times. There appeared images of *fathers* as well as mothers, fascinating her and vastly complicating the branchings of descent. Yet it remained possible to note patterns, moving up the line. Long after all trace of 'family' resemblance vanished, she still saw consistent motifs, those Jarlquin had spoken of.

Five fingers on each clasping hand …

Two eyes, poised to catch subtleties …

A nose to scent … a brain to perceive …

A persistent will to continue …

This was not the only design for making thinking beings, star travellers, successful colonisers of galaxies. There were also Butins, Vorpals, Leshi and ten score other models which, tried and tested by harsh nature, now thrived in diversity in space. Nevertheless, this was a successful pattern. It endured.

Life stirred beneath Isola's hand. Her warm, tumescent belly throbbed, vibrating not just her skin and bones, but membranes, deep within, that she had never expected to have touched by another. Now at least there was a context to put it all in. Her ancestors' images nourished some deep yearning. The poignancy of what she'd miss – the chance to know this living being soon to emerge from her own body – was now softened by a sense of continuity.

It reassured her.

There was a certain beauty in the song of DNA.

Perched in orbit, circling a deep well.

A well with a rim from which nothing escapes.

Micro-noughts, spiralling towards that black boundary, seem cosmically, comically, out of scale with mighty Tenembro, star-corpse, gate-keeper, universal scar. What they lack in width, they make up for in depth just as profound. Wide or narrow, each represents a one-way tunnel to oblivion.

Is it crazy to ask if oblivions come in varieties, or differ in ways that matter?

Rules were a problem of philosophical dimensions when Isola first studied origins.

Consider the ratio of electric force to gravity. If this number had been infinitesimally higher, stars would never grow hot enough within their bowels to form and then expel heavy nuclei – those like carbon and oxygen – needed for life. If the ratio were just a fraction *lower*, stars would race through brief conflagrations too quickly for planets to evolve. Take the ratio a little farther off in either direction, and there would be no stars at all.

The universal rules of Isola's home cosmos were rife with such fine-tuning. Numbers which, had they been different by even one part in a trillion, would not have allowed subtleties like planets or seas, sunsets and trees.

Some called this evidence of design. Master craftsmanship. Creativity. Creator.

Others handled the coincidence facilely. "If things were different," they claimed, "there would be no observers to note the difference. So it's no surprise that we, who exist, observe around us the precise conditions needed for existence!

"Besides, countless *other* natural constants seem to have nothing special about their values. Perhaps it's just a matter of who is doing the calculating!"

Hand-waving, all hand-waving. Neither answer satisfied Isola when she delved into true origins. Creationists, anthropicists, they all missed the point.

Everything has to come from somewhere. Even a creator. Even coincidence.

Mikaela barely spoke to her anymore. Isola understood. Her partner could not help feeling rejected. The worlds had selected against her. In effect, the universe had declared her a dead end.

Isola felt, illogically, that it must be *her* fault. She should have found a way to console her friend. *It must be strange to hear you'll be the last in your line.*

Yet, what could she say?

That it's also strange to know your line will continue, but out of reach, out of sight? Beyond all future knowing?

The experiments continued. Loyal camera probes were torn apart by tides, or aged to dust in swirling back-flows of time near Tenembro's vast event horizon. Isola borrowed factors from the visitors' ship-drive. She tinkered with

formulas for small counter-weight black holes, and sent the new micro-singularities peeling off on ever-tighter trajectories towards the great nought's all-devouring maw.

Cameras manoeuvred to interpose themselves between one nothing and another. During that brief, but time-dilated, instant, as two wells of oblivion competed to consume them, the machines tried to take pictures.

Pictures of nothing, and all.

"To pass the time, I've been tinkering with your pseudo-life tanks," Jarlquin announced proudly one evening. "Your servitor fabricants ought to last as long as nine days now, before having to go back into the vat."

The visitor was obviously pleased with herself, finding something useful to do while Isola gestated. Jarlquin puttered, yet her interest remained focus on a product more subtle than anything she herself would ever design. Unskilled, but tutored by a billion years of happenstance, Isola prepared that product for delivery.

The second theory of origins had amazed her.

It was not widely talked about in Kalimarn's academies, where savants preferred notions of Quantum Fluctuation. After all, Kalimarn served as banking world for an entire cluster. No doubt the colonists *liked* thinking of the universe as something out on loan.

Nevertheless, in her academy days, Isola had sought other explanations.

We might have come from somewhere else! she realised one evening, when her studies took her deeply into frozen archives. The so-called 'crackpot' theories she found there did not seem so crazy. Their mathematics worked just as well as models of quantum usury.

When a black hole is created after a supernova explosion, the matter that collapses into it doesn't just vanish. According to the equations, it goes … 'elsewhere'. To another space-time. A continuum completely detached from ours.

Each new black hole represents another universe! A new creation.

The implication wasn't hard to translate in the opposite direction.

Our own cosmos may have had its start with a black hole that formed in some earlier cosmos!

The discovery thrilled her. It appalled Isola that none of her professors shared her joy. "Even if true," one of them had said, "it's an unanswerable, unrewarding line of inquiry. By the very nature of the situation, we are cut off, severed from causal contact with that earlier cosmos. Given that, I prefer simple hypotheses."

"But think of the implications!" she insisted. "Several times each year, new macro-black holes are created in supernovas –"

"Yes? So?"

"– What's more, at any moment across this galaxy alone, countless starships generate innumerable *micro* -singularities, just to surf the payback wave when they collapse. Each of those 'exhaust' singularities becomes a universe too!"

The savant had smiled patronisingly. "Shall we play god, then? Try to take responsibility, in some way, for our creations?" The old woman's tone was supercilious. "This argument's almost as ancient as debating angels on pinheads. Why don't you transfer to the department of archaic theology?"

Isola would not be put off, nor meekly accept conventional wisdom. She eventually won backing to investigate the quandaries that consumed her. Much later, Jarlquin told her this perseverance was in part inherited. Some colonies had learned to cherish tenacity like hers. Though sometimes troublesome, the trait often led to profit and art. It was a major reason Pleasence World had sent a fetch ship to Tenembro Nought.

They cared little about the specific truths Isola pursued. They wanted the trait that drove her to pursue.

Cells differentiate according to patterns laid down in the codes. Organs form which would – by happenstance – provide respiration, circulation, cerebration …

In one locale, cells even begin preparing for future reproduction. New eggs align themselves in rows, then go dormant. Within each egg lay copies of the script.

Even this early, the plan lays provisions for the next phase.

Normally, a pseudo-life incubator would have taken over during her final weeks. But the nurturist, Jarlquin, wanted none of that. Pseudo-life was but a product. Its designs, no matter how clever, came out of theory and mere generations of practice, while Isola's womb was skilled from trial and error successes stretching back several galactic rotations. So Isola waddled, increasingly awkward and inflated, wondering how her ancestors ever managed.

Every one of them made it. Each managed to get someone else started.

It was a strange consolation, and she smiled, sardonically. *Maybe I'm starting to think like Jarlquin!*

She no longer went outside to conduct experiments. Using her calculations, Mikaela fine-tuned the next convoy sent to skim Tenembro's vast event horizon, while Isola went back to basics in the laboratory.

What mystery is movement – distinguishing one location from another? In some natures, all points correspond – instantaneous, coincidental. Uninteresting.

What riddle , then, is change *– one object* evolving *into another? Some worlds disallow this. Though they contain multitudes, all things remain the same.*

Is a reality cursed which suffers entropy? Or is it consecrated?

Once more a flash. Two micro-singularities fell together, carrying a tiny holo-camera with them to oblivion. In the narrow moment of union, the robot took full-spectrum readings of one involute realm. The results showed Isola a mighty, but flawed, kingdom.

The amount of mass originally used to form the nought mattered at this end – determining its gravitational pull and event horizon. But on the other side, beyond the constricted portal of the singularity, it made little difference. Whether a mere million tons had gone into the black hole or the weight of a thousand suns, it was the act of geometric transformation that counted. Instants after the nought's formation, inflation had turned it into a macrocosm. A fiery ball of plasma exploding in its own context, in a reference frame whose dimensions were all perpendicular to those Isola knew. Within that frame, a wheel of time marked out events, just as it did in Isola's universe – only vastly speeded up from her point of view.

Energy – or something like what she'd been taught to call 'energy' – drove the expansion, and traded forms with substances that might vaguely be called 'matter'. Forces crudely akin to electromagnetism and gravity contested over nascent particles that in coarse ways resembled quarks and leptons. Larger concatenations tried awkwardly to form.

But there was no rhythm, no symmetry. The untuned orchestra could not decide what score to play. There was no melody.

In the speeded-up reference frame of the construct-cosmos, her sampling probe had caught evolution of a coarse kind. Like a pseudo-life fabrication too long out of the vat, the universe Isola had set out to create lurched towards dissipation. The snapshot showed no heavy elements, no stars, no possibility of self-awareness. How could there be? All the rules were wrong.

Nevertheless, the wonder of it struck Isola once more. To make universes!

Furthermore, she was getting better. Each new design got a little farther along than the one before it. Certainly farther than most trash cosmos spun off as exhaust behind starships. At the rate she was going, in a million years some descendant of hers might live to create a cosmos in which crude galaxies formed.

If only we could solve the problem of looking down Tenembro, she thought.

That great black ripple lay beyond the laboratory window, crowned by warped stars. It was like trying to see with the blind spot in her eye. There was a tickling notion that something lay there, but forever just out of reach.

To Isola, it felt like a dare. A challenge.

What strange rules must reign in there! she sighed. *Weirdness beyond imagination …*

Isola's gut clenched. The laboratory blurred as waves of painful constriction spasmed inside her. The chaise grew arms which held on, keeping her from falling, but they could not stop Isola from trying to double over, gasping.

Such pain … I never knew …

Desperately, she managed a faint moan.

"Jar … Jarlquin …"

She could only hope the room monitor would interpret it as a command. For the next several minutes, or hours, or seconds, she was much too distracted to try again.

It is a narrow passage, fierce and tight and terrible. Forces stretch and compress to the limit, almost bursting. What continues through suffers a fiery, constricted darkness.

Then a single point of light. An opening. Release!

Genesis.

They watched the fetch ship turn and start accelerating. Starlight refracted through a wake of disturbed space. If any of the multitude of universes created by its drive happened, by sheer chance, to catch a knack for self-existence, no one in *this* cosmos would ever know.

Isola's feelings were a murky tempest, swirling from pain to anaesthesia. A part of her seemed glad it was over, that she had her freedom back. Other, intense voices cried out at the loss of her captivity. All the limbs and organs she had possessed a year ago were still connected, yet she ached with a sense of dismemberment. Jarlquin had carefully previewed all of this. She had offered drugs. But Isola's own body now doped her quite enough. She sensed flowing endorphins start the long process of adjustment. Beyond that, artificial numbing would have robbed the colours of her pain.

The fetch ship receded to a point, leaving behind Tenembro's cavity of twisted metric, its dimple in the great galactic wheel. Ahead, Pleasence Star beckoned, a soft, trustworthy yellow.

Isola blessed the star. To her, its glimmer would always say, *You continue. Part of you goes on.*

She went on to bless the ship, the visitors, even Jarlquin. What had been taken from her would never have existed without their intervention, their 'selection'. Perhaps, like universes spun off behind a star-drive, you weren't meant to know what happened to your descendants. Even back in times when parents shared half their lives with daughters and sons, did any of them ever really know what cosmos lay behind a child's eye?

Unanswerable questions were Isola's metier. In time, she might turn her attention to these. If she got another chance, in a better situation. For now, she had little choice but to accept the other part of Jarlquin's prescription. Work was an anodyne. It would have to do.

"They're gone," she said, turning to her friend.

"Yes, and good riddance."

In Mikaela's pale eyes, Isola saw something more than sympathy for her pain. Something transcendent glimmered there.

"Now I can show you what we've found," Mikaela said, as if savouring the giving of a gift.

"What we …" Isola blinked. "I don't understand."

"You will. Come with me and see."

Tenembro was black. But this time Isola saw a different sort of blackness.

Tenembro's night fizzed with radio echoes, reddened heat of its expansion, a photon storm now cool enough to seem dark to most eyes, but still a blaze across immensity.

Tenembro's blackness was relieved by sparkling pinpoints, whitish blue and red and yellow. Bright lights like shining dust, arrayed in spiral clouds.

Tenembro Universe shone with galaxies, turning in stately splendour. Now and then, a pinwheel island brightened as some heavy sun blared exultantly, seeding well-made elements through space, leaving behind a scar.

"But …" Isola murmured, shaking her head as she contemplated the holistic sampling – their latest pan-spectral snapshot. "It's *our* universe! Does the other side of the wormhole emerge somewhere else in our cosmos?"

There were solutions to the equations which allowed this. Yet she had been so sure Tenembro would lead to another creation. Something special …

"Look again," Mikaela told her. "At beta decay in this isotope … And here, at the fine structure constant …"

Isola peered at the figures, and inhaled sharply. There *were* differences. Subtle, tiny differences. It was another creation after all. They had succeeded! They had looked down the navel of a macro-singularity and seen … everything.

The still-powerful tang of her pain mixed with a heady joy of discovery. Disoriented by so much emotion, Isola put her hand to her head and leaned on Mikaela, who helped her to a chaise. Breathing deeply from an infusion tube brought her round.

"But …" she said, still gasping slightly, "… the rules are so close to ours!"

Her partner shook her head. "I don't know what to make of it either. We've been trying for years to design a cosmos that would hold together, and failed to get even close. Yet here we have one that occurred by natural processes, with no conscious effort involved –"

Mikaela cut short as Isola cried out an oath, staring at the pseudo-life chaise, then at a waiter-servitor that shambled in carrying drinks, a construct eight days old and soon to collapse from unavoidable build-up of errors in its program. Isola looked back at the holographic image of Tenembro's universe, then at Mikaela with a strange light in her eyes.

"It … *has* to be that way," she said, hoarse-voiced with awe. "Oh, don't you see? We're pretty smart. We can make life of sorts, and artificial universes. But we're new at both activities, while nature's been doing both for a very long time!"

"I …" The pale woman shook her head. "I don't see …"

"Evolution! Life never *designs* the next generation. Successful codes in one lifetime get passed on to the next, where they are sieved yet again, and again, adding refinements along the way. As Jarlquin said – whatever works, continues!"

Mikaela swallowed. "Yes, I see. But universes …"

"Why not for universes too?"

Isola moved forwards to the edge of the chaise, shrugging aside the arms that tried to help her.

"Think about all the so-called laws of nature. In the 'universes' we create in lab, these are almost random, chaotically flawed or at least simplistic, like the codes in pseudo-life."

She smiled ironically. "But Tenembro Universe has rules as subtle as those reigning in our own cosmos. Why not? Shouldn't a child resemble her mother?"

What came before me?

How did I come to be?

Will something of me continue after I am gone?

Isola looked up from her notepad to contemplate Tenembro Nought. This side – the deceptively simple black sphere with its star-tiara. Not a scar, she had come to realise, but an umbilicus. Through such narrow junctures, the Home Cosmos kept faint contact with its daughters.

If this was possible for universes, Isola felt certain something could be arranged for her, as well. She went back to putting words down on the notepad. She did not have to speak, just will them, and the sentences wrote themselves.

My dear child, these are among the questions that will pester you, in time. They will come to you at night and whisper, troubling your sleep.

Do not worry much, or hasten to confront them. They are not ghosts, come to haunt you. Dream sweetly. There are no ghosts, just memories.

It wasn't fashionable, what she was attempting – to reach across the parsecs and make contact. At best it would be tenuous, this communication by long-distance letter. Yet, who had better proof that it was possible to build bridges across a macrocosm?

You have inherited much that you shall need, she went on reciting. *I was just a vessel, passing on gifts I received, as you will pass them on in turn, should selection also smile on you.*

Isola lifted her head. Stars and nebulae glittered beyond Tenembro's dark refraction, as they did in that universe she had been privileged to glimpse through the dark nought – the offspring firmament that so resembled this one.

As DNA coded for success in life-forms, so did *rules* of nature – fields and potentials, the finely balanced constants – carry through from generation to generation of universes, changing subtly, varying to some degree, but above all programmed to prosper.

Black holes are eggs. That was the facile metaphor. *Just as eggs carry forward little more than chromosomes, yet bring about effective chickens, all a singularity has to carry through is the rules. All that follows is but consequence.*

The implications were satisfying.

There is no more mystery where we come from. Those cosmos whose traits lead to forming stars of the right kind – stars which go supernova, then collapse into great noughts – those are the cosmos which have 'young'. Young that carry on those traits, or else have no offspring of their own.

It was lovely to contemplate, and coincidentally also explained why she was here to contemplate it!

While triggering one kind of birth, by collapsing inward, supernovas also seed through space the elements needed to make planets, and beings like me.

At first, that fact would seem incidental, almost picayune.

Yet I wonder if somehow that's not selected for, as well. Perhaps it is how universes evolve self-awareness. Or even …

Isola blinked, and smiled ruefully to see if she had been sub-vocalising all along, with the notepad faithfully transcribing her disordered thoughts. Interesting stuff, but not exactly the right phrases to send across light years to a little girl.

Ah, well. She would rewrite the letter many times before finishing the special antenna required for its sending. By the time the long wait for a reply was over, her daughter might have grown up and surpassed her in all ways.

I hope so, Isola thought. *Perhaps the universe, too, has some heart, some mind somewhere, which can feel pride. Which can know its offspring thrive, and feel hope.*

Someday, in several hundred billion years or so, long after the last star had gone out, the great crunch, the Omega, would arrive. All the ash and cinders of those galaxies out there – and the quarks and leptons in her body – would hurtle together then to put *fini* on the long epic of this singularity she dwelled within, paying off a quantum debt incurred so long ago.

By then, how many daughter universes would this one have spawned? How many cousins must already exist in parallel somewhere, in countless perpendicular directions?

There is no more mystery where we come from. Had she really thought that, only a few moments ago? For a brief time she had actually been *satiated*. But hers was not a destiny to ever stop asking the next question.

How far back does the chain stretch? Isola wondered, catching the excitement of a new wonder. *If our universe spawns daughters, and it came, in turn, from an earlier mother, then how far back can it be traced?*

Trillions of generations of universes, creating black holes which turn into new universes, each spanning trillions of years? All the way back to some crude progenitor universe? To the simplest cosmos possible with rules subtle enough for reproduction, I suppose.

From that point forward, selection would have made improvements each generation. But in the crude beginning …

Isola thought about the starting point of this grand chain. If laws of nature could evolve, just like DNA, mustn't there exist some more *basic* law, down deep that let it all take place? Could theologians then fall back on an ultimate act of conscious Creation after all, countless mega-creations ago? Or was that first universe, primitive and unrefined, a true, primeval accident?

Either answer begged the question. Accident or Creation … in what context? In what setting? What conditions held sway *before* that first ancestor universe, that forerunner genesis, allowing it to start?

Her letter temporarily forgotten, with mere galaxies as backdrop, Isola began sketching outlines of a notion of a plan.

Possible experiments.

Ways to seek what might have caused the primal cause.

What had been before it all began.