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A PROTON'S TALE OF ALL THAT CAME TO BE

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BEGINNINGS

I a messy runaway frenzy. Collisions. Chaos. Flying objects.

Perhaps you should compare it to a fireworks factory kindled by a spark. Explosions that followed each other at furious speed. The heat. The pressure. You could call it a cyclone, a raging EF5 tornado that took nothing and no one into account, and in which everything and everyone was flung away and destroyed.

“Behind you,” someone yelled. I couldn’t escape; I was pushed and thrown in every direction. To my consternation, I noticed that another newborn proton that had been floating beside me a moment ago, was blown away, far out of reach. There went another, and another. Everything spun, turned, dove, and crossed paths at lightning speed.

“Do you know what’s going on?” a voice called out.

“I have no idea,” I answered. I whirled helplessly while projectiles flew past me on all sides. Around me, time and space exploded. There was nothing I could do to protect myself, to take myself out of the line of fire. A safe place was nowhere to be found.



I must have lost consciousness at some point. When I woke up, I heard voices. It sounded like they were not far from where I was, but I couldn’t see anything.

“How terrible,” said the one voice.

“That was disturbing indeed,” said the other voice.

“Disturbing?” The first voice sounded indignant. “It was way more than disturbing. It was a disaster. A slaughter! No one is left. Everything is destroyed! Everything and everyone.”

I did not understand much of this conversation, but it was clear that the speakers thought they were the only ones left.

“And what about you and me?” the first voice asked.

“We’re the only ones!”

“Not at all.”

“Hello,” I called out cautiously.

The two voices fell silent.

“Hello,” I said again. “Is there anybody out there?”

“Who are you?” the first voice asked.

“I’m Proton,” I replied.

“I told you!” the other voice said triumphantly. “Ha! I told you we were not alone. Hey, Proton, my name is Kalon. That faint-hearted friend of mine is Achaton.”

“What’s happening?” I asked. “What’s the problem?”

“He is new here,” said the voice that had introduced himself as Kalon. “We have to tell him about it.”

The two strangers told me about the past, about the beginning of time and space many eons ago. They told me about someone they called the Creator and to whom I apparently owed my existence. It was a bizarre story, and I found it hard to believe.

“Previously, nothing existed,” said Kalon. “Nothing at all. No matter. No energy. No time. No space.”

“There was the Creator,” said Achaton.

Kalon laughed. “Well, of course the Creator was there. He was always there. He thought of a plan to make something; something grand, something exceptional, something . . .”

“ . . . spectacular!” cried Achaton. “Honestly, Proton, you wouldn’t believe this!”

“The Creator made an egg,” Kalon continued. “A minuscule egg.”

I didn’t really have any idea of what an egg was, but it seemed smart to me to not interrupt Kalon—I didn’t want to appear stupid.

“A seed,” said Kalon, who fortunately did not catch on to my ignorance. “A speck. Smaller than a speck. Incredibly heavy and unbelievably hot.”

“How hot?” I asked.

“A million times a trillion times a trillion degrees Celsius,” Achaton said.

“Much hotter even,” said Kalon. “And that seed contained everything! All building materials. All energy. All forces and laws of nature. Everything the Creator needed. He put all his wisdom into it. His greatness.”

“And then it happened!” proclaimed Achaton, who could hardly contain his excitement. “He said something, didn’t he, Kalon? ‘There must be light.’ He said something like that.”

“That’s what he said,” agreed Kalon. “The Creator spoke, and then something happened that only he could have invented. All powers that the Creator had concentrated into that one speck erupted, spattering apart with a speed and a heat we cannot imagine anymore. A burning hot universe expanded itself in all directions. All of a sudden, everything was there and time had begun.”

It was all a little too fast for me. I was still reflecting, baffled by the mysterious sentence that the one called “the Creator” had supposedly spoken. “What is light?” I asked.

Kalon was silent for a moment. “*That* we do not know,” he answered. “It’s a mystery. There are many mysteries. I don’t understand everything either, Proton. Maybe it’s something

that was there in the very beginning. Something that was necessary to start the whole process. Or maybe there will come a moment when we will think, Aha, *that* is light.”

Suddenly, there was a head-on collision nearby. “Whoa!” “What was that?” “That was a very close call!” It made me realize how precarious our situation was, but Kalon was not to be deterred. “Now, where was I?” he asked.

“The second eon,” said Achaton. “You were going to tell us about the second eon.”

“Ah, yes! A very special period in history.”

“What period, roughly, are we talking about?” I asked.

“Oh, that is now so long ago. Time had only just begun. It was even before a trillionth of a trillionth of a trillionth of a second had passed, the moment when gravity could finally begin its work. The Creator had adjusted it with the greatest possible accuracy beforehand, and for good reason. The existence of his creation was at stake. If gravity had been just a fraction stronger, the whole universe would have shrunk immediately. A tiny bit weaker and everything would have dispersed and become too thin. Then no particles would have formed whatsoever.”

“Then I would not have existed,” I said somewhat anxiously.

“Precisely! And that was only the beginning. In the eons that followed . . .”

“Yes, tell him about the quarks,” Achaton chipped in enthusiastically.

“The *what?*” I asked. Another one of those words I’d never heard before. Everything was new for me and, to be honest, it was far too much for me to comprehend all at once.

“You don’t know what quarks are?” Achaton chuckled. “Unbelievable. You are made *up* of quarks. Without quarks you wouldn’t exist.”

“Please don’t act as if you’ve always known this,” said Kalon. He sounded irritated.

“Quarks are just building blocks, Proton. The building blocks that we consist of. Achaton, you, me, and the rest of us. Space expanded, the temperature dropped, and this caused particles to form from the energy. Electrons. Quarks. And antiquarks, of course.”

Ah okay, I sighed in relief. At least this was something I could follow, sort of.



Kalon told me about the two eons that followed, in which the other forces of nature acquired their roles. The Creator came up with four fundamental forces: in addition to the gravitational force there were the strong and weak nuclear forces and the electromagnetic force. Four giants, each with a unique set of tasks. All four had to be set very precisely, and it was a tough call on whether the newborn universe was going to make it. The smallest deviation would have had disastrous consequences. The likelihood that the universe would destroy itself was billions of times greater than that it would go well.

“That must have been a tense time,” I said.

“Tense?” Achaton replied indignantly. “That is an understatement, to put it mildly. It was make it or break it! Four times in a row, the universe had to win the jackpot in a global lottery. If the nuclear forces would have been even a teeny bit stronger, things would have gone seriously awry. And what do you think would’ve become of the universe if the electromagnetic force would have been a fraction weaker?”

“I don’t know,” I said. I wished I were more intelligent than I was, so that I could understand exactly what Achaton was telling me. And I wished I had clever answers, but I didn’t.

“Then we would not have met you here. Let’s keep it at that.”

“But the beautiful thing was,” said Kalon, “the forces were perfectly attuned to each other. The gravitational force, the electromagnetic force, and the strong and weak nuclear forces—the Creator saw to it that they became friends.”

“Well . . .” said Achaton. “Friends . . .”

“Okay, *friends* is perhaps too strong a word. Colleagues then, a team. Partners. They perfectly complement each other, as if they’ve always worked together. The four of them perform one great dance in honor of the Creator.”

Kalon described how the universe suddenly began to expand with greater speed, how it drove on with increasing energy, dark and fast, sizzling hot, extending in all directions.

“Even faster than now?” I asked.

“Ha! There’s no comparison. So unbelievably much faster than now. It was beyond extreme. It’s impossible to imagine.”

Not a second had passed since the Big Bang and another eon had already begun.

“So, small particles had formed from the energy. Countless numbers of particles. For example, the quarks I just mentioned. The ones that make up you and me. The universe was one large construction site full of building materials. There was an unfathomably large number of quarks, all ready for the task the Creator had planned for them—to form matter. Nevertheless, for a time it looked as if they would not be able to fulfill this task because they were destined to be destroyed.”

“What!” I said, shocked. I wondered how he knew all this.

“For every building block there was an anti-building block, Proton. I’m sure I mentioned it.”

“I don’t remember that . . .”

“The antiquarks!” Kalon’s voice sounded almost indignant. “I am sure I told you about antiquarks.”

“But I have no idea what antiquarks are; how could I?”

“They are anti-building blocks. I just tried to explain it to you. I have no idea why the Creator found it necessary to make them, but he did. And as soon as they would touch a quark, poof! Both would disappear and the only thing that remained was a bit of energy. It was a terrible slaughter. The universe came very, very close to being completely empty. With no more building blocks, just energy that was left. But for every ten billion quarks, one quark was *not* destroyed; what remained was more than enough for what the Creator needed.”

“So much waste,” Achaton sighed.

“Not waste,” Kalon said. “Abundance.”

“And then, modern times began,” Achaton continued. “The time in which we now live. In which we came into existence. Out of the quarks that were still left over.”

“I like to call this the most important time in the history of the universe,” Kalon said earnestly.

Achaton laughed. “I have long thought that this is what the Creator intended. This gigantic, vast universe filled with photons, electrons, neutrons, protons. Held together by natural forces that are so perfectly attuned to each other.”

“You mean,” I said, full of hope, “that we are the big plan of the Creator.”

“Yes, that’s what I thought,” said Kalon. “And so much time has passed since the creation. So many eons. The universe has existed longer than you and I can comprehend. More than a second already. But I have heard it said that the Creator is still extremely active. That he has still bigger plans. That he has decided to continue his work with just a small remainder of us. It’s possible. It actually *does* seem like it, you see, as times have become turbulent again. Many, many of us have recently disappeared into nothingness, I’m afraid.”

“I even thought that you said all of it would go wrong,” said Achaton.

“Not me. That was you, if I remember correctly.”

“Well, what would it mean, to ‘go wrong’? If the Creator had come up with another plan for us, that would have been fine too. Little by little we’ve learned that we can trust him. Hang on. Hey! What are you doing?”

“I’m not doing anything! What are *you* doing? You are really squeezing me. Get out of the way!”

“Go away, *you*, get away from me!”

And then it was quiet.

“Kalon?” I called. “Achaton! Is something wrong? Where are you both?”

There was no reply. Again I heard something whiz by me, and I was dragged along into a chaotic, destructive three-dimensional collision course. What was happening, where were Kalon and Achaton? I still have no idea. I never met them again.

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