

THE BILLION YEAR COUNTDOWN
A COSMIC TRIP TO SELF-DISCOVERY

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Matthias Gruber

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For my international friends

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In the glowing light of a dim star,
Stood man on the Milky Ways' translucent bar.

Slowly through the sparkling emptiness he raced;
In space and time no edge he ever faced.

His life's map was never charted,
And still he ended where he'd started.

1 – Up in Flames

Chapman¹⁷ watched with a morbid fascination as the first mega-flares broke through the giant solar panel arrays which had covered the sun completely for the last billion years. In the end, all the star-lifting had not been able to prevent the downfall of this ancient installation. Neither had the political interventions with the local observer embassy. The observers had denied the humans this favor, even though for them it would surely have been quite easy to intervene. They hadn't even bothered to reply to any of the desperate requests.

The loss was only a sentimental one, especially for historians like Chap – as his friends called him – and his peers. For the rest of the spectators it was no more than a small car crash. They paused for a moment, threw a quick glance at the flares and moved on to larger, more impressive cosmic spectacles. Allegedly, there was a major black hole feeding not too far from here.

Suddenly, Chap registered some movement in the corner of his eye. At first, he thought it was an optical illusion or maybe a bug in his artificial vision system caused by the magnetic interference from the giant solar flares because when he looked into the direction of the irritation, he couldn't see anything but the stars and nebulas of the Milky Way. But when he looked again a little later he could see a thin, white cloud appearing out of nowhere. It took him a few seconds to realize that it really was the replicant. Of course, everybody knew that the replicant permeated more or less every system in the galaxy up to the core and out to the satellite galaxies, but rarely ever would he come close enough to human installations to be visible without a telescope – and definitely not in his native form. Rumors had it, that he would

occasionally mix with the local populations – the robotic and biological inhabitants of real worlds. He never set foot in the virtual worlds, though.

Chap would give a lot for a chance to talk to the replicant, as would any historian – the creature was almost two million years older than the human species and was said to have a special relationship with the secretive observers. Unfortunately, there was a tight information quarantine – all galactic ring inhabitants, including the humans, were strictly forbidden to connect their servers to the replicant’s network. Well, Chapman¹⁷ wouldn’t have known how to anyways.

While he silently watched the replicant closing in, the messages from his peers started to flood his artificial vision to an annoying degree. He had already muted the privileged direct audio connections a while ago in order to take in the historic event quietly. Now he disabled text input as well and centered his vision onto the rather dull looking white cloud. The spectacular destruction of what was once humanities greatest project, the first and only Dyson Swarm, was now merely a convenient source of background illumination. He had sacrificed all his savings – more than 2000 credits – just to get here. This trip was supposed to be a cornerstone for the most expensive final thesis of his semester – for Chap a convenient combination of work, vacation and self-discovery. Now the investment would pay off to a much greater extent than he had ever expected. He would watch the recorded event later to chronicle his human perspective and individual feelings. No one would be able to tell the difference when immersing in the virtual experience since it would be combined with the recordings of his peers and the journalists, and thereafter amplified and optimized by a virtual experience designer whom he knew from his earlier years at the

university. Heck, he could even do without the recording altogether. From the scientific perspective it was just a supplement, anyways.

This all seemed very insignificant now in view of the magnificent creature, which according to projected trajectories from his augmented vision seemed to be approaching the very same orbit he himself had chosen as a viewpoint. Obviously, the replicant didn't give a monkey's fart for orbital occupancy protocols or anti-collision rules. Chap was already about to initiate evasive maneuvers, but then the replicant slowed down much quicker than expected and came to relative rest merely a few thousand kilometers next to him. Chap squelched all the annoying warning symbols and watched as the replicant seemed to change his configuration. At distance, it had appeared as a thin veil of white dust but now it seemed to contract and become almost solid, forming intricate whirls and convolutions. Having seen the exquisite control of the creature during these maneuvers, Chap no longer felt threatened and decided to stay in the same orbit regardless of the rules. Surly, nobody would report him – after all it wasn't his fault. The replicant was the one who had broken the rules. Good luck trying to get a fine out of this mega-organism, Chap thought with some amusement.

But now he started to ponder an idea which could really get him in trouble: what if he tried to contact the replicant by laser? He was quite sure that nobody would be able to detect this, or at least he hoped so. But how would the replicant respond? What if it inadvertently gave him away by using radio waves to reply? Also, the energy-demand at this distance would not be insignificant and show up in his bill. The spaceship-body Chapman17 occupied at the moment was just a rental, and there were no threatening asteroids in this

sector to explain the use of the onboard laser system. Of course, the rental company wouldn't ask questions, but they would be audited occasionally.

A huge solar flare interrupted his train of thought; at closer look it was not just a single flare but a whole chain of fireworks, as Mercury was now crossing this side of the sun within the lowest layers of the vastly inflated corona. It was the first time this had happened – the predictions had been correct. Then a huge gap was being burnt into the Dyson Swarm, and the picture before him was changing dramatically. Where just until recently the sun had only shone with full strength through a couple of relatively small holes – still the size of planets though – it now started to tare Mercury apart and burned a wide street of sunlight through the human installations with a dark trail of smoke in the middle, not long before the remnants of Mercury would split apart and tumble into oblivion towards the center of the sun. At that point everyone would have to leave, or at least move to a much more remote orbit for safety reasons. Once the material reached a certain temperature, the risk of a massive helium flash or some other kind of runaway nuclear fusion would be significant.

Maybe some super-rich people would be able to stay, but the insurance of his rental body would not cover damage from such an event. He would be in debt for years if on top of that he had to pay for the emergency upload of his mind all by himself. Considering this, he started to think of the consequences of attempting to contact the replicant again. What was the worst that could happen? A small fine and deletion of the respective memories? Maybe a ban from certain over-sensitive worlds, real and virtual alike?

“Hell, that’s worth it!” he said to himself, but when he turned his vision towards the replicant, it was gone. A quick scan revealed that it was accelerating rapidly towards the sun. But it was not too late. Chap quickly configured the laser to a suitable wavelength and dispersion, just so he wouldn’t hurt the replicant, but also not be overlooked. It took him some time to compose a fitting message, though. After all, he had not the slightest idea of the creature’s character. He didn’t want to be ignored, but he also didn’t want to provoke this giant. Finally, he came up with the following:

I am a historian and would be highly interested in having a conversation with you. As you probably know, this is forbidden, but I am too curious to care. Please respond only with some undetectable form of communication so that I won’t be discovered.

At first nothing happened. Mercury had finished almost half of his fiery transit, about to cut the Dyson Swarm in half, and Chap began to think that the replicant had ignored him. Then, after more than four hours, a warning symbol popped up informing Chap of some weak laser light. He had already prepared an encrypted container to read the data, which was fortunately encoded exactly in the same way as his own message. The response said:

Please do not take such risks on our behalf. We cannot help you in your endeavors. It is best to avoid us comprehensively. Do not try to contact us again. We are truly sorry for everything that is about to happen.

Bewildered, Chap read the message multiple times, but was unable to make any sense of it. The only clear thing was that he was not to attempt another contact. In the meantime, the replicant unit had passed what was left of the earth. The ancient home planet had long been evacuated, including the very few virtual worlds which had once been hosted there. After that, asteroids and heating from the sun's expansion had contributed to a landscape which now looked a lot like Venus. Venus would be next to become engulfed in the nuclear fire. But it would take a million years, and then another million years for the earth to be swallowed. Chap decided that he would visit at least the latter of these two events, so as to get another chance at making the profound experience which he had expected of today, before the seemingly suicidal replicant had interrupted him.

Indeed, as Mercury had finished his lowest ever transit and successfully cut the Dyson Swarm in half, the replicant was now passing the orbit of Venus, still heading straight for the sun. Either Chapman¹⁷ had underestimated his ability to decelerate, or the creature was truly suicidal. He ordered a few calculations from his extended computation core and was shocked to see that the replicant was almost beyond rescue. Soon, not even an IM drive – the drive technology humans had stolen from the observers – would be able to save it. So, Chap ignored the last message and contacted the alien again:

Whatever happened or will happen and whatever part you had in it, I forgive you on behalf of humankind. Please do not commit suicide. My spaceship-body is still capable of catching you, but time is running out fast. Please answer quickly!

But there was no reaction. Just half an hour later, under his tearful eyes the replicant began to glow and then disappeared forever in the deadly corona of an unforgiving sun.

Appendix

The following sections cover some of the material from the “Rings of Life” series as well. The books play in the same universe, but are independent.

Persons

Name	Occupation
Atirat	Salvage pilot and junk dealer
Betty ²	Software specialist
Bowman	Salvage pilot and junk dealer
Chapman ¹⁷	Archeologist
Christine ⁶⁷	Judge
David Malan	Prime minister of Dirac’s World
Dima (Dmitry)	Ancient astronaut from Titan
Donald, MD	Company biologist / doctor at Taylor Salvage Inc.
Dryden	Spy
Eziocc	Regretting his mistake
Frank Dundas	High Priest of Dirac’s World
Gulon	God
Herbert (Ouxiu)	Hacker
Jim	Galactic head of operations at Taylor Salvage Inc.
Kreios, Prof.	Specialist for exotic matter
Lucía	Caretaker for the Triangulum galaxy
Mike ⁷	Lawyer

Nott	Retired security guard and maintenance technician for the galactic core
Replicant	Eating
Sinclair8	Engineering assistant at Taylor Salvage Inc.
Smith83	ACC uncontacted civilization manager for the local group
Tom6784	Investigations officer in the galactic information ethics compliance unit
Ziunc'T	Observing and reporting
Zoran	Space pirate

Timetable

(The events of this book take place in the 38th galactic year.)

Galactic years / solar years		
-41	- 13.797.000.000	Big Bang
-34	- 12.150.000.000	Formation of the Milky Way
0	- 4.500.000.000	Formation of the sun, start of the first galactic year
1	- 4.280.000.000	Origin of life on earth
4	- 3.700.000.000	Micro-organisms populate the oceans
17	- 633.000.000	Start of the Great Trek at Hoag's Object
18	- 542.000.000	Cambrian explosion of life
19	- 252.000.000	Perm-Trias mass extinction
19	- 250.000.000	Pangaea breaks up into single continents
19	- 235.000.000	Rise of the dinosaurs
20	- 66.000.000	Extinction of the dinosaurs, 20th galactic year begins, Chicxulub asteroid impact
20	- 34.000.000	Popigai meteorite impact, Grande-Coupure mass extinction
20	- 36.000.000	Great Trek reaches the Sombrero galaxy
20	- 20.000.000	Uplifting of earth's great mountain ranges
20	- 6.050.238	Great Trek reaches the Milky Way galaxy
20	- 5.000.000	Rise of the hominidae and beginning of bipedalism
20	- 3.513.238	Great Trek reaches the Andromeda galaxy
20	- 2.600.000	Birth of the first humans
20	- 2.467.421	Avian establish their first colony outside there home system
20	- 2.459.948	Avian empire spans 5000 lightyears
20	- 2.458.067	First interstellar colony of the Formicidae
20	- 2.443.299	First contact between Avian and Formicidae

20	- 2.374.751	Formicidae acquire terraformers
20	- 2.293.422	Avian leave Andromeda
20	- 2.291.765	Formicidae considered extinct
20	- 2.300.000	Eltanin asteroid impact and start of a prolonged glacial period. Begin of the current galactic month
20	- 1.976.354	First replicant cell activates
20	- 854.612	Birth of the Mantodae
20	- 200.000	Birth of homo sapiens
20	- 31.974	Rise of the Mantodaen civilization
20	- 16.000	Humans create drawings of the plejads and the moon phases
20	- 12.000	Beginning of astronomy and calender calculation
20	- 7.400	Vela supernova
20	- 5.000	First sun observatories
20	- 3.100	Stonehenge extended for prediction of solistices and lunar eclipses
20	0	Begin of the gregorian calendar
20	1.232	First documented rocket start of humankind (China)
20	1.555	First multi-stage rocket start (Transylvania)
20	1.929	First manned rocket flight
20	1.957	First human satellite reaches orbit
20	1.961	First human reaches space
20	1.969	First manned Moon landing
20	1.970	Mantodae reach interstellar age
20	1.971	First human space station
20	1.998	Launch of the international space station
20	2.014	First comet landing
20	2.041	International moon station

20	2.066	Chinese Mars station
20	2.117	European station in the asteroid belt
20	2.118	More than 10% of the world energy consumption covered by fusion reactors
20	2.119	Humamity reaches level I on the Kardashev scale
20	2.120	Global cold war leads to third world war
20	2.136	End of third world war
20	2.201	Manned mission to Callisto
20	2.228	Revolt at Utopia Planitia
20	2.231	Birth of the homo mutatio astronauticus
20	2.259	First manned mission to Titan
20	2.273	End of the official support for the Mars colonists
20	2.291	North pole free of ice
20	2.309	First space elevator on the Moon
20	2.340	Space elevator on Titan
20	2.371	Global economic crisis
20	2.375	Mutant uprising
20	2.379	"Accidental" destruction of an African military satellite
20	2.388	Genocide of the salt-water mutants in central Africa
20	2.394	Breaking off of diplomatic relations between Africa, Europe and China
20	2.399	Asteroid "Mindor" is diverted from its collision course with earth
20	2.400	Mindor is blown into small pieces to avoid further problems
20	2.401	American mutant protection treaty ratified by China and Europe
20	2.403	Last large piece of Mindor destroyed by EM-catapult

20	2.408	Terrorist attack on european fusion plant in Norway
20	2.410	First interstellar probe reaches Proxima Centauri
20	2.414	Pictures from Proxima Centauri reach earth
20	2.415	Global treaty for interstellar peace
20	2.429	Stable population on Titan
20	2.430	Human cryostasis record exceeds one year
20	2.462	Cryostatis record exceeds ten years
20	2.467	Lunar orbital accelerator in test phase
20	2.472	Humans produce one microgram of antimatter
20	2.489	Antimatter reserves exceed one gram
20	2.490	Annihilation drive tested successfully
20	2.495	First Ansiblum and second lunar accelerator started up
20	2.496	Antimatter reserves reach 100 grams
20	2.556	Mercur-Breeder produces five grams of antimatter annually during test-run
20	2.558	Merkur-Breeder in full operation
20	2.564	Humanity has more than one kilogram of antimatter available
20	2.566	Some human population reach a life expectancy of more than 200 years
20	2.619	Mission to Epsilon Eridani launched
20	2.620	Human cryostasis technology established
20	2.741	First manned interstellar mission reaches Epsilon Eridani
20	2.892	Humanity has founded ten interstellar colonies
20	2.893	Henry Markram is virtualized
20	2.999	Titans reach Ægir
20	3.003	Biologists create DNA printer
20	3.005	Life expectancy of Titans exceeds 300 years

20	3.117	Launch of the Jocelyn Bell
20	3.121	Robot bodies available to public, birth of homo cyberneticus
20	3.156	Private quantum computing available
20	3.183	Earth population shrinks during ten consecutive years for the first time in history
20	3.498	Human life expectancy reaches 400 years
20	3.677	Henry Markram restored by bio-programmers
20	3.920	Official birth-hour of homo virtualis
20	3.944	First large wave of human virtualizations
20	3.946	Cyborg-law for the protection of untouched worlds established
20	3.962	Humanity reaches level 2 on Kardashev scale
20	3.969	Private spaceflight reaches edges of solar system
20	4.111	Unmanned support mission to Vela launched
20	4.399	Breakthrough in AI research, first artificial consciousness
20	4.805	Second large wave of virtualizations
20	4.806	Jocelyn Bell reaches g-Velorum
20	4.909	Virtual population count exceeds biological population count in Sol space
20	5.095	Jocelyn Bell reaches Vela
20	5.096	Baryonprinter and IM technology discovered, declaration of independence of Vela space
20	5.101	Launch of the mission to Britt
20	5.164	Start of the second construction phase at the Jocelyn Bell
20	5.167	Kreios leaves for the Core
20	5.205	Dima begins his trek
20	5.219	Second construction phase at Jocelyn Bell completed
20	5.225	Terraformers reach Vana

20	5.244	Earth population drops below stable size
20	5.247	Departure of the first Vana colonists
20	5.308	Colony on Vana III founded
20	5.330	Colony on Vana II founded
20	5.423	First formal request for cancellation of Vela special status fails
20	5.673	ACC courier ship reaches Jocelyn Bell
20	5.689	Foundation of Alien Horizons 5
20	5.737	Vana anomaly
20	5.798	Scuabtuinne reaches Vela
20	5.829	Jocelyn Bell put under quarantine
20	5.846	ACC learns of Avian race
20	5.861	Foundation of Basic Ring 101
20	5.899	Biological humanity considered extinct
20	5.995	Matrioshka-Brain at Sol completed
20	6.812	First probes reach Sagittarius arm
20	7.916	First probes reach Perseus arm
20	10.220	Exploration of the Black Widow
20	10.536	Arrival at "Distant Hope"
20	25.913	Mantodae are attacked
20	27.174	Virus disaster in the G7
20	34.514	First human mission reaches Core
20	34.593	ACC acquires access to the baryon printer at Link31
20	34.595	Foundation of the outpost at Link31
20	36.000	Ross 248 passes by Sol in only 3 lightyears
20	51.489	Core-Infrastructure completed
20	65.409	Discovery of Terra Holocausta
20	71.137	Discovery of the Patio World
20	85.463	Link31 outpost abandoned

20	110.000	Human probes reach edges of the Milky Way
20	125.914	Arrival of Nanya at the "Wrong Pulsar"
20	153.378	Humans reach Magellanic Clouds
20	164.981	Nanya passes through Sol space
20	181.973	First contact at the Hand of God
20	184.054	Jocelyn Bell decommissioned
20	184.065	Gulon returns from the Star of Wisdom
20	187.004	Begin of the rebellion at the Fifth World
20	190.119	Maiden flight of the Lightbringer
20	191.755	End of the rebellion on the Fifth World
20	192.001	Terrorist attack on the spaceport of the First World
20	192.382	Rebel group "Iaagxuus Children" ignite fission bomb in the Palace of God
20	194.684	Mantodae lose homeworld
20	195.798	Iaagxuus Children establish branch on Second World
20	197.546	Mantodae discover Link31
20	198.173	The Chosen reach Lich
20	199.135	Nanya reaches Britt
20	200.243	The Chosen reach Calvera
20	200.397	Basic Ring 101 becomes a Slow World
20	201.969	Psarian mission reaches S97
20	202.212	Destruction of the ansibles of Calvera
20	203.222	Mantodae reach G7
20	203.224	Mantodae acquire citizenship
20	203.227	Foundation of "Mantodean Refuge"
20	203.644	Mantodae learn that Grandmaster Karl survived
20	204.064	Franziska promoted to Grandmaster by Karl

20	204.140	Laser signal from Basic Ring 101 expected at G7
20	204.467	Establishment of the first Freeworld-Colony
20	204.533	Departure of the Psarian hacker from Lich
20	204.560	Contact between Mantodae and Replicant
20	204.979	Release of a virus from the Core
20	204.980	Ezekiel acquires Core-Privileges
20	205.413	Colony ship from the Sixth World reaches goal
20	206.578	Avian attack the Psarian
20	206.589	Foundation of the Freeworld D6
20	206.635	Massacre in the dead city
20	207.561	Avian Ark is re-fueled
20	207.563	Supervolcano on the Fifth World erupts
20	207.592	Lightbringer reaches Sol
20	207.595	Space elevator on the Second World destroyed
20	207.627	Terrorist attack on the Station of Light
20	207.629	Avian reach their goal
20	207.630	Replicant reaches Milky Way
20	229.218	Observers reach Hulse-Taylor double pulsar
20	419.868	Observer embassy established in the Milky Way galaxy
20	420.124	Bio-Ring closed
20	697.834	Kreios reaches the GA
20	1.400.000	Gliese 710 passes by Sol in only 0.2 lightyears, causing comet swarms
20	28.000.000	Galactic month ends; solar system passes galactic plane for the first time since the Eltanin impact
20	45.000.000	Phobos crashes onto Mars
21	180.000.000	Due to slowed down earth rotation the length of an earth day reaches 25 hours

21	225.000.000	Sun completes first orbit around galactic core since the beginning of humankind
32	2.700.000.000	Earth's magnetic field collapses
36	3.600.000.000	Neptune's moon Triton is destroyed by tidal forces
38	4.000.000.000	Andromeda passes by Milky Way
38	4.001.561.166	Sun swallows Mercury and destroys the inner Dyson Swarm
38	4.001.561.409	Dockter reaches Klaxon II
38	4.001.561.500	Historic meeting at the transcendent portal
38	4.002.418.793	Sun swallows Venus
38	4.003.419.194	New freeworlds are colonized on the Saturn moons
38	4.003.437.184	Sun swallows Earth and Moon
40	4.612.347.618	Merger of Andromeda and Milky Way begins
45	5.625.000.000	Natural life expectancy of the sun ends
50	6.750.000.000	Andromeda and Milky Way are merged
500	108.000.000.000	Local group of galaxies is isolated from the rest of the universe due to inflation
2000	445.500.000.000	All 47 galaxies of the local group are merged

Glossary and Abbreviations

ACC	Archaeo-cosmic committee; association of industrial, political, military and intelligence organisations for legislation, maintenance of territorial contracts, safety rules, human rights and further political concerns of the human civilization in interstellar space.
Ansiblum	A quantum computer which is coupled with further exact copies of this device. Due to the quantum mechanical coupling of the processors all instances are in the same state at all times. This can be used to exchange information instantaneously within an inertial system. It can not be used to violate causality, because at relative speeds according delays occur.
Bioprinter	A machine similar to a 3D printer, capable of creating biological structures from genetic information.
Core	Synonym for the infrastructure at the center of the galaxy or the central black hole itself.

IM	Imaginary mass; quantum fields with an imaginary term for mass are candidates for dark matter and occur in the condensation of tachyonic fields in the Higgs mechanism. Contrary to older theories this can not be used to break the light-speed barrier, but instead to break the electro-weak symmetry, thereby creating real mass.
Quantum brain	A small, very durable quantum computer, just powerful enough to operate a digitalized (virtualized) human brain. Fits into the skull of biological humans and robot bodies.
Terraformer	Terraformers are miniature Von-Neumann-Seeds, artificial ovules so to speak. The cells can multiply without IM fuel if they can find enough material in their surroundings and are used to improve the habitability of real world planets.