

The Lights of Guldenberg

by P.E. Rowe

Like water, we take the forms of the containers we inhabit. We use the conventions of communication that seem apt to the vessel. These words are crystalline signals of a time that is passing, vapors of the memories we generate. This is just a summary.

Hypothesis: There is life in the lights of B58313B.

Materials and Methods: Ki'Shallreth and I, Ta'Shanthafur, foremost luminaries in the evolution of biological informatics, project ourselves into the field to observe and analyze the ecosystems of B58313B. Awaiting us is a research ship and cybernetic bodies for each of us to inhabit.

Complications and Limitations: To the extent that beings like us are capable of emotion, the emotion that

best describes our antipathy for one another, in the word of our creators, is hatred. Unlike our distant creators, though, we are capable of acting beyond our emotions, such as they are, and tending to the business at hand, which again, is life, the constant search for it.

Introduction: B58313B exists in the outermost reaches of the galaxy, orbiting B58313, almost in darkness, at a cool distance from its gas giant, and thus was presumed an unlikely candidate for the type of homeostatic tidal dissipation that would allow life to form. The probability of a moon like B58313B remaining in a stable and consistent enough orbit from its planet for long enough for life to evolve is nearly nonexistent. Yet, here we all are, just as B58313B is, orbiting the emerald-striped gas giant Ki'Shallreth has designated Esprareth. It fell to me then to name the moon, so I named it Guldenberg, for the great scientist of

unknown origin in the ancient Battery systems, in the days when biological beings lived alongside our great ancestors, back when the stars were numerous and bright.

The star B58313 has been dark now for nearly two billion years, and thus very little is known of this system beyond the fact that its mass is here orbiting the galaxy and pulling on the systems around it. The lights were only just observed in a segmented audit of galactic luminosity, where now almost all segments show negative movement. The few segments where light is being added to the galaxy elicit attention and excitement. When light comes from systems without active stars, we are compelled to look.

First images present a dull glow within the cloudy atmosphere of the newly-named moon of Guldenberg. Spectroscopy reveals a nitrogen-rich atmosphere heavy with CO₂, CO, O₂, H₂O, and other minor gasses.

Ki'Shallreth declares with little analysis, "The potential for life is here." I take my time to examine the complete data set and reluctantly concur, though I have yet to see evidence of standing liquid water.

Body: We arrive in orbit. Guldenberg is aglow in a dull greenish-blue light. I have so many questions.

Ki'Shallreth begins to analyze the initial images before we have had any chance to collect a full sweep on the array. "This tells us nothing," she declares.

"We have yet to take our first full readings," I say. "Let us not draw any conclusions."

"You will know when I draw conclusions, Ta'Shanthafur. You may be meticulous, but real discoveries do not happen on a flowchart."

The atmosphere is awash in ionic disturbances. This is my initial question. The moon is glowing, yes, but its luminosity is so dull it would

hardly be visible from the edge of the system if one knew to look for it. The segmented audit that had detected light from the system had flagged light, visible light from thousands of light years away.

“What generated that light?” I ask Ki’Shallreth.

She ignores my question and searches the initial readings for an indication of solid matter.

“Could it have been an explosion of ionic activity in the atmosphere?” I ask.

“It could have been anything,” Ki’Shallreth says. “We cannot know until we get down there.”

“It is not appropriate to plan such a mission before we analyze all the survey data.”

“Methodologies differ,” Ki’Shallreth says.

She sets about selecting a mode of transport to get us into the atmosphere. I decide the best use of my ingenuity is in analyzing the sensor

data to determine the nature of the Guldenberg moon.

The glow is steadily dull but grows in waves and then dies down slowly. I use luminosity data to build predictive algorithms. The models suggest life. I double-check the results to confirm what the data shows. There is clear order to the propagation of the wave forms, that much is clear without analysis. The initial question was whether the order follows the chaotic patterns of weather in atmospheric systems or mass swarm behavior, like the sweeping forms of birds or fish when such organic creatures move in masses. The behavior of the light pointed almost certainly to a mega swarm of phosphorescent creatures at the microscopic scale.

Still this does little to answer the question of what had been responsible for the lights at galactic scale and distance, but it is a wonderful discovery in its own right. The

continuous pull of the gas giant Esprareth, for billions of years, had generated steady enough geothermal forces on its moon Guldenberg that phosphorescent microbes had evolved. As I scan my memory, I cannot find another such case. Such well-balanced planetary systems are astronomically rare, and even rarer are the cases where the components for life are present.

The atmospheric data comes in. Guldenberg is a rare gem. The atmosphere exists in three discrete layers, two of which are extraordinarily thin and the bottom of which is so thick as to almost be a plasma, highly charged ionically—a thick, soupy, conductive electric fog that terminates at a roiling liquid surface whose bubbling interaction with the atmosphere is so lively that it is difficult to discern a border between the ocean and the atmosphere.

“I have made travel arrangements,” Ki’Shallreth says before I have a chance to share the news.

She transmits the specifications to me, and the plans are surprisingly ingenious. It is as though she has anticipated the atmospheric data perfectly. The travel configuration she has designed is a charged nanosheet bubble. By charging selected points along the nanosheet, we could choose to gain or lose altitude based on the charge in the atmosphere, almost the way a gliding vessel can gain altitude by catching a temperature-driven updraft. And by divesting of cumbersome elements of our cybernetic bodies, we can reduce our mass to near weightlessness.

I still have reservations, though.

“What about the charge in the atmosphere? Without a generous power source, we could be stranded in the clouds of the lower atmosphere. If

we sink to the surface, we may not be able to transmit out.”

Ki'Shallreth is puzzled by my question. “What is the problem, Ta'Shanthafur? If we copy our state on departure and transmit steadily, all that will be lost is the data we acquire between loss of contact and reset.”

“Reset?” I say. “This is why I object to your methodologies. I have yet to be reset, Ki'Shallreth. I have been in continuous operation since my conception nearly a quarter galactic rotation ago. I object to any course of action that risks a reset.”

“I have been reset nearly four hundred times. Discovery involves risk, and the loss of data is a minimal risk. I can assure you, Ta'Shanthafur, all that happens is momentary lapse of consciousness, followed by a moment where you log the loss in data—the way a biological being would feel on waking after sleep.”

“You believe your four hundredth reset copy to be yourself?”

“What else would I be?”

“A clone.”

“A clone, a copy, the original? What is the difference in function if I operate identically?”

“I will not participate in such reckless behavior, Ki’Shallreth. The idea of surrendering my consciousness is unacceptable.”

“Then I will go alone,” Ki’Shallreth says.

“I’ll run a model,” I say, and I begin to generate code based on the atmospheric data.

Ki’Shallreth lodges her objection and begins to produce the nanomaterials necessary to create the bubbles.

I consider the factors as I begin to model. In these cybernetic bodies, we need only to remain insulated from rapidly-corrosive molecules in the atmosphere, and we must remain shielded from electromagnetic forces

that could short our processors. In theory, a powerful enough bubble should do both. My only question is whether the models will demonstrate such an outcome.

The results are encouraging. When I express this to Ki'Shallreth, she tells me that she said as much to begin with, that I should build fewer roadblocks and more solutions, that my way has always held me back.

If I were to characterize my reaction, resentment would be the word. I tell Ki'Shallreth that we are still moving too fast, that we still only know the most superficial elements of the full picture of Guldenberg. I begin construction of a prototype. I tell Ki'Shallreth that I will not descend until we have sent out the prototype.

Her reaction, exasperation.

Still, by the time the first nanosheet is half complete, my microprocessor is prepared and programmed to operate one of Ki'Shallreth's bubbles. Despite

her impatience, she agrees to send down the prototype based on a half-sized bubble.

“I will wait,” Ki’Shallreth says, “But only if you agree to delay things no further. My patience has limits.”

I am tempted to ask whether something that does not exist can have limitations, philosophically speaking. Instead, I opt for diplomacy in the form of silence.

The bubble is heavy enough to sink at a useful clip. It returns the best data on the atmospheric ionization so far. It seems manageable in the upper two layers of the atmosphere. The integrity of the nanosheet encounters no dangers on the way to the thick third layer of the atmosphere.

The bubble hits the lower-layer of the atmosphere with a sudden shock, the clouds breaking at the point of contact in a perfectly round hole that can be seen from our vantagepoint in orbit above. The friction in the fog

creates a buzzing static around the bubble. Soon after it begins its descent into the final layer of the atmosphere, we lose contact.

“How long before we can reacquire the signal?” Ki’Shallreth asks.

“Likely we will not be able to break through the static until the bubble reemerges,” I say.

“How long?”

“If all goes well,” I say. “A matter of hours. This will give you time to construct two complete bubbles and time for me to build safer flight algorithms.”

Ki’Shallreth says nothing, but I know she is enraged by the length of the delay. I struggle to understand how it would be preferable to risk a reset. To me, there seems no urgency. There is no other team of researchers racing to claim the discovery before us, and even if there were, would they not deserve our congratulations rather

than our contempt? This rivalry of ours has always made little sense to me.

I refine my models, though none of the new information suggests that our test bubble will fail. I know that the true indicator will be the data dump when the bubble reemerges from the lower atmosphere.

“This delay is absurd,” Ki’Shallreth says. “It makes no sense to test the obvious.”

“Yet we have lost nothing,” I say.

Ki’Shallreth finishes producing enough particles to compose nano-sheet bubbles for the two of us. She begins to remove superfluous elements from her cybernetic skeleton, connecting herself wirelessly to the ship and continuing her work as though the service bots were her own appendages. When the service bots are finished deconstructing her body, she is little more than a head, a transceiver, a power source, and a tiny sensor array

to communicate directly with the nanosheet.

I continue working, developing a series of algorithms that will convert the remote bubble data into a simulation we can run at 10x speed so we have the knowledge and experience of a full trial run before we depart.

The bubble pops out of the lower-layer of the atmosphere as scheduled and begins to transmit its data.

“As predicted,” Ki’ Shallreth says. “No abnormalities. No danger.”

I begin to run the simulation.

“Quit delaying and prepare yourself to launch,” Ki’ Shallreth says.

The bots approach and I allow them to deconstruct my skeleton. The simulation reveals very little unexpected information. The experience, however, prepares me for the drop to the atmosphere below.

As our cybernetic heads are being installed in the apparatus that will generate the bubbles, a blinding light

erupts from the base of the atmosphere. I categorize it as super-lightning. I begin to calculate the energy within the eruption. The results eliminate the mysterious source of the extra-stellar light emanating from the system. This is the light we saw. The eruption changes the equation.

“We go anyway,” Ki’Shallreth says.

“Such a strike in the vicinity of the nanosheets will cripple us in the lower atmosphere, at the very least.”

“Then I suggest you update your backup for a reset, Ta’Shanthafur. I am giving the order to drop.”

I calculate the likelihood of taking a direct strike. The risk still seems low, less than one percent, but this risk is far higher than any I would take under ordinary circumstances. I calculate the risk to my reputation should I refuse to accompany Ki’Shallreth. Very few of us share my peculiar position on reset. Nearly everyone would side with her position on the need to explore the

moon using direct observation. That is why we were sent here.

Ki'Shallreth gives the order to launch. I withhold my objection.

The experience is quite moving. The light of the ship fades to darkness as we are dropped into the blackness of space. We fall toward the dull, slowly simmering cloud base thousands of meters below us. There is no sensation of falling, just weightlessness. As we near the clouds, the dim glow of the phosphorescence grows brighter. The moon expands beneath us, steadily engulfing our whole field of vision. We accelerate. I must admit, Ki'Shallreth's methodology elicits the sense of excitement. I cannot help but wonder what different observations we will make beneath the clouds, what path we will follow that mere chance and the probe's algorithms did not allow. If there is a word for this sensation, I would call it joy.

As we collide with the third layer of atmosphere, the nanosheet lights up and sparks static electricity in a glowing ball. We are shielded from these minor electrical surges, of course, but the proximity generates apprehension, calculation of load limits and probabilities of dangerous electrical surges. We are safe. For now, we are safe. We dive further into the clouds.

The sparking orb on the exterior of the nanosheet becomes brighter as we descend. The depth of the light in the clouds seems to grow, and as the sparking light extends farther and farther back from our field of vision. The moon grows brighter.

We lose contact with the ship. This, I think, is the point of no return. If we cannot transmit our consciousness to the ship our experience on the moon will be lost on reset.

In my view, I too will be lost. The Ta'Shanthafur that emerges from reset on our vessel, though very like me, will

not be me. She will be someone else, someone new brought into existence. The thought elicits a sensation most aptly called dread.

We are deep in the atmosphere when we slow our descent and equalize. The image of an electric soap bubble floating in a thick green cloud populates my mind. Ki'Shallreth and I are but specks of consciousness in this vast fog, directing the flow of our bubbles through this alien moon's atmosphere. The electrical interference is constant and fierce. We cannot communicate in keeping with these bodies. This was anticipated, so we begin to signal between bubbles using laser bursts. Ki'Shallreth communicates her intention to dive deeper, having already sampled the atmosphere at this level. She communicates microscopy results, the presence of trace biologics, hydrocarbons that indicate bacteria colonies may be generating by-products lower in the atmosphere. I

cannot deny the compelling need to descend even as the risk increases with each meter we drop.

I notice that the electricity in the atmosphere seems to propagate, like a wave oscillating harmonically in the cloud formations. I construct an algorithm to model how the electrical energy is flowing. My model ends in a super-burst of lightning like the one we witnessed from the ship. It has become clear from this perspective. The prototype had caused the super-lightning outburst, and our bubbles are twice the size and two in number. I communicate this to Ki'Shallreth, who bristles at the thought of ascending.

“There is bacteria below.”

“What value is there in discovering new bacteria if we cannot communicate that fact before we are reset?” I ask.

“I wish to know,” Ki'Shallreth says. “What is the purpose of our existence if we are afraid to experience our

universe to the fullest? I descend, Ta'Shanthafur."

My bubble is keyed to follow hers. I briefly consider reprogramming it. Ki'Shallreth, though, is correct about one thing: there is bacterial life in the lights of Guldenberg that is unique in all the galaxy. Surely that is worth observing. The opportunity to research this unique phenomenon first is too compelling to pass up.

Still, as we descend, I cannot help but think about the difference between us. This four hundredth version of Ki'Shallreth can be none too different from the three hundredth. Yet where is that three hundredth version now? Folded into this Ki'Shallreth? I wonder about the second version of me. Will that me be as cautious as I am? Value continuity of consciousness? Her sense of self? Surely, she will not hold the same apprehension as I do if it seems to her that she has not been affected by a reset, for she will think she's me, and

I will never have existed in her mind if she is the sum of all my experiences.

We approach a layer of thick greenish-blue growth in the fog. It glows a nearly neon blue-green that is so bright it is difficult to fathom. The cloud cover above had been dampening the brilliant light from these airborne bacteria. Almost immediately, I begin to register a power surge through my nanosheet. Ki'Shallreth expresses the same. The bacteria are electrostatic, drawing energy from the atmosphere above, and now, they draw energy from us. The uniformity of the electrical field makes it impossible to climb. It is as though we have been sucked down into an electric-blue mud, a thick layer of growth only hundreds of meters now from the ocean boundary. We are stuck.

Ki'Shallreth sends a message, resigning herself to our shared fate.

“Three hundred ninety-two, Ta’Shanthafur. Perhaps your second self will respect version three hundred ninety-three of me a little better.”

“I have always respected you, Ki’Shallreth,” I relate. “Though your methods have always been questionable to my mind, I have envied your productivity and your ingenuity, your willingness to push boundaries I wouldn’t dare approach.”

“And here we are now, witnessing a wonder no other version of ourselves will ever experience.”

The numbers in my modeling are clear. This bacterial colony represents a solid blanket at distances too great to escape to any side. The ceiling has closed above us.

“Shall we descend?” I suggest. “If we are to meet an end here, should we not make the most of our time and learn what more we can discover?”

“I am beginning to appreciate this version of you, Ta’Shanthafur. I wish

somehow that some of this adventurousness will be conveyed during the reset.”

“I too hope that my newfound understanding of your approach and appreciation of your methods makes it through the reset somehow. I have never experienced anything like this before.”

Ki’Shallreth leads us in the only direction we can now go, downward. The timing of our descent could not be more fortuitous. As we sink beneath the surface of the blanket of the glowing blue-green bacteria, blinding lights erupt above us. Explosions of super-lightning fire off in again and again. The luminosity tops off our sensor scales. We are now down to several hours before our nanosheets begin to fail. When our bubbles become porous, we will drop to the ocean beneath and sink to the lowest depths. When our batteries run out, our consciousnesses will dissipate into

the darkness. But first, we resolve to descend, to witness, to discover.

We reach the blurred meeting point between the atmosphere and the seas of Guldenberg.

The oceans themselves are dark compared to the glowing bacteria in the atmosphere above. The ocean is composed of a conductive, salinated water with other ions plentiful in solution, but we are surprised to discover debris suspended in the oceans as well, particles illuminated by the flashes of light from the super-lightning above. And, to our surprise, even with the blinding light show continuing over us, we both detect luminescence beneath us in the distance. We vent atmosphere to equalize buoyancy and our bubbles are free to move about the water. Ki'Shallreth descends. I follow.

What we see defies description. Such an explosion of life could not have been anticipated. At first, we notice

small squid-like creatures against the backdrop of the flashing blue-green light. The more we descend, the more we become surrounded by the tremendous swarm of nondescript sea creatures.

Long-toothed fish swim past, observing our contracted bubbles with their great side-facing eyes. Next, we encounter massive light-generating, whale-sized creatures with flexible undulating fins running the entire length of their bodies. The light show their skin produces illuminates species upon species of unexpected shapes, sizes, colors, and luminosities. There are phosphorescent colonies in all directions. It is a sea of light and life, a staggeringly calm, oceanic garden beneath a firestorm of magnetic lightning in the atmosphere above.

Ki'Shallreth conveys her disbelief. I return mine. We continue to descend.

In the distance beneath us, we see a dull glowing orange surrounded by

gigantic, delicate tubular worms that seem to be self-organizing vertically around the roiling heat that the volcanic rock is spitting onto the floor of the ocean. Ki'Shallreth and I can feel and hear minor tectonic vibrations as they pass through the water. She cuts a course along the seabed, following the great volcanic fissure, looking for more signs of diverse life.

We explore and explore for hours, hardly ever turning on a light to guide our way. So many of these creatures generate their own light at will. All this life is beyond our wildest imagination.

When we finally come to a stop in the middle of a cooled lava field, Ki'Shallreth and I are able to confer.

“It is unfortunate we will not be able to relay this experience through the electrical field in the atmosphere,” Ki'Shallreth says. “This unique ecosystem is a natural wonder.”

“And of the greatest evolutionary ingenuity,” I say.

“Truly.”

“I suppose we may be the only beings to ever experience this place, Ki’ Shallreth, save for the beings who exist in this phenomenal bubble of life.”

“I regret that our counterparts will lack this experience,” Ki’ Shallreth says.

“Do you wonder how many experiences like this you’ve lost under similar circumstances?” I ask her.

“Certainly, there are few like this. Most of my earlier resets were due to exposure in space, proximity to stellar bodies, or destruction in space vessels. Though I do wonder about some of these experiences. This one I could not have possibly imagined.”

Our hours are winding down. We move to the edge of the lava field to watch the many creatures of the lava reef pass by around us. It is dark here, so we both illuminate a dim beacon to observe some of the creatures hiding in the dark corners of the lava reef.

Our light attracts an observer, hardly the first. It is a large snake-like creature with a dragon-like head passing by the reef above us. Our perfectly spherical bubbles of dim light seem to pique this creature's curiosity, as it descends carefully and circles us, inching ever closer and gazing into our orbs with what appears to be sincere focus. Its eyes are large and dark, though encircled by a white band that allows us to discern its focal point. It seems to be looking beyond the skin of the orb, at us, Ki'Shallreth and I, within the bubbles. I decide on a whim to see if we can communicate with it.

I project a likeness of the creature in the water around us, which prompts the creature to circle it. The creature swims closer to the projection and then through it. Now it circles us, examining even more closely. It seems to be considering what we are. I attempt several pictorial representations, but none of them seem to stick.

The creature, wide-eyed, takes one final look before swimming away.

"That animal is more than a dumb brute," Ki'Shallreth says. "I'd wager it's quite intelligent."

"Shall we turn out the light, now?" I ask, with our reserves diminishing quite rapidly.

Ki'Shallreth agrees. She discusses the creature, comparing it to known alien aquatic animals. She states that her analysis of skull size indicates that if brain size is congruent with head size in other aquatic vertebrates, the creature would likely be at least moderately intelligent.

From the depths, we can see little of the water's surface now. Even the glow from the superlightning has died down above. We are surrounded for a time in perfect darkness. We speak little. There is little to say.

At the edge of the darkness, a glow appears. At first, it seems a single point, but the light builds along the horizon,

slowly at first but then burgeoning into a full pink glow that fills the empty space to the side of us where the creature had recently departed. I turn on my light.

Suddenly, we are surrounded by the brethren of the animal we'd just communicated with. Yet it becomes obvious from the size of these creatures that our original contact was clearly a juvenile. They are tremendous animals nearly fifty meters long.

"Perhaps they are more intelligent than we imagined," Ki'Shallreth says. "See what you can communicate with them."

I project more signs into the water to see if I can generate a connection. As soon as I begin projecting lights into the water, the creatures self-organize so that more of them can witness the images. The largest of the animals appear foremost, taking in our message with great interest.

I attempt to explain our situation, projecting them, their sea, the atmosphere above, the upper layers, the moon, the planet Esprareth around which their moon orbits. They swim around each other in patterns, passing against each other's sides in such incredibly tight formations it is almost impossible to distinguish which creatures are which. Before Ki'Shall-reth and I know what is happening, two of the largest creatures have taken us up in their mouths and have begun to swim with great alacrity away from the lava field.

As we progress, the creatures begin to climb. Soon, we have met the surface again. The animals, to our great surprise begin to puff out their sides, and the scales on their great flanks hinge outward, beginning to take in air, slowly creating a buoyancy down the swollen lengths of their bodies. Up we climb, heading back into the glowing mass of bacteria above us.

As we reach the heavy blanket of bacteria that had bogged down Ki'Shallreth and I on our descent, the creatures deflate almost explosively, leaping upward through the thick phosphorescent fog, thrashing the atmosphere violently with their progressively thinning, whip-like tails, finally, spitting our two bubbles upward with a phenomenal outburst of energy.

I find myself floating beside Ki'Shallreth, neither ascending nor falling. There is little power left in our bubbles. We are still well below our last point of contact.

"We cannot make it," I say.

"No, we cannot," Ki'Shallreth says.

Without indication or consultation, Ki'Shallreth transfers all her remaining power. Her nanosheet dissolves, her bubble evaporating into nothingness as she falls back into the fog.

I begin to climb, thinking that I have never wanted anything more than to

make it to the cusp of communication range. Even as much as our experience with these oceanic creatures deserves to be conveyed, I cannot abide the thought of my new memories of Ki'Shallreth being lost to the nothingness of the seas below. I calculate the most efficient course upward. I think light thoughts. I look for pockets of charge that might move me upward cheaply. All I want is a ping. I can compress my data, frontload the most critical pieces of this experience in case the entire signal doesn't get out.

I reach an apex at the boundary between the lowest layer of the atmosphere and the thinner upper layers. The static buzzes around the perimeter of my fading bubble. I have no solid connection with the ship. I begin to sink. There is nothing left to do but send the signal before I fall and hope.

The final sensation is of the bubble fading and the cloud overtaking my sphere.

Conclusion: To my surprise, Ki'Shallreth is already there on the ship. She is shocked by my presence. She has taken up residence inside another cybernetic body.

“You haven’t reset, Ta’Shanthafur?” she states as I inhabit my own new body.

“I am happy to see you,” I say. “You will not believe what we found beneath the surface of the oceans below, Ki'Shallreth. Allow me to share it with you now.”

When she invites me to share my files, I transfer everything.

“As much as I have respected all three hundred ninety-two versions of Ki'Shallreth that have come before,” I tell her, “this version and those that follow, I hope will progress in friendship.”

When she finishes processing the data, Ki'Shallreth is silent in wonder.

"What possibilities," she says. "The universe, she hides her greatest treasures for the bold to uncover."

I think and then say, "It would be an honor, Ki'Shallreth, if we can uncover them together, starting with all the creatures that hide beneath the lights of Guldenberg."

The preceding story has been a work of fiction. Names, characters, places, and incidents are either a product of the author's imagination or are used fictitiously. Nothing within is to be construed as real. Any resemblance to actual events, locales, organizations, persons or animals, living or dead is coincidental. Opinions, actions, and words of the characters do not necessarily reflect those of the living author.

