

LIFE ANEW

Tanai Cardona

1

21 October 2063, 18:57

Nuquí, Colombia. Population: 1,288

Average global heating above pre-industrial level: 3.3 °C

Is there life somewhere else in the solar system? Or even somewhere else in the galaxy? If there is, what would it be like? Would it be as marvellous as here on Earth? Would it be simple or complex? Familiar or something unrecognisable? Liri Ana Gamboa Díaz pondered these questions each and every day for she wanted to be an astrobiologist. And today more than ever before, because on this day, the existence of living organisms beyond Earth was going to be officially confirmed to the world. Could she be so lucky as to be alive on the most important day in the history of humanity? She tried to remember if there had been another day in her 16 years of life when she was as excited as this, but she wasn't able to think of one.

Liri Ana sat in her wheelchair, Spirit, in the middle of the living room and closer to the screen than she was usually allowed. She could hardly sit still as the broadcast of the press conference was about to begin. The sizzling sound of fish and plantains being fried reached her from the kitchen,

followed by a mouth-watering smell. It was her favourite food, her dad knew, and it was definitely suitable for the day, as she was feeling like celebrating. Her dad came out of the kitchen with a jug of iced borojó juice, he poured her a glass and left the jug on the dining table, where mum sat working on her laptop.

‘I thought they had discovered life on Mars already, like twenty years ago?’ he said. Both her parents, while supportive of her aspirations, did not quite understand what today’s fuss was all about. She had attempted to explain it a couple of times already.

‘Past life, dad,’ she answered after sipping her drink and without taking her eyes off the screen. ‘There was life on Mars billions of years ago, but there’s nothing alive there today.’ Dad chuckled and went back into the kitchen. Liri Ana cranked up the volume, as the leading man of the mission, Johnny Chu—celebrity scientist, trillionaire, and CEO of Okeanos Energies—took centre stage.

‘We sent the robotic Bold Eagle II Sample Return Mission on its way to Jupiter, five years ago, to achieve what was considered impossible,’ he began in English. ‘Every aspect of the mission was a tremendous success, and for the first time in history, we have brought back to Earth water samples from the inner oceans of Europa,’ footage of the moon of Jupiter and the Bold Eagle II SRM filled the screen as Johnny Chu went into a fifteen-minute long-winded recap of the mission.

‘Something’s not right,’ said Liri Ana, getting impatient.

‘What a knobhead,’ said mum.

They both laughed.

‘I regret to say that we didn’t find new life in the water samples from Europa,’ the man on the screen said at last, ‘we only saw terrestrial life within the ranges expected for the

mission's instruments. These results were independently validated by six of the best laboratories in the world and suggest that life on Earth is the only...' and there it was. The tedious speech made sense to Liri Ana now. But how was this possible? Several older missions to Europa had produced data quite consistent with the presence of life, she knew well. She also knew that the sterilisation treatment of every bit of equipment in the mission had been so rigorous that the probability of contamination with Earth's microbes was, according to Johnny Chu himself, infinitesimal. Things weren't adding up. She changed the channel to the national news, muted the screen, and dragged Spirit, herself, and her disappointment to the dining table.

Dad appeared holding a large platter with two large fried robalo surrounded with patacones on one hand, and on the other, a large platter with fresh salad.

'Did the programme end already?' said dad, placing the platters on the table. He didn't speak English, but he could see her disillusionment without a doubt. Mum put the laptop away, closed her eyes and inhaled the aromas deeply.

'I guess we'll have to wait a little longer to prove that we're not entirely alone,' Liri Ana said, mostly to herself.

2

22 October 2063, 17:30

Nuquí, Colombia

The heat of the afternoon was easing and the occasional blows and splashes of humpback whales could be heard in the distance. Liri Ana and her best friend, Jeneé Bibo Zapia, were not too far from the shore. Whenever they had

important things to talk about they took his dad's small boat and sailed the gentle waters of the bay, about a kilometre off the beach, an hour before sunset when the temperature started to ease, then returned home for dinner after sunset. Liri Ana would leave Spirit at home and Jenené piggybacked her to the boat resting on the beach, only about 200 meters from her place. They had not seen each other for several weeks as both had been travelling to complete their university admission interviews and had only returned a few days ago. They had a lot to catch up on but today it felt like words had dried out.

'You have to stay in touch, promise we'll video call at least once a month' Liri Ana said, breaking the silence, though knowing that Jenené would be terrible at keeping in touch. She would begin her journey to Santiago de Chile in the new year, but she was unsure when she would be able to visit Nuquí again, as flying was mostly unaffordable for herself, her family, and everybody else in town. She was admitted to the best astrobiology undergraduate programme in the world at Universidad de Chile, on a scholarship, while Jenené was going to the Universidad Nacional of Bogotá to study environmental microbiology.

'Amiga, I'm so excited for you. I'm already looking forward to visiting you,' Jenené replied after a few seconds. The words didn't match his expressionless face and tone of voice, although she felt a tint of sadness sipping through. They were quiet for a few more minutes, then he spoke again. 'It's confirmed. I've been diagnosed with a type of schizophrenic disorder,' his amber pupils pierced her through. 'I'm scared. My parents don't want me to go to Bogotá.'

The sun was low in the horizon and the evening light reflected off his dark brown skin, making him seem as if he

was sculpted out of gleaming jasper. Michelangelo's David but the child of an Angolan man and a woman from the jungles of El Darién.

'We saw it coming, I guess... but you made it through to university, that's what matters,' she wanted to say something uplifting, but no combination of words felt appropriate. She held his hand tight. 'We have to do this. We can't give up now, or ever.'

They sat again in silence. A long row of silvery fish jumped in unison out of the water tracing perfect semicircles. Venus shone bright in the twilight.

'Did you see the news about the Europa SRM? What a major let down,' she said.

3

12 September 2071

Bogotá, Colombia, 14:02; Santiago, Chile, 16:02; +3.8 °C

Jenené's room was hidden from the screen. Instead, he had activated a sunny Caribbean scene as a virtual background, complete with a sandy beach and palm trees swinging with the wind. It contrasted with his dishevelled appearance: a long unkempt beard and a dirty yellow tank top with marks of spilled coffee. He was a lot skinnier than the last time she saw him virtually or otherwise, well over two years ago. They kept in touch relatively often by text, but sometimes he would disappear for long periods of time. Such vanishing acts were usually linked to bad episodes of self-neglect, Liri Ana had come to find out. Jenené had insisted they video chatted as a matter of urgency, as he had found something that would interest her. It wasn't the first time that he

wanted to chat to her about a new project, a new discovery, an unconventional idea for a start-up company that she would never hear about again. She was sceptical, but the insistence felt to her a little odd this time.

'I've been checking the genomic DNA sequences of the contaminating bacteria from the Bold Eagle II SRM, and I have found some anomalies,' Jenené started without any greeting or preamble. This piqued her curiosity immediately.

'What anomalies?' she asked, 'there wasn't really anything strange about that data, a bunch of genomes from a spore-forming bacterium, *Bacillus*, if I remember correctly.'

'That's the thing,' Jenené forced a smirk. 'There's something very strange in the data. This type of bacteria has usually about 4000 genes, with about 1 in 10 of these with no known function. But the *Bacillus* genomes of the SRM have about 7000 genes, and all those new genes have no known function.' He coughed, as if saying that many words had required an extraordinary effort.

'That's very strange,' Liri Ana said. That many unknown genes in a genome was common half a century ago when DNA sequencing was in its infancy, but now most lab strains of *Bacillus* were well characterised, she knew. 'Can you say anything else about these unknown genes? Anything that stands out?' Her brain was firing up already, coming up with ideas to explain this anomaly.

'No, but that's why you need to look at the genomes. Maybe Johnny Chu lied about the sterilisation process and cut corners to save money,' Jenené speculated.

'Unlikely. But what if the SRM didn't fail after all...' she liked this train of thought, triggering an adrenaline rush already. Starting with the most cautious interpretation wasn't quite the style of scientist she prided herself to be. She continued, 'what if this is evidence that the samples did

bring back life from Jupi—'

Jenené jolted, as if a loud bang had startled him, only that she didn't hear anything and he wasn't muted.

'Amigo, what was that?' Liri Ana asked. His complexion changed, he seemed spooked now.

'Eh... sorry about that, I think, I think... my neighbour... must have broken the programming,' he said, looking over his left shoulder, as if someone was approaching from behind. 'Just give me a minute. I think there's a... uh,' he switched off the video and sound.

Jenené didn't come back online. An hour later she texted him asking if he was alright. She said she was going to reanalyse the data and report back to him. At least that would give her an excuse to keep an eye on his friend. He didn't text back. She tried calling for several days, but he didn't answer the phone or return her calls. He finally replied a week later when she texted him saying she was going to get on a plane to Bogotá. He answered that he was now back home in Nuquí with his parents.

4

From: Jenene Bibo-Zapia
Sent: 25 March 2086, 03:28
To: Liri Ana Gamboa Díaz
Subject: RE: Happy New Year!

Hola Amiga, happy to hear the spinal implant is working. Ice? What ice? Temperature hardly dropped below zero this winter in Sweden. Thinking of moving back to Nuquí for good when my contract ends: I

don't know, I want to do something creative. In the meantime, saving as much cash as I can. I want to start a school on my grandma's land. Not sure why you bothered with Chu. Fingers crossed for the paper.

Love,
Jenené

From: Liri Ana Gamboa Díaz
Sent: 7 January 2086, 10:28
To: Jenene Bibo-Zapia
Subject: Happy New Year!

Amigo, cómo estás?

Can you believe Chu's audacity? (See below). He would rather die than admit he was wrong. I'll submit the manuscript for publication to the Journal of Astrobiology, and let's take it from there. Expect several rejections: two Afrocolombians changing the way we think about the history of life in the universe? Outrageous!

Christmas in Nuquí was fantastic. The new town was SO pretty with lights and decorations. Everyone was upbeat despite the devastation in April. Over the hills we get such lovely views of the sea that I can't believe the town wasn't built here in the first place.

I gave rusty old Spirit a rest and used my very own two sticks to dance at the New Year's Eve town party. The new implant is really working. I can only walk like 20 minutes, but I feel my legs getting stronger, which is nice. Therapy is hard work but rewarding. How about yours? Though, every time I get up from the chair it feels like an out-of-body experience. I'm still

somewhat conflicted about the whole walking situation.

You need to visit Nuquí soon. How long has it been? You should see the new power station: the solar arrays are gorgeous!

I have so much to tell you. Let's video chat soon, please! Have you got a chance to do some ice-skating in Umeå yet?

Te quiere inmensamente,
Liri Ana

PS. I went to the cemetery to visit our folks, but it was all a couple of meters under the mud. Not sure what to do about it. Sad.

From: OKEANOS Energies, EA
Sent: 6 January 2086, 21:33
To: Liri Ana Gamboa Díaz
Subject: RE: Revisiting Europa SRM data

Thank you for contacting OKEANOS. Find below my grandfather's response.

Hi Lilianne,
We had a thorough look at that data twenty years ago. There's nothing in there. You might want to ask an English-speaking colleague to read the manuscript for grammar/typos etc..

Best,
J.C.

Tommy Chu

Executive Assistant to CEO
OKEANOS Energies Corp.
Deep Sea Mining Ventures

From: Liri Ana Gamboa Díaz
Sent: 7 December 2085, 17:59
To: OKEANOS Energies, EA
Subject: RE: Revisiting Europa SRM data

Dear Mr. Chu,
I wonder if you had a chance to pass the message below to Johnny. I thought it would be of great interest to him. Any feedback would be most welcomed. Thank you in advance for your time,
Liri Ana

From: Liri Ana Gamboa Díaz
Sent: 22 October 2085, 08:00
To: OKEANOS Energies, EA
Subject: Revisiting Europa SRM data

For the attention of Johnny Chu

Dear Mr. Chu,

I hope you're well. My name is Liri Ana Gamboa Díaz, Associate Professor of Astrobiology at U. of Chile. I wanted to share with you some interesting observations regarding the genomes from the bacteria detected in the Europa SRM. Together with my collaborator, Dr. Jenené Bibo Zapia, a postdoc at University of Umeå in Sweden, we show that the genomes had anomalies we interpret as possible

signals of Europa endogenous life in the Jovian system. Indeed, I discovered that this form of life merged its genomic DNA with DNA found in few spores of Bacillus remaining in the Bold Eagle II sample chambers after sterilisation, then multiplied. Much in the same way that retroviruses do it here on Earth, but to a much larger extent. I also provide calculations suggesting that Jovian life and life on Earth share a common ancestor about 4.25 ± 0.10 billion years ago.

Attached is a draft manuscript of the research; any feedback would be greatly appreciated.

All the best,
Liri Ana

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30 November 2088, 16:10, +4.1 °C
Umeå, Sweden

The stench of Jenené's 19 m² studio made her gag. Rotting undisposed bin bags, piles of laundry, mouldy unwashed dishes, and a scatter of papers and books were shoved to one side of the room. Liri Ana had dashed to Sweden because Jenené had overdosed with a mixture of psychoactive drugs. She was his next of kin and had received an emergency call from the hospital as Jenené had gone into a coma. He was stable now and had woken up a couple of days ago, but his

mind was still very foggy. At the hospital, he had told her half in gibberish and half in Spanish that she should go to his flat to retrieve an important piece of research before dark secret operatives from the defunct NASA would get to them first.

She went in the room in her chair and after a couple of hours clearing and tidying, woke the computer up. Failed facial recognition triggered a password input request. She typed the password Jenené had miraculously remembered. Several files remained open, including a document with 10 pages of texts and plots that didn't make much sense to Liri Ana. At the end of the document there was an embedded video that Jenené had recorded with the computer camera. She played it. Jenené's skeletal face appeared, lit by the screen against the dark background of the room. He started speaking in English.

'I've identified and tracked about 1000 genes unambiguously from the Europa life merger. There are many more though. Starting at around 2065, nearly two years after the arrival of the Bold Eagle II, these genes begin to spread, they begin to appear in genomes of microbes from environmental samples, outside those thought to be contamination from the mission—' Liri Ana stopped the video to think. Jenené was at it again, he had an uncanny ability to see the connections in the counterintuitive, even amid an episode. It wouldn't be entirely surprising if he was right: after all, the scientific establishment didn't accept that the SRM had brought back a new form of life to Earth. After six journal rejections over two years, their manuscript remained unpublished and a curiosity of the non-peer-reviewed science of preprints. It had received quite a lot of traction on social media nonetheless, and had even been cited a few times. It all meant, she concluded, that containment

measures in the labs where the samples were kept could have become sloppy. She resumed the video.

‘It looks like this second form of life has found a way out of the lab, and is merging itself with other terrestrial life. Mostly bacteria, archaea, unicellular eukaryotes, and—’ he jolted, just like she had seen him do before. He looked to the left, his face showing fear, his pupils fully dilated, mouth open. He seemed to be listening to someone, he hunched, then he jolted again as if that invisible someone was shouting right into his left ear. It was hard for Liri Ana to watch, but she forced herself to continue. Jenené began to sob.

‘I’m not shit,’ he whispered between sobs in Spanish, ‘get the fuck out, no, no, no,’ he closed his eyes and took a deep breath. He was going to start speaking again, but he didn’t. Instead, he searched around himself, retrieved an unlabelled bottle of pills and put some in his hand, then took a few other pills from another bottle, then from another. He ate the pills, chewed them, then drank from a glass of water. He got up and went to the kitchenette, but the camera didn’t catch what he was doing. Liri Ana skipped the video until he returned, grabbing a bloodied tea towel. He had cut the palm of his left hand. What the hell was he doing? She wondered.

‘The candidate genes,’ he began again speaking slowly in English, ‘first appear in open access routine microbiome data from water treatment plants, hospitals, and supermarkets near the six labs... beer, bread, I need to get fungi, cow’s milk, Arabidopsis, and, uh... and,’ he frowned and rubbed his eyes with his hands, leaving a trail of blood over the left side of his face. He resumed, ‘the number of candidate genes first appear at a frequency of a fraction of a percentage in 2065, but it has steadily increased over the past two decades, now certainly above 50% and—’ he stopped and turned his head towards the invisible someone on the left. He jolts a little. The

video ends.

Liri Ana looked around on the desk to find a trail of dried blood droplets, a rack with about 50 sealed test tubes with what she recognised were microbial mats samples, a small box with a genomic DNA extraction kit, and a portable DNA sequencer connected to the computer. She deduced he was trying to get a blood sample to extract his own DNA and sequence his genome. He could have just swabbed the inside of his cheek, she thought. She used his computer to log in to her cloud data storage where she kept her own genome data and other tools of her trade. She searched the computer for the list of candidate extra-terrestrial genes Jenené was talking about, which she found without trouble. Then ran a custom-made app to look for these genes in her genome: she found nothing. She remembered then that her genome was sequenced six years ago when she started treatment for the integration of her spinal implant. She grabbed the genomic DNA extraction kit, did a swab of her cheek, processed the sample, and ran it through the sequencer: it took about 20 minutes to get an error-free genome. She ran her custom-made app on the new genome data, and there they were, a confident match to just over 800 out of the 1000 genes in the list. This alien life form had somehow fused with her, and at this rate, with anything alive on the planet, and they were the first to find out. Liri Ana felt hot, she felt shivers down her neck and saw goosebumps all over her arms, she wanted to ride Spirit at her maximum speed, she wanted to jump, she wanted to scream. What did this mean now? What was this alien life doing to life on Earth? What did it look like? Was she breathing it right now? How were these genes spreading? Were they pathogenic? One thing was clear to her, this merger of lives event would change the evolutionary history of the planet forever.

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7 August 2107, 17:30, +3.6 °C
Nuquí, Colombia. Population: 602

Liri Ana and Jeneé sat together in a boat by the bay, just like they used when they were teenagers. This time Jeneé didn't piggyback her, as she was able to walk to the boat, leaving her chair in the hotel.

'This was a great idea, how long has it been?' she said as soon as Jeneé had stopped the small electric engine of the boat. She then opened her backpack and retrieved a gift, its wrapping paper featured drawings of Jupiter on a dark blue background. It was a book: hardback. He opened the gift slowly and carefully. The cover of the book read:

One origin, two paths, one future

On the discovery, isolation, and characterization of Jovian life and its implications for the evolution of life on Earth

By

Prof. Liri Ana Gamboa Díaz

Dr. Jeneé Bibo Zapia

'Nice one,' he said.

'A full box of them is on its way to your place right now,' she placed a hand on his shoulder and gave it a gentle squeeze. 'What you're doing at the school is phenomenal, you should be proud.' Her eyes welled up. She felt elated.

'It's always tough, you know, but art has awakened in me something I didn't know I had,' he looked away towards a pod of humpback whales and took a deep breath. They

were closer and more numerous than she remembered. 'The kids loved you, by the way,' he added, then took out of his pocket two intricate tagua carvings, one of the Mars rover, Spirit, and another of a humpback whale. He gave them to her.

'Here, for luck.'

Jenené had invited Liri Ana to visit the town's school, la Escuela de Ciencias y Artes de Nuquí, on the occasion of its 10th anniversary. The Friday before, the school had held the Creativity Fair, a day when children showcased their art and science projects. In the afternoon, kids and parents gathered at the town's large maloca, where Liri Ana gave a speech and awarded prizes to the best works.

'Are we infected with the aliens?' a 13-year-old girl had asked.

'Infected, isn't the right way to describe it,' Liri Ana smiled and moved her chair closer to the girl, then continued as if narrating a fairy tale, 'we've fused, we've become one. But there's no need to worry! Researchers in my team have found that the fusion has had a positive effect on life. All animals we now live about 10 to 20% longer. It sounds little, but it means that now you might live two or three years longer than before the fusion. Isn't that great? We're only now beginning to understand how the alien DNA protects us.'

The blow of a whale brought her back after a moment of pleasant silence watching the sunset. The calm waters reflected islands of ruby and amethyst sailing in a sea of gold.

'I have some big news, she said, 'I've been asked to lead a new sample return mission to Europa.' Saying it out loud still sounded insane, 'by a new Latin American consortium of space agencies. And then, to Saturn's Enceladus.'

'Amiga, you did it!' he hugged her.
'We did it,' she said.