

Kathryn Lackie
ARKANOV'S STAIRS

Letters from an Astrophysicist to her father

I.

Do you remember the star you adopted for me for my fourteenth birthday? A boy in my class had promised it to me if I met him behind the utility shed after class. I liked him, so I let him touch my breast and stick his tongue in my mouth. But he had no credit card so he couldn't buy me a star. So I asked you.

You bought it off a website and for thirty dollars they sent us a certificate, one with foil embossing, and included my star in their registry: Arkanov's Star, in the Camelopardalis constellation, named according to astronomical convention. You called it Astrid's Astra, as though you had nothing to do with it.

I saw it through the reflector telescope on a high school field trip to the observatory. The astronomer asked us what we wanted to see, and I requested galaxy NGC 2403 and gave him the ascension and declination. He projected the image so everyone - my friends, my enemies, and the teacher who spent her lunches on the phone crying - could see Arkanov's Star. So few people have heard of Camelopardalis, and 2403 is not particularly spectacular - it's only beautiful because all nebulae are - so afterward, the astronomer asked "why that galaxy?"

I was embarrassed, shy, but pleased to tell him about my star. He was not pleased. He said star adoption was a scam that preyed on egotism and sentimentality. I was silly, and whoever had bought that star was a fool. That astronomer advised me to never talk about "my star" in scientific Company, lest I be considered airheaded, faddish, civilian.

And I didn't. I never talked about it. And no, I couldn't tell you before now. You would've been furious - not at that insensitive, hack telescope technician - but at your own daughter for wanting, and making you buy, something so insipid. Maybe you would've thrown out my certificate and used the frame for a diploma or a lithograph bought from some starving art student. You may've thrown out the star registry containing my name and my star and that would've been the first and only book you'd ever tossed away.

But I didn't tell you because I still loved my star.

I should inform you that Arkanov's Star – Astrid's Astra, supergiant 96 in the Sandage cluster – went supernova over eight million years ago. The light burst reached us in 2005, so my star died sometime during the Miocene era. There were mammals then, but it was pre-homo habilis, so Arkanov's Star died before humans were even born.

Perhaps we don't need wormholes or string theory to time travel: I travelled back in time twenty-two years by shuttling through deep space at only five hundred miles an hour.

Our ETA at the Webb Lagrange Point 2 Space Station is another eight days. I'd like to say the last five days in the ship have gone by quickly, but they've inched along and I've had too much time to think. I look forward to getting the telescope, our Mokos, assembled and operational; it'll be a relief to have a purpose. In the meantime, I'll stargaze. Lately, the antigravity space left by Arkanov's Star is the first landmark I locate.

- Dr. Astrid Arkanov

2.

May 14

One of my favourite early memories is the night we sat on the roof and watched the Perseids meteor shower. It was mid-August, right before I started grade one. I loved the "shooting stars" and I shrieked every time one fell. But then I remembered that stars were big – bigger than the world – and I was afraid that one would fall on us and crush us and said so. You drew the trajectory of the Swift-Tuttle comet against the canvas of the sky, showing me the meteoroid stream.

"Earth passes through the stream, dislodges the debris and gravity pulls meteors to the ground," you said, miming the descent. You always talked to me like I was one of your college students.

"But meteors can hit us!" I said.

"Most meteorites don't survive the atmosphere and the ones that do are no bigger than the rocks in the garden. Often, they're just grains of sand."

After you helped me down the ladder, I ran around the cul-de-sac, over-stimulated. You watched me from the front step. I twirled with my arms out, staring up at stars that blurred into nebulae.

Remember I came back rubbing my eye? I got sand in it and thought it was a meteor.

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We arrived at the space station on schedule. The station engineers are unloading Mokos's lens and I have found my berth. It's small, monastic — just a twin bed, a closet and a desk — but it's private. There is also a circular skylight, more like an oculus, with a retractable hood. The engineer who introduced me to the room called it God's yawn', because the mechanism inadvertently mimics yawning. It's a mythological trope, the idea that God has swallowed the universe. Pretty, but it propagates a mentality of universe containment. Infinity is existence without a jar. Humans need jars. We are jars.

The debris collecting around the station looks like meteorites. Up here, it appears as what it is — space refuse.

I'm using a pencil for this letter, of all things.

I hope you're well.

3.

May 28

Did you like him at all, the 'Glass Man'? I did.

'Glass' is a misnomer — he actually used flexible, plastic resins or Beryllium to make his diffractive lenses. Fresnel lenses are prismatic, like stoplight bulbs, and modelled after origami. How beautiful his profession — making irises for space telescopes. He'd tasked himself with bringing the universe into focus, but still you forgot his name. It was Micah.

He was smart — no, brilliant. But he couldn't talk, not how you wanted him to — articulately, passionately — so your discussions became one-sided and indistinguishable from your lectures. You lectured this brilliant man I liked and he sat there dumbly processing, staring into his coffee cup.

Mom always asked about Micah, and Gram hinted at marriage, and children, and was flustered by my lack of enthusiasm for both. I think you disappointed her by not raising us Orthodox; by not instilling in us her social and ceremonial values. I think I disappointed you by bringing home a soulless mute. You avoided mentioning him if you could, and when others said his name you turned away, wiped your glasses and distracted yourself with your newspaper.

But he wasn't soulless. He was romantic — intensely and awkwardly so, which already made him better than I could appreciate. And he was beautiful in his way — rangy, with an academic slouch and caffeinated movements. He had black hole eyes and was completely silver-haired at twenty-seven which gave credibility to his bespectacled baby face.

When I first met him at CITA, I thought what you must've thought –lifeless, artless. He was piebaldic under the hall fluorescents and functioned statically at a utilitarian equilibrium. Often he looked at me, but he seemed as life-sucking as his eyes so I ignored him. Throughout the lecture we attended, I was aware of him sitting behind me, affecting like dark matter.

He followed me to the parking lot. I walked slower to let him catch up so he could state his case, but he slowed as though we were diamagnetic. So I turned, faced him and dared him to initiate. He said nothing, but handed me a six - pointed origami star. The paper was mottled from his sweaty hands.

"Did you know," he began slowly, "that the techs in the computational department call you Lúthien Morningstar?" His eyes flickered over my face for a reaction I tried to suppress. But I understood the reference and I may've been blushing.

"I beat them into work every morning –"

"That's not why they call you that." He touched my hand and there was a triboelectric spark. I think we both smiled – yes, even him. He smiled often with me.

"Trust a tech for a Silmarillion reference," I joked as you know I do when I'm uncomfortable. I'm sure you'd agree that no one with healthy levels of vitamin D would ever compare me –cold, thin-lipped Astrid - to a Tolkien demigoddess.

But the Glass Man –

"Tinúviel. Tinúviel." He spoke so intensely I couldn't laugh –I couldn't even exhale. I was afraid.

Afraid of myself.

"It's Astrid," I managed.

"Astrid Arkanov, Stellar astronomy."

"And interplanetary medium."

He smiled. "And interplanetary medium. Micah Noel-Beam, on loan from UofT optics."

"Dr. Noel-Beam–"

"Don't –don't talk to me like that, please?" He said, simply. "I call you nightingale and I'm going to build for you the world's most perfect telescope. Call me Micah. At least."

Mom would cry –joyfully –to know I have sentimentality enough in me to recall that meeting. She always thought I was heartless.

You it would probably disgust.

It's very womanish to remember. Like how I'd sometimes cry when you lectured me (that was hormonal). You were most content to be near me when I was cerebrally androgynous. Then I was most like you and you could understand that. I always wondered how you and Mom were so loving and functional. You adored her, but all that you loved in her you hated seeing

in me. And then I hated seeing it. Sometimes I wished I were a boy just so I could be less of a girl for you. You had your sons –the banker, the engineer, the naval officer – and not one mediocre. You praised them and they deserved it. But you could never accept praise for yourself so you never gave it to me. To this day I still don't understand what would make my actions accomplishments.

Micah's lens is a great accomplishment – I know that. Not just because Mokos will be the first space observatory directly accessible to humans – although that is immortalizing in itself. But it's an accomplishment because he did exactly what he promised: he made the world's most perfect telescope.

How sad that he made it for me and not himself.

Before I left, I asked Micah to visit you. I wonder if he has. I wonder if you remembered you hate him. I hope you did.

4.

June 10

The star you adopted caused problems when they decided to name the latest Aurigae "Arkanov's Star". It wasn't problematic for the International Astronomical Union since they don't recognize star dedication, but it was for me.

"SN 2004dj supernova-ed fifteen years ago. Think of this as Arkanov II." Micah was a comfort. He had created the lens for the telescope I used to discover my star.

Did I ever describe my star for you? It's a hypervelocity G2-class almost ninety-eight percent the size of Sol, travelling through the Auriga Constellation with four or five planetary satellites and a brown dwarf companion orbiting at 25 000 AU. I've estimated it at 3.9 billion years old. I found it while studying Auriga's dark nebula –it was hiding behind cosmic dust.

Yes, I was studying interstellar clouds and discovered the star system most likely to foster life in our observed universe. And they wanted to name it after me.

"If it really bothers you, why not use "Arkanova"?" Micah offered. "AA Auriga –Arkanova's Star."

Russian naming conventions –you hated them. Your family hadn't swapped one icy wasteland for another for nothing. But I liked the rhythm of the feminine and the symmetry of the bookend 'A's. And suddenly I loved that anyone would encourage me to be an Arkanova because I'd always tried so hard to be an Arkanov.

For a few hours I let myself love him. Micah – the Glass Man.

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Arkanova's Star is also called The Running Star. Because it's runaway—probably part of the Barnard's Loop supernova—not because of me. Although I did run.

I hope you don't still call him Glass Man. It's too glib that I broke him. I didn't want to fucking break him. It's your fault I used to flinch when he touched me. Kissing, holding hands, hair stroking—feeble, sentimental, trite. It was disgusting to be sentimental so I was disgusted when he hugged me, when he touched my hand, when he called me to meet him in the hall for a quick kiss. I would've preferred to fuck him in the restroom—that was too primordial and biologically necessary to be insipid. But I couldn't even properly enjoy the animalism of sex because I could never stop thinking. I never knew what I should be thinking mid-coitus, so I went through a list of topics and mentally categorized them as appropriate or in-. Maybe that has something to do with the fact that your idea of sexually educating your children was to give them an illustrated anatomy book. At least Mom gave me a Harlequin. She wasn't above kissing. Is kissing her disgusting?

I told you and Mom I left CITA in November, but I'd actually left in March and spent the spring and summer in a country house in the Rockies. Some of the time I spent walking in the valley or reading trashy books. The rest of the time I stared at the sky and fantasized about my star system. I decided that planets three and four had life. Intelligent life had originated on four, and they'd colonized three. They were in the process of terraforming five.

I didn't have novel or even scientifically sound ideas for life in the Arkanovan system—I wanted it to be exactly like Earth, only better in an unquantifiable way. April mornings I would look out at the goats grazing on the frosted long grass, all set a golden blaze by the sun, and I'd be so overwhelmed by the majesty that I swore it was Arkanova bathing us all in her astral light, not Sol.

Micah visited me. He was broken, but not as broken as me because I'd only broken his heart, whereas I'd broken my brain. He listened to me talk of Arkanova, and fed my fantasy by making paper mache models of planets to match my descriptions of Alyosha, Ilya, Dobrynya, Svyatagor, Peresvet, and Mokos. Micah did indeed name his telescope after the Arkanovan cradle of life.

When I went for my walks he followed just in earshot—he claimed there were grizzly bears and mountain lions and he may've been right but I never saw any. Sometimes I heard him humming, and sometimes I thought I heard him call "Tinúviel. Tinúviel." And I thought it was nice of him but he was still a fool.

Sometimes I woke up in the middle of night and found him downstairs, silhouetted against the glass wall, trembling like glass does at certain frequencies. That's how he cried – he shuddered and dry sobbed. And when I saw it I hated and silently derided him. And then I hated myself for being that way, but I still slept easy until morning. When I saw him at breakfast the last time his eyes were bloodshot, the sockets bruised, and he sat at the table warming his hands with his coffee mug.

"Could you love me? Ever?" His voice was clear and confident. He only ever had that confidence talking to me. Maybe that's why he loved me. Or maybe I have no idea why he'd love me.

"Only if you were from Arkanova."

He knew me enough to ask 'could', because he knew I would've if I'd had the capability. So he left it, and me, at that. He had a contract at NASA waiting where he was going to build a full-spectrum telescope for the L2 Space Station. After a few months in solitude, and a year with the CSA, I joined him.

Micah should be walking Mokos down the cosmic aisle –she's his brainchild, his life's work. He birthed her. I observed. Although, according to traditional biology, I guess that makes me her father and this appropriate.

The telescope is nearly intact – the engineers have mounted the solar hood and attached the observation tank to the station framework. If everything happens according to procedure, I'll have her online tomorrow and our photographs should be on the eleven o'clock news.

5.

June 12

I'm sure it's been on the news that we've had complications. Our primary antenna was damaged by space debris and the station lost communications with earth before Mokos was operational. Our backup kicked in quickly, so we weren't dark long, but Mokos hasn't been connected to the backup antennae.

We've been trying to conduct repairs with the tele-robots, however, we've had to send out one of our engineers. He's out there right now, abseiling along the laboratory module on umbilical.

When I first saw him outside the shuttle I vomited. One of the military men saw me and I was so embarrassed I hid in my berth until our next briefing.

What I saw – him floating along, a micrometeroid away from oblivion – must be what Mom saw when she looked at me. Maybe what she sees when she looks at you. But you're off umbilical.

I've been thinking about God lately. Not about doctrine, but of the fantasy of omnipresence. I think I'm finally lonely enough to wish there was someone always with me. Can God live here in a vacuum? Funny how much easier it is to feel lonely when you're cold. Maybe God is electrons.

6.

June 14

Mokos sees. She is blessed with *40ly/n* vision. CNN should be projecting the images momentarily.

I spoke with Micah today. He was at NASA when Mokos went online. He said he visited the house last week but you were at the clinic with Mom, having tests done. So instead he had tea with Gram and they watched her stories.

As Mom would say, he's such a nice man.

Today, it was like seeing him for the first time again. Not because he's changed—he's the same, but happier, the proud new father of our most insightful telescope—but because I think I have. I've always been under the notion that people don't recognize change in themselves unless it's a conscious effort, but I can feel the black sky exacting pressure on me. I don't know if it's restructuring my carbon-base into diamond or graphite.

Micah said he missed me. I said I missed him too. I meant it. Were he here, I would share my bed with him. And I'd stay in it all night, not wait for him to fall asleep and slip away to sleep in the spare room. The constant repositioning; the smothering heat emanating from his skin; that rhythmic snore—everything I hated, I miss.

I want to be graphite. I think I was always meant to become graphite, even though you applied the correct pressure to make me a diamond.

Please don't mistake these thoughts for regret. I've lived my entire life for this moment. My only expectation was to be overwhelmed. I predicted awe, and there have moments in which I have been overwhelmed in such a way. But I am overwhelmed in other ways too. By the blackness, the isolation, the omnipresence of my own mortality and insignificance.

You probably understand this best of all.

Is it dark where you are, when you leave? I wonder how the brain processes darkness without language faculties. I suppose it would be a purely emotional reaction, instinctual. That must be terrifying for you. But perhaps terror isn't so terrorizing when you haven't the language symbols and their associations to mythologize the state.

Terror. Your diagnosis terrorized you, didn't it? Never mind those with the disease only live an average of seven years after diagnosis: you were losing your mind. You would never call yourself an intellectual because it would be pompous, but that was only a problem of semantics. In truth, it was how you self-identified and how people identified you. Your logic was impenetrable; it made us hate you growing up. Your frame of reference was worthy of Britannica, but it made you pedantic, and pedants come across as small. You lived in your head and disseminated the products of that world with everyone you met.

Now that world is the vacuum of outer space. The jar you've left doesn't even look like you now. Your body was canvas stretched over the frame of your mind, and now that structure is gone and the canvas is rumpled, draped over a wheelchair.

I hear from Mom you're in the hospital with pneumonia.

We're leaving the space station in four days. I'll be home in just over two weeks.

7.

June 17

Last night I dreamed of a ceiling full of plastic stars. When I woke up, my skylight showed a panorama of real ones and I was disappointed.

I remember putting up those glow-in-the-dark, adhesive cut-outs. It was January, so we arranged them in the constellations of the winter sky: Orion, Hydra, Perseus, Aries, Cassiopeia. Camelopardalis. I was so serious about making it perfect, so you teased me. You made a hook out of stars to reel in the seamonster Cetus, and set Vulpecula after Lepus the hare, even though that fox only comes out in the summer. You stuck the plastic lodestar to my forehead and called me a compass.

I asked you how people became constellations. You said some were heroes, such as Perseus, or villains, like Hydra. Sometimes they are a mixture of both, like Orion, or simple sacrifices to appease the cosmos. But to become a constellation, you had to die first and be placed in the sky by a god who wanted you there.

I've never felt less connected to the divine than I have here, suspended in the sky. I'm afraid you'll feel the same. But I want to see you in the sky.

You died today.

Everyone was with you when you left —your mother, your wife, your three accomplished sons and the families they accomplished.

94

Colleagues from the college, some friends from the library, golf buddies – they were there too. Even Micah. Everyone but me.

I don't know if I should be grateful or angry for that last visit. I came home for a few days the week before the launch. It was a full house the last night – the boys came home, Mom and Gram cooked a turkey dinner, and you and I sat on the veranda watching the neighbourhood kids play ball hockey in the cul-de-sac. For the first two days I was home, you were unresponsive. You'd deteriorated since my last visit. A couple of times I checked your pulse to make sure you were still breathing. I was amazed at how warm your skin was since I couldn't remember the last time I'd touched it. That final night on the veranda, as the sun was setting, I caught you looking at me, and you suddenly seemed yourself again, your mind restructuring the canvas of your body. I sat with you and told you about my mission to the space station, about Micah, about Mokos. I explained it as simply as I could, but I didn't know how because you'd never dumbed anything down for me. Still, you nodded, reacted, although I'm not sure you weren't just reacting to me. Then, because you'd looked at me for days and not seen me, because I had to check your pulse to know you could breathe, I asked you if it was okay for me to go to space.

You smiled. "Stairs," you said, looking up. I couldn't tell if it was paraphasia or poetry. I took it for a blessing.

I know I'm fortunate you had that lucid moment before I left. But if you hadn't been conscious, I might not have left. And then I could've been there with you in the end.

I've written seven letters for you. Even if you could process language, they were never meant for you to read. Some words are hard as diamond, even though they were written by graphite. No, the letters were just for me. To make sure I remembered.

I was going to shred them. But when I heard you were gone I realized I needed them for something else.

The first six I crumpled into globes and I'll do the same for this. Before we leave for earth, I will eject all of them into space.

The carbon, oxygen, and trace minerals in paper were created billions of years ago in supernova, just like the atoms in our bodies, the electrons firing in our brains. Our minds are stars, our bodies are stars, and the trees from which the paper was pulped are stairs.

These letters are the stars of your constellation. Patris ad Astri. Father of Stars. Father to Arkanov's star, Aurigae Arkanova, and the Arkanov Letters one-through-seven. Up you go with Perseus, with Hydra; with Orion and Camelopardalis. But unlike them, it isn't a god putting you in the sky.

Not a god; only a pencil.

- *Your Daughter.*