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The History of Ice

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I could tell you that I think in PSUs and atmospheric ice nucleation. I could tell you I have an optimistic disposition. I could tell you how I work interdisciplinarily, multidisciplinarily, even transdisciplinarily. I could tell you of the many times microcrystals have speckled my gloves and algae has clung to the spikes of my boots during sample collection. I could tell you about the bitter spring in the marginal ice zone. I could tell you about Stefan's Law. I could tell you about the history of sea ice. But I am running out of time.

I want to tell—

Since a noise outside my porthole's distracted me, I'll take you along on my investigation. Watch me pull on my boots and stuff my curly hair into a balaclava. I pick up my storm lamp and follow what sounds like … Laughter? Crying? Chatter? The wind feels like about 39km/h and it rinses my tear ducts colder than you can imagine. No one's meant to be outside right now. Most people would not want to. Scientists, however, are not most people by nature. I turn on my headlamp and look over at the scales of ice rising and falling. Some say the ice creaks and cracks like an old chair. Others say it whinnies like a white horse. My ex-wife heard only whispers and screams. To me, it sings a curious and joyful song. I stop to listen to it for a moment, even though the cold shatters my knees.

I walk towards the shape near the ship's bow. It's Frans with his blue beanie, intent on something in his hands. Frans makes sure to scowl whenever I approach him, to counteract my cheerfulness. Some people think us seafolk should be dour, but I am happiest in my thermal layers, coring into ice. Frans always takes ladders two rungs at a time and the first thing he said to me on the SA Sarah Baartman was "There are no friends on the ice." I'll win him over. He is whittling a chunk of ice delicately and patiently. Anger hijacks my hands before I can stop myself. I can be overprotective of the ice. *Plop!* He glares at me as I storm off. I'd send him back to land if I could, but at the 60th parallel south we're too far off the continent.

We are thick and thin, and fragile and porous. We control the migration of birds, the appetites of mammals. We shred ships. We slip on the surface of the water.

Day is four hours long; night, five times that. Night and day don't matter when we work; the ice is a patient model. The twin meteorologists ring the bell when conditions are perfect, and we go out into the breach. Once, they broke protocol and we suited up to see a 10-foot swell, frozen in a majestic curve. I issued some fines, government rules, it's taxpayers' money after all, but forgave them onshore. Some shifts are fourteen hours of heavy lifting and painstaking, slippery work. The Antarctic doesn't make things easy, and I'm in love with its complexity.

I want to tell you about the silver-toned light—

"Polar Engineer Bruce?"

The electro tech looks at the men around me, they often do in the first week. I giggle at the mistake and wave. I inspect the sensors the electrical team have been fine-tuning for us to leave behind when we return to land. Five of them are good to go. I send the rest back. The tech looks disheartened, but I assure her she'll have another set up to spec by tomorrow.

At sea, the 4 hours of daylight screws up my circadian rhythm. While I spend the night hours reading, my mind casts back, "What was Frans carving?".

We need imperfections to form. We grow from the top down.
We are well-seasoned. We are proud of our mushy layer.
We are the bottom of the world.

I want to tell you how we started with nothing but a cut up Jojo tank tied to the roof of my car and a grad student who was figuring out his meds and our coding. I want to tell you that things in nature tend towards low energy. I want to tell you about my second sight: the inventions I envisage before others can. I want to tell you that salt depresses the freezing point of seawater. I want to tell you—

But as Narcissus had his pond; I have the inbox, the reflecting pool of the soul. Mine is always bursting.

The desalination exec who wants scoops on my new discoveries usually starts his emails with "Hey baby" and ends with an offer of preferential shares. He calls me his favourite, but I know he has a scientist at every pole. I respond with some cute selfies I took with the usual NDAs.

A shipping magnate and the minister of agriculture are embroiled in a long thread spooling over months. They want to know how fast the sea ice is going to melt in one concrete figure. I'm drawing it out with explanations of the science. I don't think they'd like the long equation that explains it better than one number ever could. I'll get back to that another day.

An eight-year-old from Canada asks, "Does pancake ice tastes like pancakes?" I write back that it does and if he does well in science, he's welcome to come around and taste it for himself.

The atmosphere here usually tastes like salt and smells like diesel, until you leave the ship. Then out on the ice it smells clean as a fresh ream of paper or like absolutely nothing at all.

We are columnar. We are granular. We are a viscous liquid.
We relish disturbance. We are the shining landscape.

Interviewers and friends are always concerned with what I'm missing (fyi: my Burmese shepherd and cheese—which has a better texture on land) as much as my achievements. First black woman commandeering an Antarctic mission. Inventor of thermal

microtome procedures for cutting artificial ice. Disproving existing theories on the rate of surface energy transfer. They all just want to know what I miss when I'm at sea. I laugh and say the beach. If I was honest, I would say I miss the lab most of all. Its serenity, its limitless potential, the Belgian chocolate hidden behind the beakers at my station.

I am watching two students play table tennis on the deck, but I want to tell you about the day he came to the lab. I was fiddling with salinity ratios in the 500ℓ water troughs which were far too high. Sakaria came to build the flume machine so we could make waves indoors, agitate saltwater and replicate the ice we find in the field. He measured the space, cut the glass, smoothed out my pencil sketches with calloused hands and squared off fingertips. The wings of sandpipers fluttered in my stomach.

I had given the students the weekend off. Hileni, my deputy, was in the gym, focusing on her strength training for our next expedition. We were alone amongst the equipment, and I had been playing some Brubeck to keep us company. Sakaria was hammering and intermittently humming along. When the album started over, he asked me for a dance. We held each other close as the edges of the evening softened. "It's too late to work," he whispered. I removed my white coat, and he, his overalls. When we were totally naked, I led him to knowledge, like Eve did Adam. I lay down in drinking trough A, afloat on my back. He lay down in drinking trough B. "What's happening?" he panicked. "It's 30 per cent sodium chloride, baby," I purred. We held hands over the brim.

We have algae hiding in our brine channels. We are born of the first crystal in autumn and winter. We die more each summer. We act like concrete. We are glad to see you again, Dr.

Today we have to core through the ice and extract samples for testing. I look forward to the physical work, a break from the mental strain. I put on all my layers and go out onto the deck. My glaciology students are sweeping the snow with the deck broom hung up by the door. I was awake but didn't hear it fall in my cabin. I do a head count and find Oko is missing. She must have overslept or still be seasick. I

never manage to reach that liminal mental hallway between wakefulness and sleeping. I can't afford it. But sometimes I see the gleam of it in the support staff's faces a couple of weeks into our journey to the known world's end, and smile at their peaceful haze.

We sailed into a perfect quadrant of pancake ice and the captain woke me up blasting 'She Blinded Me with Science' into my cabin (I got tired of 'Ice Ice Baby'). I have instructed team one to lift whole pancakes onto the ship for study. While team two is being lowered into a pod with me to sail out. As the orange boat riffles the lenses of ice, it is tempting to dip your fingers in the water, but safety first. Hileni is on board, binoculars out, hoping to catch some of her beloved birds. So far, the blue-eyed shag has evaded her. What my best friend lacks in work ethic, she makes up for in loyalty.

The ice acts differently under a layer of snow. In fact, the far field ocean, 200m below the surface, is warmer than people think. Relatively. Thérèse, the slightly older meteorologist with broken red capillaries bringing out the wistful green of her eyes, slipped the report under my door this morning. I raced to catch her and ask for news of any potential storms. Every look she gives me denies she's gotten into the ethanol drum. "Perfect conditions. No storms predicted," she says. We'll help her on shore.

It's minus eighteen degrees today. The air is the coldest thing in the Antarctic. I watch my best student, Kehinde, forget this when his pincer tool slips and drops into the water. He whips off his glove and plunges it into the water. Reflexes can kill you on the ice. In a second, his hand is out again, being gnawed by the wind chill. Pride in his nimbleness warps into horrible pain. His fingers are already bulbous and blue. I drop the electromagnetic drill and stuff his hand under his armpit as he weeps. I send him back to the ship on the motorboat. They'll come back for us. Right now, we need to keep coring the ice that brought us all here.

We are on a freeze and melt cycle. We are under-researched. We can be grease, nilas and frazil ice. We are part of the largest natural seasonal event in the world. We feel her take us away and promise to give back to us.

Our work is done. We're sailing back home. It's party time! The chef is conjuring up a feast with more sugar, cream and carbs than we usually get. On the last trip, the Russians smuggled aboard some caviar. To say there's better funding in the global north is an understatement. Thérèse is in the sick bay with mild alcohol poisoning. Kehinde has his arm in a sling. To *gbeku* on the dancefloor you only need one hand and two vibrating hips, so he's in luck. And these are the lowest injury numbers on an expedition in two years! The insurers will be delighted. Shea is glued to the football on the flatscreen, trying to see her family in the stands. The captain is rapping, very off beat. The interns are loving it anyway. Hileni and Frans are smiling too much at each other, talking about sheathbills and Adélie penguins. I wonder where I put those relationship disclosure forms? We might need them for next year's trip. *Stop planning and have fun,* I tell myself. Before I give my homegoing speech, I step out for some air.

I look out into the dark, unable to see much. But I know in the distance is the landfast ice, and beyond it lies the land. No matter how much I love this work—the comforting sound of the ship groaning and listing, screaming into the rushing Antarctic wind that steals my voice and thins it into silence, my precious ice that must be saved—something in the human spirit always recognises the shore as salvation.