

FOLLOW THE WATER

Is Georgie
stuck on Mars
forever?

BY JENNIFER L. HOLM

ILLUSTRATION BY CHRISTOPHER B. SHORT, STOCKTREK IMAGES/GETTY IMAGES (MARS)



with a corner of his shirt. He puts them back on and says wearily, “Nana’s been diagnosed with stomach cancer.”

“She’s dying,” my mother says.

Nana was the one who taught me to swim. All those summers my parents spent at NASA, or on the International Space Station, I spent at the Jersey Shore with Nana in her sweet little yellow house looking out on the beach. Those summers were the best parts of my life. Sometimes I wish I could have lived with Nana forever.

“Your parents love you,” she always says, and I know they do, but they forget I’m here sometimes, like I’m an experiment that slipped their minds. Especially my dad. We look nothing alike, and sometimes I wonder if I’m someone else’s baby they picked up in the hospital by mistake. I mean, I’m nearly 15, and he still hasn’t figured out that I hate to be called Georgiana.

Nana knows everything about me. My dreams, my goals, my fears. Stuff I could never tell my parents. Like how I wanted to get a place on the swim team (I did), and that I was worried my folks would pressure me to become a scientist (they do), and how I wished a boy named Chen would like me (he does).

Nana is the thing I miss most from Earth. Sure, I hate the dust and not being able to take a bath or have a conversation with someone my own age, but there are days when I go crazy from the loneliness of not being able to talk to her.

4 And every time I dream of water, I dream of Nana and me together.

Two mermaids in the ocean.

I know she’d laugh at the way we live in plastic tents. “Why, you all look like hamsters,” she’d say, and she’d be right. She’s just that kind of person. She tells it like it is. **5 She’s the only person in the whole world who’s ever believed in me.**

“When are we going back?” I ask.

“We’re not,” my mom says.

“What are you talking about? We can’t leave Nana alone.” Nana is my father’s mother, and he’s an only child. We’re all she has.

“Honey,” my mom says, “the cancer spread to her lymph nodes. She’s got five months to live. We’d never make it back in time. She’ll die before we get there.”

“You don’t know that for sure! You’re just guessing,” I say.

My dad, ever the compassionate scientist, says, “Statistically, there’s only a 5 percent chance that Nana would survive longer than that.”

This is how they talk.

“Well, I don’t care. I’m going.”

“You can’t go,” my mom says. “Your last calcium test came back and”—she takes a deep breath—“you’ve lost a lot of bone density.”

“So what? I’ll drink lots of milk, OK?”

I hate milk, especially the powdered stuff we have on Mars, but I’ll do anything to get to Nana.

“You don’t understand,” my dad says. “You’ve lost 30 percent of your bone mass. No one knows what effect that will have when you

get back to Earth. Your legs could shatter from the gravity, and you may never walk again.”

“You could be in a wheelchair for the rest of your life,” my mom adds.

“Didn’t you,” I say, my voice wavering, “didn’t you know about this before you brought me here?”

My parents cast a sidelong glance at each other. It’s clear that neither of these brilliant scientists thought this one through.

“So how am I ever going to leave Mars?” I whisper.

“Why would you want to leave?” my dad says quizzically.

“Hey, brat.” I look up from my breakfast in the mess hall and see Buddy standing there holding a tray. Buddy is 21 and a Marine. Everyone here is either a scientist or in the military. His hair is short, and the skin on his face is dry and flaky. Mine is the same way. When there’s no water, it’s hard to keep your skin moist and glowing. I like Buddy. He’s funny, and he doesn’t talk to me like I’m a little kid.

He sits down and digs into his rehydrated eggs. “Dust storm’s coming,” he says.

What else is new.

I pick up a toffee candy that they leave out in bowls on the tables.

“How’s it going?” he asks.

“I’ve had better days,” I say.

“By the way, happy birthday.”

“My grandmother has cancer,” I blurt. “She’s gonna die.”

He blinks. “Whoa. That’s awful.”

I shake my head. “She’s always

been so healthy. She was an Olympic swimmer.”

“No kidding.”

I nod. “She won a gold medal. Backstroke.”

It all comes out in a painful rush. “My parents refuse to go back to Earth to see her. They say she’s going to die before they get there, and they won’t let me go because I’ve lost 30 percent of my bones, and my body could shatter or something.”

He puts down his fork, sits back. “Talk about a lousy birthday present.”

“No kidding.”

“Why did they bring you here?”

Good question.

“Maybe you should leave now, you know, before it gets worse. Have you talked to the doc?”

“No,” I say. “But it doesn’t matter. My parents won’t let me go.”

“You can always stow away,” he jokes. “Like my grandfather.”

“What do you mean?”

“My grandfather grew up on a farm, and he hated it, so he ran away and stowed away aboard a Navy ship. Ended up in Hawaii.” Buddy’s beeper goes off, and he looks down.

6 “Gotta go, brat. Talk to the doc.”

He stands, pockets a handful of toffees, and winks. “I love this stuff. Takes the taste of dust away.”

He buckles into his suit and disappears out the door.

“Nobody knows what will happen to the first adolescent to have lived on Mars, Georgiana,” the doctor says from behind his big desk.

“What’s the worst-case scenario?” I ask.

“Your leg bones will shatter from the force of Earth’s gravity, and you’ll never walk again.”

I let that sink in. “OK, what else could happen?”

He leans back in his chair, folds his hands. “Your legs would sustain massive fractures. You’d spend months in a full body cast. Best-case, you’d sustain no breaks and would only require hospitalization to build up your calcium.”

“How long would that be?”

He purses his lips, considering. “Minimum four months, I imagine, on a regimen of IV-delivered drugs. After that, you’ll still have to be careful. Physical therapy too.”

“What would you do if you were me?” I ask.

“Ah,” he says. “But I’m not you.”

And that’s when I realize I’m in this alone.

“Sweetie,” my mom says a few days later as I lay in my bunk. “We know you’re feeling down about Nana, so your dad has a birthday surprise for you. Don’t you, honey?”

“Well,” he says. “I got permission for us to take a rover!”

I roll my eyes. Just what I need. Another rock-hunting expedition.

“I’m really not up to looking at rocks,” I say.

“But we’re not going to look at rocks,” he says. “It’s even better.”

This should be good. My dad’s idea of fun is taking core samples.



4 CHARACTER

Why does Georgie associate Nana with water?

5 INFERENCE

What does this line suggest about Georgie’s relationship with her parents? What other lines provide insight into their relationship?



6 CHARACTER

Does Buddy really think Georgie is a brat? How do you know?



“I promise you’ll like it,” my mom says. “Come on.”

We are wearing our survival suits. My dad parks the rover, gets out, and starts walking, but I just stare. We are alone in the middle of Mars. It’s strange how serene it is—the horizon unbroken by buildings or trees or anything but a rolling rock-studded surface, an alien desert.

“This way,” my dad calls over his mic. “Race you to the edge!”

And then we are bounding across the landscape, and I am leaping over big boulders with an ease I could never have on Earth and it’s such a rush, this feeling coursing through me, my heart pounding, my lungs inflating, as if every cell in me is shouting—so healthy! so alive!—that it seems inconceivable that this same strong body may not support me on Earth.

I stop suddenly, my dad a step ahead. We are standing on the edge of a huge canyon, winding and wild, like something out of a movie. It is the most beautiful thing I have ever seen. It’s awesome in its rawness, like the ocean, and a strange peace steals over me.

“That,” my dad says, “is the Nirgal Vallis. We think there was once a big river there.”

“Like the Grand Canyon?” I say.

“Exactly,” my mom says.

“And see there? That red flag?”

My dad points to a stretch of cliff where a little red flag waves merrily.

“Uh-huh.”

He clears his throat importantly.

“That is where I found a downward smear of water-soluble mineral deposits in a core sample.” He draws the moment out. “I figure we drill 400 meters down, and we’ll hit water,” he says with a wink.

“Really?” I can’t keep the excitement out of my voice.

“Really,” my mom says, smiling at my dad proudly.

“Does anybody know yet?” I ask.

“No. We won’t announce it until we know for sure,” my dad says.

I stare at my dad. “But how do you know you’ll find water, Dad? I mean, how can you know for sure?”

7 And then he says something that shocks me.

“Nothing’s ever certain, Georgiana,” my dad, the scientist, says. His voice crackles over the mic. “You just have to have hope.”

I am bobbing in the ocean, my wet hair plastered on my face, the scent of salt in the air. I turn and there is Nana beside me.

“Nana,” I cry, hugging her sturdy body, comforting like Christmas.

“I’ve missed you.”

“I’ve missed you too, Georgie,” she says.

“You don’t look like you’re dying.”

“Dying? I’m healthy as a horse!”

Her cheeks are ruddy, her skin is flush with good health, even her eyes are shining.

“I want to do something,” I say.

“But I’m scared.”

“You can do whatever you want to do,” she says. “You always could.”

“I want to come home,” I say simply. “And be with you.”

“But Georgie,” she says, her eyes twinkling, “you’re already home.”

Then I wake up in the plastic cabin and hear the storm raging outside and I can’t help myself.

I just cry.

Buddy sidles up to me in the mess hall with a tray of food.

“You been crying, brat?”

I glare at him.

“Did you see the doc?” he presses.

“Yeah. Great news. Best-case scenario I have to be in a hospital for four months. Worst-case, I’m crippled for life.” I swallow hard.

“And Nana’s all alone,” I whisper.

He clears his throat. “My grandfather died from cancer too. They gave him three months to live. Know how long he lasted?”

“How long?” I whisper, hope lodged in my throat.

“A whole year.”

I’d settle for a week with Nana.

His beeper goes off and he groans. “Shuttle just got in.”

“Shuttle?”

“Supply shuttle. I’m helping unload it. It’s dropping off supplies, then heading back to Earth in the morning.” He stands abruptly.

The dust storm roars outside, but the only thing I hear is that one little word: Earth.

I grab his wrist. “Maybe I could bring you coffee in the morning. You know, over at the shuttle,” I say casually, looking him straight in the eye, willing him to hear me.

Buddy unwraps a toffee, sticks it in his mouth, chews for a moment, and stares at me.

“Sure,” he says finally. “How about at oh-seven-hundred?”

8 Over his shoulder, I see my parents enter the cafeteria, holding hands and laughing, and something inside me goes still. Suddenly,

all these little things seem so important—this candy, those smiles, these two strong legs. How can I possibly give this up?

Buddy sees where I’m looking.

“You sure you know what you’re doing?” he asks.

“Nothing’s ever certain,” I say, and I know that I am my father’s daughter after all. “You just have to have hope.”

The next morning when I wake up, my parents are getting ready to head out.

“We’re going out with the Alpha team to Nirgal Vallis. We won’t be back until late tonight,” my mom says excitedly. “This is it, Georgie.” Her face is one big grin. “You’ll have your very own pool in no time. We’re finding water today.”

“I know you will,” I say, and can’t help but think how ironic it is that I’m leaving this planet just when it’s getting good. Still, I hug her hard.

“I love you, Mom.”

My dad’s almost out the door when I stop him. I hug him hard too. He’s startled.

“Good luck,” I say.

And then they are gone.

Buddy is waiting when I bring the thermos of coffee. He’s the only one there.

“Hey, brat,” he says.

“Hey, Buddy,” I blush, holding my duffel.

“The closet in the back is cleared out for you. Door’s open. There’s a blanket and some other stuff too.”

“Here,” I say, and give him my dog-eared copy of *Red Mars*.

He raises a curious eyebrow.

“It’s this book,” I say, “about the first colonists on Mars.”

He laughs. “Does he get it right?”

I smile back. “Sort of. Although I kind of like his version better.”

I hesitate for a moment, stare down at my legs.

He pats my cheek. “You’ll be fine. Just have them hook you up in the same hospital as your grandmother. That way you can be together.”

“Thanks,” I whisper.

“You’d better go, brat. The captain’s finishing breakfast now.” He gives me a goofy grin. “And hey, take a swim for me, OK?”

“Only if you take one for me.”

“What?” he asks.

I smile mysteriously. **9 He’ll know what I mean soon enough.**

As the engines roar to life, I settle back and close my eyes, imagining Mars disappearing behind me **10 and all that blue water ahead.** A whole world of it. And there, in the middle of it all, Nana.

I can almost hear her voice.

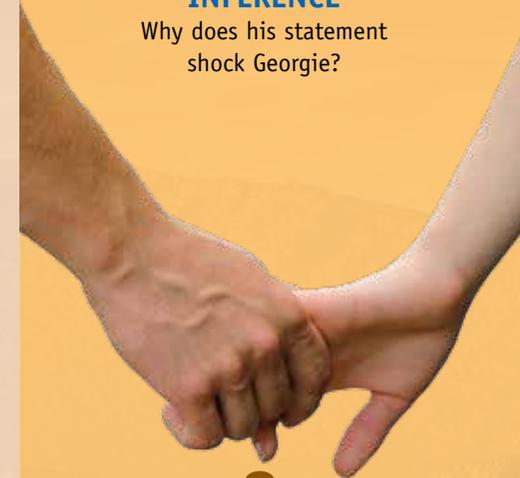
“Georgie,” she will say. “It’s heaven to be here with you.”

They should be finding my note right about now, I figure. ●



7 INFERENCE

Why does his statement shock Georgie?



8

FIGURATIVE LANGUAGE

What does Georgie mean when she says “something inside me goes still”?

9

INFERENCE

What *does* she mean?



10

TEXT FEATURE

Explain what the title of the story means. To what does it refer?



What Would It Take to Live Here?

Six challenges that must be solved before humans can move to Mars **BY MACKENZIE CARRO**



Colonizing Mars would be a pretty big undertaking. It isn't exactly a **hospitable** place, with its intense dust storms, **barren** landscape, and total lack of breathable air.

But for the past 50 years, scientists have been sending robots and rovers to Mars to collect information about its environment. That information has led some scientists to a thrilling conclusion: Sustaining human life on Mars may be possible.

So what is standing in our way?

1 Getting There

Mars is about 140 million miles from Earth. We



don't have the technology to take people that deep into space. The farthest humans have traveled is to the moon, which is only about

250,000 miles away. But according to NASA, after engineers finish constructing what will be the most powerful rocket ever built, the ability to explore deep space will be within our reach. Named the Space Launch System, the superfast rocket could get humans to Mars in about nine months!

A trip that long would require a fully stocked spacecraft: food (freeze-dried chicken, anyone?), water, and a lot of fuel. Colonists would need a decent amount of living space too; they would be on board for nearly a year, after all.

SHUTTERSTOCK (MARS, HOUSE); ISTOCK/GETTY IMAGES (ROCKET)

2 Deadly Radiation

Mars colonists would live in deep space longer than anyone ever has. No one is quite sure what that would do to the human body—but radiation would definitely be a problem. Invisible to the naked eye, radiation is made of high-energy particles that are speeding around space at all times.

Here on Earth, we're protected by our planet's **magnetic field**. In space, however, we'd be exposed. The effects of radiation exposure could include severe memory loss, brain damage, and cancer. Colonists would need some sort of shielding on the journey to Mars and once they get there.



3 Food and Air

Mars lacks two important elements: food and oxygen. (OK, two *really* important elements.)

Shipping food and breathable air from Earth would be much too slow and expensive, so colonists would need to make their own. NASA has already developed a way



ISTOCK/GETTY IMAGES (STAR); RENEE COMET/ISTOCK/FOOD/GETTY IMAGES (APPLE); SHUTTERSTOCK (WATER, ASTRONAUT); SERGIY GODOVANUK/HEMERA/GETTY IMAGES (THERMOMETER)

to produce oxygen from water, which could be used to provide air for the indoors. As for food, Mars's thin atmosphere and lack of strong sunlight are two of many reasons gardening would be difficult. Crops would need to be grown in special **greenhouses**.

4 Water

The good news is that Mars has water. In fact, the planet was once covered with it. The bad news is that most of that water is frozen underground and likely contains toxic chemicals. Scientists aren't sure how the water could be harvested and **purified** to make it safe to drink. Most likely, colonists would rely on recycled water, at least at first. And yes, that would mean drinking purified urine.



5 Gravity

Mars is smaller than Earth, which means it has less gravity. This low gravity would enable humans to jump higher and run faster. Over time, however, it would be harmful.



We have already observed

what happens to astronauts in a low-gravity environment aboard the International Space Station (ISS): weakened immune systems, extreme **fatigue**, and substantial muscle and bone loss.

Most astronauts stay on the ISS for only four to six months at a time. What would happen to colonists living long-term on Mars?

6 Weather

Mars is really, *really* chilly. Though Mars gets to a **balmy** 70 degrees near its equator during the summer, most of the time it's deathly cold. The average temperature is -81 degrees Fahrenheit. Colonists would need special spacesuits and houses to keep them from freezing.

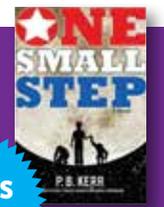
Then there are the dust storms.

These storms kick up lots of thin, sticky dust that could damage equipment and, if a storm were large enough, block out the sun for days. This would be quite problematic if colonists were to use solar panels—equipment that turns sunlight into energy—to power their colony. ●



WRITING CONTEST

Explain how Jennifer L. Holm draws on scientific information in her story "Follow the Water." Include details from the story as well as from "What Would It Take to Live Here?" to support your ideas. Send your essay to **MARS CONTEST**. Five winners will each get *One Small Step* by P.B. Kerr. See page 2 for details.



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