

an interesting backdrop for a love story became the beginning of me understanding my place in the world.

You see, once you start observing the night sky, you begin to orient yourself in time and space. You learn, for instance, that in the Northern Hemisphere, if you can spot Orion's belt, it's winter. You can learn to get a general idea of what time it is by where the constellation Cassiopeia is in relation to the star Polaris. My favorite thing I learned? If you can spot the stars Altair, Deneb, and Vega during the summer, you will see that they form a triangle. And that triangle always points south. If you are ever lost, you can find those three and know which way to go.

Something about that always seems to cure whatever ails me when my daughter and I walk out into the night. I know some of it is simply the joy of spending time with her and perhaps the thrill of new knowledge. But I think it is also the relief I feel that those stars are *immovable*.

Nothing you or I could do will ever alter them. They are so much bigger than us. And they will not change within our lifetime. We can succeed or fail, get it right or get it wrong, love and lose the ones we love, and still the Summer Triangle will point south. And in that way, I know everything will be some type of okay—as impossible as that can seem sometimes.

I hope, very much, that you enjoy this story. But I hope, even more, that Joan Goodwin can convince you to go outside tonight, after the stars have come out, and *look up*. I hope, with all my heart, Joan can convince you to be open to wonder.

—Taylor Jenkins Reid

Atmosphere

DECEMBER 29, 1984

JOAN GOODWIN GETS TO THE JOHNSON SPACE CENTER WELL BEFORE nine, and Houston is already airless and muggy. Joan can feel the sweat collecting along her hairline as she walks across the campus to the Mission Control building. She knows it's the heat. But she also knows that's not all it is.

Her job today is one of her favorite parts of being an astronaut. She is CAPCOM on the Orion Flight Team for STS-LR9, the third flight of the shuttle *Navigator*.

The role of CAPCOM—the only person in Mission Control who speaks directly to the crew on the shuttle—is one of many that astronauts fill when they aren't on a mission.

This is something Joan often has to explain to people at the rare party she agrees to go to. That astronauts train to go up into space, yes. But they also help design the tools and experiments, test out food, prep the shuttle, educate students on what NASA can do, advocate for space travel in Washington, talk to the press, and more. It's an exhausting list.

Being an astronaut is not just about getting up there. It is about being a member of the team that gets the crew up there.

Plus, Joan has already been. She has, in her nightstand at home, that elusive talisman that every astronaut aches for: the gold pin. Evidence that she was one of the chosen few humans who have ever left this planet.

She has seen the spectacular shimmering blue of the seven oceans from two hundred miles away. *Cerulean?* *Cobalt?* *Ultramarine?* There was no shade vivid enough that she could name. Ninety-nine point nine percent of human beings who have ever lived have never seen that blue. And she has.

But now she is home, both feet on solid ground, and she has a job to do.

So when Joan walks into the Mission Control building that morning with a black coffee in her hand, she is at ease. She is not anxious or terrified or heartbroken.

All of that will come later.

JOAN ENTERS THE MISSION CONTROL room through the theater. She watches for a moment as the crew from the last shift prepares two of the mission specialists for their spacewalk.

Her boss—the flight director of Orion Flight, Jack Katowski—is down on the floor already, getting debriefed by the previous flight director.

Jack has a crew cut, graying temples, and a reputation for being *particularly stoic*, even in an organization known for its stoicism.

Still, he's long supported Joan in her role as CAPCOM. And they make a good team. That is something Joan prides herself on. That she is an excellent team player.

Especially with the crew on STS-LR9, which is composed almost entirely of astronauts from her class.

Commander Steve Hagen had been one of their instructors, but the rest of the crew—pilot Hank Redmond and mission specialists John Griffin, Lydia Danes, and Vanessa Ford—are the people Joan's come up with, trained with, learned how to do this job alongside.

They are more than just her friends; some of them are her family. And her complicated histories with each of them are part of what is going to make her the exact CAPCOM they need today, but also the very last person who should have to do the job.

The shuttle's mission is to launch the Arch-6, an Earth observation satellite for the U.S. Navy. However, yesterday, on day two of the flight, as the team prepared to deploy the Arch-6, the payload retention latches would not release.

This morning, they have been preparing Vanessa Ford and John Griffin for a spacewalk, so they can go into the payload bay and release the latches manually.

Joan joins the team in the flight control center. She waves good morning to Ray Stone, the flight surgeon, and nods at Greg Ullman, also known as EECOM—electrical, environmental, and consumables management.

The previous CAPCOM, Isaac Williams, reads her in, updating her on the telemetry and timeline. Ford and Griff are in their space suits. Their pre-breathe will be completed in six minutes.

Isaac leaves, and Joan takes her place at the console.

Jack gets on the flight loop—as do Joan, Ray, Greg, and the rest of the Orion Flight Team, which is made up of twenty members, each at their own stations on the floor, with a team of people in other rooms supporting them.

Ford and Griff complete the pre-breathe and get into the airlock, waiting for it to complete depressurization so that they can be ready to function within space.

The flight deck and the mid-deck—where the astronauts live and work on the shuttle—are pressurized to mimic the atmosphere on Earth's surface. But the payload bay—where the satellites are held until they are deployed—is not. It is exposed to the vacuum of space. Which means if Ford and Griff were to enter it without their space suits, all of the oxygen would be sucked out of their lungs and bloodstream instantly, causing them to pass out within fifteen seconds and be dead within two minutes.

The human body—intelligent as it is—was formed in response to the atmosphere of Earth.

It would be easy to make the case that humans are ill-equipped to be in space. *Whatever led to our design, it was not meant for this.* But Joan sees it as the exact opposite.

Human intelligence and curiosity, our persistence and resilience, our capacity for long-term planning, and our ability to collaborate have led the human race here.

In Joan's estimation, we are not ill-suited at all. We are exactly who should be out there. We are the only intelligent life-form that we know of in our galaxy who has become aware of the universe and worked to understand it.

We are so determined to learn what lies beyond our grasp that we have figured out how to ride a rocket out of the atmosphere. A thrilling ability that seems ripe to attract cowboys, but is best done by people like her. Nerds.

Everything about space exploration is about preparedness over impulsivity, calmness over boldness. For such an adventurous job, it can be achingly routine. All risks are carefully managed; no corners are cut. There are no cowboys here.

This is how NASA keeps everyone safe. Predictable models, prepared for every scenario.

When the airlock completes depressurization, Jack gives Joan the go-ahead and Joan punches in on the shuttle loop.

And now Joan is aware of her own breath, her own heart rate. Not because she is afraid of what this mission entails—there is no logical reason to be afraid yet—but because she gets nervous every time she talks to Vanessa Ford.

"Navigator, this is Houston," Joan says.

"Houston, we read you," Steve Hagen says.

Hank Redmond chimes in with his gruff Texan accent: "Good mornin', Goodwin."

"Exciting day today," Lydia Danes says.

"Indeed it is," Joan responds. "With a lot on the agenda, which is

why I am happy to tell you, Griff and Ford, that you are cleared for the spacewalk."

"Roger that," Ford says.

"Yes, roger that, Goodwin," Griff says. "Nice to hear your voice."

These are the last forty-five minutes *before*.

VANESSA FORD HAS HAD BIOMEDICAL SENSORS ALL OVER HER BODY FOR hours. They have been sending her vitals down to the flight surgeon, who monitors every breath she takes. But even well before the electrodes were placed on her body, Vanessa has been aware that someone on the ground is always watching.

Mission Control knows everything that happens on the shuttle—every temperature, every coordinate, the status of every switch. Everywhere Vanessa turns, there is Houston, hearing and sensing everything around her.

This does not seem to bother anyone else on the crew as much as it bothers her. But knowing that everyone can see her heart rate—that they can see how her body reacts every time Houston speaks up—makes her feel like she has nowhere to hide.

"Nice to hear your voice, too, Griff," Joan says. "Good start to the day here."

She can hear Joan smiling. She can hear it in the lilt of her voice.

Vanessa reaches out and puts her gloved hands on the airlock hatch to the payload bay. She feels a vibration in her chest. With the payload bay doors already open, this is all that stands between her and space.

There's no data on the airlock hatch. It is one of the few things on the shuttle that doesn't send its own signal. Which means one of them has to notify Houston that they are about to open it.

Vanessa looks at Griff. She's glad she's doing this alongside him. She's always liked him. Not just because they are both from New England, although it helps.

"Houston, we are opening the airlock," Griff says.

Vanessa begins to open the hatch. She tries to keep her heart rate steady. She's been working toward this moment for five years, dreaming of it most of her life.

Space.

She and Griff both inhale when they can see through the hatch.

They've looked through the window, but nothing quite prepares them for the sight of it now.

Vanessa's mind goes blank. There are bright lights from the ship, but beyond that everything is black. There is no horizon, only the edge of *Navigator* and then nothingness with the brilliant colors of Earth in the distance.

"Wow," Vanessa says. She looks to Griff. He's lost in the vision of it himself.

She lets go of the ship and moves through the hatch, to take her first step into space. Her legs feel steady as she wades into the darkness. Her eyes widen at the intensity of it, a void unlike anything she's ever seen.

She looks up, past the payload bay doors, to see Earth in the distance. Clouds streak across the deserts of North Africa. For a moment, Vanessa stops and looks at the Indian Ocean.

For so long, she has loved to be above the clouds. But to be this far above them knocks her breath from her chest.

"My God," Griff says.

Vanessa turns toward him. They are both tethered to the ship, and Griff pushes away.

She follows, headed straight for the payload. The view is spectacular, but the real reason she's here is because she wants nothing more than to tinker with a machine two hundred and eighteen miles above Earth's atmosphere.

They get to the payload, and each takes their position. There are four latches, two on each side of the satellite.

"Take it slow, Ford," Griff says. "I'm going to be very upset if we set the record for the shortest spacewalk."

"There's not really much time we can milk out of this," she says. "It's just releasing a few clamps. But all right."

Using a socket wrench, Vanessa cranks open one of the latches on her side, then moves to the other. Once her second latch is open, she waits a brief moment for Griff to get his second one released, too.

When he's done, he sighs. "Houston, the clamps have been released, in no small part thanks to the brilliantly efficient Vanessa Ford."

"Copy that, *Navigator*. Good job," Joan says. And then, after a moment: "*Navigator*, we've got hours left on these suits, so better to keep you in the airlock as we deploy, in case we need you again."

"Awww," Griff says. "Now you're just being nice."

"Well," Joan says, "we've got a soft spot for you down here."

"Back at ya, Houston," he says. "Roger that. Ford and I will stay in the airlock."

They float back. Griff lets Vanessa in first and then joins her. He goes to shut the hatch. But then he stops and looks at Vanessa. He lifts his eyebrows.

Protocol is to close that hatch. But if they leave it open, they will be able to watch the satellite deploy.

Vanessa does not want to lie to Houston. Still, a smile escapes from her.

Griff smiles back and takes his hand off the hatch. He does not close it.

"Houston, we are in the airlock," he says.

They both turn their attention to the open hatch. They watch as the tilt table is raised into position to release the satellite.

"Houston, we are happy with the degree of the sat," Vanessa can hear Steve say.

She thinks about their last night before the mission, when they were quarantined at Cape Canaveral. Steve had spent an hour on the phone with Helene. Hank was annoyed because he'd been waiting to call Donna. But Steve had just stood there, leaning against the kitchen counter, making jokes with his wife, his bright blue eyes crin-

ling as he laughed. Vanessa had listened more than she probably should have. It seemed so easy for Steve to be both sides of himself at the same time—the man he is on the ground and the commander he has to be up here. For her, those two roles have always been in conflict. "Are we cleared to deploy?"

"Affirmative, *Navigator*," Joan says. "You are cleared to deploy."

Lydia is on the remote manipulator system, the RMS. She will release the satellite.

"Roger that, Houston," Lydia says. "Preparing to deploy."

"Copy that, *Navigator*."

There are two explosive cords holding the Arch-6 in the payload bay. Vanessa and Griff watch as one is detonated according to plan.

But then, swiftly, the second cord explodes in a flash unlike anything Vanessa has ever seen before. It looks nothing like their simulations. The explosions tear the metal bands around the satellite into pieces. Debris goes flying in every direction.

Vanessa cannot tell what has happened. All she can see is the flash of metal, and then a grunt comes out of Griff, like the air has been knocked out of his lungs.

She turns to see a gash below the waist ring in his suit. Within seconds, the exposure will kill him. He puts his hand on his suit to cover the hole.

"I'm okay," he says to her. They both know that his hand on his suit is enough to save him for now. But his voice is a rocky, thin whisper, as if he has spent all of his breath.

Then an alarm begins to sound, one that Vanessa recognizes but cannot place. And it is only once Steve, Hank, and Lydia all begin to shout that she understands there has been a second hit.

AS THE ALARM RINGS, JOAN BREATHES DEEPLY, TRYING TO THINK clearly. When Greg stands up, her stomach falls.

"Flight, this is EECOM. We are seeing a negative dP/dT. Pressure is dropping rapidly."

Jack: "What are we at?"

Before Greg can answer, Hank's voice comes through the loop, level but sharp: "Houston, this is *Navigator*. We have a cabin leak. We can feel the rapid depress."

"Copy that, *Navigator*," Joan says. She keeps her voice calm, but this is a choice she has to make. She looks to Jack.

Jack turns to her, eyes focused. "Tell them they have a hole. Judging from the depressure rate, it could be as big as half an inch. It's punctured the skin somewhere on that aft wall, most likely—mid-deck or flight deck. Do they have a visual?"

Joan relays.

"Negative, Houston," Hank says. "We see no hole."

Jack: "Tell them to pull everything off the walls, lockers, close-out panels, anything they can get off to expose the skin—pull it all off!"

"Roger that," Joan says.

Jack continues: "Keep Ford and Griff in the airlock but start pressurizing as quick as possible. Tell *Navigator* they need to flow in oxygen and open up nitrogen systems 1 and 2 to the cabin to feed the leak until we find that hole!"

Joan updates the crew. Clear, concise, calm. *This is NASA. We have a plan for this.*

"Roger that," Hank says as the crew gets to work. "Already on it."

Greg: "Flight, EECOM—we aren't seeing a positive change in the leak rate. Pressure is still dropping."

Joan knows that Hank is the one most likely feeding the oxygen and nitrogen while Steve and Lydia are pulling everything off the walls—the layers of wires, the sleeping bags—as fast as they can. There is so much lining the limited space of the orbiter, and they are tearing it all away, looking for that hole. Each second that goes by stuns her.

She looks at Jack. But Jack is looking at Greg.

"It's not in the aft of the flight deck!" Steve says.

"I'm pulling the lockers off the mid-deck!" Lydia calls.

Greg looks up at Jack and shakes his head.

Jack slams his hand onto the top of the console and looks at Sean Gutterson, who is in charge of the mechanical systems. "RMU, what do you have? What are they not seeing? I need something! We have seconds!"

Everyone is up out of their seats. Joan can barely hear herself think.

She has been through simulations like this, with the pressure dropping rapidly and no way to stabilize it.

They have ended only when the leak is found.

Or the crew dies.

This is NASA. We have a plan for this.