

## CATCHING RAYS

By James Van Pelt

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WENDY stood on tiptoe on the edge of the chair to adjust another mirror in the corner of her room, squinting her sea-green eyes to aim it. “Lots of scientific discoveries happen by accident.”

Her best friend, Rupert, lay on the bed reading *Sky and Telescope*. There were articles on the Mars colony and Earth-like planets the new star probes had discovered. A little box filled with computer disks sat next to him. “Uh huh,” he said. He turned another page. “So, are you setting up a discovery or an accident?”

Wendy looked at him keenly, but he didn’t appear to be laughing. She said, “This experiment may get me a spot on the colony ship. Besides, not everything we learn is on purpose. Look at Newton.”

The next mirror hung above Wendy’s favorite star colony recruitment poster. A family, their faces glowing with hope, stood on a hill overlooking a valley filled with alien trees and weird animals. The sign underneath read, “Only the best will go.”

Rupert rolled over and held the magazine above him. He said, “An apple hit Newton on the head.”

“There you go, and that started his theories about gravity. Doctors weren’t looking for penicillin when they found it. Some mold grew on a petri dish. Same with X rays and the quantum space drive. So a scientist has to keep her eyes open, otherwise she’ll miss the happy accidents.”

“What are you trying to prove here? Is this another one of your light projects? I don’t get this fascination with light.” He eyed the mirrors scattered throughout the room. Wendy had stuck them on the walls, ceiling, and furniture.

She concentrated on the last mirror. The tape didn’t hold well, and it slipped. She said, “I’m going to demonstrate that light loses intensity when it’s reflected. And, yes,

this is one of my light projects. You love astronomy... I don't see that investigating light is any different."

Rupert put the magazine down. "The first colony starships are going to need astronomers. I figure I have a better chance of going if I get a head start now. There aren't going to be any sixth graders next year in the whole world who know more than I do about the galaxy, I can tell you that. So studying the stars makes sense. They'll have to choose me. You're just puttering around here." He looked at the now completed mirror arrangement. "Although it's pretty cool puttering."

Wendy said, "Experimental science is the basis for new knowledge. Who knows what they'll find on the new worlds? They'll need 'putterers' like me. I think they'll take kids on the trip based on their scientific potential. Not on whether they've memorized a lot of star names." She grinned at him. "Now, are you going to help? I'm about ready." Wendy crossed to her desk where she had set up a laser pointer on a work stand.

"As long as I get to use your mom's computer afterwards. I've got the latest pictures from my telescope, and I need to see how they turned out. So what's your plan?" Rupert asked.

Wendy checked the laser's alignment. "I'm going to turn on the laser. The light will go from here to the first mirror..." She pointed to a corner where a mirror hung over a poster of a rainbow. "...where it will be reflected to that mirror." She shifted her finger to a second mirror on her headboard. "To that mirror, to that one, to that one, to that one, to that one, and so on until it ends up here, on this piece of paper." She pointed to a bull's-eye drawn on a notepad on her desk. "Along the way, I'll measure how much weaker the light grows with each reflection."

"How will you do that?" Rupert scratched his chin.

"Visually. That's where you come in. When I tell you to, turn on the fan on my dresser. It will blow across that tray full of flour. Then I'll be able see the laser's path."

Rupert shook his head doubtfully. "OK. It'll be like a light show, right?"

"Well, this is just a crude demonstration. By the time the science fair comes around, I'll have something more impressive."

Rupert smiled. "Like last year when your display melted?"

“Are you going to keep bringing that up?” Wendy said as she flicked the laser on, and a bright, red spot appeared in the bull’s-eye. She paused dramatically. “Turn on the fan.”

Rupert flipped the switch. The fan kicked into life much harder than Wendy had expected. She’d imagined a faint, white cloud, cut by glittering strings of ruby laser light. Instead, flour exploded from the tray in a choking fog.

“Argh! Turn it off!” Wendy squeezed her eyes shut, but it was too late. The first spray caught her full in the face.

“I...can’t...find it,” said Rupert. Wendy couldn’t tell if he was laughing or coughing. She staggered toward the fan’s sound, banging her shin against a stool she didn’t remember putting in the middle of the room. Rupert stumbled into her. He was definitely laughing.

He said, “HOOOOO. HOOOO! I’m a foghorn. Watch out for the reef!”

After she turned the fan off, it took some time for the flour to settle. They retreated to the hall. When she saw Rupert, she started giggling. Flour coated him from head to toe. His eyes blinked out at her like two dark marbles on a snow field. He shook his head, flinging white powder everywhere.

“What will you tell your mom?” said Rupert.

Wendy looked at the base of her closed bedroom door, where a haze of flour had drifted out. “I’ll say it was a scientific accident. You should see your clothes! How will you explain this when you get home?”

Rupert said, “I’ll tell them I was here. They’ll understand. Now can we look at my pictures?” He held up his box of computer disks, also covered with flour.

After going outside to brush off most of the flour, they went into the office to use the computer. Rupert had been working on his science fair project for six months, a wall map of the night sky. He’d taken pictures with a digital camera through his telescope, then used the computer to print the images after he labeled the stars. Wendy’s mom had the best printer in the neighborhood.

Rupert said, “I took new pictures of the stars north of the Little Dipper. I thought last week’s were hazy. We need to compare.”

Wendy wiped flour from each disk carefully until she found the two latest ones. She put the first disk in the computer and a scattering of stars appeared on the screen.

“Is this the right one?” She didn’t know the night sky as well as Rupert, and, to her, one set of stars looked pretty much the same as any other.

Rupert concentrated on the image. “Yes. Those brighter stars there and there are part of the constellation, Cassiopeia, on the northern horizon. See, if you connect them they look like the letter ‘W.’ That’s the direction the first star probes went, the ones that didn’t report back. The successful ones went toward Scorpius on the southern horizon.”

“You’re showing off,” said Wendy, as she adjusted the image to make it clearer.

He didn’t say anything, so she knew she was right. “OK, now I’ll switch to this week’s picture.” A new picture flicked on the screen. “Looks the same,” she said.

“Here, let me see,” said Rupert. He took the chair and hit the button that changed from one image to the next. “No, this one definitely isn’t as good.” The old picture and the new picture swapped places several times. Wendy still could see no difference. Rupert flipped them back and forth quickly.

Wendy sat up suddenly. “Do that again!”

“What?” Rupert rested his fingers on the keys.

“Switch them fast.” She leaned closer to the computer monitor.

The pictures flicked one to the other.

“Stars aren’t supposed to move, are they?” she said.

“What?” Rupert stared at her.

“That star changes position from this picture to the next. Look!” She put her finger on a crisp spot on the screen, then hit the key that switched to the other picture. The spot had moved about a centimeter.

“Wow!” said Rupert. “Let’s see what star that is.” He changed to the astronomy program on the computer and looked up that section of the sky. “Double wow! There isn’t supposed to be a star there at all. I’ve found something!”

“I found it,” said Wendy.

Rupert went on, his face glowing with excitement. “They’ll name it after me. I’ll be famous! I’ll bet it’s a comet. Rupert’s Comet. I like the sound of that. They’ll have to take me on the starship if I found a comet. No other sixth grader has ever done that, I’ll bet.”

Wendy said, “I spotted it first.”

He grabbed her hand and shook it. “Oh, of course you did. It’ll be the Rupert-Wendy Comet. We’ll both be famous!” Rupert jumped around the room, shedding floury puffs.

Wendy stayed in front of the computer, thinking. “Are you sure it’s a comet? We need to be scientific about this.”

“What do you mean? Naturally, it’s a comet. What else could it be?” Rupert sat in his chair, raising another small cloud.

“We don’t want to tell everyone we found a comet when that might not be what it is. We’d look like silly kids. For example, do you know if it’s coming toward us or going away?”

Rupert leaned back, still excited. He drummed his fingers on the desk. “It’s new, so it must be coming toward us.”

Wendy nodded. “That’s good thinking. Let’s test it another way, though. Here’s last week’s image.” She pointed to the screen. “Now, I’ll darken it until the new object disappears.” A tiny control bar appeared on the screen, and she used it to dim the image until they couldn’t see the new spot. The control button was turned halfway down. “We’ll do the same with the fresh picture.” This time the new spot didn’t disappear until the control button was three-quarters turned down. “See, the star is brighter, so that means you’re right. It’s coming closer. How else can we test that it’s a comet? What’s a comet look like through a telescope?”

Rupert closed his eyes as if he were reading from an astronomy book in his head. “A comet is a ball of icy rock. When it gets close to the sun, the ice starts to boil off and makes the trail behind it. Since my telescope is pretty small, this comet should be close. It would be fuzzy in the picture because the sun would be melting it.”

“Uh huh,” said Wendy. She increased the magnification so they saw less of the sky, and could concentrate on their mystery spot. It shone on the screen like a tiny diamond, clear and bright and not fuzzy at all.

Wendy looked at the image for a while, running possibilities through her head. Finally she said, “It’s darned bright. Look, it’s brighter than half the stars on the screen. If it’s not a comet, then it’s either very shiny, like a mirror, or very big, or very close. Is your telescope set up?”

Rupert nodded.

“OK. I’ll grab some equipment from my lab...”

“Your ‘lab’ is your bedroom,” said Rupert.

“When I’m doing an experiment, it’s my lab. And that’s not the point anyway. I’ll meet you in your backyard. Better brush the rest of that flour off before you go into your house or your dad will kill me. No! No! Not in here! Wait until you’re outside.”

When Wendy reached Rupert’s backyard, he’d already aimed the telescope toward the northern horizon. Stars glittered like fiery sand scattered on black cloth. There was no moon or clouds. Perfect conditions for star gazing.

“What’s that?” asked Rupert doubtfully.

On the grass, Wendy unpacked a small box containing a battery pack and a complicated-looking device. “This is a spectrometer. It’s a machine that can tell you what something is made of by the light it makes when it burns. Like a lit candle will produce a different kind of light than if you burn a piece of paper. The spectrometer can measure the difference. Scientists use much better ones than this to decide what kind of chemicals are in stuff. They’ll burn a sample and the spectrometer will look at the flame. See, I told you my ‘puttering around’ with light would be useful. I just didn’t know it would be this soon.” She attached the spectrometer to the telescope.

“What kind of kid owns a spectrometer?” said Rupert.

Wendy grinned in the dark. “One who doesn’t spend her allowance on stuff like music videos and junk food, and who’s going to be on the first colony starship, that’s who.”

“So, what do you think you can find out by looking at the light?” Rupert held the telescope steady while she checked the spectrometer.

“Let’s be scientific about it. How come we can see the mystery spot?” asked Wendy.

“Same reason we see the moon and planets,” said Rupert promptly. “It reflects the sun’s light.”

“That’s one way,” she said as she switched on the spectrometer. A tiny screen glowed on its top. “If the mystery spot is reflecting the sun, I’ll know because the reflected light will be similar to sunlight. You can tell some things about the sun by looking at the light that bounces off the moon. Are you sure we’re pointed at our target?”

Rupert checked the telescope's aim through a smaller telescope mounted on its barrel. "Yes, right on it."

Wendy stayed hunched over the spectrometer for a long time. A summer breeze moved through the trees behind them. She looked at the numbers on the small screen, growing more and more excited. Her cheeks warmed as she realized what she had suspected was true. "It's not reflecting the sun. It's making its own light," she said.

"What is it then?" Rupert's voice sounded small in the outdoors. He sounded a little frightened.

"I think it's a spaceship, Rupert. A really big one. I think we're looking at a space ship slowing down as it's coming toward us, and its engines are on."

Rupert glanced up at the sky, to the tiny star in Cassiopeia that wasn't supposed to be there. "We don't have any space ships in that direction. That's where we sent the probes that didn't come back."

Wendy sat on the grass and gazed at the new star. "Exactly. I think our probes reached somebody, though. I think some aliens are coming for a visit!"

WENDY and Rupert's discovery caused a lot of excitement. Thousands of scientists pointed their telescopes toward Cassiopeia. They sent messages to the travelers coming to Earth and found out that they were as curious about us as we were about them.

In the excitement, the two friends almost forgot about the colony starships, and if they would be able to go, until they both received letters saying that other children had been chosen.

Their disappointment didn't last long, though. On the same day, a man came to Wendy's house to talk with Wendy and Rupert and their parents. He was a small man with lots of gray hair, but he laughed a lot and soon made everyone feel relaxed.

He introduced himself as the chief coordinator of a new space mission. "The alien ship is designed to travel between the stars, not land on planets, so we've decided to send our best people into space to welcome our new, alien friends. They said they would like to know all of us: scientists, artists, teachers, and traders. They also want to meet our children. The committee has chosen you two to go as our representatives."

Wendy and Rupert looked at each other, but they didn't speak.

The man said, "Will you go? We think that you have earned the right because you made the important discovery."

Wendy grinned and said, "Oh, it was just an accident."

Rupert smiled too and said, "A scientific accident."

Wendy laughed. She was so excited that she could hardly sit still. They were going!  
"All we did was keep our eyes open."