

ERNESTINE

Octavia Cade

Octavia Cade is a New Zealand author with a PhD in science communication. She wrote this story in Ernest Rutherford's den, when she was an artist in residence at the Christchurch Arts Centre. This isn't the first time she's written about NZ's most famous scientist. Rutherford's life and research also inspired her speculative story "The Ghost of Matter," which is about splitting the atom. That tale won the Sir Julius Vogel award for best 2015 novella. It's available from Paper Road Press.

Ernestine couldn't understand why the only adult left who would help her was dead. There had been fewer of them around, strangers disappearing in the streets. Her neighbors, her mum. It wasn't that they ran away, exactly. It's just that they were no longer there. The last person she'd seen alive over the age of eighteen had been a cashier at the supermarket—and why he was there she didn't know, except perhaps it was for the same reason that she was still going to the cashier at the supermarket instead of stealing food. An attempt to retain some sort of normality in a world grown stranger every day. He had disappeared somewhere between her putting a tin of baked beans by the till and her reaching into her basket for what was left of the oranges. There'd been a warm puff of wind, a gentle exhalation, and she'd looked up to see his clothes settling into his seat, and onto the counter, except there was no one inside them anymore.

She'd poked the clothes, and they were still warm. She would have tried on the shoes but they were twice as long as her own foot, and besides, there wasn't anyone in the shoe store; they'd puffed away with all the rest, and so she had gone there to take some shoes that had mostly fitted. They were still too big for her, but whenever her mum had bought her shoes she'd always pinched the end while Ernestine was trying them on, and she'd always make sure to pinch two fingers worth so that Ernestine could grow into them, even if the growing took a while, because shoes were expensive and so shuffling for a bit, while annoying, meant that they lasted longer. Ernestine couldn't bring herself to steal shoes that fit better, because what if her mum came back and had to pay for the shoes, and they didn't last like they should?

"She used to cook me pasta for dinner and drink the water the pasta had cooked in and tell me it was all right and she wasn't that hungry anyway," Ernestine said to the ghost. It was why she hadn't taken the red shoes that didn't shuffle when she put them on, no matter how pretty they were.

There wasn't any pasta left in the supermarket. All the other kids had taken it because it was easy to cook. Ernestine wasn't sure whether or not to be sorry about that.

"When I heard I'd got my scholarship I was digging potatoes," said Ernest. "I threw down that spade and swore I'd never dig another potato in my life." Even dead, there was a shine of remembrance over his face that reflected the happiness he'd felt at that moment. "I had studied and studied, but my family didn't have much money, so I spent a lot of time digging potatoes. And every time I dug one up I would think *you should be studying*, but we had to eat."

Ernestine thought that although he stopped digging potatoes he clearly hadn't stopped eating them, but that didn't seem polite to say out loud, not if she wanted to learn more than just potatoes. There was no point learning from a ghost if it was only potatoes. She could figure those out herself.

"Day in, day out," said Ernest, remembering. "Always digging those damn potatoes."

Ernestine wondered if his mum drank potato water sometimes, like her mum had drunk the pasta water, but it didn't seem polite to ask. You weren't meant to ask about things like that. You were meant to pretend that they didn't happen. That way no one felt embarrassed, and her mum could keep drinking pasta water instead of plain water and pretending it was fine. It was why she didn't ask him if he liked her new shoes. It was better to pretend that they were the shoes she'd always had, so that she didn't have to explain that she got them by stealing. Ernest had won a Nobel Prize, and Nobel Prize winners might dig potatoes, but they probably didn't steal.

It had been stealing, too. There wasn't anyone at the shoe shop to pay, but she could have left a note. She had just chosen not to. That made her a thief, and her mum would be so disappointed, but Ernestine would take the disappointment if her mum came back. She'd just puffed away, like a dandelion head, and all her clothes were empty, except for the sweater that Ernestine wore as a reminder. She needed a sweater in the Den.

"Of all the places to haunt," said Ernest. "This is where I ended up."

The Den was part of a museum now. It had been a cloakroom, once, a little underground room with a low ceiling and hardly any light, and a concrete floor. It was still cold but it wasn't damp any longer, because there wasn't anyone left to hang up their wet things. A cloakroom, in a building that had once been part of a university, and Ernest Rutherford had asked to use it as a laboratory when he had been a student, because it was the only room in the whole building with a concrete floor, and that had meant that there were less vibrations from the streetcars that had gone by outside, and still did go by outside, at least before the adults who drove them puffed away and left the city a place for children. That made it a good place for experiments.

Ernest was so tall that his head drifted through the pipes on the ceiling. "I banged on them all the time when I was alive," he said. "Poky little place. It smelled like mold and dust."

Not much difference now then, Ernestine thought. Mold and dust and a horrid little light that was too bright to sleep through, but the Den was too scary to sleep in anyway, so small and so dark it was like being buried alive. It was better to pull her mum's sweater over her head to block out the light and to reach out blindly to museum buttons, and to listen to explanations and Ernest's voice recorded, and the voices of people who knew him, until the power went out and all the voices died.

"It's a bit grim, child," said the ghost. "Don't you have a home to go to?"

Ernestine laid out the oranges against a wall, one by one. There were six of them. "There's no one there," she said. "Just some bigger kids now. They're mean. They go around breaking windows. I cleaned up all the glass, and I tried to put blankets over the windows, but it's really cold." The little flat had always been cold, no insulation, and power was expensive, but without the bare protection of glass it had got even colder, and when it rained the blankets got wet and they took forever to dry and had started smelling bad. Ernestine had taken her mum's sweater and emptied her

school backpack and filled it with some clean underwear and the last clean blanket from her bed, a tin opener and a spoon, the small jar of small change that was on the kitchen windowsill, which her mum had been saving for a winter coat from the second hand shop, and she had come to the one place she knew that had no windows to break. The term before last, a school trip had taken her to Rutherford's Den, at the very bottom of the city Arts Center, in the big block of old stone buildings that had once been the city university, and now it was a safe place. The last safe place, maybe.

She hadn't known that there would be a ghost there.

"I wasn't a ghost before this," said Ernest. He wouldn't tell her where he was before he came back to the Den. Ernestine suspected he wasn't anywhere but the ground, and when she told him that he just laughed at her, but it was a kind laugh so she didn't feel laughed at, exactly, just warm. He laughed at her like he once had a little girl to laugh at, too.

"I did," said Ernest. "But then she died. It was . . . very hard to bear. To know that I couldn't save her. Clever and respected as I was, and I couldn't save her."

Ernestine knew that in fairy tales things came in threes, and if the disappearance of everyone she could think of relying on had taught her anything, it had taught her that she wasn't in a fairy tale, but maybe the rule of three was enough. He had had a daughter, once, and she was a daughter. They had the same name, sort of, and when the world turned to sad, unending incomprehension she had run to the place where, for him, it had all started to unfold. Maybe that was enough.

"Maybe you can be enough for me," she said.

"I would certainly like to think so," said Ernest.

Ernestine saw his face as he looked down on her, and understood that the expression on it was pity. It didn't bother her any more than the laughing did. She wasn't surprised that he felt sorry for her. She felt sorry for herself.

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Ernest's version of *enough* was heavily potato based. Ernestine had expected a bit more from someone who was supposed to be a genius, and even more from someone who hated digging for vegetables as much as Ernest did, but the ghost was unmoved.

She wished he'd talk to her about science instead. Not that she was very interested in science, really, but she was even less interested in being alone in the dark and remembering empty clothes and warm puffs of air. The public library was a short walk from the Den, and she'd carefully written down what she'd borrowed, along with the barcode of her library card, and left it by the issues desk, but she couldn't read all the time, and torchlight in the Den made her eyes feel swimmy and sick.

"My teacher said you split the atom," said Ernestine. She'd only had a very hazy idea of what an atom was at the time, but the little museum on the floor above the Den, on the floor beneath the lecture theatre, had some easy to understand displays and she knew what an atom was, now. "Can't you tell me about that?"

"We need to talk about farming instead," said Ernest.

"Do you think I'm too stupid to understand atom splitting?"

"Stupidity has nothing to do with it. When I was alive I'd say that if scientists couldn't explain their experiments to a barmaid they didn't understand them. I understood them, and if I could explain to a barmaid, I could explain to you."

"Barmaids aren't stupid," said Ernestine, scowling. "My mum was a waitress, and that's close enough. She wasn't stupid either."

"Of course barmaids aren't stupid," said Ernest. "But they don't spend their days around a lot of science experiments, do they?"

"Yeast is science," said Ernestine, aware that she was being difficult and perverse glad about it.

"I didn't come back from the dead to teach you to make beer."

"Fine with me. It tastes horrible anyway."

"*My point*," said Ernest, repressively, "is that if you are a scientist who can explain an experiment to someone who doesn't know anything about science, then you understand what you're doing. I'm a good explainer, so I'm going to explain something about science to you. Are you ready?"

"All right," said Ernestine. Maybe he'd tell her something more important than atom splitting. Maybe he'd found a way to stick things back together, to make them the way they were before, so that all the people who puffed away would reverse themselves, like a recording of someone blowing on a dandelion head but backward, so the seeds all stuck together again. "Hit me with it. Maybe I'll win a Nobel Prize too one day."

"You won't win anything if you're dead, and you'll die if you don't eat," said Ernest. "How's that for science? Six oranges won't keep you alive. The shops will run out of food eventually. And you'll get by for a bit with what's there. Once that's gone you might get by on dog food for a bit longer. But that will run out, too, and if you can't grow your own food, you won't have anything to eat and you will die. Slowly. The hunger will hurt. God knows I was sick to death of digging the bloody things, but I dug them because I had to. Potatoes are more important than physics. Now, where can you get some?"

Ernestine stared at him. Even though he was dead he was very big, and very tall, and he was scary. She hadn't been scared of ghosts before, because one ghost meant there might be more, and one of them might be her mum, but she was scared of them now.

"I don't want her to come back if she comes back like you," she said.

"If she were here she'd say exactly the same thing," said Ernest.

"I don't care," said Ernestine, picking up her backpack, and stuffing it full of blanket and oranges. "I hate you."

* * *

She ran away to the lecture room. It was two floors above the Den, though she didn't quite know if it was always two floors, or if a century of refurbishment had rearranged history about her. Either way, the seats and the desks were old—far older than Ernestine. Generations of names had been carved into them. Some had dates carved alongside them—the oldest she could see, sitting in the far back row, was from 1899.

There was one from 1908, and one from 1917. Ernestine wondered if any of them went to war, and if this was all that was left of them. The ones from 1923, from 1926—they must have survived, but then there was another war. She wasn't quite sure of the dates of that one, but there was always another war. She was living in one now.

It was a kids' war, one of thrown stones and stolen things. The cold wasn't the only reason she'd left the flat she'd shared with her mum. Windows let the cold in, but they also made it hard to hide. She'd hidden in the flat for a while, sneaking out at night for food, and she'd been very careful and very quiet, and she'd seen a lot of kids. They were bewildered, like her. As the days went on and there were fewer adults, there was a sense of feverish excitement, and Ernestine had felt a bit of it herself when she'd stolen two of the biggest chocolate bars she'd ever seen from the local dairy. Halfway home she'd felt bad and run to put them back, and then she'd spent the rest of the week kicking herself for being such a goody two shoes. By the time she'd hardened herself to the idea of theft, all the chocolate was gone, and all the windows in the dairy were smashed and the shelves pushed over.

There'd been a lot of smashing.

Ernestine had wondered, for a little bit, if it would be safer to join the smashers. That way she'd at least have—not friends, exactly, but people on her side when one

group of smashers found another. But she'd never been good at making friends, and maybe all the smashers would join together and smash her instead, and they were so loud, and the flat was so cold and so empty, that one night she hid under the bed and pretended she was a rabbit, safe down in its burrow, but even that didn't help because rabbits were pests and needed to be shot. Under the bed didn't seem as safe as a burrow anyway, not that she had any idea how to build a burrow without the sides caving in and drowning her in dirt, but that was when she'd remembered the Den. Most of the kids she'd known at school had gone there, too, on the same school trip, but it had been a boring school trip, and she didn't think that any of them were in a hurry to go back. The only person who had it first on her list was Ernestine, and that's because it was dark and underground and not, she'd thought, full of a ghost who wanted to talk about root vegetables and make her plant them, instead of coming up with a plan to make everything go back to normal.

She ate all the oranges, one by one, on the old hard lecture seats, and left the bright peel on the sloping desks. Six oranges were a lot of oranges to eat at one time, and they made her feel sick, but she didn't know what else to do. If she peeked out the window she could see other kids in the streets, sometimes, and they either wandered about looking lost, or they were smashers, so she didn't want to go outside while it was still light enough for them to see her in case their being lost made her feel more lost, too, or their being smashers made them want to smash her. She'd have to go out at night to look for more food, but the night was scary, too.

Maybe, she thought, she could just not go looking for food and not try to grow potatoes and get it over with. Maybe before she could get thin enough for hunger to really hurt she'd get thin enough to puff away, like everyone else. It would serve Ernest right, to be left alone in the Den without her, and without his daughter. He looked too heavy to puff, so he could just stay there by himself, and Ernestine wouldn't miss him.

She looked for Ernest in the desk carvings, but didn't find him. Perhaps he was too busy taking notes, scribbling down mathematical notations, the physical explanations and harmonies of the world. It seemed like something he would have done, and the thought made her scowl. If she had to have a ghost, why couldn't she have had a ghost that carved his name into desks and talked about other things than vegetables? Ghosts shouldn't talk about vegetables. If he had come back to talk about science instead, well, that still wouldn't be very interesting, but it sounded like something a science ghost should do.

The lecture room sloped down to the bottom, and the stairs beside the strange long desks creaked when she stepped on them, the planks ancient and splitting. But they creaked, too, when she *didn't* step on them, and when Ernestine looked down, there were little green tendrils forcing their way up between. The shades were pulled up on all the windows because no one could look in and see her, so there was sunlight even if not very much of it, but there wasn't any ground for the tendrils to grow in. The underneath of the stairs must be the ceiling of the room below, and Ernestine had never seen plants that grew in air, without something for their roots to cling to. Besides, even with the thin bits of sunlight coming through the windows, Ernestine thought the plants should be more green than they were, but they were all very pale, those tendrils, unfurling pieces of anemia, stretching.

She poked at one with a finger, and her finger went right through it. "That's not fair," she yelled, stomping up the lecture room stairs in her too-big shoes to yell down the stairwell to the floors below. "That's *cheating*."

Ernestine had never seen a potato plant in her life, but she was certain that the ghost plants forcing their way up through the lecture room floor were ghost potatoes.

She couldn't touch them, which meant that she couldn't eat them, which meant that the ghost potatoes were only there to nag at her.

She just bet that they came from the Den, from the concrete floor that no thin little potato plant could dig through, and which was too dark for them to grow in anyway.

"It *is* cheating," she grumbled to herself. "Ernest, you *suck*." But she didn't say it very loud, because he was still an adult even if he was annoying, and he was the only adult she had. She would have yanked up all the potato plants by their roots and thrown them down the stairs, but they were only ghost plants so she couldn't touch them, not even to throw them.

Ernestine stayed in the lecture room, sulking, until it was too dark to see. She didn't want to turn on the lights, even if they still worked, because the smasher kids might be outside and see the lights. She might have stayed there anyway, but it was too cold and her blanket was in the Den, so she had to go back. Ernest was waiting for her when she got there, and the potato plants in the Den were glowing slightly, phosphorescent, when she lay down among them. Ernestine lay with her back to him.

"I don't like you very much," she said, and Ernest snorted.

"That isn't important," he said. He told her about his little brothers. "Charlie and Herbert. They died when they weren't a lot older than you. One was ten, the other twelve. They went boating one day and never came back. They knew how to swim. I was older, I'd helped to teach them, but sometimes just knowing how to do a thing isn't enough. They drowned and we never found their bodies. It was like they just disappeared."

"Everyone here has disappeared," said Ernestine, clutching at her blanket. She refused to look at him. "Like a puff of smoke. All that's left is clothes."

"We didn't even have that," said Ernest. "My father walked the coast for a year, looking for their bodies. My mother never played her piano again."

"I wanted to learn the piano," said Ernestine. "We could never afford it. Mum said she was really sorry, but other bills were more important."

"You had to eat."

"Yes."

"You still have to eat," said Ernest. "If your mother had known how to play the piano, and you chose to starve instead of learning how to provide yourself with food, then she'd stop playing, too."

Ernestine rolled over so she could look him in the face. It was a nice face, mostly, but a bit blurry because her eyes were all wet. "Is my mum dead?"

"I don't know," said Ernest.

"But you're dead, too. Can't you find out, and make her come back?"

"If I could make the dead come back, I would have done it long ago," said Ernest, and for a moment Ernestine thought that his eyes were blurry, too.

"Why is this happening?" she asked him. "Did I do something wrong?"

"I don't know what's happened here, but I don't think it's anything a child could cause," said Ernest. "So no, I'd say you didn't do anything wrong."

Good, thought Ernestine. That was a relief.

"You're doing something wrong now, though," said the ghost. "Don't look at me like that. If you wanted someone to sit and talk with you about what-might-have-beens, you should have conjured up a theoretician instead."

"I don't know what that means," said Ernestine. She wanted to cry. She was sick of not knowing what anything meant.

"It means that there are two types of scientists," said Ernest. "One type works all the time inside their head. The other type's like me. We test things out with our own hands. We're practical people. Do you know what that means?"

Ernestine was pretty sure she did. "It means potatoes, doesn't it," she said, glumly. "Bull's eye," said Ernest.

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The thing about planting potatoes was that you had to have potatoes to plant. The supermarket where Ernestine had bought baked beans and oranges was right in the middle of the city, across the road from the bus station. It had mostly been cleaned out, and she couldn't find a single potato. There were none in the freezer section, which probably didn't matter as she couldn't plant chips, and there were none in the fresh fruit and vegetable section either, which by this time was not fresh at all. It was moldy and smelled bad. All the good stuff had been taken, and what was left was a swampy liquid that might have once been spinach and a few pumpkins that were so soft her fingers could cave in their sides. A rat had burrowed its way into one of them, and Ernestine had shrieked and run all the way back to the Den to hide under her blanket.

"Buck up," said Ernest. "It's only a rat."

"It *hissed* at me!"

"I hope you hissed back."

Ernestine choked at him, her mouth stuffed with blanket. "Why would I hiss at a rat?" she said, hiccupping into wool.

"Oh, I doubt it would do anything to the rat," said Ernest. "But it would give you an extra few seconds to *think*, instead of panicking and running off. You want to be a good practical scientist, you have to make time to think. I used to kick everyone out of the lab at the end of the day. Some of them would try to stick around and work longer hours, but I soon put paid to that. They needed to go home and think instead."

"You could say I came home to think," said Ernestine. It sounded better than saying she'd shrieked and run away.

Ernest looked at her, one eyebrow raised. "So you did," he said. "My mistake. That was very sensible of you. Very practical."

"I can be practical," said Ernestine.

* * *

She was surprised to find that practical meant stealing as well as potatoes.

"Yes, well," said Ernest. "It's not ideal. But a choice between starvation and stealing is an easy one. No one could blame you."

"I can write it all down, just in case," said Ernestine. "Like I do when I go to the library." There was another supermarket that she knew of, and it was a long walk away and she didn't like the idea of that much, not when she didn't know where the smashers were. "I might have to take a trolley, though," she said. "If there are potatoes I don't know if I can carry a whole sack back by myself."

"If you're going to steal might as well be efficient about it," said Ernest, though his mouth was set very small as he said it, ghost lips pressed into each other under his moustache. Ernestine could see that he wasn't very happy about her moral decline, but she also thought that if he could see ghosts, they would be children, too, and he was probably sick of dead children. Besides, she was beginning to be hungry; her tummy had rumbled a lot lately, but now it was beginning to ache, too, so she was feeling a little less particular herself.

The walk out to the supermarket was longer than she liked to be out on her own, but it wasn't very far away, and the ground was flat so it took her less than an hour, and that included the time it took to hide carefully at corners and look both ways so she didn't run into smashers. Ernestine went as early as she could in the morning, when it was still dark, so there was less chance of seeing anyone else, but when she got to the supermarket, she could see that the smashers had got there first. All the windows had been broken, and it was light enough that she could peek inside and

see shelves overturned, dried food and washing powder scattered over the floor, and boxes stacked up to make a fort.

"It was a sensible idea," she said, after she scampered back to the Den. She hissed as she ran, partly because it made her feel braver, like she wasn't just running away again. "If I were a group of smashers I might live in a supermarket, too. There's lots of space and lots of ice cream, even if it is all melted. Lots of fizzy drinks. They wouldn't have to go anywhere else for ages. It'd be a good base. I don't think they want to share, though."

"Did you ask them?" said Ernest, and Ernestine shook her head.

"They're too scary," she said. Smashers who smashed windows would smash other things as well, and she'd seen them, back when she still lived in the flat she'd shared with her mum, peeking out through the smashed windows late at night to see two rival groups smashing each other for once, instead of things.

There was a long silence. Ernestine used it to stare very carefully at the ghost potato plants that were still pushing up through the concrete floor of the Den.

"Well then," said Ernest. "On to plan two."

"What's plan two?" Ernestine asked. "I hope it's not going back and trying again. Trying again only works in stories where other people don't have stones." She wasn't sure, exactly, if it had been stones that had smashed all the supermarket windows, but it had been stones that smashed the windows at home, so it seemed like a sensible conclusion.

"Adaptation," said Ernest. "You know, when I started out, when I was working in this cloakroom—and some people still used it as a cloakroom, no matter how much I asked them not to—there was no money. We were a small country on the edge of an empire and there was no money for science, so we had to think instead. We had to adapt to what we had, to use old things in new ways. All right, so you don't have access to a market. What do you have?"

"I think there's a tin of baked beans left," said Ernestine.

"It's a good thing ghosts don't need to eat. No, I meant something else. You have *location*. You live in a city. That means you live in a place that has lots of people in it."

"Not anymore it doesn't," said Ernestine.

"But they did live here once, and they had to eat. There are restaurants here. There are homes here."

There were two cafés at the Arts Center, and both of them were locked. Ernestine had already tried them.

"I suppose I could smash their windows myself," she said, although she really didn't want to be a smasher.

"Not if you can possibly avoid it," said Ernest. "It's not just breaking and entering. If you cut yourself, there's no one to help you."

"I could go to the hospital," Ernestine began, before remembering that there was probably no one at the hospital, unless it was the kids in the children's wards, and if they were there and couldn't get up and walk away to find their own food they were probably dead, and that was a scary thought. If she were a better girl she'd go and see for herself, but the thought of wandering through a hospital full of unmade beds and empty pajamas, and full beds with dead kids who were still wearing their pajamas, was terrible. She didn't think she could do it.

"I can't go to the hospital. There's no one there to help me."

"If you cut yourself on glass, you might need stitches," said Ernest. "You might get an infection. Best not to risk it. No. Those cafeterias may be locked, but they were locked because no one who disappeared—"

"Who puffed away," Ernestine interrupted.

"Who puffed away," Ernest agreed, "was inside them when they, er, puffed. They

might have been in the street, or at home. There will be unlocked houses. There will be unlocked businesses. Many of these places will have kitchens.”

“There’ll be food in the kitchens,” said Ernestine. “And potatoes, I guess.” She was coming round to the idea of potatoes, even if they weren’t very interesting. Mostly she was coming round to it because she didn’t want to starve, but partly it was because she was afraid that Ernest would go away and leave her if she didn’t start to do something to help herself. He was a ghost, and that wasn’t ideal, and he wasn’t *very* comforting, but at least he was there and trying to help.

The Arts Center was in the very middle of town, across the road from the big museum and the botanic gardens, and the street closest to the Den was filled with cafés and the occasional house, but it seemed like the houses had mostly been made into businesses. Ernestine had seen other houses, though, that weren’t very far away. She was a little bit worried about going into them. Most businesses had windows all along the front, and she could easily see if anyone was in them, but with the houses she would have to walk all the way around, peering in, which was not only rude but dangerous if other kids lived there. They might be smashers. They might think that *she* was a smasher, and be scared and start smashing first. And if the house had more than one story, she might not be able to see other people even if they were there.

“You should make a plan,” said Ernest. He couldn’t come with her. He didn’t seem to be able to leave the Den. Ernestine had tried to get him to go outside, but if he had been able to manage it she couldn’t see him. Maybe it was just harder to see ghosts in daylight. In the Den, down where it was dark, he glowed slightly, like the potato plants. “A plan will make you feel better.”

Ernestine decided that she would go all along the street, for one block, first one side of the street then the other. She’d go in early morning, as soon as it was light enough to see, and when she was done she’d run all the way back to the Den to report in. It wasn’t like she’d have to run a long way. She could see the entrance to the Den for the length of the block; she wouldn’t be turning any corners.

The first side was easy. It was all the Arts Center, and lots of it was still under construction, back from where the earthquake had knocked most of the city down. That had been years ago, but Christchurch was still being built up . . . or it had been, when there were adults still there to build things. Besides, Ernestine had already explored most of the Arts Center from the inside, the parts of it along that street anyway, including the Great Hall, which was enormous and all sorts of echoey and looked like it belonged in a castle. She’d gone into the office areas, too, up the big wooden staircase that split in two halfway up and curled around both sides of the fancy entrance, and she’d raided the staffroom for all the biscuits they had left on her second day. She would have drunk the milk as well, but by then it had gone solid and revolting in the bottle, so she’d tipped it quietly down the loo instead. At first it had been fun to explore, if a little creepy—all that empty space!—but office supplies and half-completed rooms full of dust and rubble didn’t stay exciting for long.

The one place she made sure to check was the little arcade. There had been a sweet shop in it, but the shutters had been pulled down and locked, and Ernestine knew this because she’d tried it before, secretly, on an early trip back from the supermarket where she had picked much less exciting things to eat. She thought that if she were a smasher, the sweet shop was one of the places she would have gone to first, but it was hidden away so maybe no one had been there to try and break the shutters down. They still looked as solid as ever, which was a relief. It didn’t help her to have the candies locked away, but it also meant that smashers weren’t smashing on her almost-doorstep, and she’d give up chocolate for that.

The other side of the street was more challenging. It was mostly houses that had

been converted into businesses, and there was a little alley with a gift shop that was locked, and a second hand bookshop that was very small and also locked, but Ernestine didn't mind that much. The library was close by, and she didn't have anyone to buy gifts for. She had better luck with a couple of houses that had been turned into office type places. Not that she needed paperclips or staplers, but there were packets of biscuits to gather and some hot chocolate sachets, half jars of jam and Marmite. Everything was very quiet.

The house that had been turned into a restaurant was locked. Ernestine sneaked round the back, and there was a courtyard there she'd never suspected, and a door that was *not* locked. The Astro Lounge had a funny menu full of things with science fiction names, and there were lights strung up around the courtyard, and it was the type of place that Ernestine would never have gone to, back when everything was normal, because normal was never visiting restaurants, unless they were takeaways for hot chips, and for a few minutes she wanted to pretend that she was a guest there, sitting at one of the tables and waiting for her order. The power was off here, too, and that made the freezers a horror, but the fridges were full of drinks and she didn't care if the Coke wasn't cold, she was going to have one. If the owners came back, she could always ask to work it off.

There were menus by the bar, and Ernestine read through one carefully. There were lots of chips, but they'd be kept in the freezer and the smell in there was appalling, she wasn't going back. They'd be soft and squidgy, too, if she poked through the side of the packet, so that was out. But the menu also had potato on it that didn't sound like chips, little round new potatoes in a sort of salad, so Ernestine ransacked the kitchen cupboards. There was food there that she could eat, anyway, and she promised herself she'd clear out the place that evening, and stack as much as she could in the Den. It wasn't very big itself, the Den, but as long as there was space for her to sleep, and for the few small information boards that were in there already, she'd be fine. She could always store some in the rest of the Rutherford museum. It was pretty unlikely that any other kids would go there, so it should be safe.

"And look!" she said to Ernest, half an hour later. "I found potatoes!"

They were not good potatoes. They were small and wrinkled and some of them had gone slimy and smelled as bad as freezers—"Throw those out right now" said Ernest—but most of them were all knotted up with hairy bits of root that made them look weird and creepy.

"I don't think I want to eat those," she said.

"You're not going to eat them, you're going to plant them," said Ernest.

Planting sounded all right, but Ernestine had found something better. There had been chalk at the restaurant, lots of colored chalk, and it must have been used to write tempting meals on blackboards to try to get people to come in and eat them, Ernestine thought, but it was bright and pretty and gave her something to think about that wasn't starvation and potatoes and loneliness.

Maybe she could draw pictures on the wall of the Den. They wouldn't be very good pictures, and she wouldn't be able to see them most of the time anyway, because it was so dark, but just knowing that they were there would make her feel better. As if making herself feel better mattered. Ernestine scowled. "You're going to tell me I can't eat chalk, aren't you." It wasn't a question.

"You most certainly *can* eat chalk," said Ernest. "It will taste terrible and be very bad for you, but you *can* eat it if you want to."

It was the practical response. It was what her mum would have said. Ernestine didn't know why she had expected anything else.

"You can draw all you want after you've done the planting," said Ernest. His great ghost moustache twitched as he looked at her, as if he were laughing at her,

and Ernestine scowled again. “No one can work all the time. Didn’t I tell you people needed time to think? Drawing’s a type of thought. You think I didn’t sketch out experiments when I was working out how to explain them to myself, or to other people?”

Ernestine must have looked unconvinced, because he followed it up with what could only have been a bribe. “You get on with that planting, and I’ll show you how to split an atom.”

It may have been a better bribe for a girl who was more interested in science than Ernestine was, and she might have been able to find out how to split an atom from the rest of the exhibits in the floor above the Den, but it was a bribe that meant he would spend time with her, *guaranteed time*, and that was the most important bribe of all.

* * *

There was disagreement as to where the potatoes should be planted.

“No one would see them growing in the Den,” Ernestine argued.

“There’s no *sunlight* in the Den,” said Ernest. “Plants need sunlight and so do you. There’s no soil here either.”

“I could bring some down,” said Ernestine. It sounded like a grubby job, but she could find some pots to plant the potatoes in and then there wouldn’t be any digging. “You should be pleased about that! You’re always complaining about the digging.” Ernest sighed the same way her mother did when Ernestine annoyed her. The ghost potato plants wilted at the sound. “They glow,” she said. “Mostly. Isn’t that light enough?”

It was not light enough.

“You cannot farm in a cloakroom,” said Ernest, but he had experimented in a cloakroom when he had needed to so that was a poor argument, she thought. The Den was the only place in the Arts Center where Ernestine was willing to farm. There was a big courtyard in the middle, with grass and trees, but “If I dig up that lawn and the smashers see it, they’ll know someone’s here,” she said. “They’ll *know*. And if they smash the potatoes or steal the potatoes, there’ll be no potatoes.” She kept saying “potatoes” because that was what Ernest seemed to care about most, other than her, and so she thought it would be a good reminder.

The ghost seedlings wilted again.

“It’s adaptation,” Ernestine reminded him.

Ernest’s ghost eyes snapped open and he stared—not at her, but past her, as if he were trying to see through the gloomy, closed-in walls of the Den. “I was a student when this place was still a university,” he said. “There were gardens across the road. Are they still there?”

“The botanic gardens,” said Ernestine. “Yes.” The Arts Center took up an entire block, and the Den was near a corner. The street that she had explored for potatoes was made up of Arts Center on one side and shops on the other, but around the corner was Arts Center on one side and the botanic gardens over the road, the gardens and Canterbury Museum, and next to that a school.

“So plant them there,” said Ernest. “Use one of the flowerbeds. Anyone who sees them will assume they’re meant to be there, that they’ve always been there, and they’ll ignore them.”

“They’ll think that potatoes have always grown in the flowerbeds?”

“Would *you* recognize a potato plant if you saw it growing in a flowerbed?” said Ernest, and Ernestine nearly made a smart comment about being around ghost potatoes all the time, but the poor things withered when they were around arguments and disappointment, and she felt sorry for them, dead things that they were, so she shut up.

"Besides," said Ernest, "until you find a spade, you'll have to find another way to plant them. At least the dirt in the flowerbeds is likely to be relatively soft. Just don't rip out all the flowers and leave them scattered on the grass. That will give you away entirely."

"I'm not an idiot," said Ernestine. "You don't need to explain *everything*."

"I'll remember that when it comes to the gold foil experiment," said Ernest, but she knew that he was lying. A scientist who was worried about explaining things properly to barmaids was not a scientist who would explain things badly to a child so that she would feel badly, too. "Come to think of it," he said, "you could think of the flowerbeds as an introduction. So much of science is observation, and sometimes people stop looking at what's around them. They expect a flowerbed to be a flowerbed, and they don't stop to think that it might be a vegetable garden as well."

"When you're planting," he said, "I want you to think about gold."

* * *

Ernestine didn't have a lot of experience with gold. She knew that it was used for wedding rings, but her mum had never had one of those, and the one passed down from her granny had been sold to pay for a trip to the dentist. Her mum had cried when she sold it, after Ernestine was in bed, but she had still heard her through the walls.

She planted the wrinkled, root-covered potatoes in the early morning. The flowerbeds in the gardens were beginning to look overgrown, which was useful because it meant less chance of anyone noticing that potatoes were growing there, but it meant she had to be very careful with her weeding, so that the potatoes had room to grow. The weeds she chucked into the middle of hedges and left to rot, and when she was done she washed herself off in the river before going home wet, in her underwear, and hanging the dress in the stairwell. She would have hung it in the Den, but that would have made it feel more like the cloakroom that it used to be rather than a makeshift bedroom and pantry and ghost-filled potato garden.

"I didn't see anyone but ducks," she said to Ernest. Ernestine liked ducks. Once, when she had visited the gardens, there had been ducklings, and they were so friendly that they came right up to her shoes and clambered over them. She had even seen one of the gardeners working with his wheelbarrow, and a duck who had waddled up to him for a pat. She wondered how the ducks felt now, with no one to pat them. She wondered if they were lonely.

"It must be lonely sometimes, being a ghost," she said.

"It must be lonely sometimes, being a child," said Ernest.

At least they were lonely together.

"That's not really enough for a little girl like you," said Ernest.

* * *

Ernest Rutherford had used gold to split the atom. Not gold like a wedding ring, he told Ernestine, but gold foil, gold beaten flat. "Think of it like a very thin sheet of yellow paper," he said to Ernestine. "Are there holes in a sheet of paper?"

Ernestine considered. "There might be," she said, "if I put my fingers through it."

"Let's say that you don't. And that you don't use scissors to make a hole either."

"What if the paper comes with holes already in it? Like a fancy doily." The café where her mum worked had sometimes had fancy doilies with holes in them, to go underneath the cakes.

"Just a normal sheet of paper," said Ernest. "No fingers, no scissors, no holes that are meant to be there. It's just all in one piece."

"A ring's all in one piece, and I can still put my finger through it," said Ernestine.

"Ah, but you see, we were shooting at the gold. A ring wouldn't be a very good target then, would it?"

All this for potatoes, Ernestine thought. And who would shoot at gold anyway? Gold was for selling and crying and paying the dentist.

"I don't understand," she said, miserably. "I'm not a barmaid." Maybe her mum would have understood, but Ernestine wasn't a waitress either.

Ernest reached for her, and his hand went through her hair. "It's my fault you don't understand," he said. "It was a bad explanation. I'd forgotten that you were an experimenter, like me, and not a theoretician."

What she needed, he said, was a model. Before she could make the model, though, she needed equipment. It didn't need to be fancy equipment. "Every good experimenter makes the most of what she can get," said Ernest. It was like a treasure hunt. She went through the office desks upstairs in the Arts Center and found a hole punch and scissors and some sticky tape. Early one morning she sneaked out to the school that was next to the Canterbury Museum and wandered around the outside of it until she saw an open window that she could fit through. She wasn't worried about meeting any other kids there. It was a *school*, after all. They wouldn't go back if they didn't have to. Admittedly, it was a much nicer school than the one Ernestine had gone to. A school for rich kids, she thought, and that meant that their art room was well-stocked. She took all the yellow paper they had, and all the colored string.

She was allowed to punch holes in the yellow paper, as many as she liked. It was nearly as much fun as popping bubble wrap. When she felt there were enough holes she taped all the pieces of yellow paper together, to make one big square that was almost as tall as she was. It was difficult to do down in the Den, where there wasn't much light apart from ghost glow, but Ernestine wanted to make her experiment there so that Ernest could be part of it.

"Now you just need somewhere to hang it," said Ernest of the big yellow square, and that was a problem because the Den really wasn't big enough. The biggest space that Ernestine knew was the Great Hall, right next door to the Den. It was already open, and she could pull all the chairs to the side because there weren't going to be any more concerts there any time soon—she knew that there had been concerts because there were still old posters outside of small groups of people playing violins and flutes. The Great Hall also had a plaque in it, a plaque for Ernest, and so it felt fitting, but there was nowhere to hang the yellow paper from. The roof was stories above her, and there was no way to climb up to it.

Ernestine looked at what she had and thought about what she could do, and she thought about adaptation and making do, of not having fancy equipment and having to think. Because her home was the Den now, and experimenters should go home and think—even if what they thought about was not having fancy equipment—she went home and remembered that the Den used to be a cloakroom, and that made her think of a clothes rack. There was one in the office, so she wheeled it to the top of the big staircase and bumped it all the way down, took it into the very middle of the Great Hall and taped the yellow paper sheet to the clothes rack. It didn't quite fit, so she had to get more paper and make more holes and use more tape, but eventually she had a big upright sheet of yellow paper in the middle of the Hall.

She was just taping the last bottom corner of the paper to the clothes rack when ghostly little potato plants started pushing through the floor beneath her. When she looked up, Ernest was there, beaming at her.

"I didn't think you could leave the Den!" Ernestine cried.

"You're doing my experiment," said Ernest. "Maybe that's enough."

The experiment was bits of string and paper and sticky tape, something done to fill the time while secret potatoes grew in flowerbeds, so Ernestine thought it was something of a stretch, but she wasn't about to complain. Instead, she wrote in permanent marker, across the top of the yellow paper, *Ernestine's Gold Foil Experiment*.

Her next job was cutting up the string. The pieces she cut had to stretch all the way down the Great Hall, so she needed a lot of string. The string she had taken from the art classroom wasn't enough. "That's okay," she said. "I know where more is." She'd seen great rolls of it in some of the half-restored rooms; she'd only got string from the school instead because she'd gone there for yellow paper, and it had seemed an efficient use of treasure hunt to get as many things as she needed at once. Also it was prettier than the string the builders had been using.

By that time it was late, and she went back to the Den to sleep, so that she could get an early start on string retrieval.

"What's wrong?" said Ernest, as she brought the string back next morning in a wheelbarrow. "You look pale. You need to spend more time outdoors."

"I think someone else is out there," said Ernestine. "I didn't see anyone. But . . . I think there was someone in the sweet shop. The shutters were closed last time I went by there. They were a little bit open today, and then it looked like they shut again."

"Could it have been the wind?"

"It's not windy. And I had a look around the other places, too. The bookshop window's been smashed in." It hadn't been smashed very badly, only a little bit, enough for someone small to get inside, but smashed was smashed.

"It could be someone passing through," said Ernest.

"There could be someone living in the sweet shop," said Ernestine, darkly. "There could be a smasher in there."

"There could also be someone as frightened as you," said Ernest. "If anyone was going to take refuge in a sweet shop it would probably be a child. Though they must be getting sick of sweets by now."

"I wouldn't be sick of sweets," said Ernestine, but she knew she couldn't expect much more from a ghost who was mostly concerned with potatoes. "Not that you aren't very nice, too," she said to the ghost plants, which were still sprouting through the floor of the Hall, just as they were still covering the floor of the Den. Her mum had always said that plants did better when you talked to them.

Maybe she should be talking to the potato plants that weren't dead instead.

"Would you like to stop the experiment?" said Ernest.

No, Ernestine thought. She would not.

She'd lost too much already.

* * *

The building site string was less colorful than the string that she'd got from the arts classroom. "That's all right," said Ernest. "We'll use it for the expected outcomes."

"The boring outcomes?"

"Close enough."

Ernestine threaded her long pieces of string through the holes in the yellow paper. She tied all of the ends of the string on one side of the paper to a chair, and set the chair well back in the Hall, so it looked as if all the string was coming from the chair and bursting through the yellow screen. On the other side of the paper, she took the sticky tape and taped each individual string to random spots on the walls. It took her all day to cut and thread and paste, and when she was finished one half of the Great Hall looked like a spider's web.

Ernest sat in the chair, ghost potato plants flowering around his feet. "Imagine where I'm sitting is a cannon," he said. "I'm firing at the yellow paper, and the string shows the paths of the cannonballs. Does that make sense?"

Ernestine skipped up to him and picked one little string tied around the chair leg. She followed it to the yellow paper, and checked which hole it went through, and then she went to the other side of the paper and found the string, and followed it to

where she had stuck the string to the wall. She had to be careful, clambering over all the other strings. It was something like an obstacle course.

“Got it,” she said.

She’d do the rest tomorrow.

Except she didn’t, because when she came back into the Great Hall the experiment had been completed. The colored strings, the art class strings, had been tied to the chair and stretched to the yellow paper. They hadn’t been threaded through holes, though. Each colored string had been carefully taped to the paper, and then the string had been reversed and stretched out again, and taped to a wall again, but still on the same side, as if the cannonball had burst out of the chair and hit the paper and bounced back.

On the seat of the chair, where Ernest had sat, was a chocolate.

* * *

“The gold foil experiment was my experiment,” said Ernest. “I directed it, but I didn’t do it alone. There were two others. They were younger than I was, one still a student. Protégés, if you will. Their names were Hans and Ernest.”

“Another Ernest,” said Ernestine.

“Science is better when you can do it with a friend.”

“What if they’re not a friend?” said Ernestine. Everyone had gone. They’d puffed away and left her. “What if I’m better off by myself?”

Ernest regarded her steadily. The potato plants were luminescent around his feet. “Sweetheart,” he said, “there’s more than one type of poverty.”

* * *

Ernestine stood in front of the sweet shop. It had metal shutters pulled all the way down, so no one would be able to get inside. She wondered if it was dark in there, like the Den.

She knocked, and when there was no answer she knocked again. Perhaps whoever was inside wasn’t answering because they didn’t know who she was. “You finished my experiment just right,” she said, leaning close to the shutter so that her voice wouldn’t echo. “Thank you for the chocolate.”

There was silence for a moment, and then the shutter began to lift. It lifted very slowly, as if the person inside was worried that they were doing the wrong thing, but when it was over halfway up Ernestine could see that, barricaded in the sweet shop, was a girl just about her age. She had dark circles under her eyes and her nails were all the way bitten down, and above her fuzzy cardigan was a gold necklace with a name written in loopy letters: *Hannah*.

Hans and Ernest. Hannah and Ernestine.

“Everyone’s gone,” said Hannah, and her voice was squeaky, like she hadn’t used it for days. “They just, they just . . .”

“They just puffed away,” said Ernestine. “I know.”

“This was my aunt’s shop,” said Hannah. “I knew where she left her keys. I thought it would be safer here than at home.”

There were lots of sweet wrappers on the shop floor, and a small pile of science books that looked very hard to read. Ernestine remembered what she had written on top of her sheet of yellow paper, and she remembered the broken windows at the bookshop, and how she had sneaked around in the early morning because she was afraid that other kids might see her. She remembered that she hadn’t given a single thought to kids like her, the bright strings that bounced back in unexpected ways. She’d expected that all kids were cannonballs, and that all the cannonballs smashed.

Maybe I’m not a good practical scientist at all, she thought, but that was all right. She could get better.

“I’m growing potatoes,” she said. “Do you want to see?”