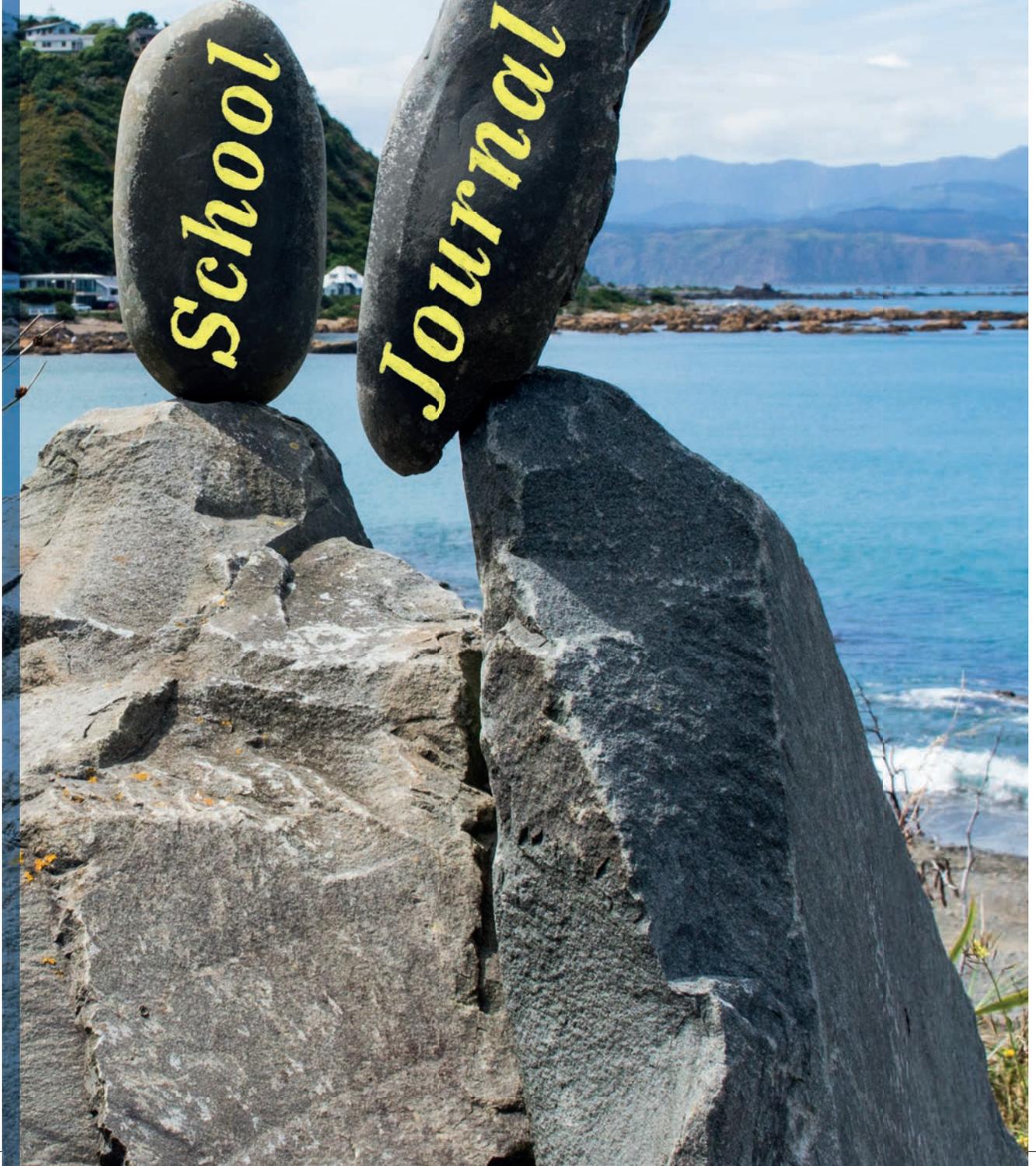




JUNE
2018

Schools

Journal



TITLE	READING YEAR LEVEL
Balancing Act	5
Talking to the River	6
Sharks	5
Ship's Captain	6
The Force	6
Plenty of Room	5
River Swimming	6

This Journal supports learning across the New Zealand Curriculum at level 3. It supports literacy learning by providing opportunities for students to develop the knowledge and skills they need to meet the reading demands of the curriculum at this level. Each text has been carefully levelled in relation to these demands; its reading year level is indicated above.

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School Journal

LEVEL 3 JUNE 2018

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Balancing Act

by Tricia Glensor

For the past four years, Stavros Kyriakides has created sculptures along Wellington's wild and windy south coast. His artworks are distinctive. They use only natural materials – and there's no glue, nails, wire, or concrete holding them together. Instead, Stavros relies on the laws of physics.



Off the Cuff

When he was a boy, Stavros loved to watch circus acts on TV. He was especially fascinated by the high-wire performers. “Their skills were amazing to me,” he remembers.

For a long time – many decades – Stavros was content to enjoy other people’s creativity. Then one day, he noticed some driftwood that had washed up on the beach after a storm. Off the cuff, he chose a few interesting pieces and began to experiment. Carefully, he placed them on top of each other. They moved in the wind, but that was OK. The main thing was they didn’t fall over. These pieces of wood became Stavros’s first sculpture.





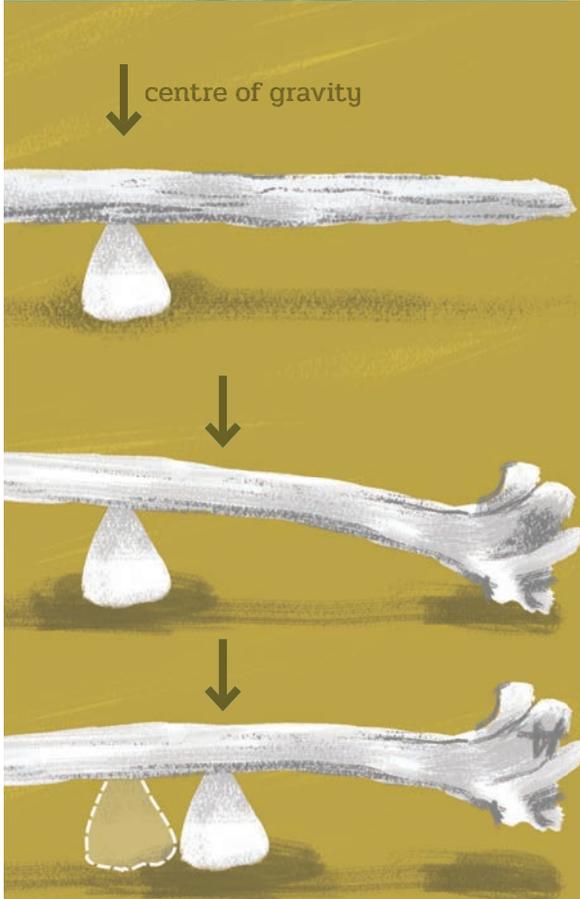
Feel the Force

A lot of artists work with found objects. Stavros is unique because he chooses his material with a special question in mind: Will it balance? That's because everything Stavros makes relies on gravity to keep it stable. Without it, his sculptures wouldn't exist.

To balance an object, Stavros must first find its centre of gravity. This is the point around which the weight of an object is evenly spread. "For something to balance," Stavros says, "its centre of gravity needs to be directly in line with the area supporting it."

Finding this centre is easy when the object has a regular shape, like a plank. Its weight is evenly distributed. But Stavros works with driftwood and rocks that come in all shapes and sizes. This makes their centre of gravity trickier to find. Luckily Stavros knows just what to do.





Finding the Centre of Gravity

1. This piece of driftwood has a regular shape, and its weight is evenly distributed. The centre of gravity is in the middle.
2. This piece of driftwood has an irregular shape. One end is heavier than the other. This means the centre of gravity is closer to the heavier end.
3. Now that the supporting base has been moved so that it's under the centre of gravity, the driftwood is balanced.



Standing Upright

Mathematicians use calculus to figure out a tricky object's centre of gravity. Stavros prefers another method: time and patience. This approach works no matter what material he's using, although smaller stones are usually easiest. That's because Stavros can hold each one in the palm of his hand, turning it gently to assess the stone's weight and where it might "settle".



Once Stavros has found a stone's initial resting point and it's standing upright, he'll crouch down low. He likes to examine what he calls the "kiss point" - the place where the two surfaces touch. He's looking for bumps or cracks ... anything that will help to make the stone more stable.

Balancing a single stone takes time. Making an entire tower is harder still because of the constant danger of toppling. About this, Stavros has some familiar advice: "Make sure each stone's centre of gravity is in a direct line with the base. If the tower gets out of kilter, it's guaranteed to fall over."



Stavros the Artist

Stavros rarely names his sculptures, but he doesn't mind when others do. Some people think the craggy rocks look like faces gazing out to sea or like the figures once found on the prows of sailing ships. Stavros is always pleased when people see things in his work, although he doesn't think of himself as an artist. "I'm just messing around on the beach, having fun," he says.

But many people *do* think of Stavros as an artist. In 2016, he received an award from Wellington's then mayor, Celia Wade-Brown. The award recognised the way his sculptures "draw attention to the local materials and view beyond". South coast locals commenting on social media agreed. "I love seeing the changing art along the beaches," one person said. Another liked the fact the sculptures just pop up. "For ages, we never saw who constructed them. It was a great mystery. We found new surprises every day."





Something from Nothing

Stavros's work is made to survive Wellington's energetic weather. In strong winds, some of the sculptures move slightly – the longer pieces of driftwood look as if they're dancing. So it's not the weather that destroys the artwork – it's people. Surprisingly, Stavros does have critics. "One person said that what I do is like graffiti," he says. "It's not 'natural'."

Occasionally Stavros finds that his sculptures have been kicked over. Once, someone chopped a piece up with an axe. "I think they wanted to smash something so they could feel powerful," he says. "Maybe they were bullied once, and this was their way of making up for it."





How does it feel when people destroy his work? Does Stavros ever get angry?

"Yes, I do," he says. "It shows no respect. Sometimes, when I find a piece half-destroyed, I feel so frustrated I want to throw it all back into the ocean. But I see it as a challenge too. If someone messes with a sculpture, I'll put it back together." Stavros has done this with one piece countless times (see above).

Why does he keep at it?

"My work gives me a lot of satisfaction. There's a real feeling of accomplishment when I finish a sculpture. I've created something out of nothing."



Ship's Captain

by Fraser Smith

My nan always said I should be the captain of my own ship. Which was weird because I didn't feel like a captain when she was around. Nan was captain of her ship ... and everyone else's! When we were in Hawke's Bay, she wouldn't let us talk to any Māori. They'd wave and say hello, and she'd put her nose in the air. When Nan wasn't listening, Pop would say, "They're tūrangawaewae. Wave. Your nan's being a Ngāpuhi princess."

Up north, Nan was different. She would wave and kōrero to everyone. She was happiest on her land on the Whangaruru Harbour. Getting there was a two- or three-day trip, the last bit by boat. While Pop rowed the dinghy back for the second load, Nan had me and my brother, Brent, carry the gear up the beach. Then we'd pitch camp. We'd stretch a big tarp across a low pōhutukawa branch. That was the kitchen roof. Our beds were wooden frames filled with mingimingi scrub.

Once we'd settled in, we stayed put. There was a shop, but it was a long walk around the oyster rocks at low tide. Those oyster shells were sharp, and if you cut yourself, Nan would have to dig out the shell with a needle. Any bits left would lead to infection. If that happened, Nan would plunge your swollen foot in hot water. "As hot as you can bear," Nan would say (it was always hotter). Then you got a ponga poultice.

* * *

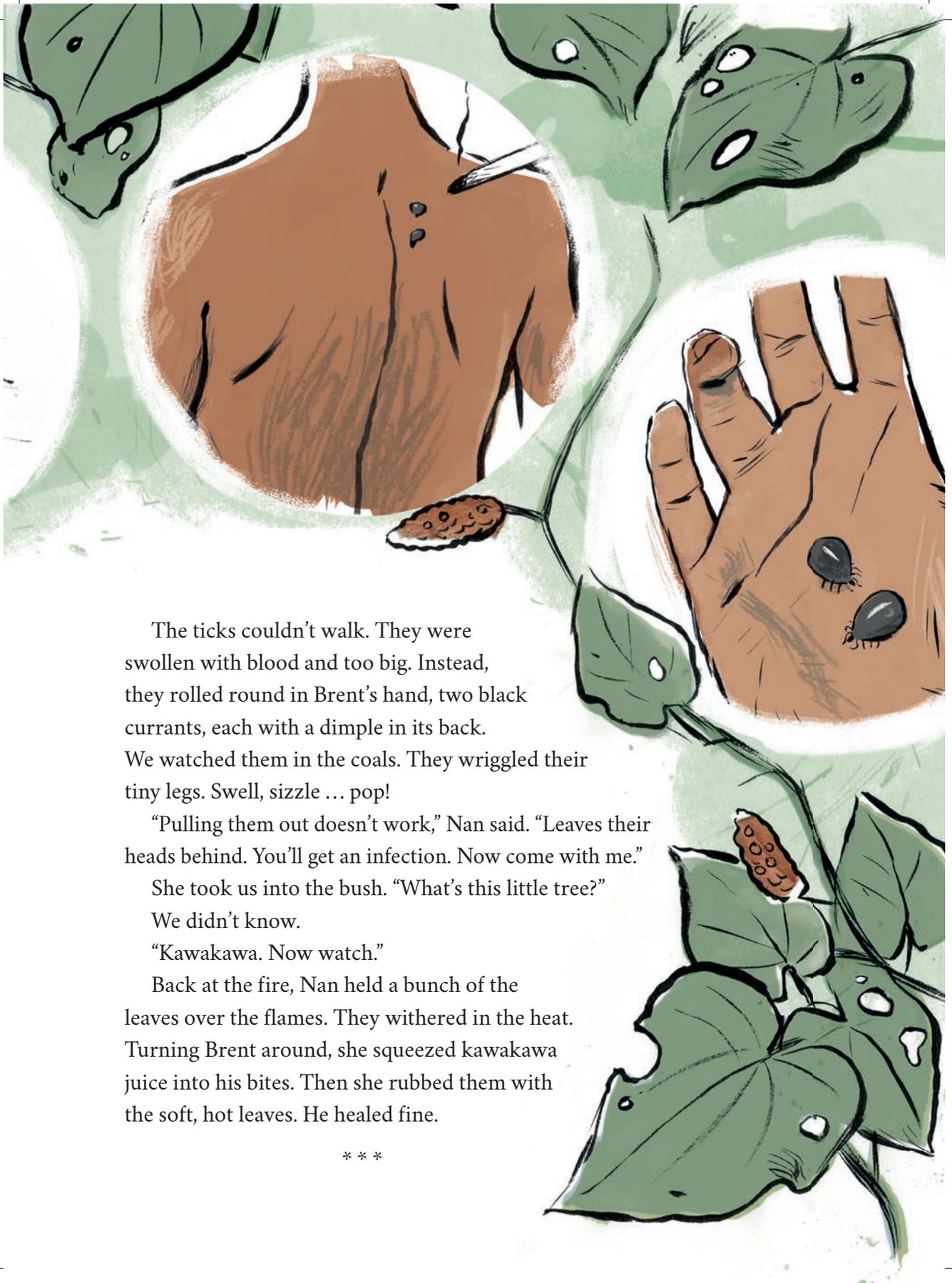




Pop was building a bach. It was going to be our base. While he got on with the business of hauling and nailing timber, Nan taught us how to use hand lines. We'd stand on our fishing spot on the point and swing the sinker around our heads in widening circles. Later, we'd grill pan-sized snapper whole and eat them with tomato sauce – luxury!

One morning, my brother was bent over the fire, boiling the kettle. "Brent, come here," Nan said gently. I think it was the soft tone of her voice that alarmed him; he was a possum caught in the headlights. Nan examined Brent's back. So did I. Two fat black ticks were snugly burrowed between his shoulder blades.

"Get me a burning stick," Nan said. She held Brent firmly by the arm. His eyes went wider still. I took a stick from the fire, and Nan blew out the flame. "Hold still!" she commanded. Carefully, she prodded each creature with the stick's red-hot end. "Still!" Nan repeated. She plucked the ticks from his back with a satisfied grunt. "There," she said, passing the gruesome pair to Brent. "Now into the fire so they won't lay eggs."



The ticks couldn't walk. They were swollen with blood and too big. Instead, they rolled round in Brent's hand, two black currants, each with a dimple in its back. We watched them in the coals. They wriggled their tiny legs. Swell, sizzle ... pop!

"Pulling them out doesn't work," Nan said. "Leaves their heads behind. You'll get an infection. Now come with me."

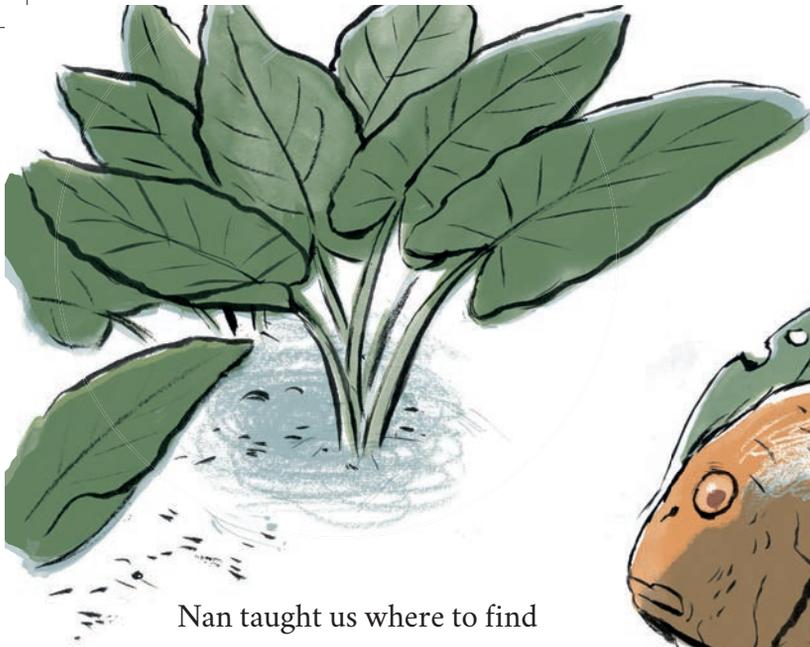
She took us into the bush. "What's this little tree?"

We didn't know.

"Kawakawa. Now watch."

Back at the fire, Nan held a bunch of the leaves over the flames. They withered in the heat. Turning Brent around, she squeezed kawakawa juice into his bites. Then she rubbed them with the soft, hot leaves. He healed fine.

* * *



Nan taught us where to find taro that had been planted by her tūpuna hundreds of years ago. We'd make a baby hāngī in the moist sand between the tides, cooking the taro along with fish wrapped in the vegetable's leaves. Sometimes we boiled the fish heads and backbones, drained off the liquid, and added chopped onion. We thickened this soup with dried sea lettuce. It kept you full. We also smoked pipi on flax strings over the fire. Brent and I wore the pipi as necklaces around our necks. We ate them like chewing gum. We smelt a bit weird, I guess, but no one complained.

Most low tides would find us out on the rocks, looking for kina, mussels, and oysters or digging for pipi and cockles in the sand. We sizzled our shellfish over the fire in the evenings and ate them hot, sipping the juice from the shells. We always cooked a few extra pipi for bait. Cooked, they stayed on the hook better. A camp oven always waited by the fire for the next course.

* * *



“I want to show you how to make a whare raupō,” Nan said one day.

We gathered armloads of raupō reeds from the swamp by the taro patch. Pop cut some mātuka poles and made a tiny house frame, lashing the poles together with flax. We bound the reeds in tight packets and tied them to the frame to make the roof and walls. Pop hung a tarp over the thatched roof. “Another luxury!” he said. The entrance was a small, square hole we had to crawl through.

The whare raupō sat proudly on the edge of the bush as if it had been there for centuries. Brent and I slept in it on more springy mingimingi. The mossies ate us alive until Nan filled a milk-powder tin with hot coals to put inside the door. We dropped kawakawa leaves on top to smoulder. As the smoke rose, the mossies vanished. Nan said that the whare would probably fall apart before we came back next year. She was right.

* * *



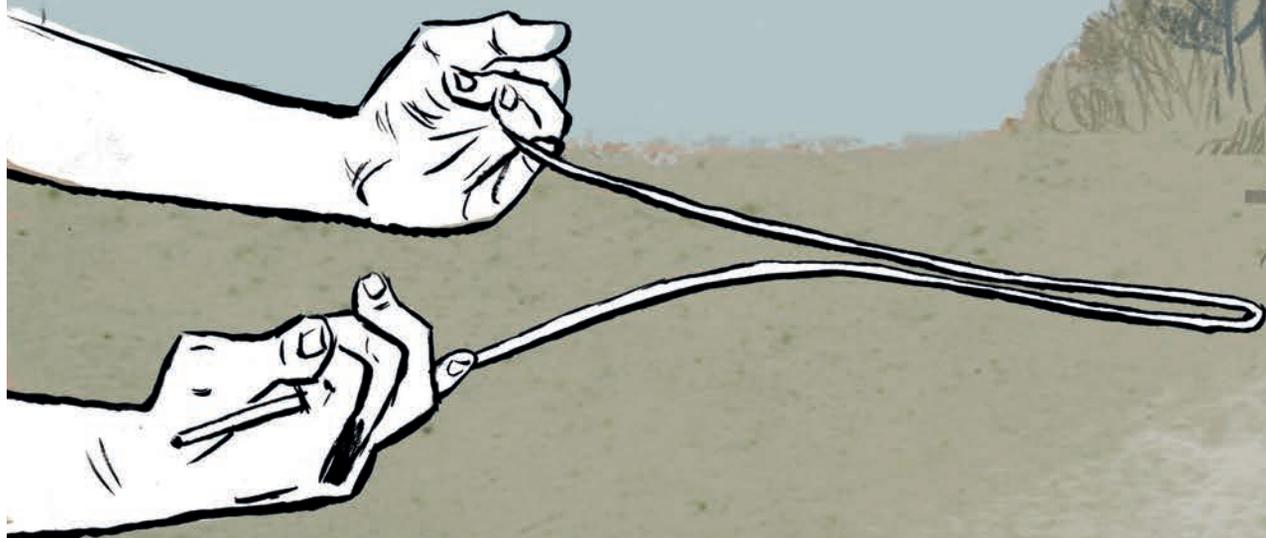
At night, Nan told us stories about her grandparents. They had brought her up and were both great chiefs. The land on the harbour had belonged to them. When Nan was a young woman, they tried to arrange a marriage for her with a man from a chiefly line. She refused and ran away to the Hawke's Bay and married Pop. Or so the story goes.

As a little girl, Nan reckons she saw a moa on the beach. It was blue, bigger than a turkey, and fat like a barrel. The blue turkey barrel hooted at Nan. She followed its tracks along the sand until they disappeared into the bush. I always watched for strange prints after I'd heard that story. I'd listen for hooting in the bush. The moa feathers in museums were brown, but I reckoned those ones were old and faded.

* * *

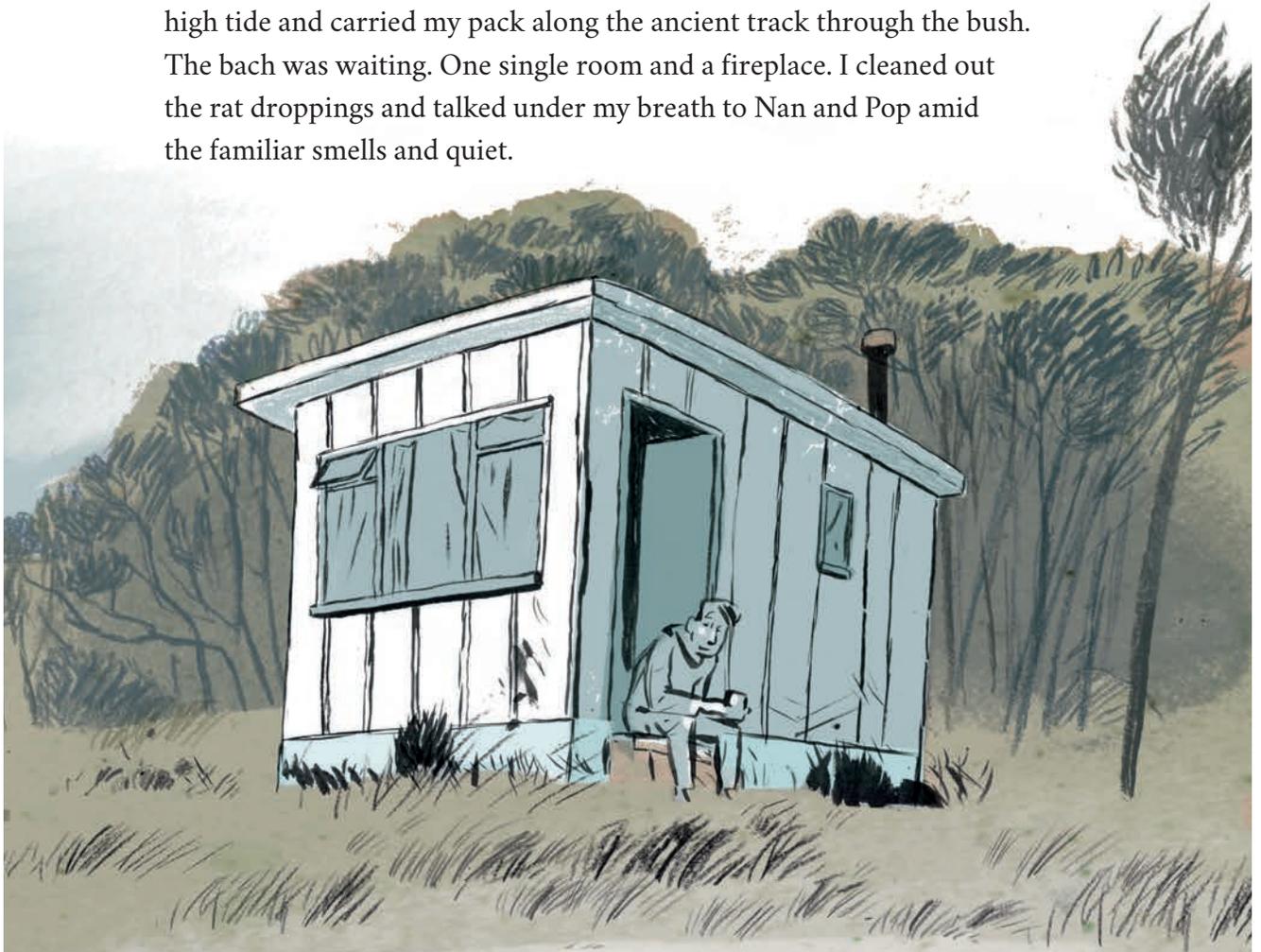
People came to visit Nan. Sometimes they'd row; sometimes they'd walk around on an outgoing tide. Nan would be taken to help someone who was sick. Occasionally she helped people to find water. For this, she had a piece of number eight wire. She held the bent wire loosely over the ground. It would quiver and swing and eventually point to where water flowed or rested underground. Like magic!

* * *



Over the summer, our skin darkened and became crusted with salt. We didn't wash in fresh water, ever, but Nan made us brush our hair. We swam every chance we could. The summer holidays seemed endless. Brent and I grew strong. Nan and Pop taught us how to live well on very little. I didn't understand why it couldn't be that way all the time.

And so, many years later, I found myself heading north. I arrived at high tide and carried my pack along the ancient track through the bush. The bach was waiting. One single room and a fireplace. I cleaned out the rat droppings and talked under my breath to Nan and Pop amid the familiar smells and quiet.



The bach was to be my home. I had the skills. Now that I was captain of my own ship, I was going to stay there as long as I could.

illustrations by Daron Parton

Talking to the River

by Clare Knighton



A person wearing a dark blue jacket is holding a red and grey water sampling device in a river. The device has a red top and a grey bottom with several holes. The background shows a rocky riverbank and water.

**Kaua e kōrero
mō te awa,
kōrero ki
te awa.**

**Don't talk
about the river,
talk to
the river.**

The story

The Pahaoa River curves around three sides of Grant Muir's farm at Hinakura, a rural community in southwest Wairarapa. When Grant arrived in the district in 2002, the river was teeming with life. Ten years later, it was almost dead. The fish had gone, and the water was brown with **algae** and foamed when it rained. Something was killing the river, and Grant thought he knew what.

Cows from nearby farms often grazed on the unfenced riverbanks. This was destroying the vegetation and eroding the banks. The animals' manure in the water added to the problem. Grant tried talking to his neighbours but got nowhere, so he went to the local regional council for help. He was determined to save the river for future generations.

The problem

Before it could help, the council needed to know how much pollution was in the river and where it was coming from. Grant could see for himself that the Pahaoa was dying, but he needed to prove it. Getting that proof wouldn't be easy. Nobody was monitoring the river, and the equipment that could do this job was expensive. Most people would have given up, but not Grant.

COWS AND RIVERS

Cows and rivers are a bad mix. Cows produce a lot of manure, and this contains phosphorus and nitrogen, the same **nutrients** that are found in fertiliser. In fresh water, high levels of nutrients cause problems. Algae can start to grow very fast (called an algal bloom) and use up too much oxygen. This can harm fish and river insects. Cow manure also contains bacteria that sometimes cause serious illness in people. High levels of harmful bacteria is the main reason many of our rivers are now unswimmable. Finally, as Grant saw, wandering cows damage riverbanks. This usually means that more **sediment** is washed into the water, reducing the amount of light that can reach the riverbed (see page 22).



Designing the prototype

Grant needed something that could monitor river water cheaply and effectively. Engineering and computer science students at Victoria University in Wellington needed a real-life project. They offered to design, develop, and test a **prototype** that could gather data from the Pahaoa – and any other river in New Zealand.

When it came to designing the prototype, the students had to find solutions to four main challenges.

1 River water changes by the minute. This meant the monitor had to stay in the water. How could the device be protected from damage from flooding and debris? The answer was to design a strong outer shell with small holes so the water could still flow through.

2 Many things affect the health of a river. If there's too little dissolved oxygen in the water, for example, fish can't survive. Fish also die if the temperature of the water changes too much. So how do you gather different kinds of information? By having different sensors. The students decided their monitor needed five. These would measure temperature, turbidity, dissolved oxygen, pH, and conductivity (more about these things later).

3 Pulling the monitor out of the river to access the data would be a hassle. There had to be an easier way, and there was – using Wi-Fi. This meant the monitor could send the data directly to a phone or computer. Users could stay dry on the riverbank and still know what was happening in the water.

4 Grant wanted as many people as possible to keep an eye on our rivers. How could the students encourage this? The solution was to develop an app. People could take and upload photos of river pollution along with the river's name and its location. This information would be shared on a website. Eventually, the website would become a national **database**, where people could go to see exactly what was happening in our rivers.



An algal bloom

THE DATA: WHAT AND WHY?

The prototype monitor was named RiverWatch. It was designed to measure five different aspects of water quality.



TEMPERATURE: The temperature of a river affects every living thing in that river. A significant change in temperature causes stress; extreme changes can cause death. Most native fish prefer water to be between 18 and 22 degrees Celsius.



TURBIDITY: The turbidity (cloudiness) of a river is caused by sediment. Too much sediment reduces the amount of light that can reach the riverbed, and plants and algae need light to grow. If they die, so will the creatures that feed on them. Sediment also clogs up the riverbed and the small spaces that many freshwater species call home.



DISSOLVED OXYGEN: This is the amount of oxygen in the water, which aquatic life needs to survive. If the dissolved oxygen level becomes too low, river plants and animals will die.

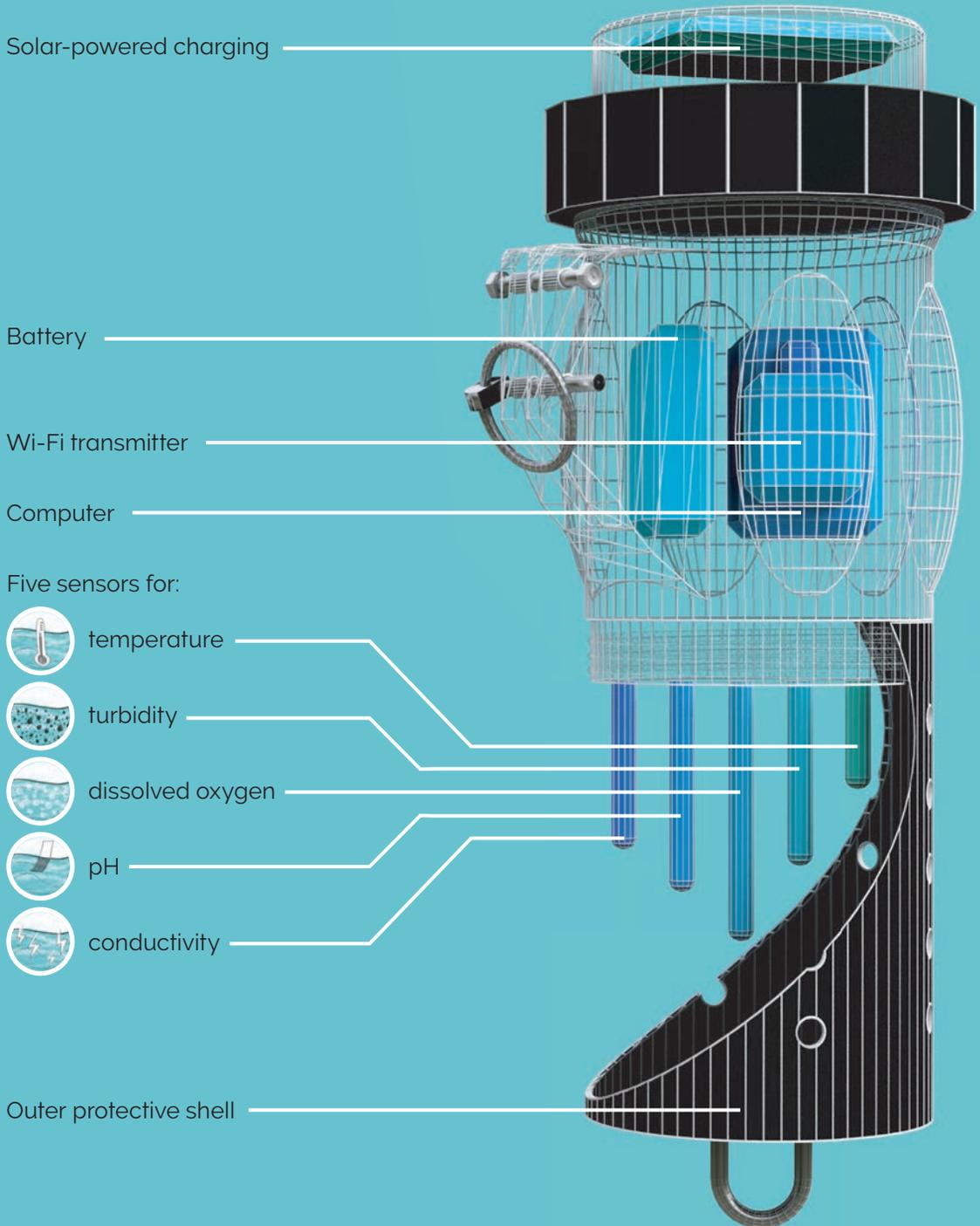


PH: This is a way to measure acidity or alkalinity, a scale that ranges from 1 to 14 (under 7 is acidic, over 7 is alkaline). River water with a very low or very high pH can become **toxic** for aquatic life. River plants and animals need water that has a pH between 6.5 and 9.



CONDUCTIVITY: Conductivity is a measure of how much electricity can pass through water. This information tells scientists about the nitrogen and phosphorus levels of a river, both of which conduct electricity. A river ecosystem needs a small amount of nitrogen and phosphorus to survive – but too many nutrients cause algal blooms, which can choke the waterway and affect oxygen levels.

The RiverWatch monitor: what's inside



Where to now?

The RiverWatch monitor and app are a brilliant example of technology making information widely available. And the team's just getting started. The prototype was finalised in 2016, and the following year, Grant met another milestone: raising \$50,000 on a **crowd-funding** website (in just five weeks!). The money will pay for ten new monitors that will be tested in rivers around the country. Soon, Grant hopes to be selling RiverWatch monitors to the public. In the meantime, work is continuing on the monitor's design. For instance, Grant is interested in measuring the presence of harmful bacteria by using sound waves.





The river today

The Pahaoa River is still in crisis. RiverWatch testing has shown high levels of sediment, and in the summer, the water temperature has been rising above 27 degrees Celsius. This is much higher than most fish prefer.

Sadly, Grant believes these trends aren't unique. "It's not only the Pahaoa that's changing," he says. "River pollution is a problem all over the country." Recent studies show that almost three-quarters of our native freshwater fish species face an uncertain future. Water pollution and habitat destruction are the main reasons for this. A lot of these species are only found in New Zealand. Once they're gone from our rivers, they'll be wiped off the planet.

"If we want to solve our pollution problem," Grant says, "we need to start gathering data from as many sites as possible. Then we need to do something about what this data is telling us. There's so much at stake."

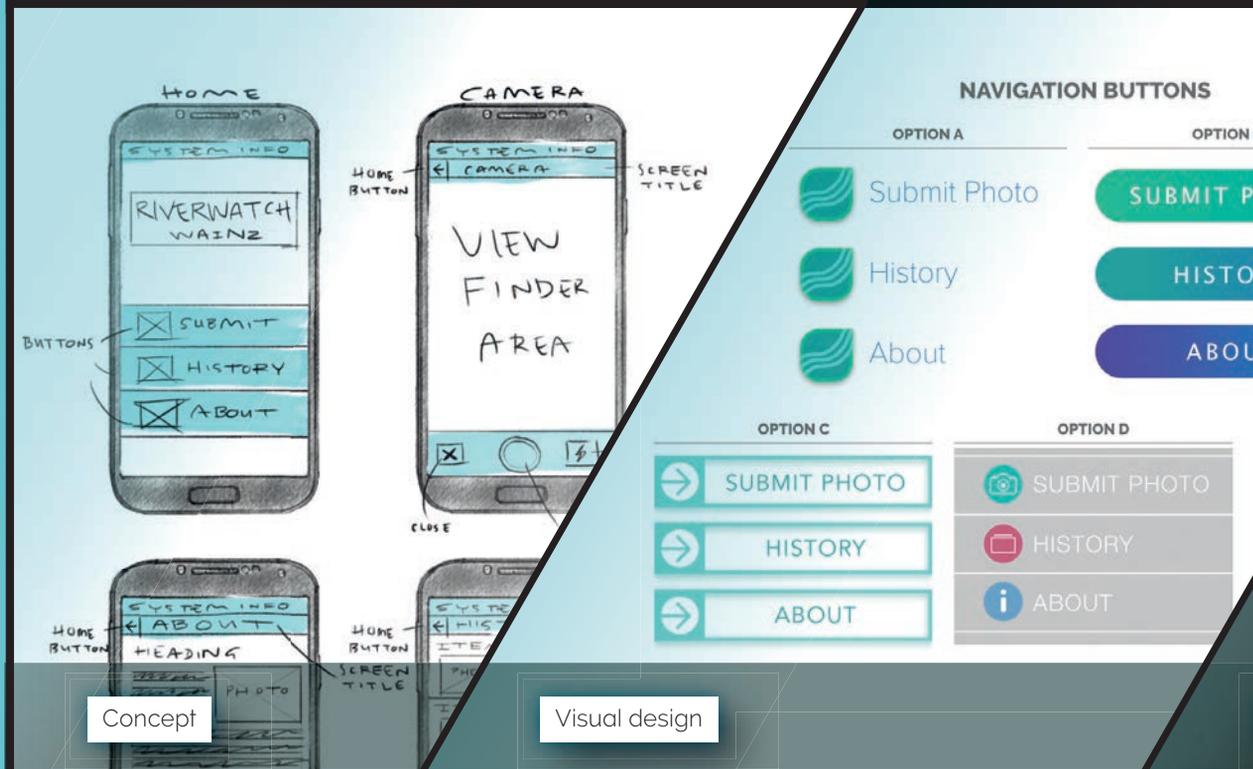
BUILDING THE RIVERWATCH APP

The RiverWatch app is an essential part of Grant's project. It's the main way the public can become involved. So how was the app developed?

First, the students discussed the app's purpose and the ways people were likely to use it. They wanted the app to be as user-friendly as possible. One important decision was choosing what the user would see when they uploaded a photo. How would they know their photo was uploading? What would they see on the screen once this process was finished?

Then came the visual design. What would the buttons look like? What colours would be used for the screens? Would there be any images or animation? How much information would a screen contain?

Next, the app had to be built. This meant writing the computer code that would instruct the phone to produce the screens and functions needed. While apps can be built using basic drag-and-drop software, the students chose to use Java. This programming language was more flexible and allowed them to be more creative.



Finally came user testing, when people trialed the app. User testing was a crucial part of the process. It allowed the students to ask some important questions. Was their product working? Was anything confusing people? What needed to change?

For most app developers, user testing isn't the end of the process. Often, it's just the end of the first development cycle. When it came to the RiverWatch app, each new class of students added their own ideas, slowly improving and refining the design.

Glossary

algae: a very basic form of plant life, usually microscopic

crowd-funding: raising money for a project from a large number of people, usually on the internet

database: a set of information that is accessed using a computer

nutrient: any substance that provides nourishment for a living thing

prototype: a model to test how an invention will work

sediment: particles of soil along with plant and animal matter carried by water

toxic: poisonous

SECTION B

T PHOTO

STORY

ABOUT

Programming

User testing



THE FORCE

by Renata Hopkins



It was a perfect day. As Mum and Dad unpacked the picnic stuff from the car, Harper heard a loud whoop from the direction of the bridge. Seconds later came the heavy splash of a human cannonball hitting the deep water below. The jumping had begun.

“Hear that, Harp?” Max hopped excitedly from foot to foot. “We should go straight to the bridge.”

“Nah, I’d rather have a swim first.”

“The longer you wait, the harder it’ll be.”

“Max!” Dad said. “Harper can make up his own mind. And you need to wait till I’ve checked it’s safe where you’re jumping.”

“But he said he wanted to jump this year.” Max turned to Harper. “You said you wanted to, right?”

“I said I’d try.”

Max cupped his hands on either side of his head, making two pointy ears. “Do or do not. There is no try,” he said in a croaky Yoda voice.

Do or do not. Easy for Yoda to say. He was a Jedi master. It was also easy for Max to say – he’d been jumping off the bridge for three years. Two weeks ago, on his tenth birthday, Harper had told himself he would definitely jump this year. But what if he couldn’t do it?

Harper looked from Max to Dad and back to Max.

“Feel the force,” Max intoned. Harper felt only fear, but he knew that his brother was right. The longer he waited, the harder it would get.

“OK, I’ll do it,” Harper said. *There is no try.*

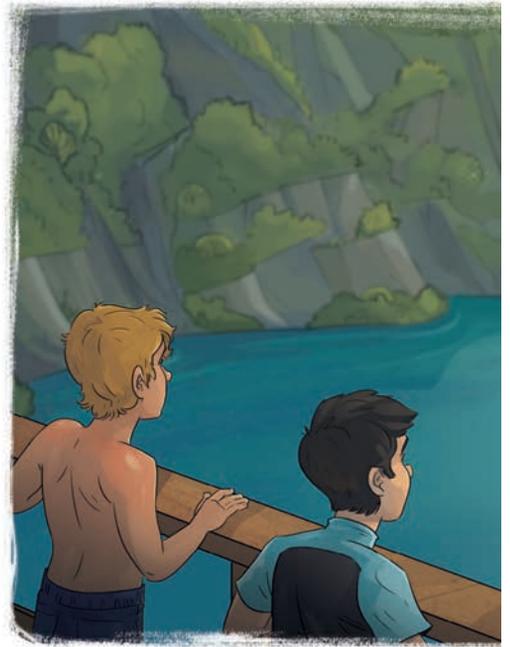
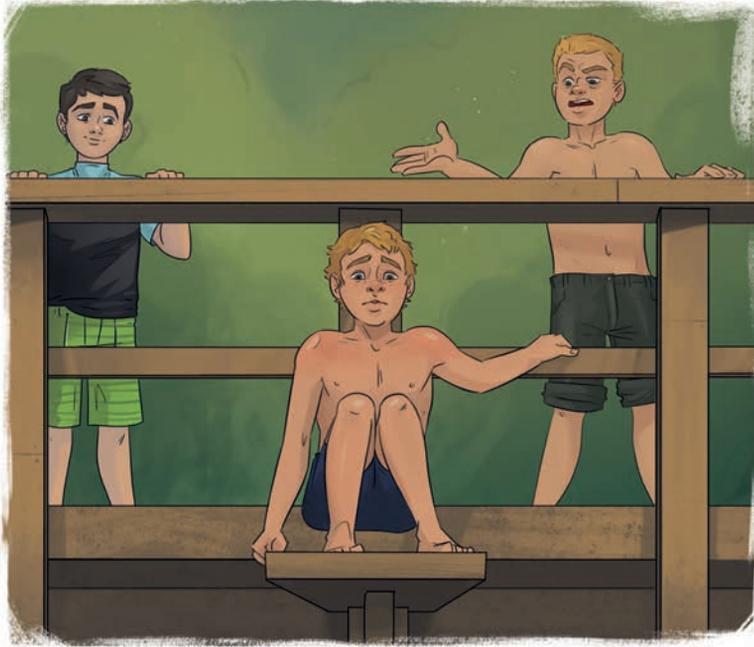
The wooden footbridge joined the picnic area on one side of the river to the tracks on the other. A few metres below, the blue-green water was so clear you could see right to the bottom. Already, kids were crowded at the handrail, waiting their turn.

Harper watched as a teenager in baggy, wet boardies climbed over the railing to stand on one of the struts. The boy didn't hesitate – he simply stepped into space. One by one, the other kids followed. Some looked relaxed. Others screeched and yelled, circling their arms like windmills. But no one chickened out.

“Go on,” said Max, prodding Harper. “We’ve been here ten minutes already.”

Do or do not, Harper thought. But he shook his head. “That guy’s next.”





A boy with sunburnt shoulders climbed shakily through the railing. Balanced on the strut, he froze, staring down at the river.

An older kid stepped forward – a brother or cousin by the look of him. “Get on with it, Van,” he commanded.

The sunburnt boy bent into a knock-kneed crouch. Long seconds ticked by. Some of the kids looked sympathetic, others impatient. Pushy Kid rolled his eyes. “Maybe he needs a hand.” He stepped forward, ready to shove.

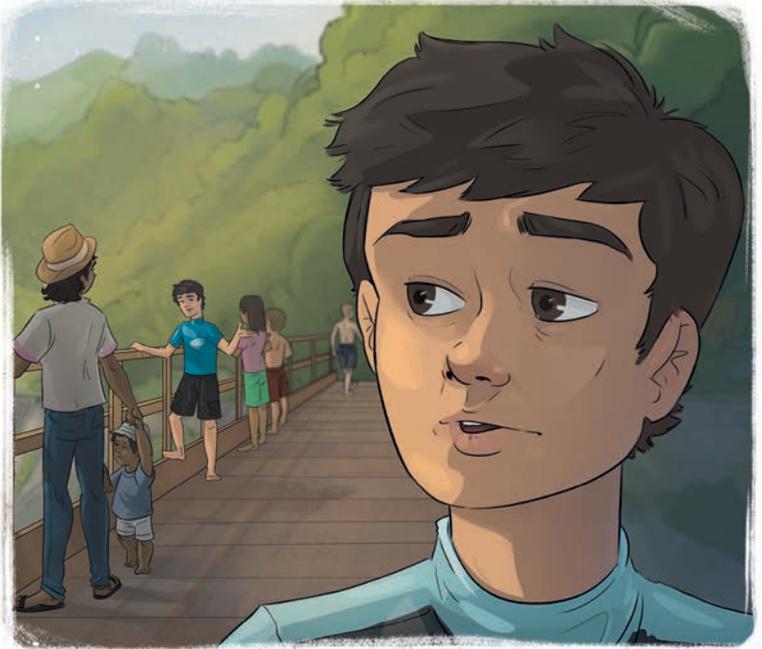
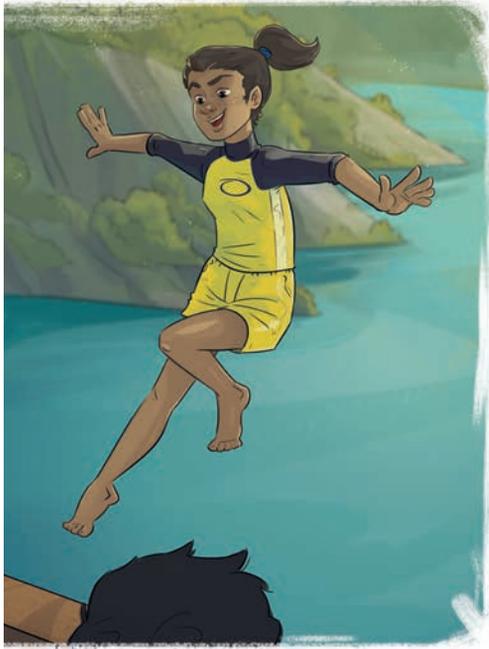
“Don’t,” said Harper, grabbing Pushy Kid’s arm. “He doesn’t have to do it.” The other boy seized his chance to scramble back to safety. He shot Harper a grateful look before running off down the bridge.

“You’re such a girl,” Pushy Kid shouted after him.

A girl in neon yellow turned on him. Her freckly face was fierce. “A what?” she demanded. She put a hand up to her ear. “Say that again.”

Pushy Kid smirked but kept his mouth shut.

“I’m a girl,” Neon Yellow declared. “Like, I am *such* a girl.” She moved to the side of the bridge, but instead of bending through the railing, she climbed up to balance on top. There was an impressed silence as she swivelled to face the crowd. She grinned, then jumped off ... backwards



There was a roar of approval. Kids clapped and shouted. Some boasted they were going to try that next. In the midst of all the noise, Harper felt suddenly certain that he couldn't jump. Not forwards, not backwards – not at all. As Pushy Kid walked off towards the car park, Harper made his own getaway in the other direction.

“Hey!” Max called. “Where are you going?”

Harper gestured in the vague direction of the toilets. Max looked annoyed but didn't follow.

The noise of the bridge jumpers grew gradually fainter. It was cool and peaceful among the trees, and the complicated knot in Harper's stomach loosened. He started up the slope towards the toilets.

“I sense much fear in you,” said a croaky voice.

Harper jerked to a halt. He blinked. A familiar wrinkled creature sat at the edge of the path. He wore a faded orange sunhat, along with his usual dust-coloured robes, and was watching Harper with an amused expression.

“Yoda!” Harper blurted.

The Jedi master wiggled his ears. They were a bit squashed by his hat. “Know me, you do,” Yoda replied. “Hmmm?”

Harper screwed his eyes shut. When he opened them, Yoda was still there. This wasn't happening.

Yoda turned to look at the toilet block behind him. "Loo? Or loo not?" He giggled at his own joke.

Harper swallowed. "Actually, I don't need to go. It was just an excuse to get off the bridge and not jump."

"Then face your fears, you must," said Yoda.

"I tried, but my fears won! I'm not ready."

"Hmmmph! If waiting until ready you are, waiting a long time you will be."

Harper had to think hard about this confusing sentence. "Why do you always talk back to front?" he asked.

Yoda waved a three-fingered hand impatiently. "Change the subject, do not."

"Fine. You're a Jedi master. Tell me how I can make myself jump."

Yoda gave him a hard stare. "Feel the force."

"But I don't feel it. I just feel scared."

"Defended someone, you did. Someone who needed help. What did you feel then?"

"That just ... happened. I didn't really think about it until I'd done it."

Yoda sat up straighter. His old eyes twinkled. "Yes, young Padawan, this is the way. Think less. Worry less. Trust in yourself, even when scared."

Harper's heart beat faster just picturing himself on one of the bridge's struts, but he knew Yoda was right.

"OK, I'll try, even though there is no 'try'."

From back down the track came the sound of voices. Harper turned to see a mother, leading a grizzly preschooler.

"Quick," Harper said. "You'd better hide before –" But Yoda was gone.

As the bridge came into view, Harper's feet seemed to drum out the words. *Do-or-do-not-do-or-do-not*. He still had no idea which of these options would win out.



Max was waiting, his hair and togs wet. “You took ages,” he said.

Harper opened his mouth to explain. *I’ve been having a chat with Yoda by the toilets. He was wearing an orange sunhat.* But before he could say anything, Max spoke again.

“You know you don’t have to jump, right? We can just go swimming – no biggie.”

Do or do not. Harper suddenly saw that Max was right. The bridge jump wasn’t a test he had to pass. It was a choice, and he was free to make it. A swim would feel amazing.

“See you down there,” Harper said. Then he was climbing through the railing on jelly legs. Below him, the last kid to jump was swimming to the side. The deep water waited.

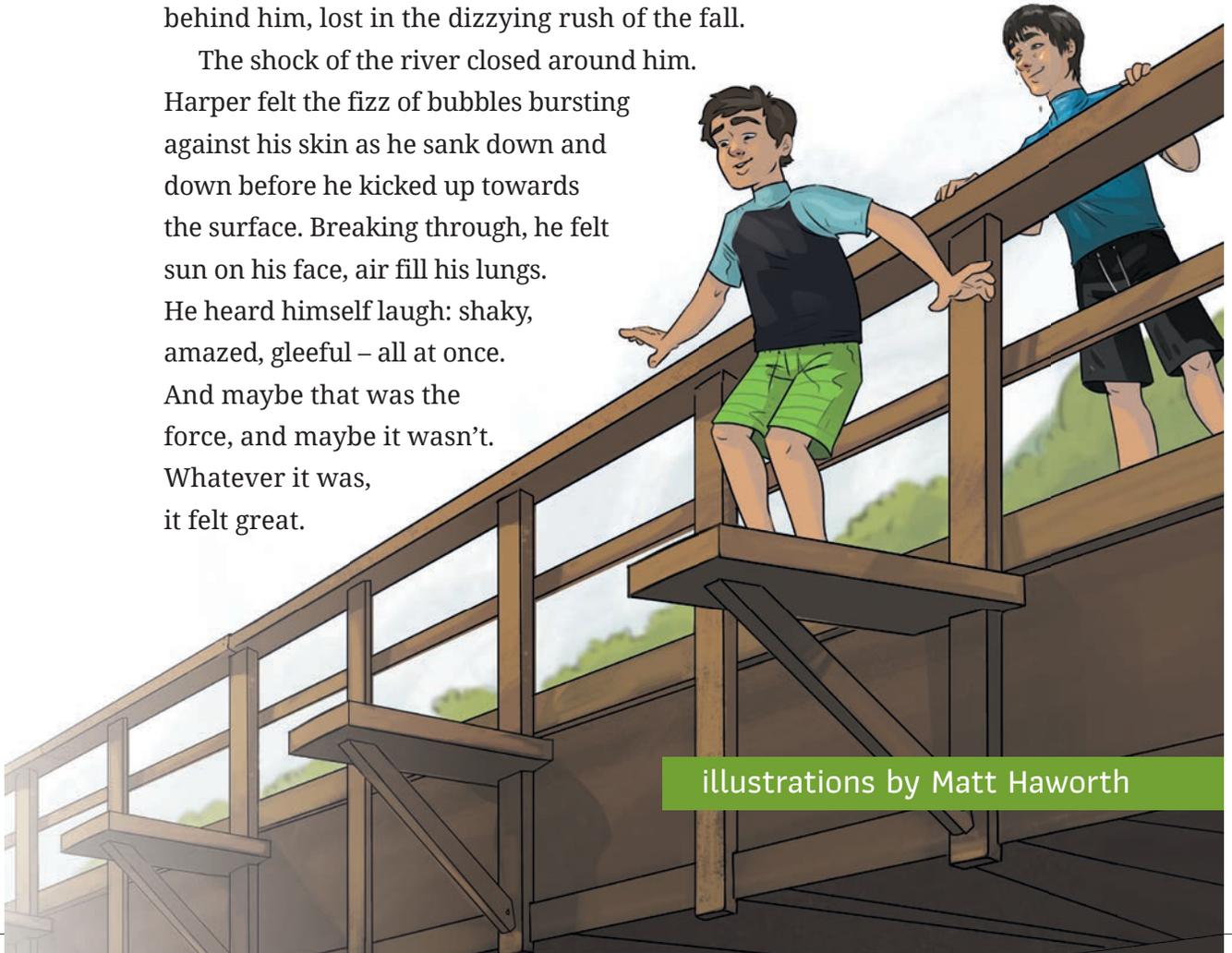
“Feel the ...,” Harper heard Max say, but the last word trailed behind him, lost in the dizzying rush of the fall.

The shock of the river closed around him.

Harper felt the fizz of bubbles bursting against his skin as he sank down and down before he kicked up towards the surface. Breaking through, he felt sun on his face, air fill his lungs. He heard himself laugh: shaky, amazed, gleeful – all at once.

And maybe that was the force, and maybe it wasn’t.

Whatever it was, it felt great.



illustrations by Matt Haworth

SHARKS

BY ALISON BALLANCE

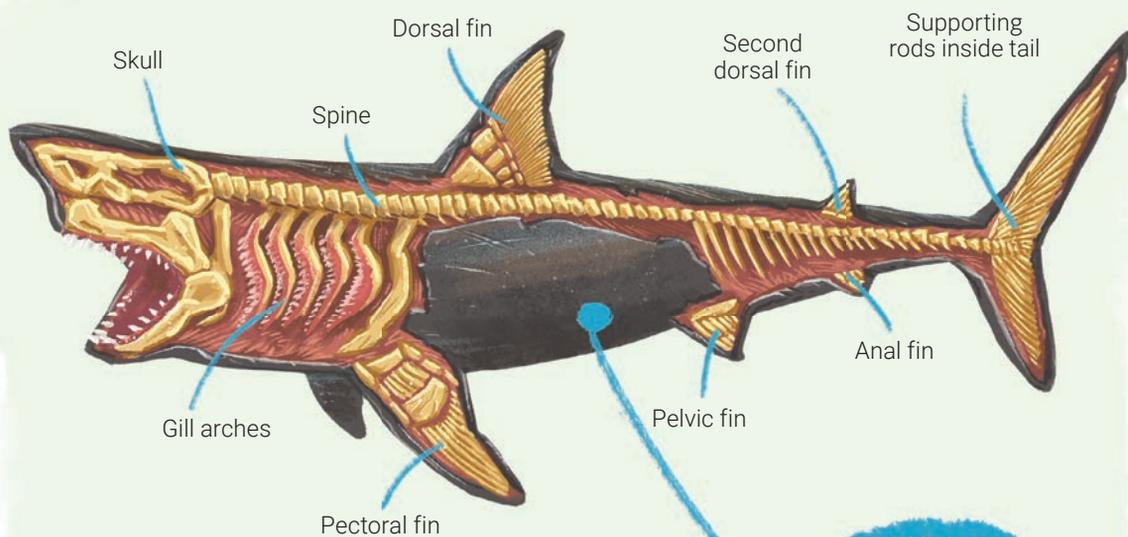


All kinds of sharks live in the seas around New Zealand. Some are small, others huge. There are sharks with stripes and sharks with spots. Some sharks live in the deep ocean. Others like shallow harbours. So what do these sharks have in common?

BIG FISH

All sharks are fish, although their skeletons are made from cartilage, not bone. Cartilage is lighter than bone, and it's tough but elastic. People have cartilage in their hip and knee joints.

The skin of a shark looks smooth and shiny, but look again! It's made of hard, grooved scales that protect the shark's body. These scales have another job. When a shark swims, water flows along the grooves. This means less **friction** so that the shark can swim faster.



There are more than 1,250 species of sharks in the world. In New Zealand, we have 112 species. They belong to three groups: sharks, rays and skates, and deep-sea chimaeras (pronounced kai-meeras). Many of the sharks found here live in all oceans, but around twenty-three species are **endemic** to New Zealand. We don't know a great deal about sharks, although scientists have studied a few species, including the great white.



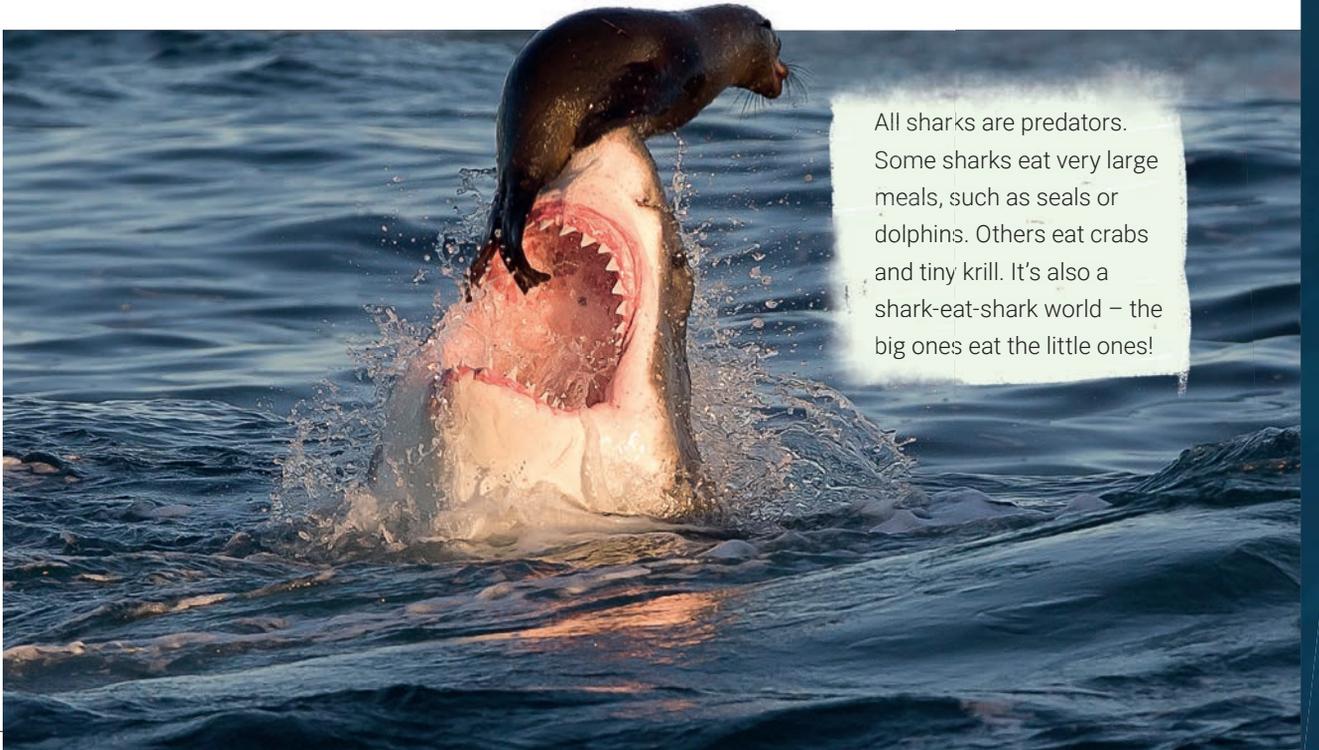
Shark skin seen through a powerful microscope

GREAT WHITE SHARKS

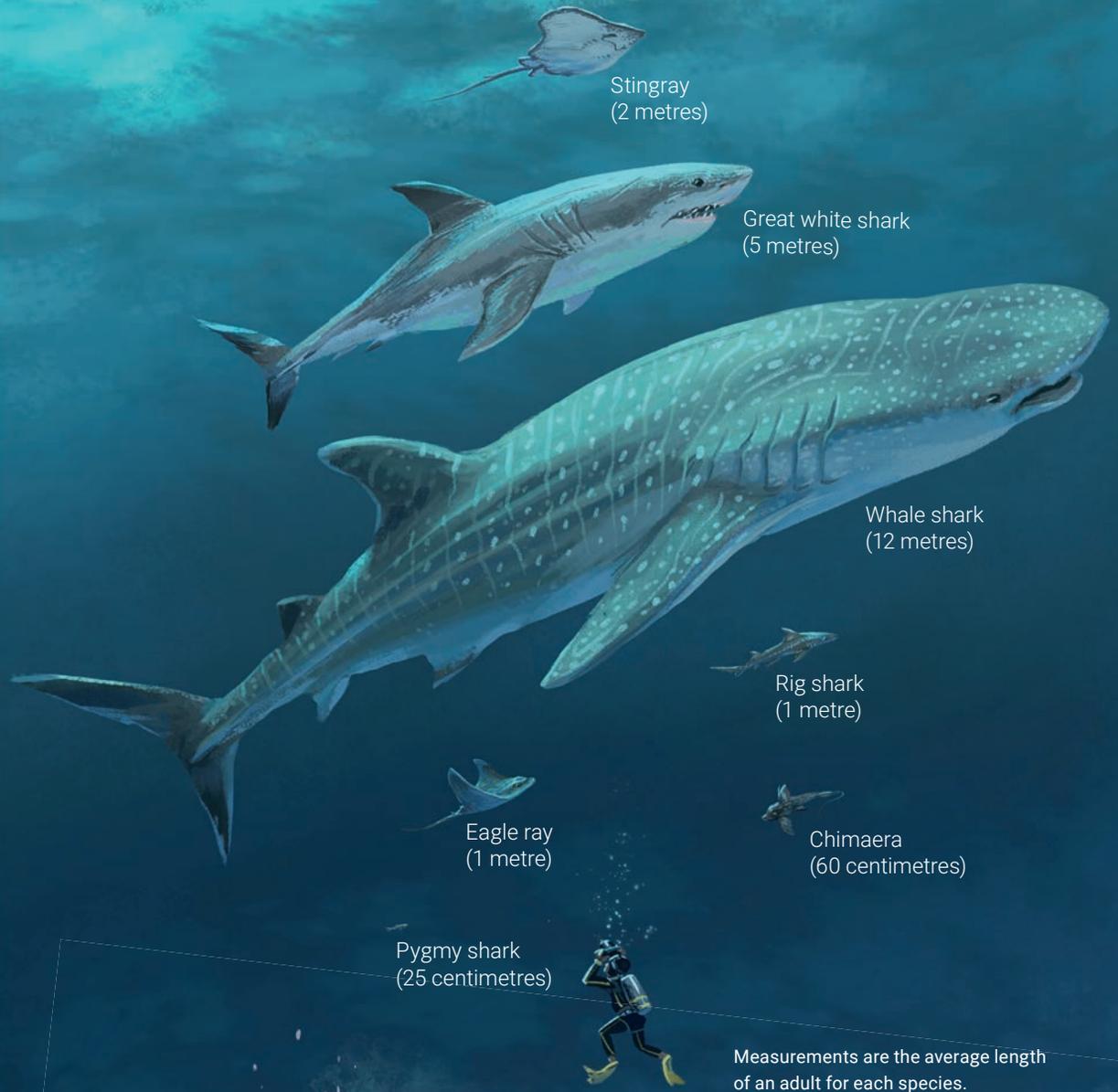
The great white is one of the largest sharks found in New Zealand. At birth, a great white measures around 1.5 metres, but it can grow up to 6 metres. The female sharks are usually bigger than the males.

Like many shark species, a great white has a grey back and a white belly. This is known as counter-shading. From above, the shark's back matches the dark water below. From below, it's hard to see the shark's white belly against the bright surface. These two colours meet around the gills, where they create patterns that are unique to each animal, just like a person's fingerprints.

In one study at Stewart Island, scientists used these patterns to identify more than 170 great whites. To find out where the sharks went during the year, the scientists then tagged around fifty of them. They discovered some surprising things. The great whites didn't stick to the cool waters around New Zealand. Most spent winter in the tropics. Some went to the Great Barrier Reef while others went to Vanuatu, New Caledonia, Fiji, or Tonga. A few of the sharks swam south, to the subantarctic region, before heading back north. This told scientists that great whites can live in water as cold as 3 degrees Celsius – another new discovery.



All sharks are predators. Some sharks eat very large meals, such as seals or dolphins. Others eat crabs and tiny krill. It's also a shark-eat-shark world – the big ones eat the little ones!



Stingray
(2 metres)

Great white shark
(5 metres)

Whale shark
(12 metres)

Rig shark
(1 metre)

Eagle ray
(1 metre)

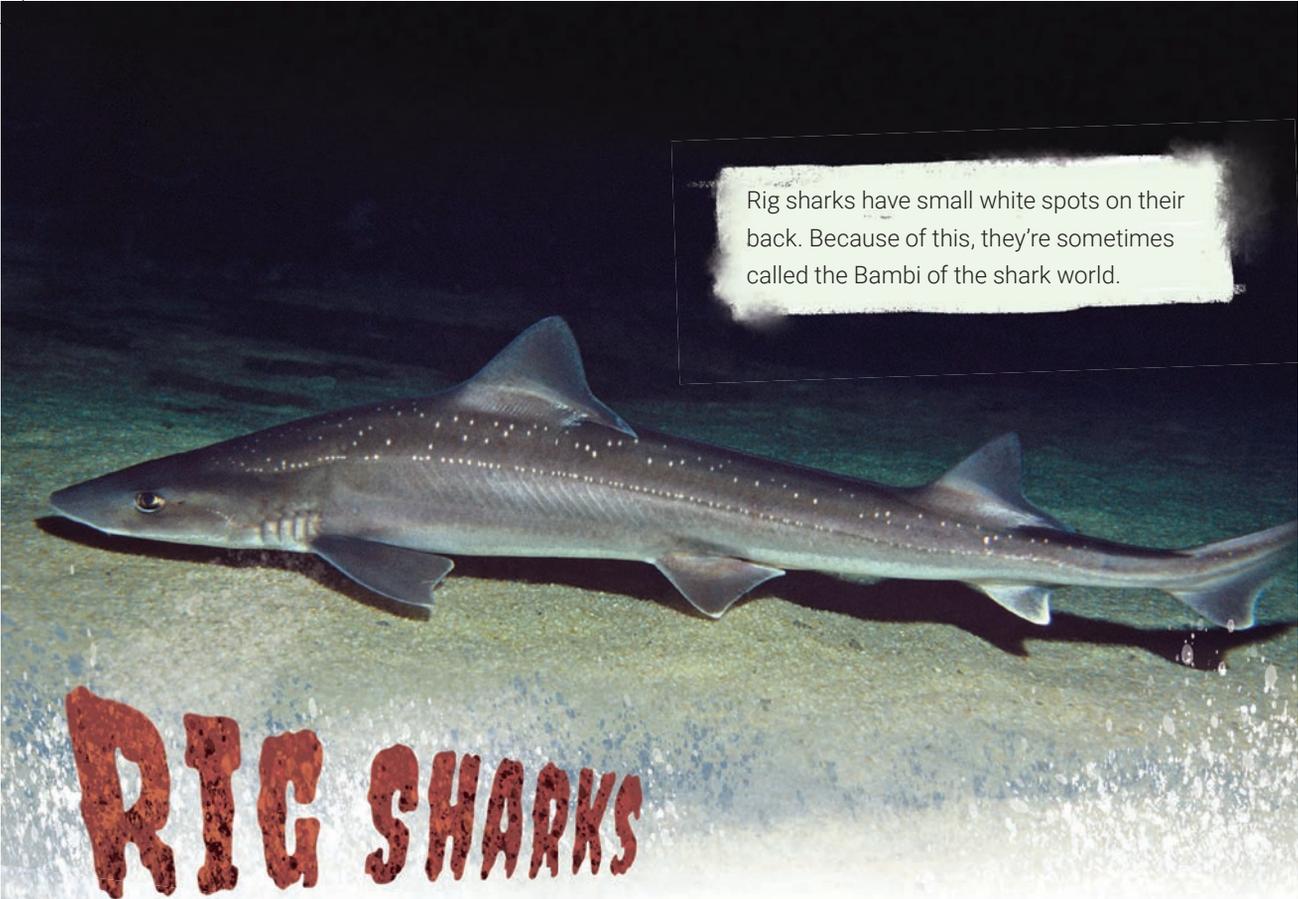
Chimaera
(60 centimetres)

Pygmy shark
(25 centimetres)

Measurements are the average length of an adult for each species.

RECORD HOLDERS

The biggest shark found in New Zealand is the whale shark. The average length of an adult whale shark is 12 metres, although they can grow to 18 metres. In the summer, when the sea is warm, whale sharks are often found around Northland. Our smallest shark is the pygmy shark. This species never grows longer than 27 centimetres – shorter than your school ruler!



Rig sharks have small white spots on their back. Because of this, they're sometimes called the Bambi of the shark world.

RIG SHARKS

Rig sharks live in harbours and estuaries right under your nose. You've probably eaten them without realising. Most fish and chip shops sell rig under the name lemonfish. Some people also use the name spotted dogfish.

A rig has a flat belly, and its mouth is on the underside of its head. This design allows it to hug a harbour's muddy bottom. Mud crabs and shellfish are a rig's favourite food, which is why its teeth are made to crush and grind. An adult rig can grow as big as 1.5 metres. In spring, they come into shallow water, including the Porirua, Raglan, and Kaipara harbours. These places are important breeding and nursery grounds. After the females give birth, the adults leave for deeper water. Because females mate with more than one male, shark pups born in the same **litter** can have different fathers. Newborn pups stay in shallow water for about six months, leaving in early winter.

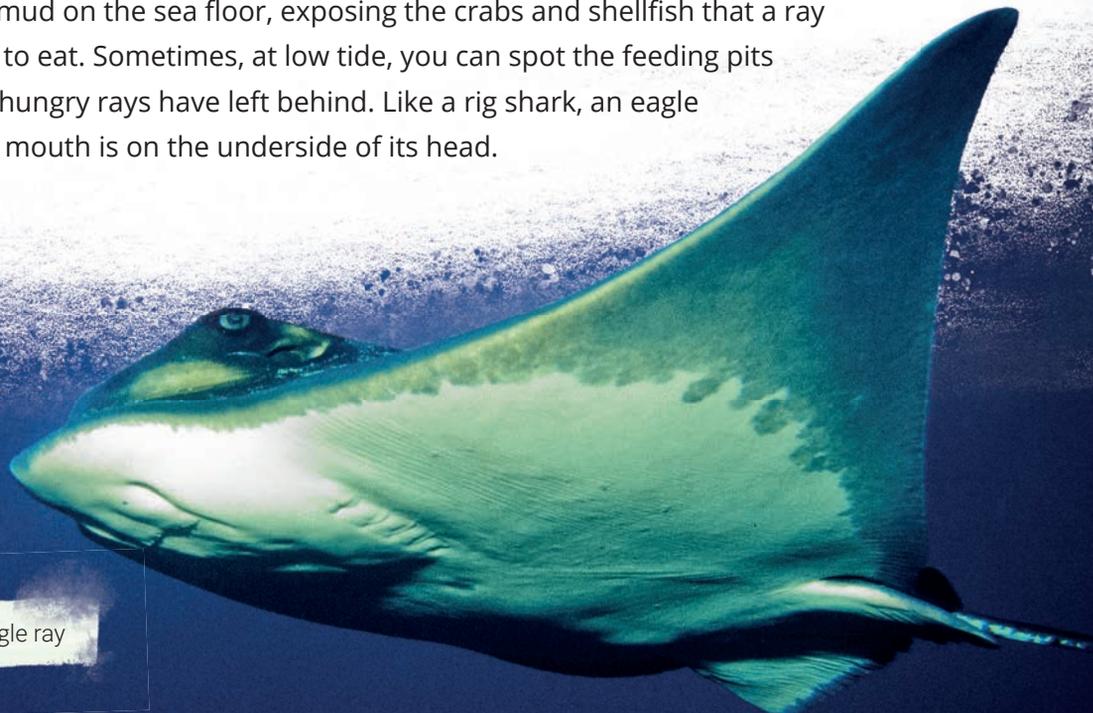
After heavy rain, fresh water often floods the places where young rigs live, changing the **salinity** level. When this happens, the rigs move to the mouth of the harbour or estuary to be closer to the sea.

EAGLE RAYS AND STINGRAYS

Eagle rays and stingrays are basically flattened sharks that move along the sea floor. It's easy to tell the two apart. Eagle rays have pointy wings, which they flap like a bird, and stingrays have rounder wings.

One eagle ray species and two species of stingrays are commonly found in New Zealand's shallow waters. A third stingray species lives in the open ocean. A good place to see eagle rays is Whairepo Lagoon on Wellington's waterfront. The lagoon is named after the eagle rays that visit during summer. It's common to see eagle rays and stingrays in places like this, especially when fishers feed them scraps.

Eagle rays scavenge fish scraps, but they also have a clever way of finding their own food. This involves using little holes, called spiracles, which are found on top of a ray's head. The ray sucks water in through these spiracles before jetting it out through gills on the underside of its body. This blows away sand and mud on the sea floor, exposing the crabs and shellfish that a ray likes to eat. Sometimes, at low tide, you can spot the feeding pits that hungry rays have left behind. Like a rig shark, an eagle ray's mouth is on the underside of its head.



Eagle ray



Long-tailed stingray

Eagle rays and stingrays are popular items on an orca's menu. New Zealand orcas hunt in packs. Once an orca catches a ray, it often flips the ray like a pancake or spins it like a frisbee. This is a way to avoid the sharp barbs on a ray's tail.



Chimaeras are small, mysterious sharks that live in deep water. Scientists are still finding new species of them. Chimaeras are very unusual looking, which is probably why they were named after the fire-breathing monster in Greek myths. This monster was a mix of animals: a lioness, a snake, and a goat. Chimaeras are also known as spookfish or ghost sharks.

A chimaera has smooth skin with no scales. Its big eyes have a reflective layer at the back, just like a cat's, so it can see in the dark. A chimaera also has strange-looking teeth that grind up food from the sea floor. Most chimaeras have a poisonous spine on their back.

SHARKS UNDER ATTACK

Sharks get a lot of bad press, but in New Zealand, fatal shark attacks are rare. A person is much more likely to drown than be killed by a shark. In fact, scientists argue that sharks themselves are under threat. Only seven species of sharks and rays are protected by New Zealand law. The conservation group **IUCN** lists four New Zealand shark species as vulnerable to extinction. More than seventy of our shark species are caught by fishers, often by accident. Sharks mature late and have few young, so this by-catch puts all shark species at risk – not to mention your fish and chips!

This shark drowned in a fishing net. An accidental death like this is called by-catch.



GLOSSARY

endemic: only found in one place

friction: the action of one surface or object rubbing against another

IUCN (International Union for Conservation of Nature):
an environmental group that works to protect the natural world

litter: the young animals born to the same mother at the same time

salinity: saltiness



River Swimming

You would go for the whole day, pack a picnic lunch and a Sunday collection of things.

Your mum always remembered the stuff you would forget: sunblock, hat, a blanket for later, toilet paper (just in case).

You took care of the essentials:

togs, towel, boogie board, the last

of the chocolate you got for Christmas

that you'd been hiding from your sisters.

Too cold too fast too blue; the adults sat

beside the river on the bank, drinking tea

from flasks and commenting on the weather.

Make-believe was everywhere they couldn't see:

the current was a lane pool to race each other,

flapping furiously towards nowhere;

the silver slivers of trout were the taniwha's

minions, emerging from the shadows

to make sure you didn't go too far upstream;

underwater, you were a mermaid, hair fur-soft

your skin aglitter and sun-through-water blue.

Watercress came home with you in a plastic bag

and Mum would dish up some for dinner,

little tastes of river-fresh that wouldn't live

another day. Dad would say you were eating

rabbit food, and you'd wonder what he meant –

you'd never seen a rabbit in the river before.

After dinner you'd find your uneaten chocolate

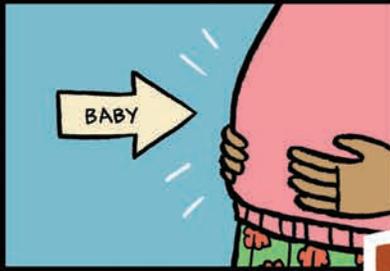
underneath the damp towel in your bag.

It had melted and set again in the shape

of a rabbit.

Or a taniwha.

Lynley Edmeades



Plenty of Room

by Sarah Johnson



Sometimes I just want to be alone. Know what I mean? It's good. Gives you a chance to think. I don't like hanging out with other people all the time. I need space. So you can imagine how I feel when Dad tells me Sharon's having a baby.

"A baby?" I say. "But babies make noise. And they puke."

"You're getting a new sibling!" Dad says. "It'll be great!"

"Where's it going to sleep?"

"There's plenty of room," he says. "Plenty of room."

A lie, and he knows it.

So far in our house there's me and Dad and Sharon. She's been around almost a year now. I like Sharon. She's nice.

Then there's Uncle Adam. He sleeps in the spare room. He's not a real uncle, but he's been with us so long we call him one.

Uncle Don is a real uncle. He sleeps on the couch in the lounge. "Just till he gets back on his feet," Dad said. "Finds a place of his own." That was five months ago.

Sarah and Sam live in the sleepout. They're not related at all, but Dad treats them like part of the family. Sarah is the daughter of Dad's friend on Great Barrier. Sam is her boyfriend. They're finding their feet, too.

Things are no better at Mum's. There's Mum and her girlfriend, Tracey, and at weekends, when I visit, there's also Tracey's four kids: Anita, Alwyn, Ariana, and Angela. Mum says it's quieter during the week.

Now there'll be a baby.

After Dad tells me, I look up sibling in the dictionary: "each of two or more children or offspring having one or both parents in common; a brother or sister". Brother or sister – that doesn't sound like many options to me.

"Sibling" I write in my notebook. Then "Binslig", "Gilsbin", "Singlib", "Bisglin", "Nigslib", and "Igsnilb". Beside the names, I draw pictures – alien babies with extra-large heads, six arms, and four eyes. Binslig has an enormous howling mouth. Igsnilb has a trunk instead of a nose.

It's a shame the baby doesn't qualify as a step-sibling because then I could have called it Pest-Binslig, which in my opinion just about sums it up. I add the name to the list anyhow. Pest-Binslig is green with five antennae and a rubbish bin for a body.

Before the baby's born, the level of excitement in our house becomes unbearable. Dad and Sharon act like they've won the pokies. When they aren't cooing over pictures of cots and prams in catalogues, they're endlessly discussing baby names. Their ideas are way too cute.

"What about BJ?" I suggest one evening. "Or JB? Or how about Binslig?"

They ignore me. I go to my room for some quiet time. Fat chance of that. Uncle Adam and Uncle Don are hosting a full-moon drumming circle outside my window. Men only. Sam's part of the circle. Sarah's supporting on tambourine from the sleepout.

I think about my poor sibling. Who's going to hear it when it cries?

When the baby's born, I stay with Mum and Tracey for a few days. It's a boy, and even Mum's acting like his arrival is earth-shattering news.

"Stop sulking," she says. "You'll love him when you see him. Wait and see."

"Binslig," I say under my breath. "Gilsbin."

"What are you muttering about?" Mum asks.

"Just practising nursery rhymes," I say. "For the baby."

Dad picks me up after school to visit Sharon and the baby in hospital. I take my time getting ready. Then, when we're halfway there, I suddenly remember I've left my homework sheet at school.

"We'll miss visiting hours," says Dad.

"My homework's due tomorrow."

So we go all the way back.

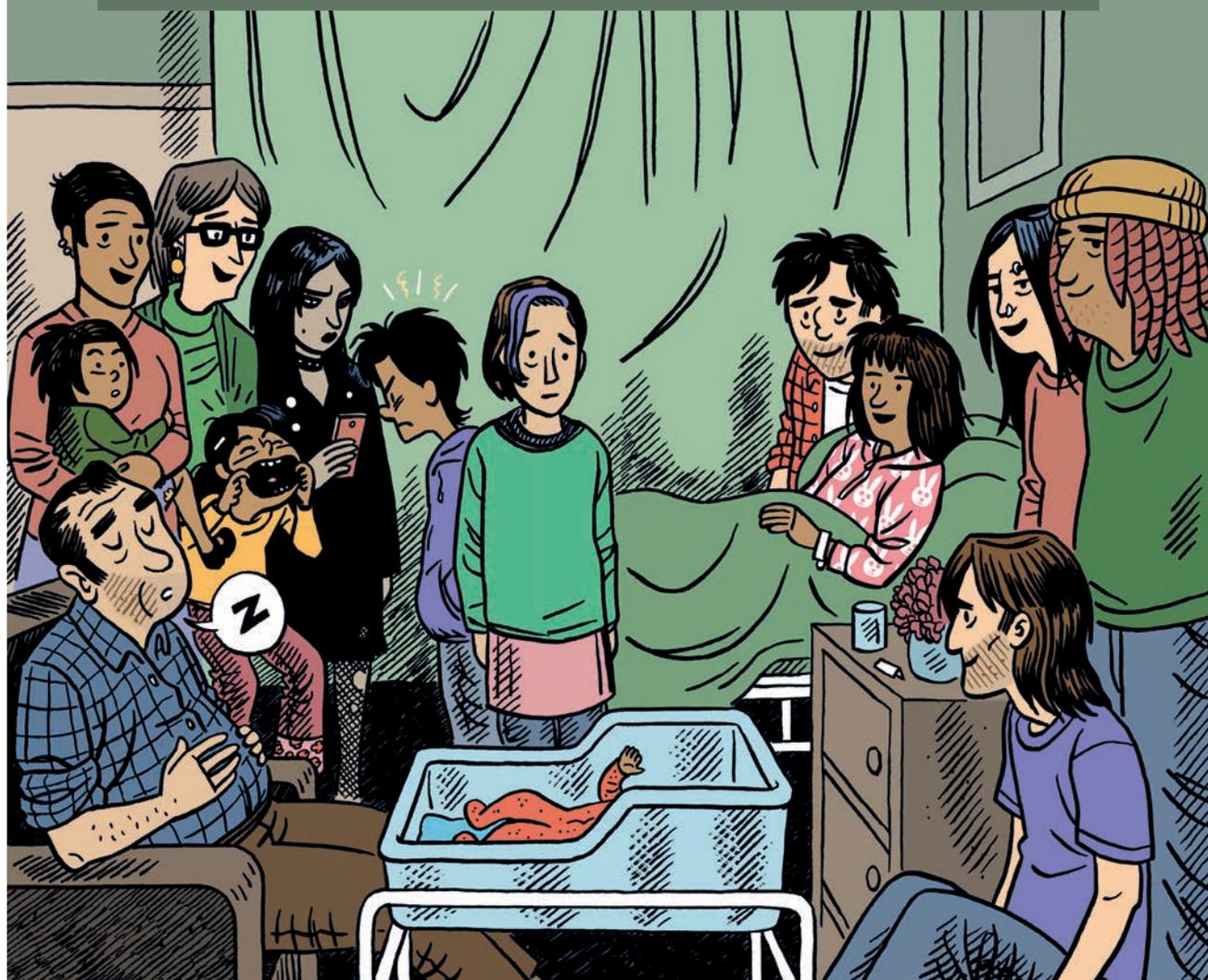


Unfortunately, it's just more time for Dad to rave on. "Wait till you see his hands," he says. "They're so tiny. And his hair. So soft! And he smells like fresh bread and flowers and sunshine, all rolled into one. Scrum-dish-o-licious!"

Scrum-dish-o-licious? Is that a word?

At the hospital, Dad parks the car, and we take the lift to the maternity ward. Everyone's there, and they all grin when I come in. Sharon's in the middle of it all, sitting up in bed. She's wearing her pink onesie with rabbits on it. By the window is a cot – not a flash, wooden one, like in the catalogues, but a plain hospital one.

"He's asleep," says Sharon.



Dad places a hand on my shoulder. “Take a look,” he says. He goes to sit by Sharon, and I go and look in the cot.

The cot’s quite big, and the baby’s very small. I have to lean a long way over to get a proper look. When I do, it’s not his smell I think about, or how cute he is, or his hands, or his hair ... or any of the other million things Dad mentioned in the car. What I think about is all the names. They bounce round in my head, trying to claim top spot. Blignis, Gilsbin, Singlib, Bisglin, Nigslib, and Igsnilb. None of them seems right, so when I lean even further into the cot, I just whisper, “Hello, baby.”

He’s not asleep; he’s just pretending, and he blinks when I speak. He has his head turned towards the others, so I explain who they are. Backwards. “That’s Nod,” I say. “Mada, Haras, Mas, Norahs, Dad, Alegna, Anaira, Nywla, Atina, Yecart, and Mum. My mum, not yours. But you don’t need to worry about any of them. You just need to worry about me.”

The baby turns his head towards me, and although his eyes are sort of cross-eyed and watery, I’m sure he sees me. I stretch one finger down and touch his hand, and his fingers unfurl, then clamp over mine like an anemone.

I lean in even further until my face is only centimetres from his. Now I can smell him, and Dad’s right – he is scrum-dish-o-licious.

“You can sleep in with me,” I say. “Once you get home. There’s plenty of room.”

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