

The Superteam

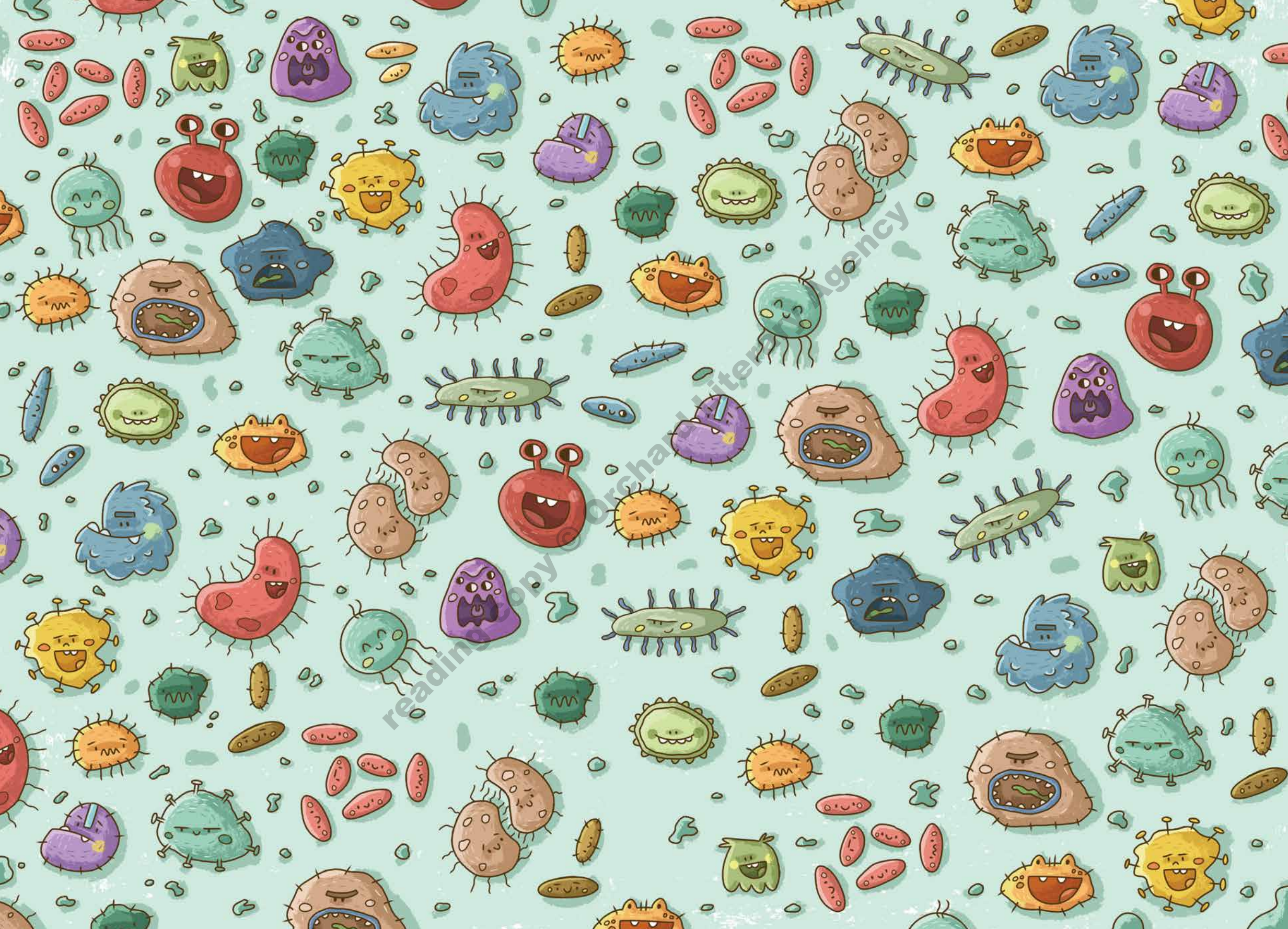
VIBÓK ILDI

A SZUPERCSAPAT

Mire jó az oltás?

MAYER TAMÁS RAJZAIVAL





The Superteam

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BY VIBÓK ILDI

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The Superteam



BY ILDI VIBÓK



illustrated by Tamás Mayer


Pagony



 **DAY 1** 

*When Emma is sick of vaccinations,
but at least we get to meet her bodyguard*

A typical Friday morning was kicking off at the royal court. His majesty, King John, was humming to himself in the bathroom while he shaved, Queen Sara was buttering brioche and slicing tomatoes, tea was steaming in the rose-China teacups, and Shaggy, the court hound, was crunching his 'if you love him give him this' premium quality dog food. There was just one thing that was out of the ordinary. Emma, the youngest princess, wasn't standing in the kitchen doorway demanding a double portion of chocolate in her cocoa. Indeed, she was nowhere to be seen and, after a while, this fact came to the attention of her majesty the Queen, who quickly set out for the nursery with a search party to find out what on earth was going on.

Emma was not in her bed (nor under it), neither was she hiding behind her fluffy pillows nor the blackout curtain, and the double-door wardrobe was found to be utterly child-free. Queen Sara was about to withdraw from the royal children's nursery when her eyes fell upon the floor-to-ceiling bookcase. Suddenly, she stopped. There on the bottom shelf, wedged between a sleeping cuddly bear and a remote-controlled pirate ship, was

her youngest child in her pyjamas, pasty-faced and with a steely expression. As her royal mother looked down upon her, she said:

‘I’m not going! Full stop!’

Queen Sara was startled, for at first, she had no idea where Her Royal Highness might not be going, but then she remembered. Today was the day. That dreadful day! The one the court paediatrician had marked for delivery of the vaccination that was due to be administered to the tiny royal body.

‘So, you’re not coming then?’ asked Queen Sara, taking great care not to smile.

‘Well, no!’

‘Full stop?’

‘Full stop!’

‘Then you had better let the doctor know, best to do so immediately...’ sighed the queen. ‘After all, you can’t keep him waiting in vain all day!’

Emma looked at her mother and ventured cautiously, ‘I will tell him... but you must promise that there won’t be any jabs!’

‘I’d rather say that there won’t be any jabs until you want one, if that’s OK with you.’ Queen Sara smiled now, as Emma nodded in agreement.

After all, it’s the same thing, isn’t it?

The court paediatrician, or ‘Doc’ as everyone called him, used to hang out at the Academy of Sciences practically all the time. He usually got up early in the morning, quickly downed his chamomile tea—which his wife always prepared for him with meticulous care, adding two spoonfuls of acacia honey—but he

always scoffed down his jam sandwiches, and he almost never had time to wipe his mouth because he was in such a hurry to get to work. For him, his workplace was just like zoos, bakeries or libraries would be to other people, and there was nothing in the world he loved better than to be there beetling about, unearthing and unravelling all the secrets that nature had been trying so hard to conceal from him.

The Academy of Sciences was about ten minutes from Doc’s home, by the way, and Emma and her mother hadn’t walked more than a quarter of an hour to get there either, although they stopped twice—first for a giant Spanish slug, then for a spotted salamander that was trying to get to a stream—and meanwhile they also agreed that Emma would go in to the doctor alone because the vaccination thing was her business and hers alone. So, when they got there, Queen Sara settled herself comfortably on a blue and orange garden bench, dug her knitting out of her wicker basket—a beautifully tailored tasselled hat was being manufactured for King John for the winter—and Emma slowly made her way to the entrance.

The Academy of Sciences was humungous—because there’s a lot of science in the world and they need a lot of space for that—all windows and glass, an ultra-modern building full of lifts,



cameras, signs, and on the signs a lot of buttons to be pressed. The princess stretched to reach the second from the top of a column of pushbuttons under which was written LABORATORY, and once she had finally managed to press it, after a short period of buzzing, the door opened, and she entered.

Doc didn't work alone in the great glass palace, but he had the best room because it had two huge windows, and where there were no windows there were bookshelves, and on the bookshelves were lots of books, all of which were needed to unravel mysteries as quickly as possible. There was also a desk, comfy armchairs, and Peekaboo, the giant microscope, which was almost as big as Emma when she stood on tiptoes. Occasionally Doc would show the little princess things so tiny that no one in the world would ever have noticed them with the naked eye: paramecium, animals that looked most like flat potatoes and almost never came in pairs; thread-like, wriggling little worms; and once a spider mite. The princess had learned that nothing is really as it seems, especially that which is not visible to the naked eye.

It was into this wonderful room that Emma now entered to say that, fortunately, the scheduled jab had been cancelled. At this news, Doc stared wide-eyed from behind his black glasses at the determined princess, and then scratched the top of his bald head.

'Are you sure?' he asked, doubtfully.

Emma nodded.

'But are you absolutely sure?'

Emma nodded again, but still didn't say a word.



‘Well, they won’t be happy to hear that!’ Doc sighed.

‘Don’t worry,’ said the princess at last, ‘mummy already knows, and daddy doesn’t care about these things! On week-days, he’s only concerned with affairs of state and shaving.’

‘I’m not talking about them!’ growled Doc, ‘I’m talking about your bodyguard!’

Emma, who was on her way out of the door, suddenly stopped.

‘What do you mean?’ she snapped.

‘Just what I say! They’ll go mad when they find out!’

‘But I haven’t got a bodyguard! Are you mixing me up with Papa? Because he’s got loads of them!’

‘No, not at all. Of course, he does have lots of them, but he actually looks after his! I’m not worried about them! Not me! Not for a moment!’

‘Well, I’d take good care of my bodyguard if I had one!’ The princess insisted with deep conviction. ‘Will you tell me where they are?’

Doc stood up and walked over to one of the bookshelves. ‘Well... we can find out a thing or two about them, if you’re not busy...’

I think I could be free... you could say that I don’t have anything urgent to do! At worst, Mummy will end up knitting Daddy a scarf, as well as a hat out there on the bench...’

Doc nodded and placed a huge book on the table.

‘Tarraaa!’ he said, flipping open the cover and digging a remote-control gizmo out of his pocket. Emma stared at the open book.

‘But it’s totally blank,’ she wanted to say; however, Doc was fiddling with something on his remote control and suddenly a blob popped on the empty page. A pink one. Yay!

‘Hello, little girl! What’s up?’ asked the cell.

‘What’s that?’ Emma said, turning to Doc, but the cell continued.



‘Hey! Listen to me when I’m talking to you. I’m a pillar of the Emma protection system! The white blood cell squad, neutrophil unit. I work there. And my job title is—and at this point, if such a thing were possible, the tiny cell had pulled itself up even taller—neutrophil cell.’

‘What?’

‘I don’t suppose you have any problems with superhero names, huh?’

Captain America and the Incredible Hulk, right?

Do try to pay attention!

NEUTROPHIL CELL!

‘Pardon me for asking, Doc, but is your new friend a bit... dim?’

‘If I were you I wouldn’t be so cheeky about the King’s daughter,’ grumbled Doc.

‘Whoa! So you’re Emma?’ the blob blurted out.

'I am,' nodded the princess. 'But who are you? Your name is a bit complicated, you know!'

'Just call me Muncher, little girl. This might come a surprise, but we are actually old friends. I've been circling around inside your body ever since I was born. Though not alone, obviously...'

'Are there more of you?'

'You could say there are a few of us, and we're pretty busy. We've really had to sort out the division of labour between us!'

'What kind of work?' Emma raised her eyebrows.

'All sorts of things! Like when you get hurt. Remember when you crashed your bike the day before yesterday?'

Emma looked down at her grazed knee and nodded. It was a painful memory.

'Well,' Muncher continued, 'there were a million bacteria and whatnot suddenly swarming all over your knee instead of lurking on the pavement, and we had to rush around catching them all. Because...'

Catch, gobble up, tidy away!

...that's our motto!

'So, you're wound cleaners! Luckily, I've only fallen over once this year,' Emma looked at her hands. 'And I cut my finger once. You don't have as much to do nowadays as you used to when I was little.'

'What makes you think that?' Muncher suddenly jumped off the page onto Emma's nose. 'You don't only get those wretched bacteria by falling over!'

'How then?'

Muncher frowned.

'In a lot of different ways! They have loads of ways of getting in. You can breathe them in when Mia, the neighbour princess, sneezes without a hanky at her birthday party. Or you can swallow

them when you put your hand in your mouth! And

I know you don't chew your nails anymore, but you still chew the end of your pencil... And Ebony

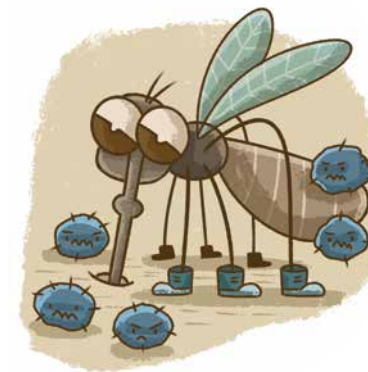
the cat can scratch you with her dirty claws, or you could

get a splinter from the royal garden toilet, or a bite from some grubby mosquito, and then there are also the tics...'

The blob was silent for a moment, then looked at Doc,

'Really, you should call the others in, Doc! Together we'd be able to explain this defence thing a lot better.'

'Good idea!' Doc pressed the remote control, and smaller blobs started popping up on the page, one after another. Muncher surveyed the company:





MUNCHER

- neutrophil
- devourer

DUMPLING

- phagocyte
- devourer

STICKY

- B-cell
- armaments



TITCH

- helper T-cell
- help for B-cells

BONSAI

- dendritic cell
- devourer, news spreader

CRUSHER

- killer T cell
- cell killer

‘Dumpling, Sticky, Titch, Crusher, Bonsai... Come on guys, line up! Meet Emma! I was just explaining to her what we have to do to protect her from diseases. She’s new to the subject. I’ve already told her what I do, now it’s your turn. How about you, Dumpling?’

The plump little cell stepped forward and bowed:

‘Hi, Emma! I’m Dumpling, and I’m a phagocyte’.

‘All day long I keep my eyes peeled for invaders, and when I finally find one...’ Dumpling grinned,

‘I’ll sneak up quietly, attack, engulf and devour it.’



I love my job! It’s not too complicated, all you need is a healthy appetite and good observation skills, almost everything in life depends on that, believe me,’ he nodded, and then gave the cell next to him a friendly jab.

‘Your turn, Sticks!’



Sticky stepped forward. She seemed quite small alongside Dumpling, but looked very determined.

‘Sticky, at your service!’ She said to Emma in a soldierly manner. I’m a B cell and develop defence equipment. It’s precise engineering work.

Indeed, it is my life’s work! My method is this:

when I come across a stray bacteria or virus, first I examine it from top to bottom, and work out what it’s up to. Then, if it’s up to no good, on one hand I memorise what it looks like for life, and on the other hand I develop a special weapon against it.’

‘What kind of special weapon?’ Emma asked, as she caught Muncher wandering about on her nose and carefully put him back with the others on the page.

‘Well, an antibody of some sort. A first-class invention!’



‘And what can an antibody weapon do?’

‘Almost everything!’ Sticky said proudly. ‘For example, it finds the enemy, surrounds it, engulfs it, and then snuffs it out. Or it just sticks itself to it so looks like this:



That way the whole world can see that it’s a sneaky little intruder.

‘They can see it?’ Emma was surprised.

‘Of course!’ said Sticky. ‘Everyone recognises that sign. It makes it easy for Dumpling’s crowd to catch the stinker and...’

‘...devour it,’ Emma finished. ‘I already know that. And you, Scruffy, what do you do for a living?’

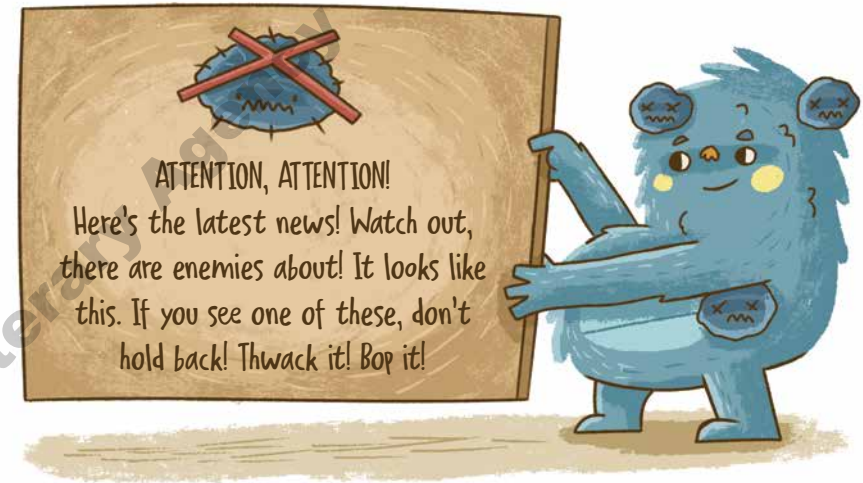
‘My name is Bonsai,’ corrected the little shaggy blob.

‘I’m very good at two things. First, if I see a stray bacteria or a cell infected with a virus, I catch it, chew it up, spit it out, and then...’ here Bonsai paused for effect, ‘I tastefully stick the left over bits and pieces to my outside.’



‘Really?’ Emma’s eyes widened. ‘But why?’

‘Why... why...’ Bonsai snorted. ‘Because that way I look like a notice board:’

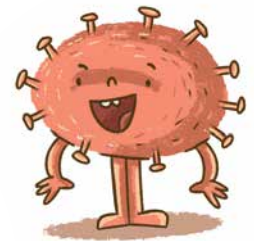


Bonsai smiled. ‘So at least Titch and his crowd know exactly what they’re up against’.

‘Or us!’ Another tiny cell leapt forward. ‘I am a T-cell! A helper T-cell. A sort of news messenger. Unfortunately, I’m unable to catch intruders on my own,’ the little figure fidgeted awkwardly, ‘but when Bonsai’s belly has a display, I’ll take a good look to identify it and tell the world what it looks like. I’ll notify the whole company so that they know what they are up against.’

‘So Titch is a helper T-cell, and Bonsai is a helper’s helper?’

‘That’s it, exactly,’ grinned Bonsai.



‘And who are you?’ Emma asked the last blob. The other blobs stepped back, the tiny cell gave a nod and said in a deep, hoarse voice: ‘I’m Crusher. I’m an assassin. Or more precisely, a killer T-cell.’

‘And who do you kill?’ Emma asked, wanting to clarify the important points, ‘I hope it’s all strangers’

pathogens!’

‘Not entirely,’ sighed Crusher. ‘I cruise around all day, and when I finally come across a cell that the enemy has invaded, I catch it and kill it. I don’t leave anything to chance.’



Emma nodded. ‘So, you’ll all take care of me if I’m injured or ill, but what does all this have to do with vaccinations?’ She looked at Doc.

‘Hrumph...’ the royal physician cleared his throat in confusion, ‘that’s what I was going to...’

But he was unable to continue because Muncher interjected impatiently.

‘Leave it, Doc! Just put us on the set and we’ll do the rest.’

‘Okay.’ Doc pressed another button and a flashing green sign appeared:



‘Danger?’ Emma was startled. ‘Wow!’

‘You’ll be alright, you’re not an alien,’ grinned Muncher ‘we are your autoimmune system.’

‘My what?’

‘Your autoimmune system. The system that protects you. Everything that belongs to you is under our constant protection. I mean, every part of your body, because your teddy, for example, is not. You can protect that yourself.’ Muncher made himself comfortable and continued. ‘Let’s start with the fact that your body is made up of cells. Just like a Lego dinosaur is made up of Lego bricks. But instead of Lego bricks, you are made up of cells and’ Muncher held up an index finger here ‘all of your cells are our friends, but absolutely everything else is usually an enemy! That’s just the way it is!’

‘That’s what we live for,’ Bonsai sighed, ‘we look for the enemy. We travel around your veins, to be able to go wherever we want, because the main thing is to be everywhere, and to be sure of that we use another channel as well as the blood vessels: the lymphatic vessels. If we can’t get somewhere one way, we can go through the other. Don’t worry, we’ve got everything covered!’

‘And then it’s also important,’ Sticky interjected, ‘to be able to tell who’s a friend and who’s an enemy, because it’s just as dangerous to attack your friends as it is not to catch your enemies and let them roam free and run riot inside you! So, we have to identify everything we come across. Computers require passwords to do that, which I’m sure would work for me, but most white blood cells aren’t really very talkative, so we use signals instead. Every Emma cell has an identifying mark that it carries like a badge, and that way we know who our friends are.’



‘Or who belongs to us. Anyone who doesn’t have an Emma badge is our sworn enemy, and we’ll get them. Luckily enough, most pathogens are not geniuses, so they show us their own badges, which we try to remember while we are in action. It doesn’t always work instantly at first, but once it does, and we

bump into their type again then we don’t stand on ceremony, we just dive into action. For example, I recently came across a chicken pox virus. Here’ Sticky pointed to something on herself ‘this is their sign!’

Emma nodded. She remembered only too well the blooming chicken pox that had stopped her going to the carnival party, even though she had a great costume. She had been intending to dress up as a naked mole rat...

‘And my brother has the sign for mumps virus,’ Sticky continued unstoppably. ‘Remember that one too?’

‘Of course, I do,’ nodded Emma ‘it’s the neighbours’ dog. I ran into him today.’

Doc grinned, rather unkindly.

‘Grumps is not a virus, he’s a pug! Mumps is a contagious disease!’

‘And if you had it,’ interjected Titch, ‘believe me, you’d remember it! Girls find it especially hard to forget when their necks puff up like balloons...’

‘Really!’ said Sticky. ‘How true! That was a vaccination! So, that’s where my brother got the sign on himself...’

Emma decided it was time to cut the pug and balloon story short and get back to learn more about their bodyguard duties. ‘OK, but what about after you’ve identified the intruder? What do you do with them then?’

‘It depends who we find,’ said Sticky cryptically. ‘For example, if I meet an alien germ, I engulf it so that it doesn’t know which way is up! Or I mark it and hand it over to you, Dump-ling,’ she smiled at the big, plump blob.

‘And I gobble it up,’ said Dumpling, stroking his big belly. ‘Assuming that I get there before Muncher, of course.’

‘And I hunt down every single cell that’s been invaded by an enemy. Usually viruses. I bash them to blazes and kill the lot of them.’ Crusher bounced belligerently on Doc’s head, then looked down at the princess, who was a little startled. ‘Sorry, but you know, it’s my job, so...’ he said apologetically.

‘I know,’ Emma pulled the book closer, ‘that means you can protect me in three ways, right? You gobble up the enemy and advertise,’ she looked at Muncher, Dumpling and Bonsai. ‘You engulf it or serve it up for lunch,’ Sticky and Titch nodded eagerly, ‘while if you find infected cells, Crusher, you kill them and then the enemy is destroyed.’



‘Something like that’ muttered the tiny T cell. ‘But now,’ she looked around ‘it’s time to be on our way! After all, we didn’t sign up to be storytellers! Bodyguards, fall in!’

The six blobs lined up on the page in an instant. Sticky threw Emma a kiss, and in an instant, they were gone.

‘Well I never!’ Emma closed the book. Doc nodded.

‘Well, that’s why it’s dangerous to enter!’ he explained. ‘Because everyone is checked by your bodyguards, and anyone who can’t identify themselves is, um, um, so to speak... done for. They’re very professional, aren’t they?’

Emma shrugged.

‘Too bad they’re so tiny. If they could grow bigger, say, to the size of an elephant, they could be real bodyguards, because then they could even beat a grizzly bear. Or a bloodthirsty Siberian tiger. Of course, they’re still very good, even if they’re just slaughtering tiny bacteria and viruses.’

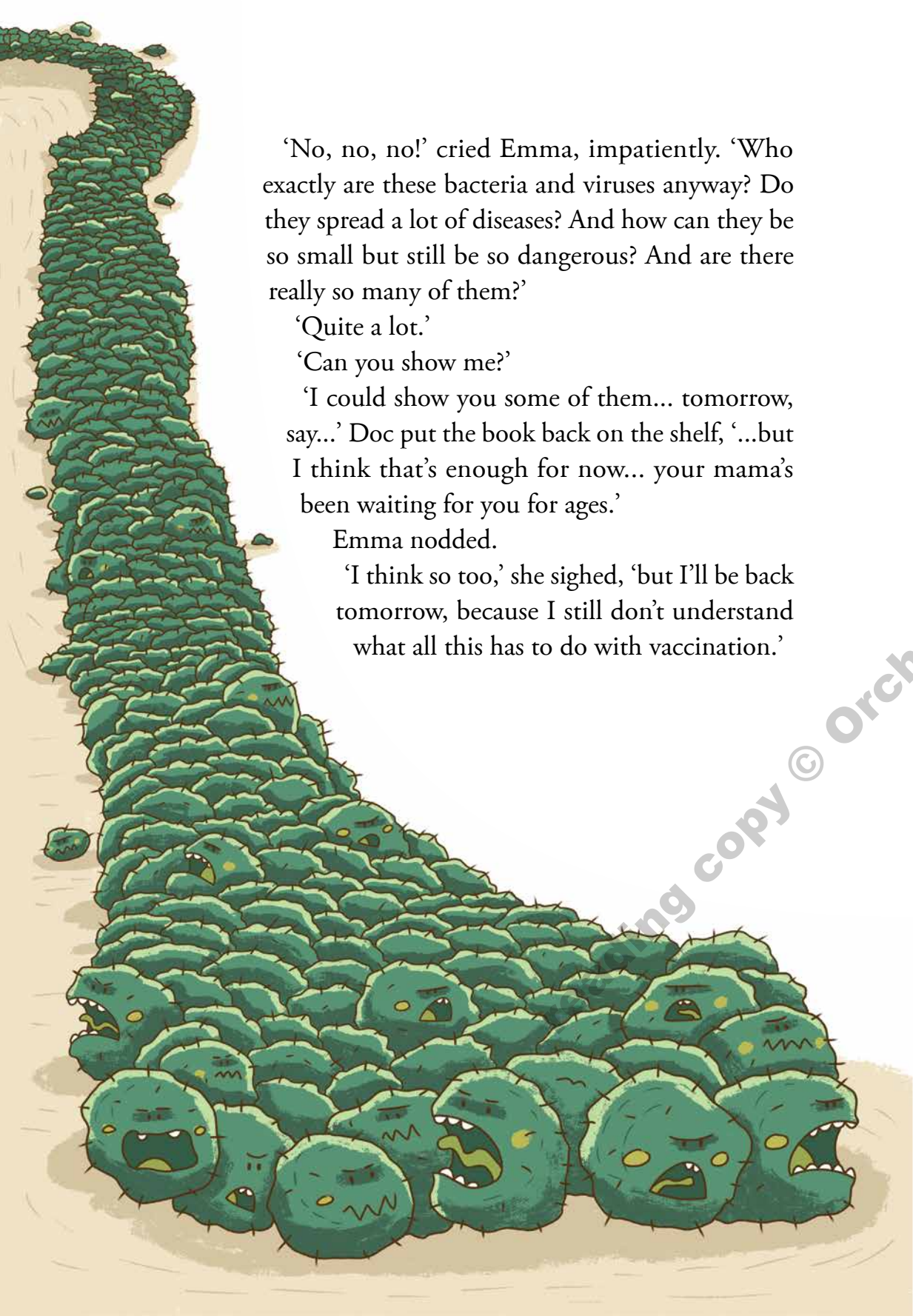
‘Jussst!’ Doc snorted. He couldn’t believe his ears.

‘You do know that bacteria and viruses are so tiny that you can’t see them with the naked eye. Even an ant is bigger than they are. Is defeating them really such an adventure?’

‘Well, they certainly are small’ Doc pushed his glasses up ‘but like ants, they don’t fight one on one. They can attack with terrifying speed and in terrifying numbers. What’s more, they are not easy to get at because they are so small. Or did you manage to catch your flu by the ear?’

‘No,’ the princess admitted.

‘Or did you manage to trap your chicken pox? Or has your father thrown it in a dungeon to keep you safe?’



‘No, no, no!’ cried Emma, impatiently. ‘Who exactly are these bacteria and viruses anyway? Do they spread a lot of diseases? And how can they be so small but still be so dangerous? And are there really so many of them?’

‘Quite a lot.’

‘Can you show me?’

‘I could show you some of them... tomorrow, say...’ Doc put the book back on the shelf, ‘...but I think that’s enough for now... your mama’s been waiting for you for ages.’

Emma nodded.

‘I think so too,’ she sighed, ‘but I’ll be back tomorrow, because I still don’t understand what all this has to do with vaccination.’

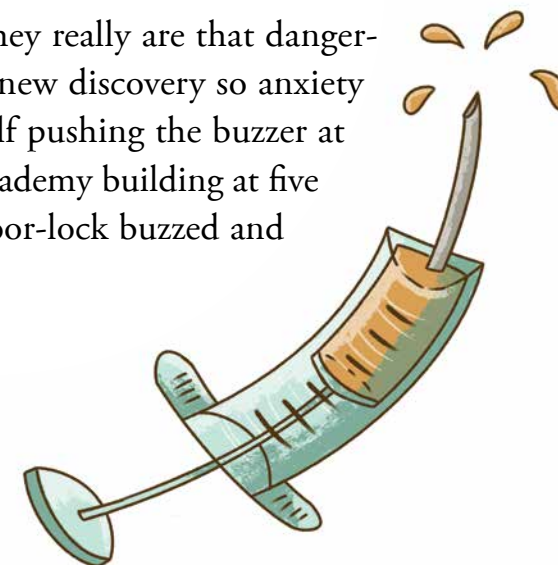


DAY TWO



When Emma learns that there are absolutely loads of different bugs and viruses, and that chickenpox is not the worst virus in the world

The next morning, Emma popped over to the Academy of Sciences very early. Not that she didn’t have things to do at home—there were three unfinished drawings on her desk that she had promised Grandma by the end of the week; she had had her skates for two weeks, and she needed to get some practice in because she still hadn’t dared to roll down the big slope; and she hadn’t finished the book *Which Track is Whose? Guide to Woodland Rambling* which was still lying unread by her bed. But she wanted to find out more about this bacteria and virus business. Because it was obvious that if it was something the size of a great white shark or, say, a Nile crocodile, then it would not be advisable to bump into one; however, one rarely encounters Nile crocodiles and white sharks still less frequently. Bacteria, it seemed, you could encounter without even noticing, at first. And if they really are that dangerous... Emma found this brand-new discovery so anxiety provoking that she found herself pushing the buzzer at the entrance to the great glass academy building at five to eight in the morning. The door-lock buzzed and she entered the laboratory.



‘Oh! Good to see you!’ Doc was standing in front of the window with a humungous hypodermic needle in his hand. At least, to Emma it seemed humungous.

‘What the blazes!’ She wanted to exclaim, but Doc beat her to it.

‘Doris’s rabies vaccination,’ he explained. ‘Could you stroke her a little?’ He pointed at the still unsuspecting doggie, ‘I think she could use it right now.’

Emma crouched down by Doris the dachshund, who began to eagerly jump and roll about, and nuzzled her head. Meanwhile Doc gently pinched the skin on her back and they were already done with the vaccination. The doggie clearly wasn’t that bothered by the experience.

Emma looked at Doc.

‘Is rabies caused by a tiny bacterium?’ She asked, as she popped a well-earned reward snack into Doris’s mouth.

‘Actually, it’s a virus, and much smaller than a bacterium’ Doc nodded ‘and without vaccination, it’s almost always fatal.’

‘But I still don’t understand how bacteria and viruses can be so dangerous if they’re so very small. By the way, do you have any here in your lab?’

Doc scratched the top of his head.

‘There most certainly are, and I think you have probably brought a couple of million of them in with you!’

‘No way!’ Emma shook her head. ‘I even washed my hands at home. Thoroughly! I put on clean clothes in the morning and made sure I didn’t touch anything on the whole trip here. Not a thing!’

‘And did you manage it? Anyway, it doesn’t really matter because you had at least ten times as many bacteria as there are Emma cells. They are partying in your hair, on your skin, on your tongue, on your teeth, everywhere...’

‘How come?’

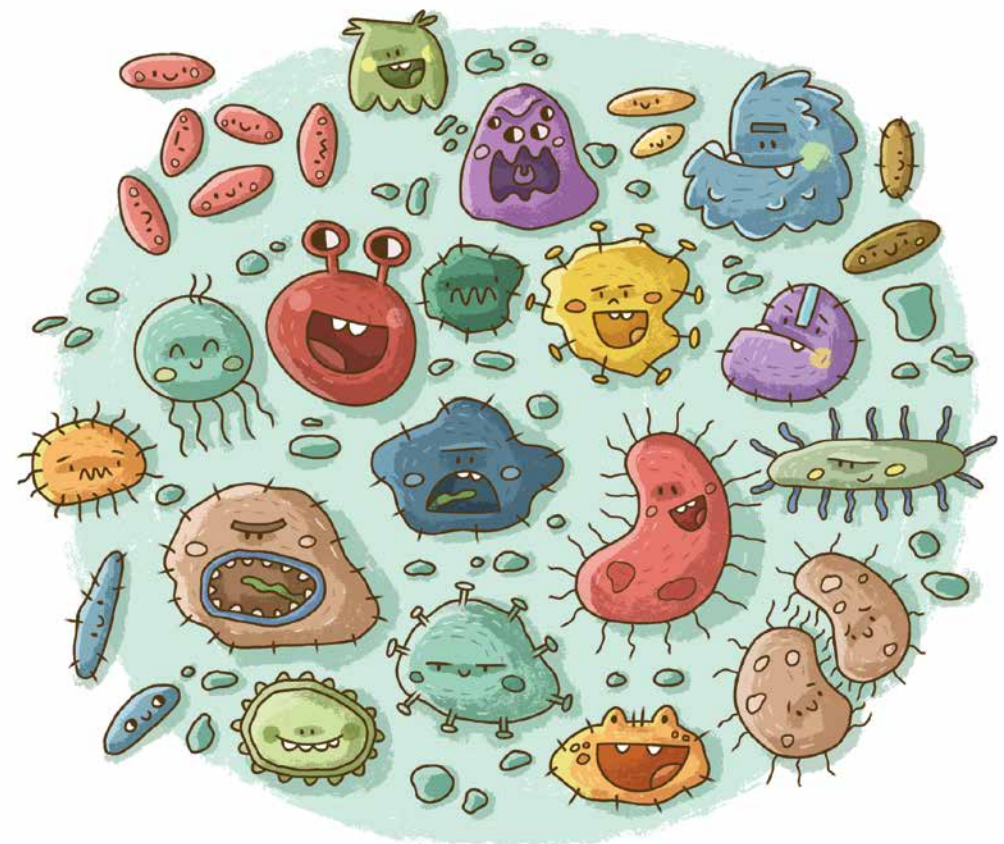
Doc turned on Peekaboo the microscope, and then twiddled with it a bit.

‘Well, here they are,’ he nodded, ‘take a look at that!’

Emma jumped up on the chair and stared into the microscope. All she said was:

‘Crikey!’

Because suddenly everything was full of moving spheres, screws, rods, or at least things that really looked rather like balls, screws and rods.





‘Indeed!’ Doc nodded cheerfully, ‘Everything, everything on earth is absolutely heaving with bacteria, including you...’

‘But that is simply awful! Isn’t it?’ The princess hesitated.

‘Of course not! Most of them are completely harmless, and some are even quite good for us. For example, the ones that lurk in your bowels and help you to digest your buttered scones and cocoa puffs at breakfast. You can’t imagine how many of them there are, or exactly what kind, but there are at least six hundred different

types of bacteria living on and in you. It’s them that make you fart...’

‘Really? Then I like them. What do the dangerous ones do?’

‘They cause diseases, mostly. Fevers, stomach aches, sore throats, headaches, nausea, dizziness, rashes. That sort of thing.’

‘Viruses too?’

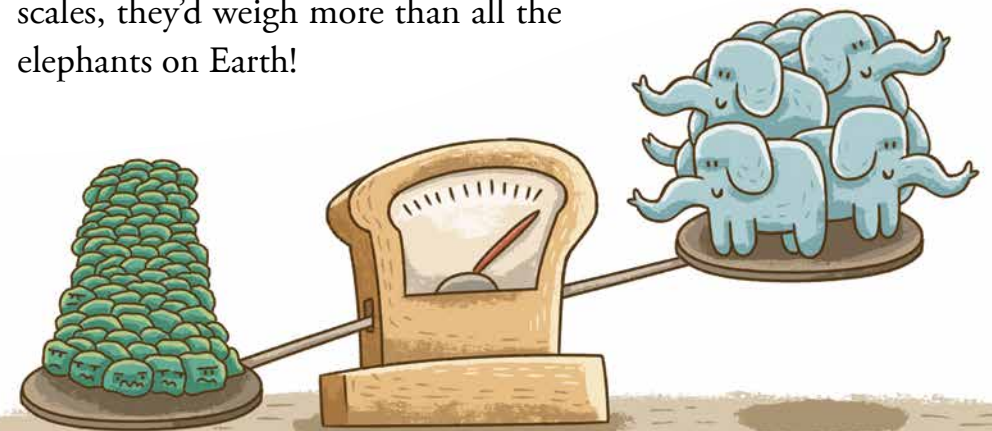
‘Absolutely. Only viruses are much, much tinier than invisible bacteria.

They look like this:



‘And are viruses everywhere?’

‘Of course they are! Take the sea, for example. If only because everyone keeps saying how healthy salt water is. Which it is, but it’s still full of viruses! If you put all the bacteria-attacking viruses that live in the oceans on a big pair of scales, they’d weigh more than all the elephants on Earth!’



‘Can viruses also attack germs?’

‘Yes,’ Doc nodded, ‘and there’s another big difference between bacteria and viruses. When bacteria get into our bodies, they really enjoy it, they live and thrive and they start to reproduce as soon as they can. Their goal is, of course, world domination, and they have all the equipment to do it. And viruses, unable to act on their own, have devised a very different method of conquest. They have a devilishly cunning plan. They attack the cells of their host, infiltrate them and put them to work. Well, from then on, the poor master cell slaves can do nothing apart from what their virus overlords tell them to do. Whatever they want.’



‘And what do they want?’ Emma’s eyes widened.

‘Well, to breed and to rule.’

‘Oh, dear!’ Emma really wasn’t keen on anyone else ruling over her cells at all. She decided that it was probably time to put the kettle on! ‘And who can I get the bacteria and viruses from?’

‘That’s easy! From the people who have them. For example, the CARRIERS.’

‘I see.’ Emma was silent for a moment. She looked at the Doctor and asked, ‘but who are they?’

‘Clever question!’ Doc nodded. ‘There are pathogens that are carried by animals and spread only among themselves. For example, cats can have feline coronavirus, or dogs parvovirus. Then there are diseases that we can get from animals. For example...’

‘I know! Chicken pox!’

‘No, I don’t mean that! I mean anthrax, which is a very, very dangerous disease that sheep can get. In comparison chickenpox is a minor irritation. And in any case, chickenpox spreads among humans!’

‘Then why is it called chicken pox?’ Emma snarled.

‘Because it’s not usually a big problem, and perhaps because the sores look a little bit like chicken pecks. Of course, sometimes it can be worse. Especially for grown-ups.’

‘And what else can we catch from animals?’

‘For example, the plague from rats, malaria from mosquitoes or’ Doc stroked the base of Doris the dachshund’s ears, ‘rabies from dogs and cats, and, by the way, from bats too. If a rabid dog or cat or bat bites you, or a malaria mosquito bites you in the jungle, or a flea tries to eat you after feeding on a rat with plague, well, that’s a big bad problem. Fortunately, there are hardly any rabid animals around here, and malarial mosquitoes and plague rats are very unlikely to be nearby at all.

‘Good! I was getting scared!’ Emma jumped off her chair.



‘But don’t go looking for cats you don’t know to stroke’ Doc nodded. ‘And stay away from bats. They’re better off that way too! Anyway, vaccinations are the reason why you don’t actually have to worry much about epidemics.’

‘Why is that?’ Emma asked her favourite question.

‘Believe it or not, epidemics were around on our planet before we humans were. Of course, there was no medicine against them then. Then we humans came along, but there were still no really effective medicines against them for a long time.’

‘Then how did the patients get better?’

‘Either with difficulty or not at all with the very dangerous infectious diseases. Of course, the doctors of the day did everything they could. They tried herbs and trees and leeches, they searched and searched for a cure in everything, but they didn’t find a cure for infectious diseases for a long time. It was

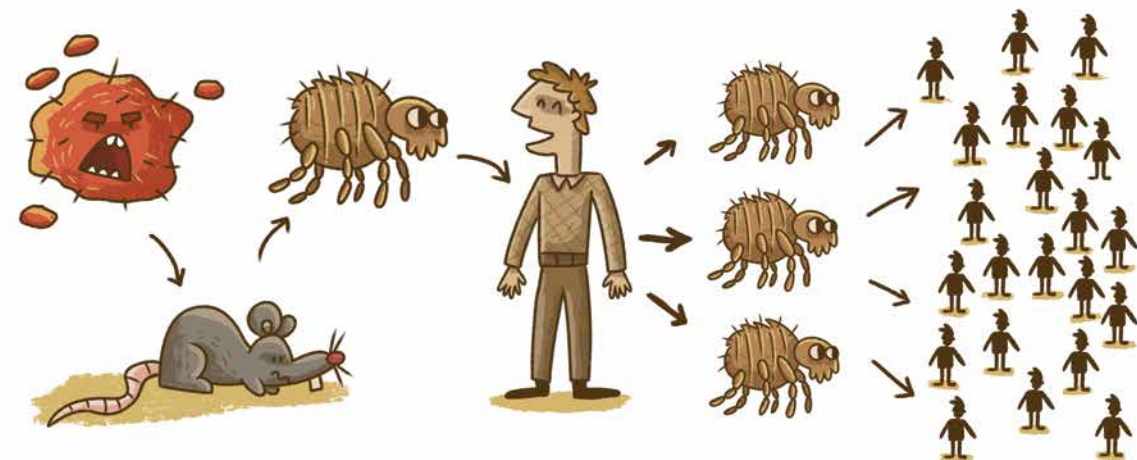
a long time before they discovered antibiotics against bacteria and vaccines against viruses, if for no other reasons than because the bacteria and viruses had not then been discovered.’

‘Because they had to have a super microscope like Peekaboo first, didn’t they?’ Emma nodded.

‘Exactly. At first, when there was an outbreak of something contagious, they’d watch the stars, the weather, what kind of wild animals were swarming around... They’d also say that humid, warm weather was a breeding ground for contagious diseases, and they soon discovered that sick animals were better kept separate from healthy animals and humans. But it was not until the devastating plague of the Middle Ages that the first real quarantine was introduced.’

‘I can’t remember what quarantine is now. Nor the plague for that matter.’ Emma looked questioningly at Doc.

‘It is when you’re sick and you’re locked up in a place where you can’t go out among the healthy people, and they can’t come in to see you, except the doctors and nurses, and even then, just in protective gear, that’s quarantine. It was invented to stop the spread of a dangerous disease like the plague, which is actually caused by germs, something like this:





‘And then once there are bacteria that have become so sophisticated that they don’t need fleas or even rats to ‘jump’ from one host to another, because even a well-directed cough can send them flying from person to person, then the epidemic is all set ready to go.’

‘Do viruses jump like that?’

‘Well, yes, something like that. Just think of the flu! At Mardi gras, Mimi easily sneezed that one over to you.’

Emma didn’t like thinking about Mimi and the flu. The runny and sore nose, the high fever, the bad mood, and, of course, staying in bed all day... grrr!

‘I’d rather forget it,’ she muttered. Doc smiled sympathetically.

‘Then, of course, there are diseases’ he continued ‘that are common in animals, that we humans can get from them, and yet we owe them a lot.’

‘Such as what?’

‘Vaccinations, for example,’ Doc smiled. Emma sighed.

‘I’m never going to thank you for any vaccinations! At least I don’t think so,’ she faltered. ‘Why would I?’

‘They’re the mainstay of your bodyguard. I tell you, you are very lucky to have them! But I will tell you all about the great conspiracy between vaccines and white blood cells to prevent the most virulent diseases tomorrow. For now, I’ll walk you home, and we’ll get your royal watchdog a rabies vaccine. Okay?’

‘All right. Hi there, Doris dachshund,’ Emma nuzzled the head of the ground-level puppy, then looked at Doc. ‘But I’ll be back early tomorrow morning, okay?’



 **DAY THREE** 

When the bodyguard shows up again and it finally turns out that vaccines aren't for winding up children after all

Emma was standing outside the Academy of Science the next morning, not just early, but hyper-super early, and she was pressing the button marked LABORATORY, when someone tapped her on the shoulder. Doc was standing behind her.

'Hi, princess! You're up good and early!'

'Hi, Doc. Of course I'm up. Don't you remember? You promised to tell me today why I need those jabs, despite my bodyguards working so hard to protect me.'

'True, true,' grumbled the court scientist, 'but perhaps you'd be better off if you knew the facts at first hand.'

'What do you mean? What do you mean 'first hand'?'

'Your bodyguard. Ask them. I think they know a lot more than I do. After all, it's their lives on the line here!' Emma nodded, Doc opened the door and they ambled into the lab. The princess ran to the shelf, carefully took down the huge book, put it on the table, opened it, but of course the first page was white as snow, just like the last time.

'Oh, where's your remote control?' She looked questioningly at Doc, but the court scientist already had the magical gadget in his hand. He aimed it at the book, pressed the big green button, and the eager bodyguards bounced onto the page in turn:



'Good to have you here! I have a question to ask that Doc says you know the answer to.'

'You mean Doc says there's something we know that he doesn't?' Sticky stared incredulously at the court scientist.

'Actually, what I said was that you know best, that is, that no one could answer the question more accurately than you.'

'Brilliant' Muncher jumped on Doc's nose and looked deep into his eyes 'and what would that difficult question be?' Doc looked at Emma, Emma fidgeted awkwardly a little before she spoke.

‘So what I wanted to know... I mean what I’m curious about is... tell me, if you’re my immune system and you’re so good at defence and protection and catching all the bacteria and viruses and other pathogens, and then devouring them and sticking them on yourselves and advertising them and making super weapons against them, I mean if you’re so cool, why on earth do I need a vaccine?’

‘Ha ha’ Muncher laughed. ‘In fact, ha ha ha! I knew it! I knew it! Well, what did I tell you?’

‘That the vaccination business is not sorted yet.’ Sticky sighed.

‘Actually, vaccinations help me the most. I mean help us, because Bonsai... Bonsai...? Bonsai...! Where on earth are you?’

‘Yeah, where’s Bonsai? Where did you leave her?’ Emma looked at Doc.

Doc pressed his remote control in confusion.

‘I think’ he muttered ‘that I called her... I’m pretty sure I called her...’

‘I’m coming! I’m coming!’ Bonsai bounced onto the page, though her reply was more like ‘I’m yummingyum, I’m yumming!’ And then another ‘yum’, because she was eagerly devouring something. Emma stared at her, fascinated.

‘What are you eating?’

‘Did you hear that, Bonsai? What are you stuffing your face with?’

‘Yum. Yum yum!’ Bonsai took a big gulp.

‘Look at me!’ she snapped, pulling a piece of food out of his very satisfied face and neatly smoothing it onto her belly among the other notices.

Sticky leapt to her side in a flash.

‘What on earth is that?’ she said as she began to examine the bacteria remnants.

‘What on earth could it be?’ Suddenly she looked at Emma. ‘Have you picked up a bug, Emma?’

‘I don’t think so...’ said Emma hesitantly, thinking of her breakfast muesli, which unfortunately had spilled onto the kitchen floor, and as Queen Sara hadn’t been paying attention, she had managed to share it with Shaggy.’

Sticky nodded.

‘Yeah, yeah, it’s not just any old bacteria. This was one of the big guns! I think I’ve seen one like it before... It’s like a... it’s like a...’

‘Tetanus bacteria,’ Bonsai burped loudly, then dug another piece of bacteria out of her mouth.

‘Tetanuuuuuuuuuus!’ screamed Sticky. ‘Tetanuuuuuus! That little creep! And here you are, just hanging around burping instead of spreading the news to everyone who lives and moves?’

‘Why do you think I was late? Everything’s going like clock-work. Memory has been turned on!’



‘What luck!’ sighed Doc, turning to Emma. ‘Where were you wounded, Emma?’

The little princess was stunned. ‘Right here on my leg, but it’s only a scratch! I was hurrying so much that on the way I accidentally bumped into a little blackberry bush that was lurking by the path. But how could you know that? And what’s the ‘memory’ that’s lucky to be on?’

Doc was about to speak, but Muncher butted in as usual. ‘You’d better pull yourself together, my girl! You ran into one of the most dangerous bacteria in the world this morning! Sticks is right! A real little creep, and it produces one of the deadliest poisons in the world!’

‘A poisonous bacterium? Where did I bump into it?’

‘It was hitchhiking by the side of the road on the blackberry bush, and you picked it up.’

‘Where is it now?’

‘Over to you, Doc.’ Muncher bounced off the court paediatrician’s nose and turned to face him. ‘Please, tell us about this tetanus thing.’

‘It is true’ Doc began the tale, as he began thoroughly disinfecting Emma’s scratch ‘that tetanus bacilli are a dangerous breed, and they can be found pretty much everywhere: on dirty pavements, on garden tools, on a woodland path, on the fence around the chicken coop. In other words, anywhere.

And then, when you happen to fall or cut yourself with whatever they are on, then they can get into your system, and then there will be an absolute riot!’



‘Why, what do they do?’

‘First, they survey the area, and then, if they find that they’re in a good place, they start to multiply. They live, thrive, reproduce and produce poison, a nasty, dangerous, muscle-destroying poison. An absolute killer!’

‘Wow! So when are you going to start curing me?’

‘I’m not going to cure you, they are!’ Doc pointed to the bodyguards. ‘But I think they’ve already started. Right, boys?’

‘Something like that.’ Bonsai scooped the last remains of the bacteria out of her mouth. ‘Fortunately, quite a few of them remember tetanus, so now we just need the right antibody. We have a good memory of this one! The Immune memory. Or...’ Bonsai adjusted one of the exhibits on his belly ‘our reminder.’

‘Wow!’ Emma went silent for a moment, and then she just blurted out, ‘So, I’ve had tetanus before?’

‘Ah, no! But you got your tetanus jab in good time.’

‘Before I was sick?’

‘That’s right! The whole point of the vaccine is to get a small dose of the pathogen and then beat the living daylights out of it. That weakens it so the bacteria don’t want to reproduce any more, but they’re still recognizable. And that way, when the bacteria are so crippled that they can’t harm the host, the vaccine is ready and you can inoculate people.’

‘And then, as the weakened bacillus wanders in your bloodstream,’ began Sticky ‘we B-cells will run into it. We study it, examine it, and produce antibodies against it, memorize his mugshot. But unfortunately, we are like the little elephant, we have a hard time learning too... and it may take us a few days

to produce the antibodies. And the truth is, the first batch doesn't work very well! So, if we were to encounter the real terminator germs, not the weakened vaccine, they'd start multiplying before we got our act together.'

'Could they defeat you?' Emma was stunned.

'Yes, that could easily happen!' Sticky's voice trailed off. 'But don't worry.' The face of the tiny white blood cell brightened again. 'This tetanus was a familiar face. The others took care of it before it got going!'

The princess's face lit up.

'Good!' she said and suddenly turned to Doc.

'How fab it is that you thought up this vaccination thing!' she praised him, and the court scientist laughed.

'I didn't invent it!'

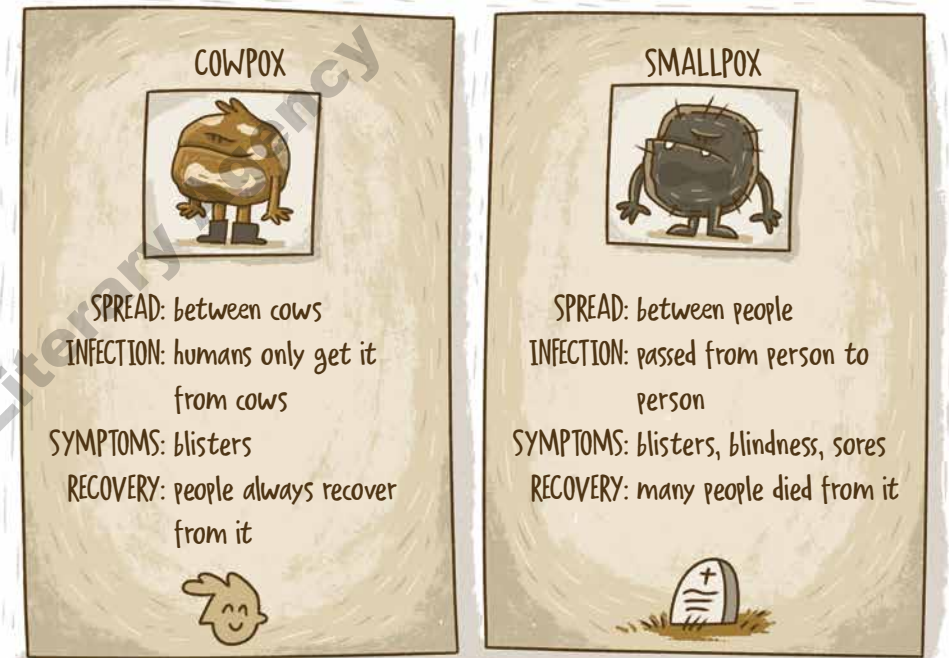
'Didn't you?' asked Emma was stunned.

'Another doctor did a long, long time ago. At the time, two separate pox epidemics were spreading across the world. One was called cowpox because it mainly affected cows. Now, the people who looked after the cows, for example, the milkmaids—and this is very important— always got over the infection. And then there was the other pox, the really big one, the SMALLPOX. The most awful disease, the dreaded blight, the killer pestilence, the shadow of death...' Doc's voice suddenly became very ominous. 'It didn't need cows or any other animals. It spread among the people like bad news. And there was no worse news than smallpox because a lot of people died from it, and those who recovered from it often paid with their sight.'

'That's terrible...' whispered Emma.

'So there was cowpox and smallpox.'

Doc continued:



Smallpox was spreading and spreading, and it reached the cowsheds, and the milkmaids were shocked but overjoyed to see that they didn't catch it. At least not those who had already caught cowpox from cows. Word of this miracle spread around the world, and luckily it reached the ears of an English doctor, Doc Jenner. Doc Jenner was very clever, so he thought...

'That if everyone caught cowpox, no one would die from smallpox!' cried Emma.

Doc looked at her, his eyes twinkling:

‘Yes! Looks like you’d have discovered the vaccine too if Doc Jenner hadn’t beat you to it!’

‘But luckily, he did!’

‘It was very fortunate indeed’ Doc agreed ‘but it wasn’t easy, because he had to prove that the vaccine really was effective and protected people. Don’t forget that Doc Jenner didn’t have a microscope like Peekaboo yet, nor did he have any idea why his vaccine had worked. He just knew it worked. He needed some evidence.’

‘Wasn’t it enough that he promised it would?’

‘I know somebody who still doesn’t want to get the vaccine, despite Doc Jenner has already having proven that...’

‘Alright!’ The princess stamped. ‘How did Dr Jenner prove to the others that by vaccinating for cowpox they could avoid smallpox?’



‘First, he met a very brave boy called Jamie, who allowed him to infect him with cowpox. That is, inoculate him with the secretions he had obtained from the cowpox blister.’

‘Now, even I would accept the jab!’ Emma said quietly.

‘You are very brave too.’ Doc smiled at the princess, then continued. ‘Sure enough, Jamie caught cowpox, got inoculated, and was cured, as he should have been.’

‘And he never caught smallpox!’ Emma exclaimed excitedly.

‘No, but Doc Jenner didn’t leave it to chance. He had also inoculated him with the smallpox virus. But our Jamie remained as healthy as an ox! So that was the first vaccine that was proven.’

‘And mine will be the first of many!’ smiled the princess.

‘Ready?’

‘Go on then!’

‘Hooray for Emma!’ cried Muncher, and then he turned to Emma in confusion. ‘We could always use a little help’ he said. ‘Come on everyone, I think we should go’ he said to the others. ‘We have work to do!’

The little white blood cells lined up on the page.

‘Doc, you can do your thing.’ Muncher commanded, but before the Royal paediatrician could press any buttons, Emma spoke quietly. ‘Thanks, everyone, for looking after me! I’ll look after you from now on.’

Sticky jumped up and planted a sloppy kiss on Emma’s cheek.

‘Thank you huuuugs!’ she shouted. ‘You have no idea what a weight has been lifted from my heart. I can’t wait to tell the rest of the B-cells. And everyone else!!!! Hey, guys, hang on.’ With that, Sticky did another bounce and also disappeared.

‘Let’s get this over with.’ The princess turned to the Royal Paediatrician. ‘You can get your jab collection out, Doc...’

‘I don’t quite know what you mean...’ Doc rummaged through his doctor’s bag. ‘You only get one one at the age of six.’

‘But not for a princess!’ Emma straightened herself. ‘I can handle more. I mean...’ She eyed the syringe in Doc’s hand suspiciously. ‘It’s okay, if all the juice doesn’t fit in one syringe, you can use two. You know, if you gave them all to me at once, I’d never be sick again, and...’ Here Emma hissed, because Doc had stuck the needle in, and they were done with it, so the princess went on: ‘...and I don’t know why other people haven’t thought about this before.’

‘I say,’ Doc snapped his fingers in acknowledgement ‘after that, you really aren’t a scaredy cat, are you?’

‘Well... I don’t know, actually. Bacteria and viruses are scarier than jabs, aren’t they?’

‘That’s very true. But fortunately, you’re already protected against a lot of things, and there’s no point in those bacteria trying.’

‘They’ll come a cropper with me, won’t they?’ Emma giggled.

Doc flipped through the book, then looked at Emma.

‘You know, Princess Emma, one of the most important things in life is to be able to breathe deeply. And believe it or

not, a lot of bacteria specialize in destroying our breathing. Of course, most of them are easily cured with a couple of vaccinations.’

‘What? Aren’t there any where just one jab is enough?’

‘Some we use booster shots against. Sometimes you need to be told a thing more than once, don’t you? So that you’ll remember it better and think of it occasionally.’

‘Sometimes,’ nodded Emma, looking at the book.



EMMA HADÁSZATI FELSZERELÉSE,

EMMA’S STRATEGIC EQUIPMENT

proclaimed the inscription at the top of the page. And underneath:

AVAGY OLTÁSI HISTÓRIA

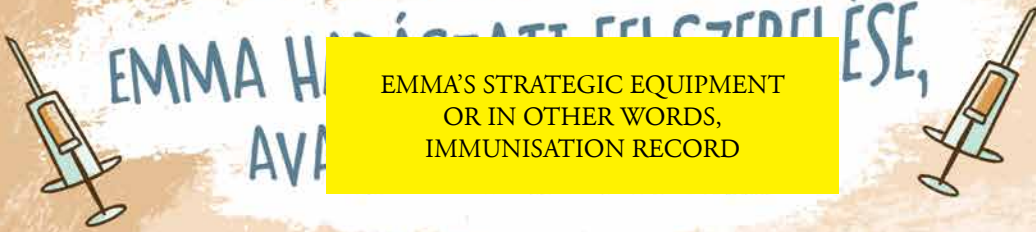


OR IN OTHER WORDS
her IMMUNISATION RECORD

‘Let’s see...’ Doc muttered, ‘...this is Emma’s vaccination book. The story of all the vaccinations I’ve poked into you over the years.’

‘Nice one! I hadn’t remembered so many of them.’

EMMA H...
AV...
EMMA'S STRATEGIC EQUIPMENT
OR IN OTHER WORDS,
IMMUNISATION RECORD



EMMA NEWBORN



BCG



EMMA A COUPLE OF MONTHS OLD



PNEUMONIA POLIO



EMMA AT 15 MONTHS OLD

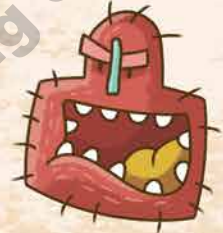
MUMPS



RUBELLA



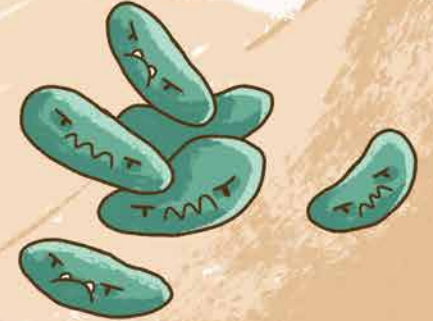
MEASLES



EMMA ONE YEAR OLD



RUBELLA



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‘Well, you were quite small when we started, but even then, we were well equipped against lung diseases, which can be very nasty. There are several kinds of bacterium that can grow on the lungs and they also poison the environment. That is, the patient, because that’s their environment. And until there was a cure, it was very easy to catch. For example, it was enough if somebody coughed up a dose of bacteria and somebody else happened to walk by and breathed it in...’

‘And what exactly did you stick in me here?’ Emma looked at the next picture.

‘Ah! That’s a very sophisticated weapon, the one that Sticky needs to defeat diphtheria, whooping cough and tetanus.’

‘Diphtheria? Whooping cough? They sound awful.’

‘Diphtheria is terrible, the name actually comes from the Greek word for leather, whoever catches it grows a leathery membrane around their tonsils, and when it comes off you have to cough it up, and if you can’t...’ Doc suddenly became serious. ‘you suffocate. It’s a very serious disease, and usually it was children who suffered from it until there was a cure. Whooping cough is not very nice either for the people who get it. The germs that cause it make the patient get feverish and have a runny nose, and feel tired and cough and cough and cough endlessly, but so hard that they can even break a rib in the process. It’s also sometimes called the hundred-day cough. And when someone has a coughing fit and they can finally breathe in, the air is sucked in with such



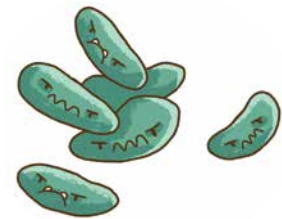
force it makes a whooping noise. So, that’s where the name comes from. And then tetanus and...’

‘I know, the little poisonous little creep. That’s ultra-bad!’

‘Exactly!’

‘And what are we armed against here?’

‘Here, the pneumonia bug gallantly allies with the flu virus. The flu attacks first, and then when the patient has been thoroughly weakened by that, then comes the rogue pneumonia virus, and that has an easy time of it. Or rather would have had an easy time of it, if we hadn’t put some serious obstacles in the way. Doc winked at Emma. ‘Which is especially important because these diseases are very easy to catch. One little snuffle and a cough and you’ve got an epidemic on your hands.’



‘Then you really need a lot of vaccinations,’ nodded the princess solemnly.

‘As you say. There’s the epidemic of polio, also called infantile paralysis, for example. The name alone is terrible. By the way, it’s not caused by a bacterium, but by a much, much smaller...’

‘...virus!’ interjected the princess.

‘Yes! And measles, rubella and mumps are also viral diseases.’

‘The mumps! The one that Sticky told me the day before yesterday, would make me grow a balloon neck!’



‘Yes, mumps attacks your salivary glands and it’s not such a nasty disease in itself, but until there was vaccination, a lot of people used to get it, and sometimes there were complications.’

‘Complications? Who are they?’

‘Not who, what! That’s when some patients are more ill than others. And sometimes the complications can be hard to get rid of. Or they can’t be got rid of at all.’ Doc closed the book and looked at Emma. ‘The doctors work hard to find or invent a cure for every dangerous disease.’

‘Find or invent?’

‘Good question! Do you remember? For smallpox, they found a cure in cowpox. The two viruses are very similar, at least the immune system can be prepared to resist the gentler cowpox just as well as if it had run into smallpox. But most pathogens don’t have such a ‘tame’ lesser version, so you have to start with the virus itself. Sometimes it is killed, sometimes it is terribly weakened, or only a piece of it is used. The point is that when they stick the immunisation in us, we don’t get the disease instead of the help.’

‘The immunisation?’

‘Yes, that’s another name for the vaccine. It has two names.’

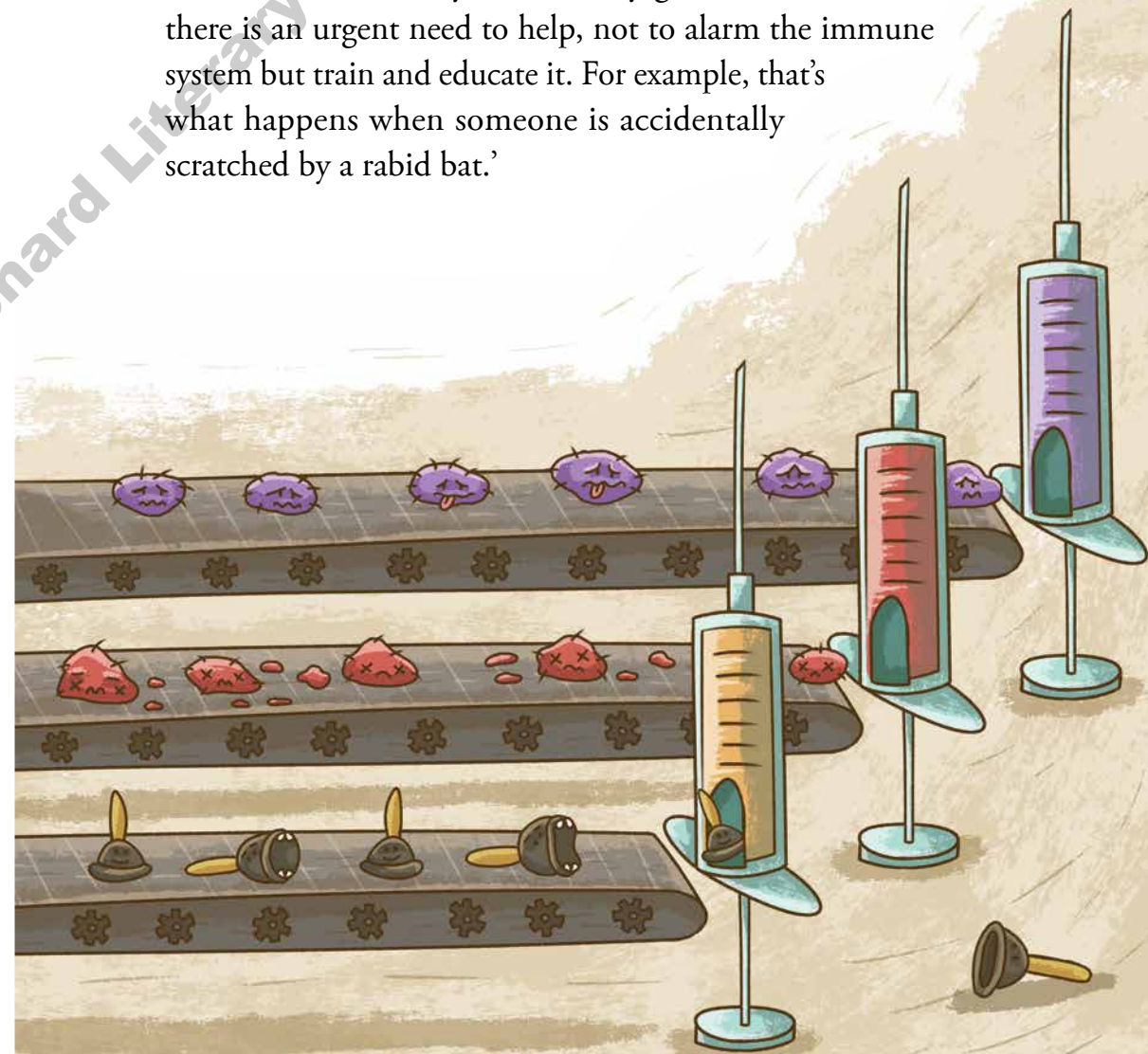
Emma’s eyes lit up. ‘And what’s a dead or weakened bacteria? If you can just kill them and they can help Sticky and her friends even so, wouldn’t it be safer to do all the vacci-thingy stuff that way?’

‘They are called vaccines! And another good question, but no, because while it’s true that dead pathogens injected in pieces will also alert the bodyguard, but since they can’t reproduce

in us anymore, the bodyguard doesn’t take them seriously. That’s how it is. Well, that’s when we need...’

‘...booster jabs,’ Emma sighed.

‘Yes. But if the doctors can safely turn a pathogen into a crippled one that still reproduces but no longer causes disease, then, hooray! It’s time for a vaccination without the need for boosters. By the way, there are also cases where scientists pinch Sticky’s job and start producing antibodies. It’s very practical to have a vaccine like that if you’ve already got the infection, and there is an urgent need to help, not to alarm the immune system but train and educate it. For example, that’s what happens when someone is accidentally scratched by a rabid bat.’



‘Well, that’s brilliant! Why can’t we always do antibodies? It would be a great help for Sticky’s crew!’

‘Unfortunately not, because this protection is doesn’t last our whole life, but just for a few days. Sticky’s crew are much better at it than we are.’

‘I see.’ Emma jumped off the table. ‘I think I have to go now, but I’ll come back tomorrow, okay? I’ll help you discover a vaccine!’

Doc nodded seriously. ‘And we can try to figure out a new delivery method.’

‘What’s that?’ Emma turned back.

‘You know, when you don’t need not a jab, but, say, can have it in an ice cream. The scientists are working on it right now’ Doc replied, waving goodbye to the princess. Who was already rushing away.



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CONTENT

DAY ONE

*Emma is sick of vaccinations,
but at least we get to meet her bodyguard*

5

DAY TWO

*When Emma learns that there are absolutely
loads of different bugs and viruses, and that chickenpox
is not the worst in the world*

25

DAY THREE

*When the bodyguard shows up again and it finally turns out
that vaccines aren't just for winding up children after all*

36

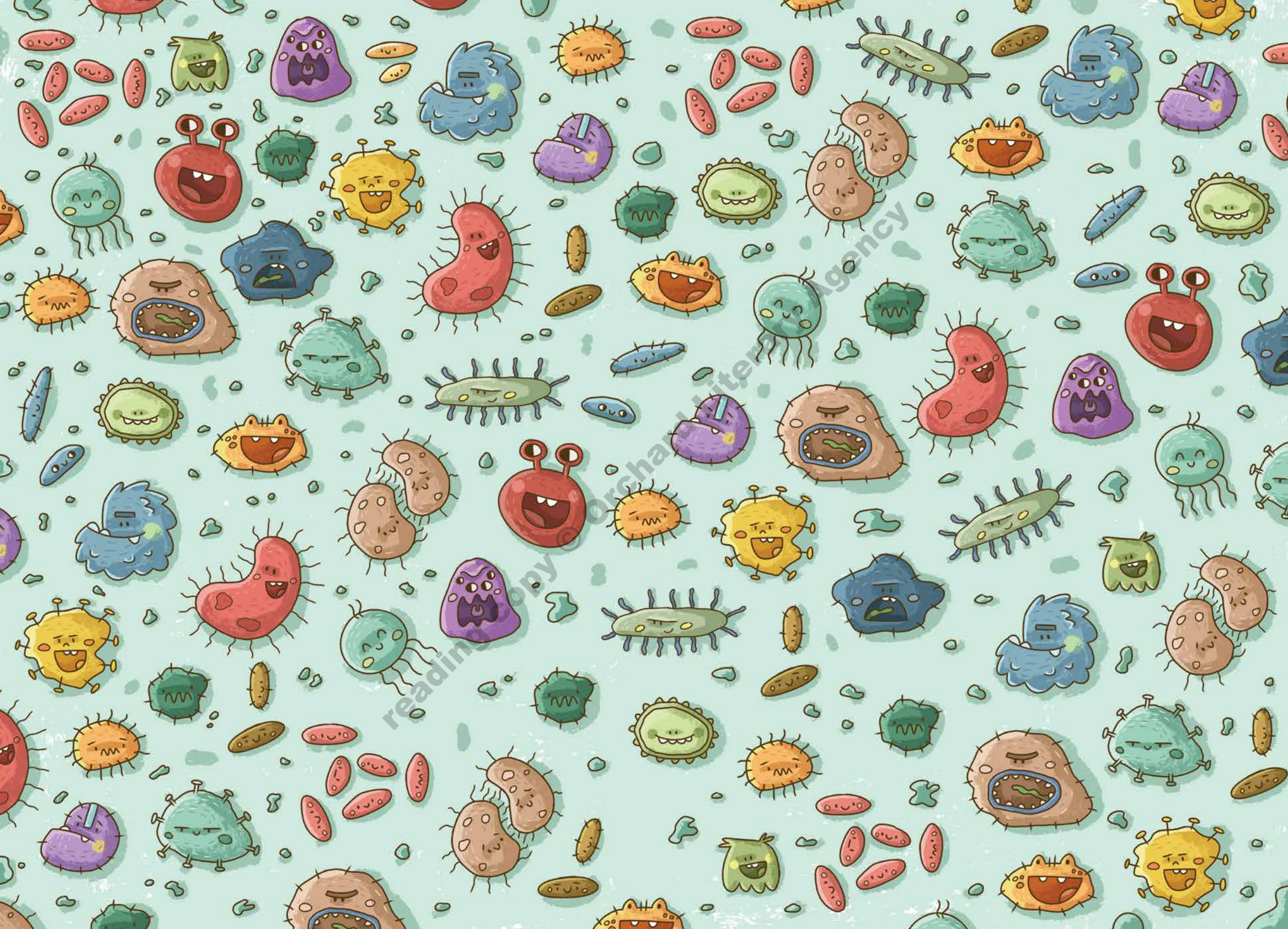
ISBN 978-963-410-702-6

Published by Pagony Publishing in 2020
www.pagony.hu

Text © Ildi Vibók, 2020
Illustration © Tamás Mayer, 2020
Publication © Pozsonyi Pagony Kft., 2020

Responsible publisher: Péter Banyó
Editor in chief: Eszter Kovács
Edited by Hanna Győri
Technical manager: Andrea Pais

Production work: Wunderlich Production Kft.
Production manager: Mészáros Gabriella
Printing, binding: Central Dabasi Nyomda Zrt.
Managing Director: Attila Balizs
www.dabasinomda.hu



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