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Introduction: What this book is about

Do you think insects and bugs are cool – or a bit icky? Insects are all around you and that’s a good thing. They can be a bit of a nuisance sometimes but at the same time they’re mega useful. I work with insects and there’s one thing I can say for sure: we couldn’t get by without bugs. They make soil out of dead animals and plants, they help plants produce seeds and they are food for millions of birds and fish and bats. If insects suddenly vanished, everything would be changed.

Since they are so very useful, maybe it’s a good idea to find out a bit about them. In this book, you’ll find stories about common insects living in Norway – some below water in lakes and streams, some in forests, some in your garden or some in your home.

You can read about mosquito larvae that breathe through a snorkel and ants that milk aphids for sugar water. You’ll learn how flies are able to walk upside down on the ceiling of your room, why mosquito stings itch and which insect was actually the *very* first animal in space. And although spiders aren’t insects, there are a couple of stories about them in here too.

I’ll also tell you about the ones I think are the world’s weirdest creepy-crawlies. A little wasp that changes ladybirds into zombies. The larva that kills other insects by farting on them. Beetles that can flash and beetles with a poison cannon in their bottom.

But first of all I’m going to tell you what insects actually are, as well as a bit about how they smell, hear and see. And where they hide away all winter.

[...]

Mayflies

Imagine you’ve waited years to become a grownup. At last the big day comes. Along with thousands of others, your body changes and you pass over into adult life. But whoops! What’s happened to your mouth? It’s gone, so you can’t eat any more. And look! Your legs have become so feeble you’re forced to fly almost all the time. That said, your adult life isn’t especially long – anywhere between a few

hours to one or two weeks. The sad record is held by an American mayfly, whose adult female lives for just five minutes.

Mayfly children, nymphs, live in water. When the time comes, they grow wings and fly up into the air. There, thousands of brand-new mayflies dance a beautiful aerial ballet as they look for a partner. The males have very unusual extra eyes that help them spot a female mayfly. These are known as turban eyes, which is hardly surprising since they really do look like great big turbans on top of their heads.

Because adult mayflies live such a short time, it makes sense for all of the mayfly children to become adult at the same time. That way it's easier for them to find a partner and make new mayfly babies before starving to death.

It actually ought to make us happy when we see masses of **mayflies**, because it's a sign that the water in a stream or river is clean and not polluted. But it can get to be too much of a good thing. In some countries, the police have sometimes had to close roads because millions of mayflies have turned into adults at the same time in the same place. There were so many mayflies that people couldn't see the road, and the cars got stuck in piles of dead insects. In the end, the police had to fetch snow ploughs to sweep them away.

[...]

The fly on the wall

Have you ever wondered how flies manage to sit on your wall? And not just sit. Like Spiderman, they can walk all the way up a wall – or upside down on the ceiling.

This is because flies have very special feet. Right at the end of the foot there are two claws and two pads covered in sticky hairs. Each hair looks like a kind of spatula, with the flat part at the outer end. The sticky spatula hairs keep the fly's feet firmly fixed to the wall. When it wants to raise its foot, the fly uses its claws to lift the sticky pads away from the wall. In order to use the least possible force to free its feet again, the fly only keeps three of its feet on the surface at a time when it is climbing up the wall. It takes a bit more of an effort to hold on firmly to

the ceiling, so then the fly keeps all four feet firmly stuck to the surface, but moves two feet at a time when it wants to walk.

These clever feet also come in handy when the fly wants to land on the ceiling. And the way it lands is like a circus trick. It flies towards the ceiling and just as it's about to crash, it reaches its forelegs up over its head, gets a grip and swings itself around in a half somersault. Hey presto – there it is, sitting upside down.

Houseflies aren't easy to swat. With their great big eyes that can see in all directions, they'll often spot your hand long before it reaches them and take off. What's more, they have small hairs on their body that sense tiny changes in the air. That's why a fly swat has lots of holes in: it doesn't push so much air ahead of it, so you have more of a chance of catching the fly off guard.

[...]

The beetle with a poison cannon

Some beetles are tougher than others. And the beetle that can create homemade explosions in its bottom, causing boiling hot poison gas to shoot out with a bang, is one of the very toughest. Such is the life of the insect known as the bombardier beetle, although perhaps we should call it the poison cannon beetle – because it has a chamber in the rear of its body that contains two explosive substances. These explosives are very well behaved as long as they aren't mixed with a third substance – which is why substance number three is stored in a separate chamber in the beetle body, enclosed in thick walls with an opening to the outside.

If some hungry enemy comes too close for comfort, the beetle opens up a connection between these chambers, mixing together all the substances. At once the mixture starts to boil, and poisonous burning hot steam shoots out of the beetle's backside. The beetle fires its steam cannon several times, a bit like when you pull the trigger on your water pistol over and over again. The beetle can even aim at the enemy when it sends out this cloud of poison. The heat and poison in this cannon are powerful enough to kill smallish insects and scare off bigger animals.

(...)

Tongues beneath their toes and ears on their knees

Insects don't always have such great table manners. For example, houseflies often land right in the middle of the food they're about to eat and trample around in it. That's because they use their feet to taste their food! Fly feet have a sort of tongue on the bottom that lets the fly work out whether this something it wants to eat. Imagine if you had tongues on the bottom of your feet! You could wander around the forest barefoot and taste the blueberries underneath the soles of your feet.

Insects have ears in all kinds of strange places. Some insects listen with their antennae or with the vibrations of small hairs on their body or their bottom. Grasshoppers have ears on their legs, while some butterflies have ears in their mouths! Pretty much the only place you'll never find insect ears is on the side of the head – the place where you have yours.

Why do insects need to hear? So that they can listen out for hungry enemies, among other things. At night, bats hunt moths. Some moths have learned to listen for the special sound signals bats send out when they fly. When the moth hears a bat nearby, it plays dead. It stops flying. Then it tumbles to the ground and avoids ending up as bat food.

Insects also need to be able to hear to find their way to other little bugs they want to eat – or find their way to a mate.

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Seeing what you need to see

If you're going to hunt, you need to be good at spotting movement. If you live off the sugar water in flowers, you need to be good at seeing the colours of the flowers. If you live in the eternal darkness of a cave, you simply don't need eyes. Insects' sight is adapted to the lives they live. That's why dragonflies have enormous eyes while cave insects are blind.

Honeybees can see several colours, just like us, but they can't see shades of red. Another odd thing about honeybees' eyes is that they have loads of tiny short hairs growing on them. Maybe these hairs make it easier for the honeybee to feel which way the wind is blowing.

Insects' eyes are made up of lots of separate eyes. Their brain puts all the little images together to make one big but slightly fuzzy image. It looks a bit the way an image on a PC screen looks to you when you zoom in really close.

If you could ask an insect what smells good, the two of you would probably disagree. The beautiful blue-black beetles known as dor beetles adore the aroma of poo. Mosquitoes think smelly sweaty feet are splendid. A lot of flies can imagine no scent sweeter than rotting meat.

Insects smell with their antennae – which are their nose. They can use their antennae to sniff out something good to eat or find a place to lay eggs. Or they can sniff out a mate.

A lot of insects use scent to find a partner. The females often send out a kind of insect perfume. Different species use different scents so that the males can

sniff their way to a female of the same species. Some male butterflies have long feathery antennae. These help them to pick up even the very faintest scent of a nearby female.

Horseflies

Have you ever seen a horsefly? The females suck your blood after cutting a little hole in your skin. Next time you swat away a horsefly take a moment to look at its eyes. A lot of them have colourful eyes, with yellow, purple or green stripes.

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Whirligig Beetles

Do you wish you had eyes on the back of your head too, so you could see what was going on behind your back? Some insects called whirligig beetles have just that. A whirligig is a round, shiny beetle. It looks a bit like a black plastic bead. Whirligig beetles swim on the surface of ponds and lakes and have four eyes. Two of their eyes are on the underside of their head, beneath the water. These ones let the whirligig beetle keep an eye out in case a fish comes up from below to eat it. The beetle also has two eyes on the back of its head, pointing up in the air. It uses these to watch out for enemies approaching from the air. These eyes are also useful when the beetle is looking out for food – usually dead insects floating on the water.

Whirligig beetles are incredibly quick. It isn't easy to catch them because they use their four hind legs as oars. Their legs are short and flat, and they draw them

rapidly back and forth through the water. This allows the beetles to dash away across the surface of the water, travelling more than forty times their own body length in a second! Whirligig beetles can swim under water too. What's more, they have wings and can fly.

Whirligig beetles like to hang out with other whirligig beetles. They whizz round and round like dodgems at a fairground. It makes sense for them to be part of a crowd. That way there's less chance of getting eaten. And these beetles have another trick up their sleeve: If they're bothered, they can give off a nasty-tasting substance. So the fish often spits them out again.

(...)

Dor Beetles

Maybe you have a caretaker working at your school who cleans and tidies the classrooms and corridors. But have you ever thought about who takes care of the cleaning out in nature? How do elk poo, sheep droppings and cowpats all disappear?

Maybe you've seen the caretakers of the forest without knowing anything about the work they do. The big black dor beetle is one of them. Dor beetles are strong, hungry beetles. Their eating habits seem very peculiar to us because they eat animal poo. They can eat their own bodyweight in poo in just one day! Adult dor beetles dig long passageways under the earth beneath a dollop of animal dung. These passageways can be longer than your arm. Right at the end of the passage, they build a little nursery. They drag the poo down from the ground and into the nursery. In the end, the dor beetle mum lays an egg down there. That

gives the larvae loads of food to eat in a safe, cosy room beneath the earth. At the same time, the poo gets cleared away from the surface and mixed in with the soil.

Next time you see a big semi-circular black beetle moving slowly across the path, pick it up gently and take a good look at it. If you've found a dor beetle, you'll see there's a blue or purple sheen to its underbelly. You'll also understand why this beetle moves so slowly: its legs are like elongated spades. They're great for digging soil but not much good at setting records in the 60 metres.

Maybe you'll also see some tiny reddish brown creatures clinging to the dor beetle, often on its underbelly. These are mites. Mites aren't insects, they're related to spiders. They don't have wings and can't fly themselves. That's why it makes sense for them to hitch a lift with a dung beetle so they can make their way from one poo to the next. Although these passengers make it harder for the dor beetle to fly or walk, it's still worth the dor beetle's while to take them along because the mites eat up the larvae of other insects that also live in the poo. That way, there's more food for the dor beetle's own children.

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Spittlebugs

Have you ever seen small blobs of foam in the grass in summertime? It looks as if somebody spat on the ground. A lot of people call this foam cuckoo spit. But it has nothing to do with cuckoos. The spit is made by a little baby insect, a spittlebug nymph. It sits still as a statue sipping plant sap through its long sucking snout. That means it's a good idea for it to hide away from enemies and sunlight.

The nymph does this by producing a kind of liquid from its bottom and then blowing air bubbles into it. This turns it into the very finest foam, like a long-lasting bubble bath!

When the spittlebug grows up, it moves out of its bubble bath and hops away to find a partner. And what a hopper it is! It can hop more than 400 times its own body length. Imagine if you could jump higher than the Eiffel Tower.

It's raining spit

In Africa, loads of spittlebugs live together in trees. They make so much foam that it drips down off the branches like rain!

(...)

Parasite wasps

There's a lot more to wasps than the stinging kind. We have several thousand different types of wasps in Norway alone. Most of them don't sting and can't be seen. A lot of them are small. In fact, the world's smallest insects are wasps. Like the tropical Tinkerbell wasp, named after the fairy in Peter Pan. It's so tiny it could sit on the tip of a hair from your head.

A lot of wasps are parasites. That means they live off and eat other living creatures, usually other insects. The animal the wasp is living in often ends up dead. It simply gets eaten up from the inside. It sounds yucky, but wasps like these are important to nature. They make sure there aren't massive numbers of other species. That helps us humans out too. We can get wasps like these to work

for us when we're growing plants in greenhouses: the wasps can kill off other bugs that want to eat our plants.

Parasite wasps have learned some tricks when it comes to laying their eggs in other bugs. Some may creep around on a tree trunk, listening with their feet. That way, they can hear if there are any beetle larvae gnawing away, deep inside the tree. Then the wasp mum wiggles a long tube into the tree trunk at just the right spot so she can hit the poor larvae inside there. She sends an egg through the tube and – plop! – it lands right inside the larva's body.

Odder still, some parasite wasps can use this tube to taste whether another parasite wasp has already laid eggs in the larva. Often, there's only enough food for one parasite larva inside the other larva. And it would be silly to lay an egg in a spot that's already taken. That's why the wasps have a kind of tongue at the very end of their tube. That lets them taste whether there's already an egg inside the larva.

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Earwigs

Earwigs are elongated brown insects. They have scissor- or pincer-like things on their rear ends. Some people call them "pincher bugs". But although earwigs use their pincers to defend themselves, there's no need to be afraid of them.

Earwigs don't pinch very hard at all. And they only pinch if you bother them. But why not impress your friends instead by telling them which earwigs are females and which are males. It's actually easy to spot: males have curved pincers, like when you curl your thumb and forefinger towards each other and

make the fingertips meet. The females have straight pincers, more like when you make a scissor shape with your index and middle fingers. At the very tip of the female's pincers there are tiny curved hooks.

Earwigs are among the few insects where the mum stays with the eggs after she's laid them. She washes the eggs and keeps them clean. When the tiny earwig babies hatch, the mum feeds them on withered leaves and little bugs.

If you want to find earwigs take a look in your mailbox. Earwigs often crawl in through the little holes in the bottom of the mailbox and gather there. That way they can keep out of the rain and steer clear of other animals that want to eat them. If you don't find any in your mailbox, take a look under some rotten leaves and other debris on the ground.

(...)

Zombie beetles

Are you scared of zombies – those living dead creatures you see in films? If so, you'd better skip this chapter. Because here come some zombie stories from the insect world.

Imagine wandering through a beautiful flower meadow in the US. In the flowers sit big beetles, wings spread out to the side. Suddenly, you realize that a lot of the beetles are dead. They have been infected by a special fungus that turns them into a kind of zombie.

First of all the fungus grows inside the beetle's body. It produces some chemical substances in there that make the beetle behave really weirdly. The fungus makes the beetle climb up and bite hold of the flower. Then the beetle dies. The beetle corpse is left dangling from the flower. And then night falls.

During the night, the fungus starts to grow out of the beetle's body. Weirdly, the beetles open their wings even though they are dead. Now the wings are spread out to the side, it's easier for the fungus to get out of the beetle's body. And now, masses of tiny "fungus seeds" sprinkle out of the dead beetle. They land on new beetles as they come to eat the flowers in the meadow the next day.

Other times, one insect can turn another insect into a kind of zombie. In North America, there's a little wasp that lays its eggs in living ladybirds. The wasp larva eats the ladybird up from the inside. Incredibly enough, the ladybird can wander around as usual even while it's being eaten alive. But the minute the wasp larva has eaten its fill and crawls out of the ladybird's body, something happens to the ladybird. First it freezes.. Then it remains stock-still. Seemingly dead.

The wasp larva spins itself a little house of silk between the ladybird's legs. With the zombie ladybird as the roof. Inside the house, the wasp changes its body from larva to wasp. At the same time, the wasp manages to control the ladybird, making it stand guard. Every time an enemy gets too close, the ladybird jerks, frightening away the attacker. In this way, the wasp gets to change its body in peace. When the wasp comes out of its pupa, it flies away. Sometimes the ladybird really does die then. But other times it just stops behaving like a zombie and carries on its life as normal.

Sample translation

Beetles, bugs and Butterflies

By Anne Sverdrup-Thygeson

pp. 16-17

Tongues beneath their toes and ears on their knees

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Insects also need to be able to hear to find their way to other little bugs they want to eat – or find their way to a mate.

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Earwigs don’t pinch very hard at all. And they only pinch if you bother them. But why not impress your friends instead by telling them which earwigs are females and which are males. It’s actually easy to spot: males have curved pincers, like when you curl your thumb and forefinger towards each other and make the fingertips meet. The females have straight pincers, more like when you make a scissor shape with your index and middle fingers. At the very tip of the female’s pincers there are tiny curved hooks.

Earwigs are among the few insects where the mum stays with the eggs after she’s laid them. She washes the eggs and keeps them clean. When the tiny earwig babies hatch, the mum feeds them on withered leaves and little bugs.

If you want to find earwigs take a look in your mailbox. Earwigs often crawl in through the little holes in the bottom of the mailbox and gather there. That way they can keep out of the rain and steer clear of other animals that want to eat them. If you don’t find any in your mailbox, take a look under some rotten leaves and other debris on the ground.

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Zombie beetles

Are you scared of zombies – those living dead creatures you see in films? If so, you’d better skip this chapter. Because here come some zombie stories from the insect world.

Imagine wandering through a beautiful flower meadow in the US. In the flowers sit big beetles, wings spread out to the side. Suddenly, you realize that a lot of the beetles are dead. They have been infected by a special fungus that turns them into a kind of zombie.

First of all the fungus grows inside the beetle's body. It produces some chemical substances in there that make the beetle behave really weirdly. The fungus makes the beetle climb up and bite hold of the flower. Then the beetle dies. The beetle corpse is left dangling from the flower. And then night falls. During the night, the fungus starts to grow out of the beetle's body. Weirdly, the beetles open their wings even though they are dead. Now the wings are spread out to the side, it's easier for the fungus to get out of the beetle's body. And now, masses of tiny "fungus seeds" sprinkle out of the dead beetle. They land on new beetles as they come to eat the flowers in the meadow the next day.

Other times, one insect can turn another insect into a kind of zombie. In North America, there's a little wasp that lays its eggs in living ladybirds. The wasp larva eats the ladybird up from the inside. Incredibly enough, the ladybird can wander around as usual even while it's being eaten alive. But the minute the wasp larva has eaten its fill and crawls out of the ladybird's body, something happens to the ladybird. First it freezes.. Then it remains stock-still. Seemingly dead.

The wasp larva spins itself a little house of silk between the ladybird's legs. With the zombie ladybird as the roof. Inside the house, the wasp changes its body from larva to wasp. At the same time, the wasp manages to control the ladybird, making it stand guard. Every time an enemy gets too close, the ladybird jerks, frightening away the attacker. In this way, the wasp gets to change its body

in peace. When the wasp comes out of its pupa, it flies away. Sometimes the ladybird really does die then. But other times it just stops behaving like a zombie and carries on its life as normal.