



Ash's outdoors discoveries

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It was an early Saturday morning, and Ash was playing video games as per usual, while his father got ready for work. “I’m sorry I can’t spend the day with you today, Ash” his father said to him, “But I hope you’re looking forward to spending the day with your Aunt Olive”

“She’s funny. And I barely even know her, I haven’t seen her since I was little.”

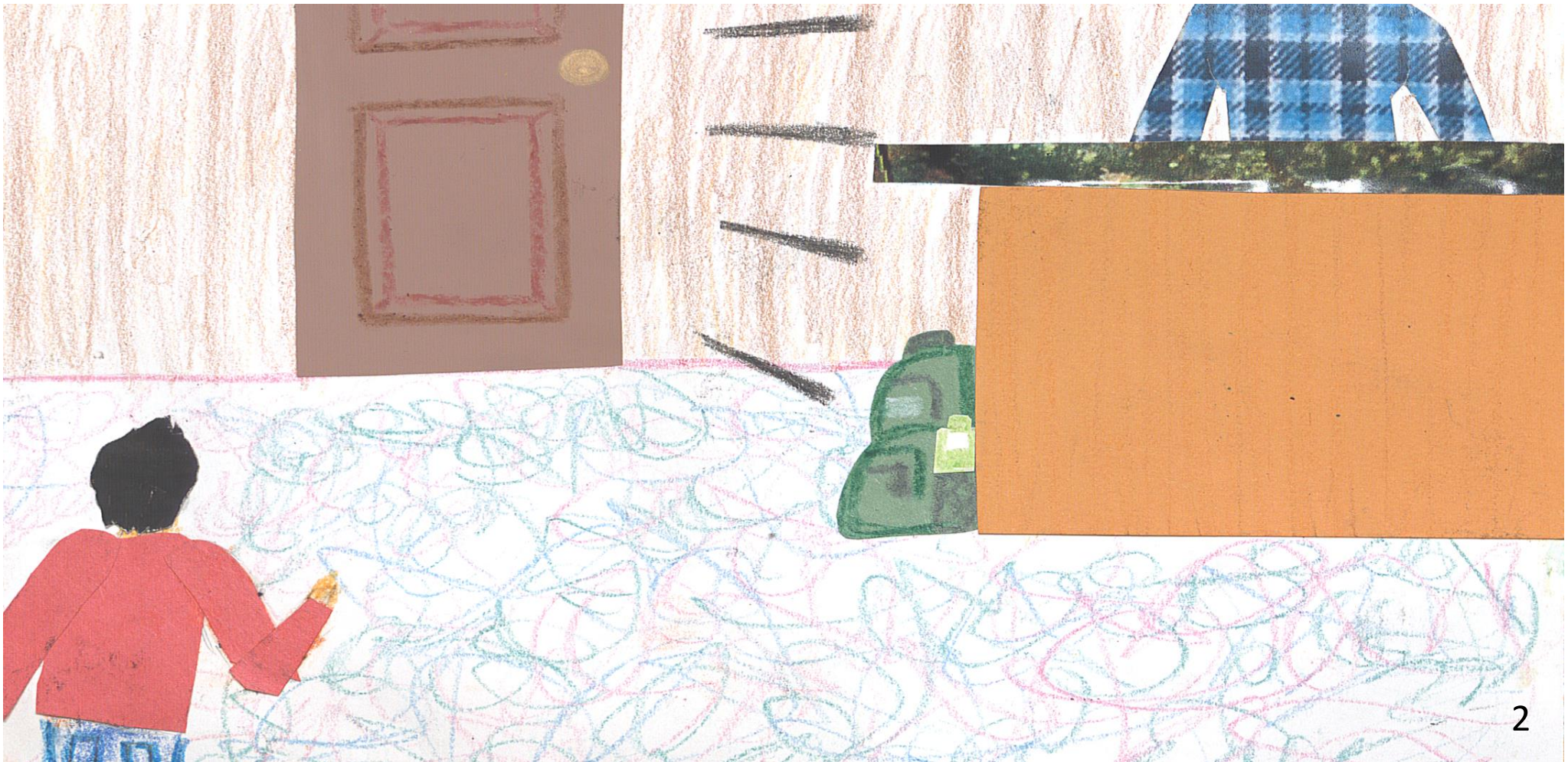
“That’s because she’s been travelling the world, learning about all sorts of cool and interesting things. She’s very excited to see you, and thinks that you’ll really enjoy the day she’s planned.”

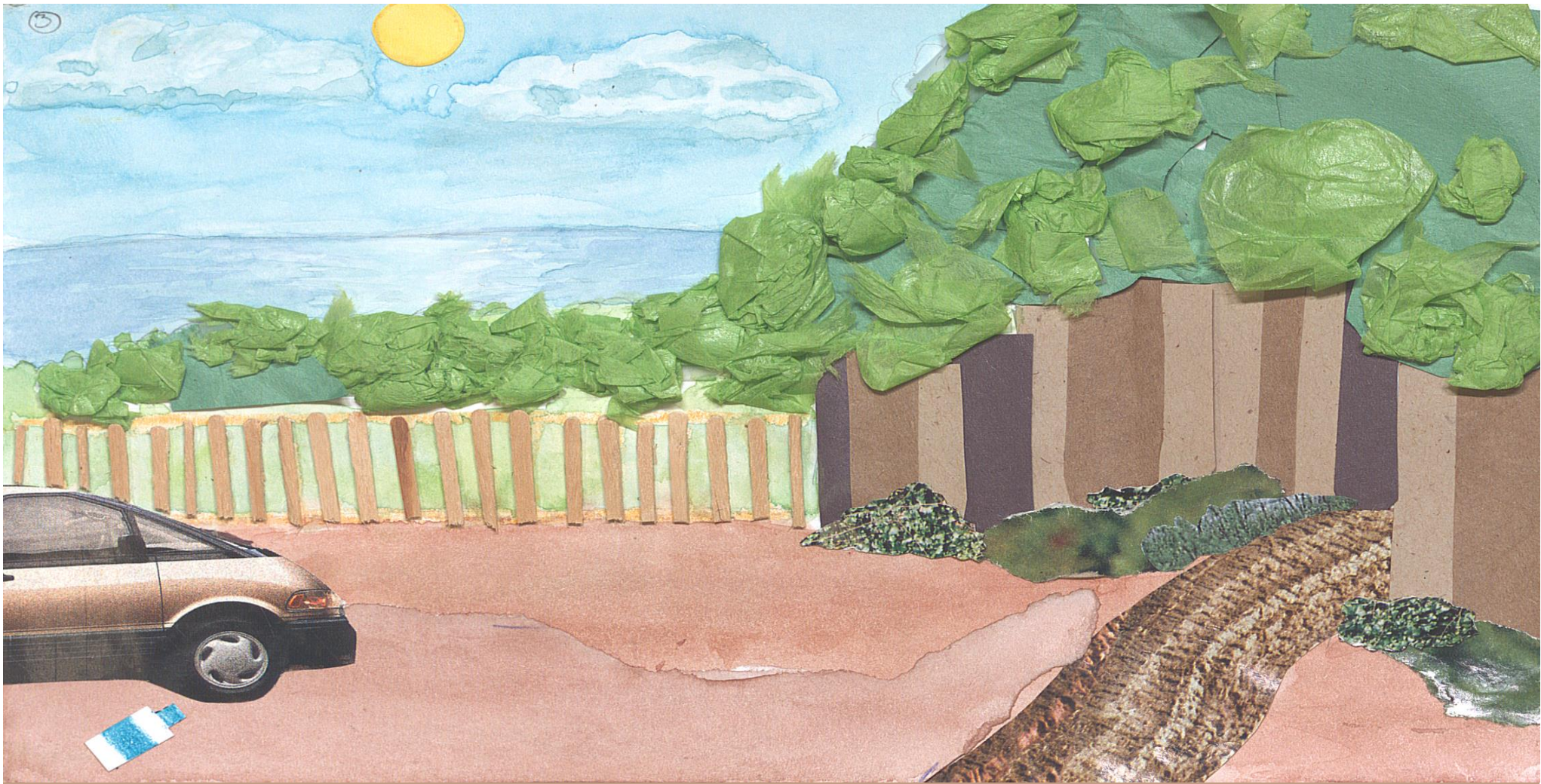
Ash grumbles. “I would rather stay here”

Shortly after that, Aunt Olive arrived. Ash's Father lets her in. She greets Ash and he reluctantly greets her, as his dad leaves.

"I hope everything goes well today, call me if you have any issues." Ash's father said as he kissed his son on the forehead, "I'm looking forward to hearing about what you learn today!"

"Well Ash, I hope you're excited!" Aunt Olive says as she checks her backpack to make sure they had enough food and water for their trip. "We need to stay hydrated today! Our bodies need water to keep us going on our adventure" she told his nephew excitedly, as she handed him a water bottle.





After a car ride that twisted and turned for what seemed like a long time, Ash and Aunt Olive arrived. They parked their car and start to look around. From where they parked, Ash could see out over a mountain covered in trees, all the way to a glimmering blue lake in the distance.

“How far are we going?” he asks, already impatient from the lengthy car ride. “Well I’d like to make it all the way out to the beach, if you’re feeling up for it” his aunt replies “But, we’ll just start walking and if we get too tired we’ll turn right back around, how does that sound?”

Ash grumbles again, empties the water bottle in one gulp and throws it on the side of the car.

“Did you notice that we’re at the top of a really big hill?” aunt Olive asks Ash after a while.

“Yeah,” he says “that’s pretty clear.”

“Well do you know why we’re at the top of a big hill?” “What do you mean? Shouldn’t you know that?” Ash asks rudely. “I meant why the *hill* is here, not why we’re here” she replies nicely.

“Aren’t hills just... there?”

“Well, sure, but what if I told you that thousands of years ago all of this place was covered in ice and the ice helped create these landscape?”

Ash for the first time lifts his gaze of the ground to look around.



We're actually standing at the top of a moraine, a name for a hill made by a glacier" she explains, "During an ice age in the past, the glaciers of stretched out over the earth under our feet. Since it wasn't the same temperature all the time the glaciers would grow and shrink, travelling all over."

"But glaciers are really heavy and really strong, so as they travelled they picked up rocks of all different sizes, including *huge* ones. And when they melted, they left behind those big rocks in giant piles and the melt-water carried some of the smaller rocks down to the bottom of the hill."

"Well what's at the bottom of the hill now?"

"The beach!" Aunt Olive said "And on our way down, we'll see lots of other cool plants and animals that adapted to live between here and there."



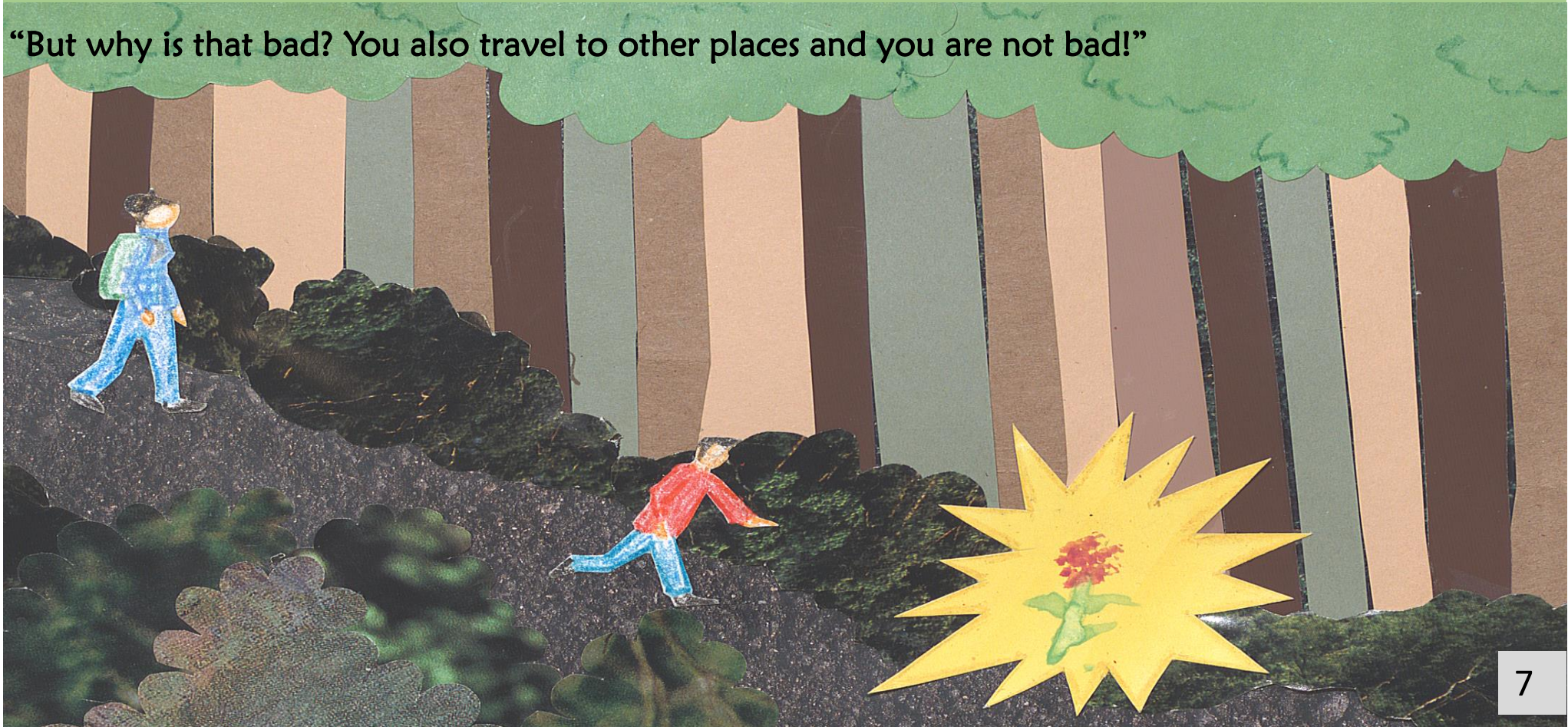
After a while they enter a thick forest.

“That is a beautiful and colorful flower!” Ash says, pointing and starting to become more engaged.

“Yes! but it’s not native here” Aunt Olive says “What do you mean? Did it travel here like you?” Ash inquires

“All natural ecosystems have elements that make them special” Aunt Olive explains “When we travel from one place to another we might unknowingly bring seeds and other stuff with us, like in the hem of your pants, or attached to your shoelaces. This little plant probably got here like that.”

“But why is that bad? You also travel to other places and you are not bad!”





Aunt Olive smiles to Ash “Invasive species are not bad in themselves. They are in the wrong place. They grow and spread too much because other species are not used to them. This results in damage to the native species.”

“So, does that mean that we shouldn’t go to other places? Why do you do it, then?

“Well, as I told you, invasive plants are not bad by themselves. It is us who are responsible for the proliferation of invasive species, because we are the ones that take them to the wrong places. That does not necessarily mean that we should restrain ourselves from traveling, but we have to be careful of how we might affect the places we go to.”

Ash stops for a while trying to process the information. He nods, smiles and keeps walking.



Further down they stop to take a drink break and meet up with stream of brownish water. “Why is this water brown? Is it dirty?” asks Ash.

“I’m not sure if dirty is the right word” Aunt Olive said “some of the water travels the ground and flows through decayed leaves and soil. The water changes color as it drags small particles and dissolves soluble material”

“Wow. My dad once told me that some rivers flow underground. Are underground streams also brown?” Ash ventures

“In fact, they usually have the clearest water. Part of this river flowed underground, but the water eventually reached the surface and mixed with the larger stream above ground. You can even find where smaller, underground streams meet bigger ones like this.”

Ash walks to the edge of the stream. “You can? How?”

Aunt Olive squats next to him and reaches her arm into the river.
“The water feels much colder there. Oh! Found something!”

“Let me see!” Ash says, and kneels down next to his Aunt. He moves his hand around and felt the difference, it was ice cold! He peeks over the edge of the stream, and sees the river’s pebbled bottom.

He picks up a rock with something stuck to it. Looking closer Ash exclaimed “Is this a bug?”

“Sure! You’ll find lots of interesting creatures in here. The stream moves very fast though, and not all creatures can swim like fish do. So this little caddisfly larva makes a home and perches on a rock. They live in water when they’re young, and eventually emerge as flying insects. These friends eat small bits of leaves and trees in the water.



“Wow!” yells Ash after a while of walking silently, pointing at something mushy “Mushrooms grow outside! I thought they were made for pizzas!”

“Of course not! Mushrooms are like fruits, though not of plants but of fungi”

“Fungi?” he asked puzzled

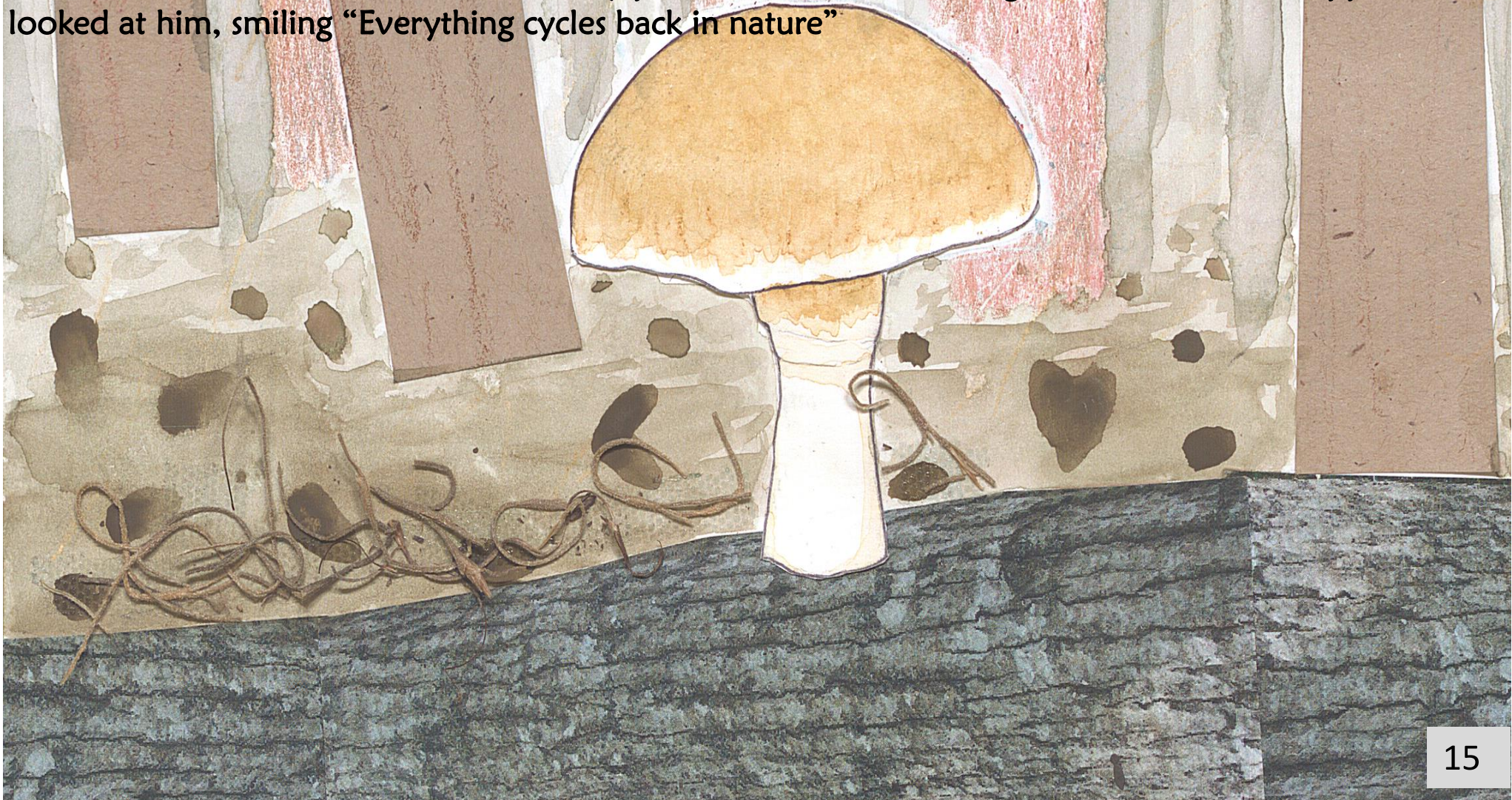
“That’s right! Like animals and plants, fungi are part of another kingdom of living beings, though we often only can see their fruits, like this mushroom. Fungi are very important to natural ecosystems, because they are decomposers”



Her aunt paused and kneeled, grabbing leaves and throwing them in the air “These leaves died but their essence is going back. In a way they never die”

“How is that so?” Ash can’t stop asking questions now

“All decayed material is broken down by nature. Water and macroinvertebrates like the ones we saw break down these leaves to small particles which then are consumed by organisms like fungi to turn them back to nutrients which are taken by plants from the soil through their roots” She stopped and looked at him, smiling “Everything cycles back in nature”





“I can see the lake!” Ash screams picking up his pace. “We are getting close!”

“We sure are! I’ll race you to the edge!” They arrive at the lakeshore, and Ash screams in excitement
“Now the water is green! Water is so colorful!”

“That’s right, what do you think makes it green?” she inquired. “Well plants are green... Are there plants in the water”

“There sure are! These are called algae and are fundamental to water ecosystems. But like everything in life, too much of something can be bad”

“Humans put a lot of nutrients in the land, to help our crops grow faster and larger. But those excess nutrients in the soil when rain falls are carried as runoff into the river and flow to the lake. The algae then use those nutrients to grow in number excessively.”

“And why is that bad?”

“Remember how invasive species might grow and spread too much, damaging others? Something similar happens here. When all those excess algae die, decomposers have a lot of work and they overuse one precious resource in the water: oxygen. Without this, *dead zones* form: areas with little oxygen where nothing else can live”. She sighs and looks upstream and back to the lake “As you can see, nature is in balance. We might alter the balance without realizing.”



A few feet from where he is standing, Ash notices an old plastic water bottle, probably carried by the river, and thinks back to the start of the journey where he dropped a similar one by the side of the car.

“Ready to go back?” Aunt asks him

“In a minute!” He open his backpack, picks the water bottle and puts it in the backpack, then goes running towards her aunt.



“So, how was it?” Ash’s dad asks, once they had said goodbye to Aunt Olive.
“Did you have a good time? Did you learn anything new?”

“It was ok” Ash replies

“Just Ok? Aunt Olive told me that you guys went to the place we used to go as kids. I loved that place! We discovered so many cool things there”

Ash takes a while to answer, taking a glance at the TV station and his videogames in the shelf. An internal battle seems to be going inside his head. After a while he goes to the sofa and starts emptying his backpack, smiling when retrieving the empty bottle.

“Yeah, I learned a lot too! We went to places where you could see the past and how nature has changed! Aunt Olive told me about how plants travel from one place to another... I never thought plants moved! Oh! And she showed me small animals and the houses where they live in!

“Wow! That is amazing!” Ash’s dad exclaimed

Ash puts the bottle in the recycling bin in the kitchen and starts laughing “Did you know that mushrooms are more than just ingredients for pizza!?”

