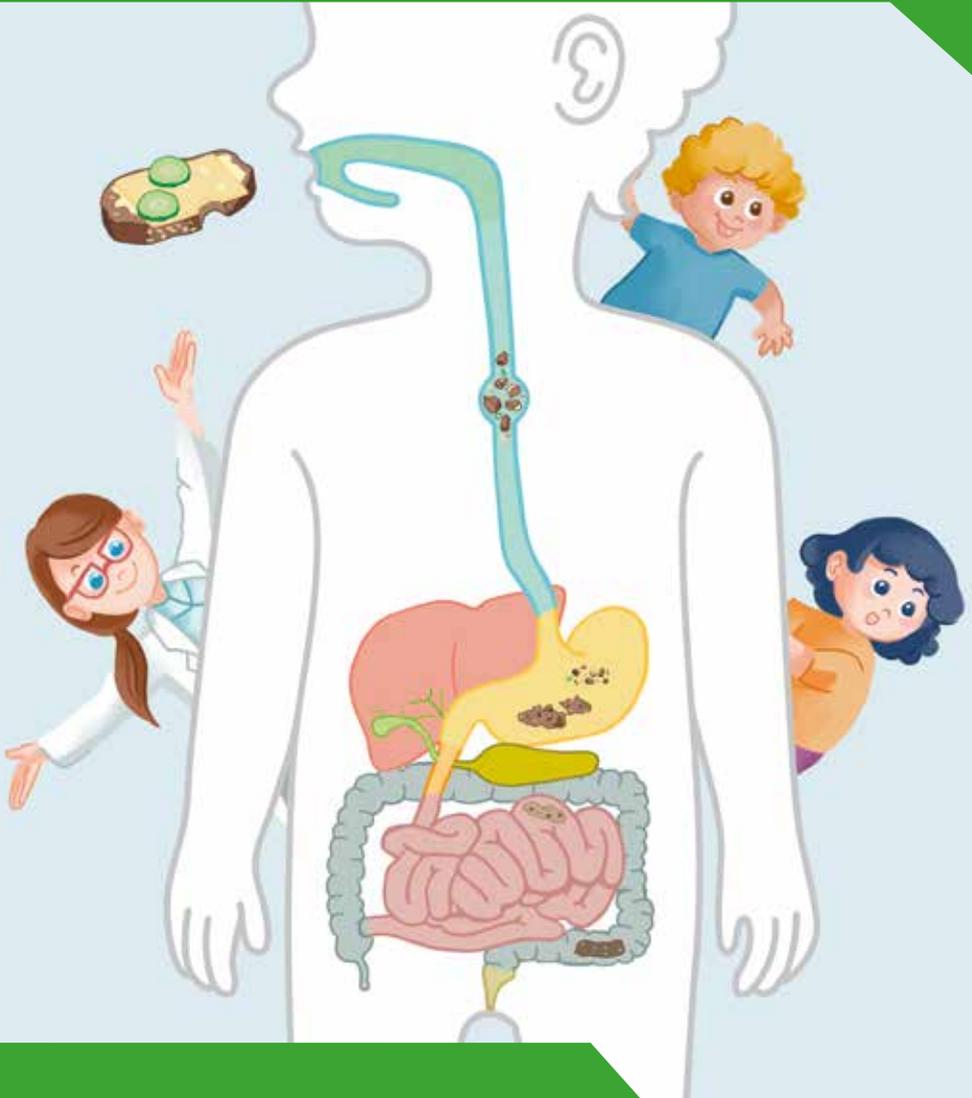


# Kamishibai Stories – Our Digestive System

Nr./Art. 764634



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## **The Kamishibai – Application and Use**

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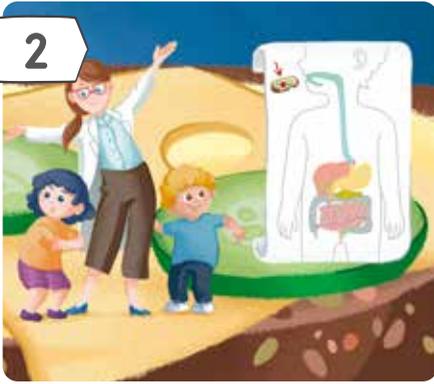
1



Mia and Max love exploring the old attic. The children pull a dusty old box into the middle of the room and open it, curious to see what's inside. Can you see the blue plastic box, too? "That's my lunch box! How did that get in here?" shouts Max, surprised. "What's that?" says Mia, reaching for an old, wooden box.

She puts it on the floor and opens the lid. Suddenly, the box starts to shudder and shake, and the lid rattles open and closed. A storm swirls up, whirling and whistling around the children, tugging them about. "Oh no! I think we're going to be pulled into the box!" cries Mia. Suddenly, everything goes quiet.

2



Mia and Max look around in wonder. Just a moment ago they were in the attic, but now they are standing in the middle of a huge slice of bread with cheese and cucumber on it. It smells so nice that Mia's mouth starts watering. Max nudges Mia. "Who is that lady?" he whispers. "Hello, my name is Professor

Piccolina," replies the lady. "Hi," says Max, as Mia realises... "We're sitting inside my blue lunch box! That's impossible!" "Almost everything is possible in this story box," the professor laughs. "Unfortunately, I don't have much time. I'm going to look at the human digestive system in a moment." Max stares at Professor Piccolina in wonder. "Digestive system?" he asks. "Would you like to see?" the professor replies. "Can we?" ask the children. The professor smiles and points to the map. "Of course! If you are interested, I would be happy to take you on a tour of the digestive system. I happen to have a few protective suits with me."

#### Fun facts:

- Because a person's sense of smell is closely linked to their sense of taste, the mouth produces saliva when you smell food.



3



Once they have put on their protective suits, the three enter the mouth with a bite of bread. “Make sure you don’t get in the way of the teeth!” calls the professor. “Here we are at the first stage of the digestion journey,” she explains. “Can you see how the teeth break up the bread and the tongue mixes everything

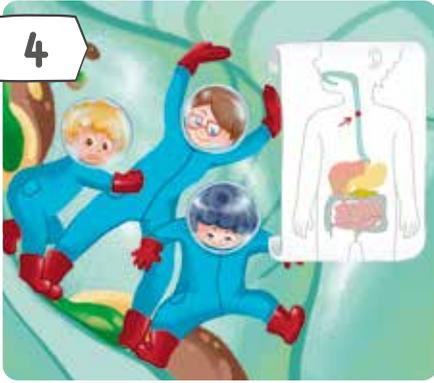
together nicely?” The children nod. “What’s that spraying out of the walls?” asks Max. “That’s saliva from the salivary glands. It makes the food wetter,” explains the professor. “Aha, I think the lump of bread is about to be swallowed – it’s already moving backwards.”



#### Fun facts:

- As it breaks up, food mixes with saliva.
- Saliva comes from the salivary glands.
- Saliva releases chemicals from the food so that you can taste it.
- The tongue can taste and discern sweet, sour, salty, bitter and umami flavours. Umami is savoury or meaty.
- The saliva makes the pieces of bread wet so that they stick together in lumps. This makes it easier to swallow and stops the oesophagus from being hurt by sharp pieces of food.
- Saliva contains the digestive enzyme amylase, which can break down carbohydrates.
- Each person produces up to 1.5 litres of saliva a day.

4



“Watch out!” warns the professor. “We’re about to be swallowed!” At that moment, the children are thrown into the oesophagus with a jolt. “It’s quite squishy in here!” says Mia. Professor Piccolina explains: “The oesophagus is a long, thin tube of muscle that will carry us down. We don’t need to do anything

ourselves.” While the professor is explaining, the oesophagus begins to squeeze and stretch, squeeze and stretch, moving the professor, the children and the lumps of food further and further down. “Why are the walls shiny, and why are they wet?” asks Max. “That’s a mucous membrane,” explains Professor Piccolina, whose glasses were now crooked thanks to all the commotion. “It makes it easier for us to slide down, and also protects the oesophagus. That was quick, children – we’ve already reached the gastro oesophageal junction.”



#### Fun facts:

- The oesophagus is a tube of muscle that’s about 25 cm long.
- The oesophagus connects the mouth to the stomach.
- It is stretchy and changes shape to fit the food.
- The muscles in the tube contract section by section before stretching out again.
- The oesophagus has a layer of glands that release a liquid that makes food slide down better.
- By doing all of this, the oesophagus transports the food to the stomach in just a few seconds.
- The entrance to the stomach is called the gastro oesophageal junction.

5



The group enter the stomach and find themselves in a huge cavern with a lake. Can you see what colour it is? A small lump of bread slides down the slippery wall, which starts to move in waves. A green liquid pours from a number of glands into the bubbling lake. “There are still some bits of the last

meal here. It must have been something hard to digest,” the professor muses. “By the way, the lake is filled with hydrochloric acid! You see that little piece of cheese there? It’s almost disappeared!” “Where has it gone?” asks Max. Mia points down and replies: “Right under our feet! But where does the rest go?” “Let’s go and see.” the professor tells them, pointing to a lump of food floating past. “Quick, jump on!”



#### Fun facts:

- The stomach is a hollow organ in the upper abdomen, a little to the left side of the body.
- It can hold up to 1.5 litres and is about 25 cm long.
- The stomach’s gland system makes around 2 litres of gastric juice a day.
- Gastric juice is made up of hydrochloric acid and a digestive enzyme called pepsin.
- The stomach has a very thick mucous membrane so that the gastric juice doesn’t harm it.
- The stomach has strong layers of muscle that move in waves to mix food together and transport it to the small intestine.
- Food that is easy to digest remains in the stomach for around an hour, but food that is harder to digest can stay for up to eight hours.

6



The group have arrived safely with the lumps of food at the first part of the small intestine. “This is the duodenum,” explains Professor Piccolina. “What a funny name,” giggles Mia. “It is!” chuckles the Professor. “This is where all the different digestive juices come together. Can you see that clear liquid? That’s

pancreatic juice, which comes from the pancreas, next to us. It neutralises the corrosive hydrochloric acid from the stomach. The pale yellow bile over there comes straight from the liver. It separates fat from the food into tiny droplets.” The professor looks at her watch and hurries the children on. “Come on, we can still visit the liver if we’re quick!”



#### Fun facts:

- The broken-down food leaves the stomach through the duodenum; the first section of the small intestine.
- The glands of the duodenum can produce up to 3 litres of digestive juices.
- The pancreas adds up to 1 litre of clear abdominal saliva, which also neutralises the hydrochloric acid from the stomach.
- The enzymes in the digestive juices break down carbohydrates, proteins and fats.
- Bile divides fat into tiny droplets, which are then split up into fatty acids by the enzymes in the pancreatic juice.

7



The group have reached the bottom of the liver. “Oh, it looks so dark!” says Mia. “Yes” replies the professor. “The red-brown colour comes from all of the blood, which constantly flows through the liver to be cleaned here. You already know that the yellow bile that we saw before comes from here. The bile that

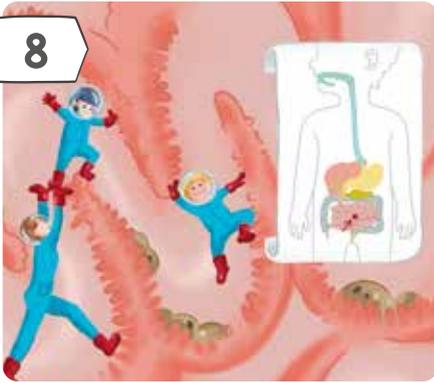
isn’t used straight away for digestion can be stored here, in the gall bladder. We should get back to the intestines, though, and carry on with our original route!” “Thank you for showing us the liver!” says Max.



#### Fun facts:

- The liver makes up to 0.5 litres of pale yellow bile a day, and sends it to the duodenum, if it’s needed there.
- The gall bladder is attached to the underside of the liver.
- Any bile that is left over is thickened in the gallbladder and sent to the intestines later as dark yellow bile to help digest fatty foods.
- Bile divides fat into tiny droplets, which are then split up into fatty acids by the enzymes in the pancreatic juice.

8



The journey continues through the long and winding small intestine. The group pass several heaps of something soft and light brown. The wrinkly intestine walls are pink and shiny. “It’s great here!” call the children enthusiastically. Dr Piccolina nods and agrees: “Yes, this is my favourite part of the digestive

journey, too. The intestine is so long that it has to wiggle all over so that it fits in the human body. There are millions of little bumps on its mucous membrane. Can you see them? These are called intestinal villi, and they can send useful things like glucose all over the body. Look how hard the intestine is working! The straight and circular muscles move the lumps of food along to the large intestine.”



#### Fun facts:

- After all this, there are only end products left in the small intestine.
- The small intestine is about 5 metres long.
- It has a wrinkly mucous membrane that has millions of little villi and microvilli extending from it. This means that the small intestine has a huge surface area.
- Glucose and amino acids are sent all around the body through the tiny blood vessels in the intestinal villi.
- The lymph vessels in the intestinal villi absorb glycerine and fatty acids.
- The intestines mix lumps of food and carry them along using the straight and circular muscles.

9



The intestinal tube is getting wider again. “The large intestine is much wider than the small intestine,” explains the professor. “Oh, watch out, children!” she warns. “A nasty wind is coming up from behind!” The children look around, scared. A swirling storm catches them up and blows them along the intestine.

“Are you hurt, children?” asks the professor. “No, no – we’re okay!” call the children. “What was that?” asks Max, amazed. “That was intestinal gas,” the professor tells him. “It comes from the intestinal bacteria that live here and eat the leftover food. This ends up making gases, which whoosh along the intestines.” Max grins and snorts: “And sometimes fart out of us!” Mia and Professor Piccolina start to laugh. “I haven’t had this much fun for a long time, children,” the professor chuckles. “It’s a pity that our journey is almost over. We are nearly at the rectum, now. The thick, circular muscles will take you outside from there.”



#### Fun facts:

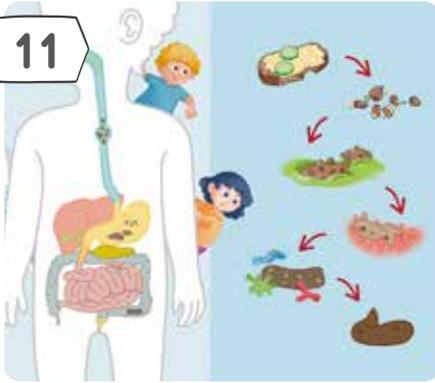
- The colon is about 1.5 metres long.
- The food remains here between 12 hours and several days.
- Minerals and nutrients are passed into the blood.
- Billions of bacteria live in the colon and make up the intestinal flora.
- There is a worm-shaped organ attached to the large intestine called the appendix.
- As the intestines move, the thickened mass of undigested food, mucus, bacteria and pathogens travels into the rectum.
- This is called stool, and it leaves the body through the anus.

10



The children take off their helmets and wait for the professor. Mia hugs the professor goodbye. “I’ll never forget this journey!” she exclaims. “That was a real adventure!” says Max, excitedly. Professor Piccolina sighs happily and rolls out the map between them. “I’m glad you enjoyed it. You can keep this map to remember it by if you want.” “Yes, please!” shout Mia and Max at the same time.

11



Do you remember all of the parts of the digestive system? Of course, you can see your mouth. That's where the journey with the professor started. Who can find the long oesophagus and the stomach, where the lake of corrosive hydrochloric acid was? Which comes first – the small or the large intestine?

Does anyone remember where bile is made, and the name of the first part of the small intestine with all of the digestive juices?



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