



Phage Phips on an adventure trip

iGEM Team TU Darmstadt 2021



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Today we want to take you on a little adventure through our body. We would like to introduce you to the little phage Phips. Phips has tiny little legs and is smaller than your finger or a grain of sand. So you can't see him with the naked eye. However, he will help you understand your body a little better. Do you want to know what Phips experiences in my body and yours? Then listen attentively and with curiosity!

Phips opened his eyes. His eyes got bigger and bigger. "Ohhh, such beautifully brushed teeth! I'd wish I had those too." He couldn't get over his amazement. Everything around him shone in brilliant white. But Phips didn't have time to continue admiring the teeth, because - **poof** - , he was taken away by a wave of water that whirled him around like a vortex in a swimming pool. "This is just like riding a carousel!" exclaimed Phips with delight.

All of a sudden, Phips felt himself falling off the tongue into a deep, round hole. He slid a very long way and squeezed his eyes shut in fear.

Plops - He landed very softly as if on a trampoline. When Phips opened his eyes again, he was in the stomach. Everything was moving back and forth, like waves, and Phips jumped up and down cheerfully. He had never had so much fun jumping on a trampoline! **Huiiiiiii** - He jumped and jumped and noticed how he was getting more and more tired. Eventually he fell asleep while the waves continued to gently crash around him.

Phips awoke to loud music. "Well, what's going on here?" he asked to himself and slowly got up. Around him was a huge buffet with towers of Spaghetti Bolognese and muffins. He noticed some strange figures enjoying the buffet or dancing to the music. He was at a party!

While he was still wondering where he had landed, one of the figures walked up to him and addressed him, "Hey, who are you?"

"I'm... I'm Phips," Phips said uncertainly. He was a little afraid of the strange figure. It looked like a small ball.

"Hello Phips, I am Firmi," said the ball figure. "I belong to the Firmicutes and I am a bacterium."

"A bacterium?" asked Phips. "What is that?" He looked around at the dancing and eating figures. They looked very different from each other. Some were small and round like Firmi, but others were long and thin.

Some stood all alone and others danced in groups of four or in long chains with each other.

"Us bacteria are very small creatures. We are everywhere. In the air, in the water, in the soil, and even in people! I'm an intestinal bacterium, that's why you met me here. We help humans digest food. Now, why don't you tell me what you are?"

"I'm a phage, Phips the phage. I fight bad guys."

Firmi looked at him uncertainly, but she didn't have to be afraid. Phips sensed immediately that she was not a villain.

"Hey, who's that?" a voice suddenly called from the left. It came from a fat little stick. Next to him walked a long, thin little stick. The two looked droll next to each other. "Hello Proteo," said Firmi. "This is Phips the phage."

(Proteo): "Hello, you look funny."

Phips nodded thoughtfully and looked at his many legs. "The legs help me fight bad guys," he said, nodding meaningfully.

Proteo looked at him in wonder.

"I am Actino," the taller stick spoke up. "We are about to go on an adventure, are you coming?"

Phips didn't know exactly what to do, but an adventure trip sounded very exciting! He nodded and Firmi waved him over to a small door.

"Watch out," she whispered, pointing to the door.

"Behind this door is the bloodstream. The blood flows throughout your body, so you can travel anywhere you want with it. It's like a little roller coaster ride."

She opened the door and Phips looked at the tiny rockets whizzing by them in amazement.

"Where are you going?" asked Phips the bacteria.

(Proteo): "Wherever you like."

Phips thought for a moment and said, "I've always wanted to see the heart." "Then what are you waiting for?" shouted Actino and jumped on one of the rockets and *-poof-* it was gone.

(Firmi): "Come on." Firmi pulled Phips onto one of the other rockets and off they went. They whizzed and roared away.

Everything passed by them like in a car on the highway. He only saw other rockets and doors in a blur and far too many small, funny figures, all of which he couldn't look at because they were going so fast. Sometimes they whizzed around the curve so hard that it almost made Phips sick.

Sound effects: *Heartbeat*

(Firmi): "Next stop: heart." Firmi jumped off the rocket, pulling Phips along with him. Already in front of them were Proteo and Actino, bouncing around excitedly.

Phips heard a loud, thudding sound and glanced around.

(Actino): "So, what do you think of the heart. Did you imagine it like this?"

(Phips): "It's much nicer than I thought! You can feel the heartbeat all the way to your stomach!!!" He looked at the huge heart as it beat in time.

It reminded him of the rhythmic beating of a drum. Firmi and Proteo nodded their little heads along.

(Actino:) "You know Phips? The heart is what powers our rockets. We can get anywhere and we don't have to walk. It beats 60 times a minute, so it beats 86400 times a day."

(Phips:) "Wow, I can't count that on my fingers anymore!"

(Actino:) "It can beat even faster when you're excited or playing with your friends. Or even when you're scared!"

"I'm bored. Can we finally go to the maze?" whined Proteo impatiently.

(Actino:) "Well, let's go!"

Proteo grabbed Phips by the hand and the two were already in the next rocket.

Sound effects: *Bubbling*

"Next stop: lungs," Firmi shouted and jumped off.

In front of them opened a huge labyrinth with lots of small tunnels. Phips was so fascinated by the sight that he completely blanked out what was happening around him. Before he knew it, he and Proteo were hurtling through a giant bubble.

"Hold on tight," Proteo yelled. "Here comes the turbulence!". Proteo deftly maneuvered the rocket around the bubbles.

"What's in those bubbles?" asked Phips curiously.

They turned around the next bend. Proteo pointed to a bubble that was rising. "There's CO₂ in there. That's the air we breathe out. There's CO₂ in sparkling water, too - that's what tickles your tongue."

Phips chuckled. He loved sparkling water.

At the next junction, they turned left. Phips completely lost his orientation. "And that bubble there," Proteo pointed to a sinking bubble, "contains oxygen. That's quite important for us, we need that to survive. In the rockets, the oxygen is sent all around the body."

"Where are Firmi and Actino anyway?" asked Phips, looking around.

(Proteo:) "They're probably waiting for us at the rally point. We can't miss it, since all the tunnels lead to the lungs from here on."

At the same moment, Phips saw Actino and Firmi waving at them. This time he didn't miss the jump.

"It took you guys a long time," Firmi complained.

(Proteo:) "We took another detour through the bubble landscape."

"Hey, we missed the bubbles," Actino said disappointedly.

"Look," Firmi called out, pointing to the lungs. "The lung is like a balloon that keeps getting inflated and then the air is let out of it. That's how all the bubbles are formed."

(Phips:) "It's pretty windy in here!"



Sound effects *woosh*

Phips realized that he had gotten very hungry from the trip and all the excitement. His stomach was rumbling *sound effect*.

(Phips:) "I'm getting really hungry."

(Firmi:) "Come on then, let's go back to the party in the intestine."

Almost arriving at the intestines, Actino asked, "Funny, where did the music go?"

When they burst in through the door, all their bacterial friends were gone. Proteo and Firmi looked horrified. Everything was trashed! The party tables had been knocked over, food was scattered criss-cross on the floor, and there was dead silence.

"What happened here? Where is everyone?" Actino looked around for his friends.

In the distance, soft creepy voices sounded from a dark tunnel.

Firmi whispered, "Oh no... Kolis. Come on, hide!"

Panic spread among Actino, Firmi, and Proteo, and the three disappeared behind the walls in a second.

Phips stood alone, frightened, "Hello? Where are you?"

Sound effects: *spooky*

He gathered all his courage and followed the sounds into the darkness. It felt like an eternity until he caught sight of the shadows of the Koli bacteria. He immediately sensed that those were the bad guys.

"The party is over now," rumbled one Koli bacterium. "This is our territory now. Get lost." A few frightened bacteria ducked down and were encircled by the koli. One of them resembled Phips' bacterial friend Firmi. Anger rose in Phips. "Hey! Leave my friends alone," he yelled at the Koli.

When one of the Koli bacteria caught sight of Phips, fear was written all over his face. "Oh no guys, a phage!"

As if on cue, the Kolis took flight. Phips was baffled but pleased that he had chased the bad guys away.

Suddenly the lights came on and all the bacteria emerged from their hiding places. Phips heard cheers from all corners and promptly the music started again.

Out of the corner of his eye, Firmi, Proteo and Actino came running towards him again.

"You did it, Phips. You saved us all!" they shouted (together).

Phips was overjoyed and grabbed a huge plate of spaghetti Bolognese. And let's be honest: he definitely deserves it!