

5

The Digestive System

Hard to Stomach



The way to many a person's heart is through their stomach. Master the ways of your digestive system while you visit **ancient Japan, the year is 1611.**

Hello Adventurer!

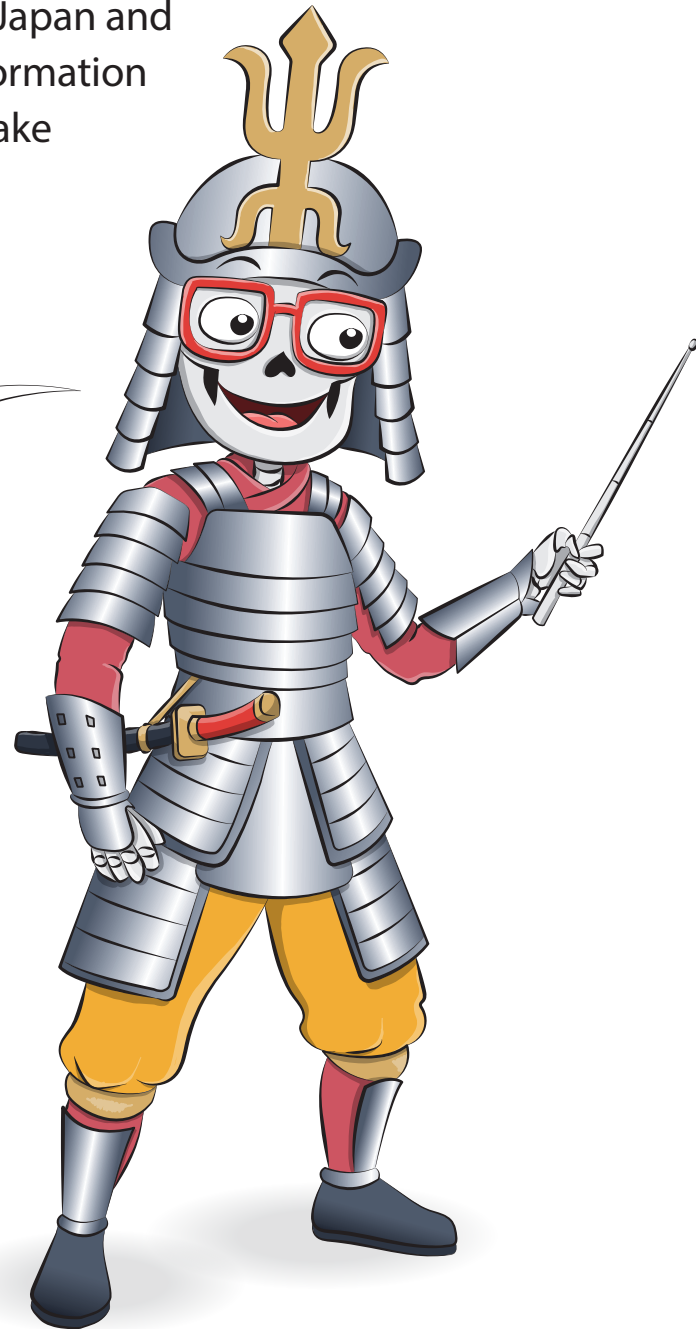
Welcome to Adventure 5 - The Digestive System.

In this workbook, you will learn about Ancient Japan and your body's Digestive System. There will be information to read, activities to complete, and quizzes to take when you are ready to challenge yourself!

Take your time along the way - spend as much or as little time as you like on each activity.

Good luck, and have fun!

Can you find Japan?



Get ready to digest some knowledge!

LEARN ABOUT

The Digestive System

Get the breakdown on how your body turns food into the nutrients it needs

VISIT

Edo Period Japan

While it is a time of peace, dangers lurk from those who wish for conflict

MEET

Tokugawa Ieyasu

one of the Great Unifiers of Japan

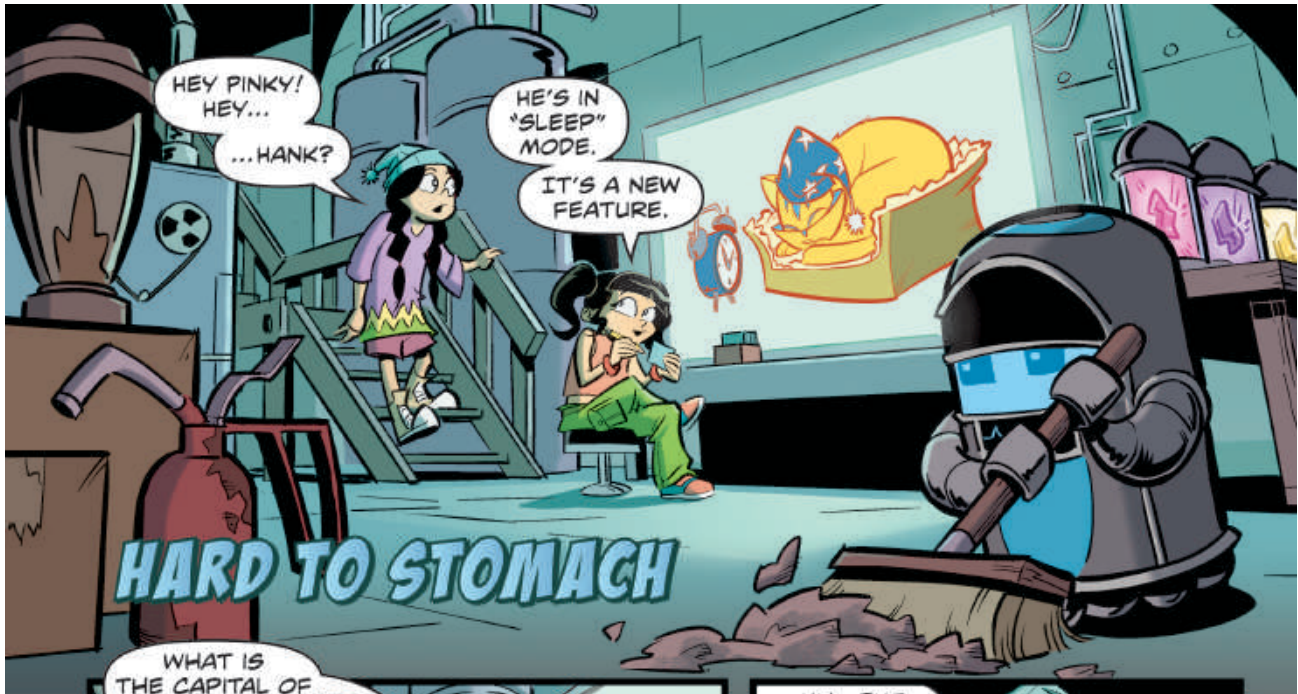




Follow us to...



Time Skaters Adventure 5: Hard to Stomach



HEY PINKY!
HEY...
...HANK?

HE'S IN
"SLEEP"
MODE.
IT'S A NEW
FEATURE.

HARD TO STOMACH



WHAT IS
THE CAPITAL OF
ECUADOR?
WHAT
ARE YOU
DOING?

PLAYING
TRIVIA WITH
SHORTY.

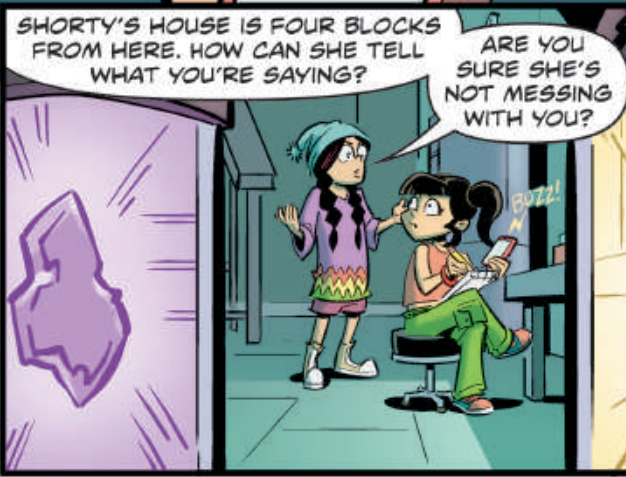


UH...BUT
SHORTY ISN'T
HERE.
OH YEAH.
SHE'S AT HER
HOUSE.

BUZZ!



GRRR...
SHE'S RIGHT
AGAIN...



SHORTY'S HOUSE IS FOUR BLOCKS
FROM HERE. HOW CAN SHE TELL
WHAT YOU'RE SAYING?

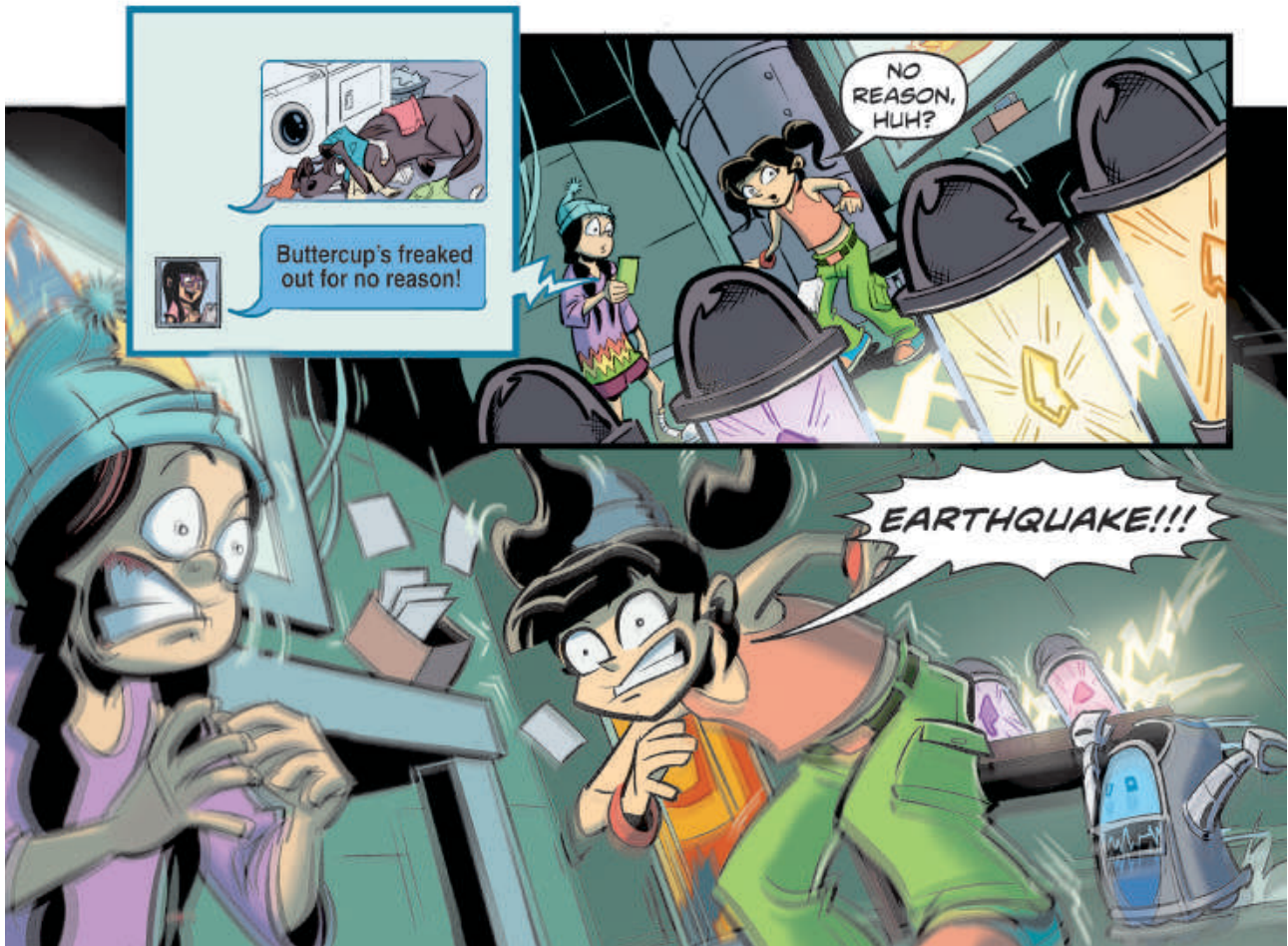
ARE YOU
SURE SHE'S
NOT MESSING
WITH YOU?

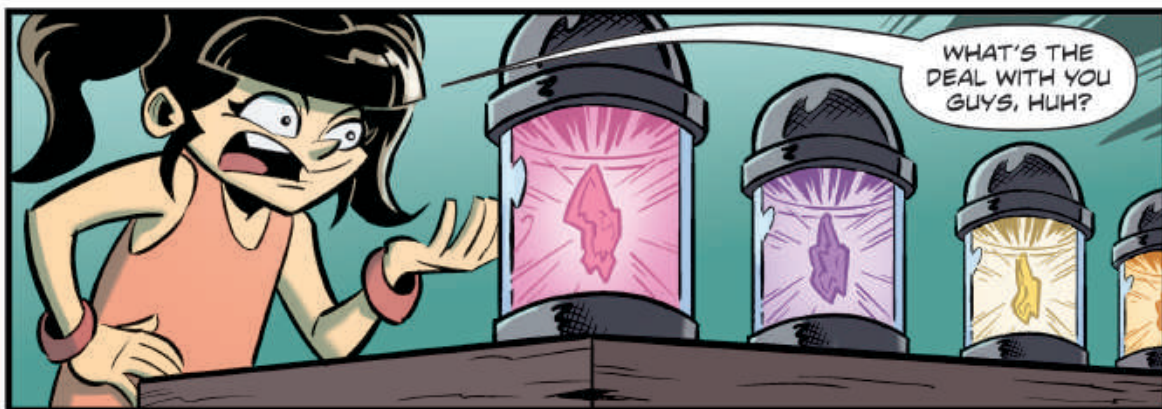
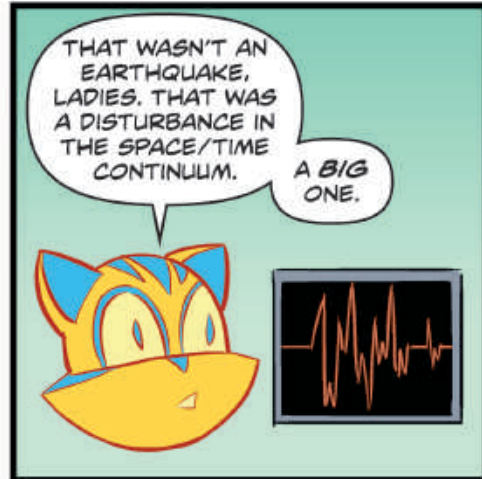
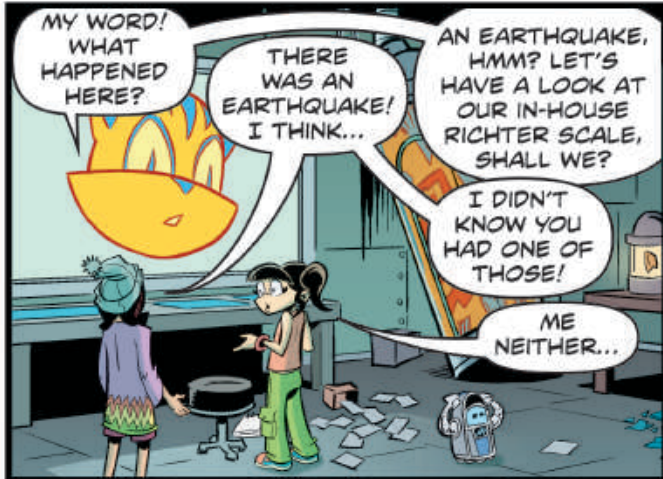
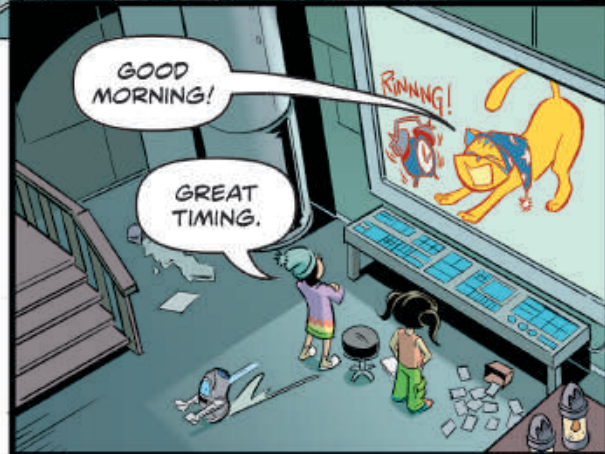
BUZZ!



"I'M NOT
MESSING WITH
ANYONE, NAZ."

OKAY.
WHAT'S
GOING ON?





Learning Calendar

Part **1**
**Know
Your
History**



Gather the adventure equipment you'll need from around the house - find the checklist on pages 30 and 31!

Locate Japan on the map on page 1.

Read the comic **Time Skaters Adventure 5 - Hard to Stomach**. Find it at the beginning of this Adventure Guide!

Get to *Know Your History*.

Uncover *Know Your Ninjas*.

Make Haste *From Hokku To Haiku*.

Find *Your Fashion Statements*.

Paint *Neat-o Edo Art*.

Fold *Your Words*.

Discover *The Shogun Must Go On!*

Part **2**
**Know
Your
Digestive
System**

Check out *Know Your Digestive System*.

Become a *Digestion Detective*.

Follow *Your Food*



Count *Numbers and Nutrients.*

Do the *Digestive Dash.*

Digest *Your Knowledge.*

Part **3**
**Know
Your
Appetite**



Explore *Know Your Appetite.*

See the recipes on the following pages.
Make a shopping list, purchase ingredients,
and get your kitchen ready!

Make *Pickled Cucumbers*
and *Sushi Rolls.*

Share your dishes with your family. Discuss
Thoughts for Young Chefs around the table.

Part **4**
**Show What
You Know!**



Spot *Food for Thought*
in Feudal Japan.

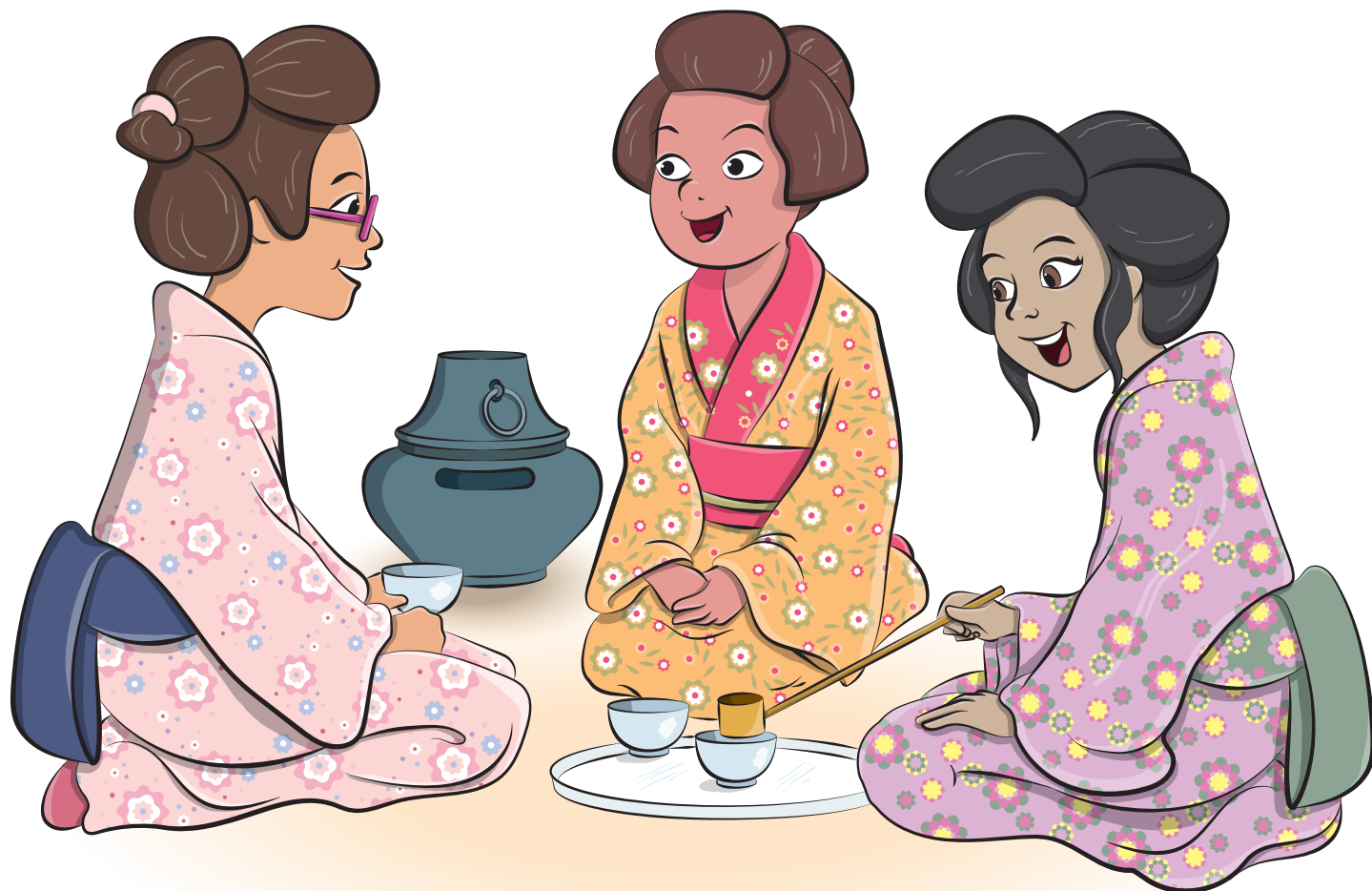
Check out *Further Reading*
for more opportunities
to learn.

**Great job
Adventurer!**



Time For Tea

Tea reached Japan from China in the 8th century as a medicinal beverage, but by the Edo period it had become a popular beverage for all people. **Sen no Rikyū** was a renowned tea master who heavily influenced the “**way of tea.**” This ceremonial tea emphasized simplicity, directness, and honesty between both the host and their guest. By putting thought into every aspect of the beverage and its sharing, he was able to elevate a simple break for a drink into something deeply meaningful. To this day, tea ceremonies continue to be very common in Japan and act as a way for people to find calmness in our busy world.





While learning the methods of a tea ceremony takes a lot of time, you can apply the same ideas.

Directions:

1. Set up a time with someone you care about to share a drink or food.
2. Make sure that all screens are put away or silenced.
3. To make it special, use a tablecloth you don't normally use.
4. Make food and a tea that you don't have every day. For an extra special touch, put extra work into the presentation of the food.

Dr B.'s Note

**By using care and attention,
you can make a special experience
for everyone involved.**

Know Your Digestive System

Gut Reaction

Did you know the digestive process starts before you even bite into your food?

You might have noticed that when you see or smell something delicious, your mouth starts “watering.” That’s **saliva**,* already preparing your mouth for **mastication*** (otherwise known as chewing). Your brain anticipates that you’ll be eating soon, so it gets the digestion process started.



Your body actually uses two types of digestion: **Mechanical** and **Chemical** Digestion.

Mechanical digestion is when you break down food into smaller pieces, mainly by chewing.

Such as when you bite off a piece of sushi.

Chemical digestion, also starts with your mouth, but happens with the substances of your body further break down those foods for your body, mainly by the stomach.

*Say them like this:

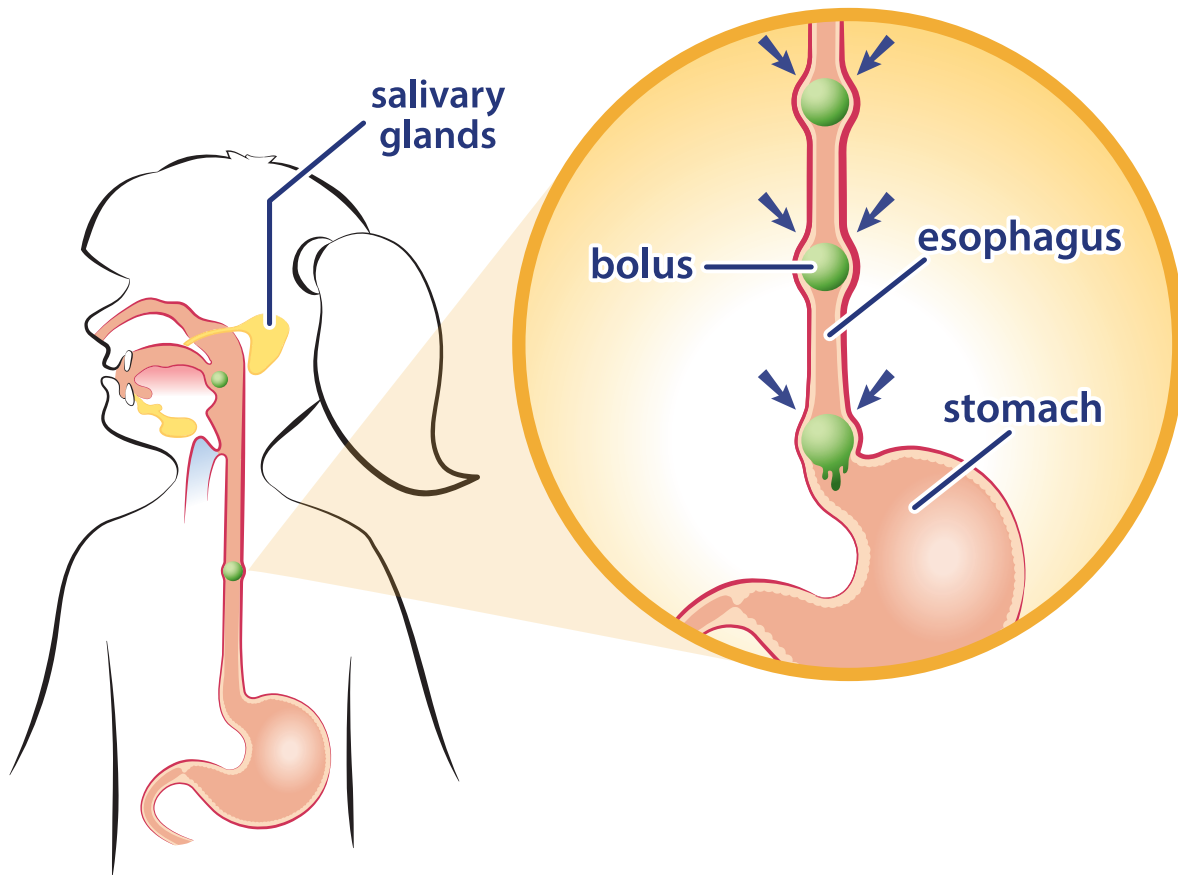
saliva - “**suh-LIVE-uh**”

mastication - “**mas-tih-KAY-shun**”

The strongest syllable is always shown in **CAPITALS** and **red**.

As your teeth crush and grind this food, enzymes in your saliva begin breaking down the starches into sugar. Your teeth and saliva work together to create a small group of chewed food into a **bolus**.*

After you swallow the bolus, it passes through your esophagus, which has muscles that squeeze food down into your stomach through a series of contractions called **peristalsis**.*



*Say them like this:

bolus - "BOW-luhs"

peristalsis - "pear-ih-STALL-sis"

The strongest syllable is always shown in **CAPITALS** and **red**.

Follow Your Food

Now that you have a pretty decent idea of what your digestive system looks like, let's further explore how food moves through the body.

Materials:

- 1 small resealable plastic sandwich bag
- Cereal
- Water
- Soda
- 1 nylon stocking
- Scissors



Directions:

1. Seal a small handful of cereal in the plastic sandwich bag, along with a spoonful of water. The water acts like saliva, which contains an enzyme called **amylase*** that helps break up carbohydrates.

The action of this enzyme is called **chemical digestion**.



2. Mash up the mixture by gently squeezing the bag. This is similar to what occurs when you chew up food with your mouth and teeth.

This physical breakdown of food is called **mechanical digestion**.



*Say it like this:

amylase - "AM-ill-ayz"

The strongest syllable is always shown in **CAPITALS** and **red**.

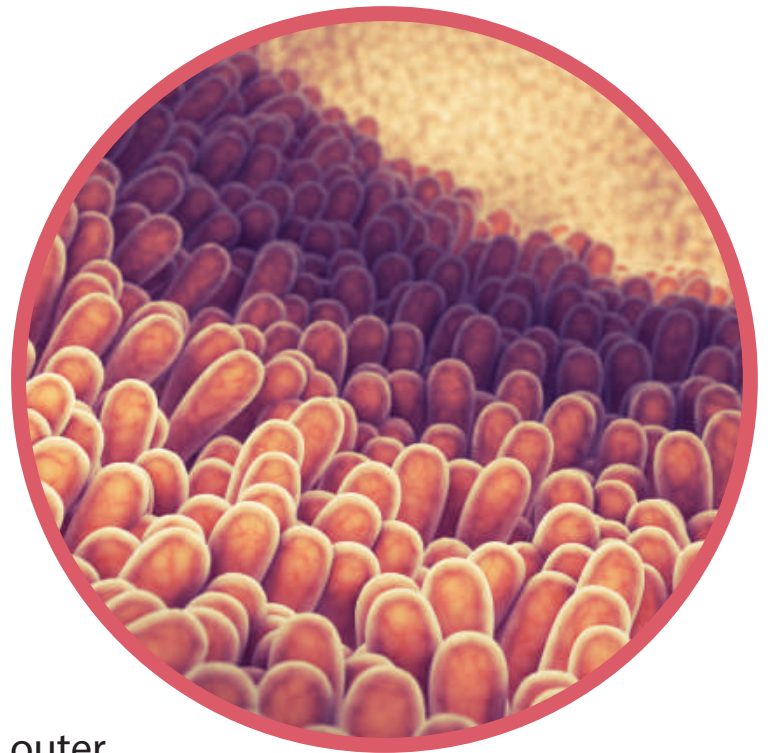
A Fuzzy Situation

What does the inside of your small intestine look like?

Take a look inside of this fuzzy situation using a sock and a few home-inventory materials. The fuzzy sock represent the villi and microvilli that help to transport nutrients from the small intestines and into the rest of your body.

Materials:

- **A fuzzy sock** (that you don't need. Check your lost sock collection!)
- **Scissors**
- **Square-inch grid paper**
- **A pencil or pen**



Directions:

1. Turn your fuzzy sock inside out. The outer part of the sock represents the smooth texture of the small intestine. Look inside the opening. The “fuzzies” represent the small, finger-like folds called **villi***, and smaller hair-like projections called **microvilli***, that line the inside of the small intestine. Cut the sock open lengthwise and lay it down on top of a piece of square-inch grid paper. Trace around the material using a pencil or pen and count the total number of square inches it covers. For partial square inches, imagine putting them together to make a whole square inch for an approximate area measure.

*Say them like this:

villi - "VIH-lie"

microvilli - "MY-crow-VIH-lie"

The strongest syllable is always shown in **CAPITALS** and **red**.

2. The villi and microvilli increase the surface area of the interior of the small intestine to almost the size of half of a basketball court! This helps to absorb a large amount of nutrients in a short amount of time (about 3 to 6 hours).
That's 338,400 square inches!

How many fuzzy socks would you have to cut open and lay down to cover half a basketball court? Divide 338,400 by your sock area to find out.



Dr B.'s Note

Your small intestine sends nearly everything it absorbs directly to the liver through a special system of blood vessels, allowing the liver cells to break down toxins (such as poisons put in your rice by your enemies!).

3. Now imagine that number of socks with villi and microvilli working to absorb nutrients from the food you eat!

Know Your Appetite

Experience Japanese Foods

Japan's food culture is rice-centered, and this starchy base is generally combined with pork, tofu, or seafood. Legend has it that sushi was created when an elderly woman began hiding her pots of rice in birds' nests to protect them from thieves. After a time, she collected her pots and discovered that the rice, because it had been left out for so long, had begun to ferment.

Fermentation is a natural process that helps to preserve food. The woman also discovered that fish scraps from the birds' meals had mixed into the rice. Not only was the mixture tasty, but the fermented rice also served to preserve the fish. With that, a new way of extending the shelf life of seafood was born!



Pinky's Hint:

Read through the entire recipe before beginning to prepare food. This way, you'll know what equipment and ingredients are needed, and you'll be familiar with the steps involved.



Whenever you see the chef's hat icon, it means **you'll need an adult's help**.

いただきます

(Itadakimasu)*

That means **"Thanks for the food!"**
in Japanese.

*Say it like this:

"ee-tah-dah-key-mahs"

Note: Syllables in Japanese words are generally spoken with equal stress, and for the same length of time.



Recipes and food knowledge provided by
Chef Polly Legendre of La Gourmande Catering.

**CREATED WITH LOVE
BY THE
KNOW YOURSELF TEAM**

