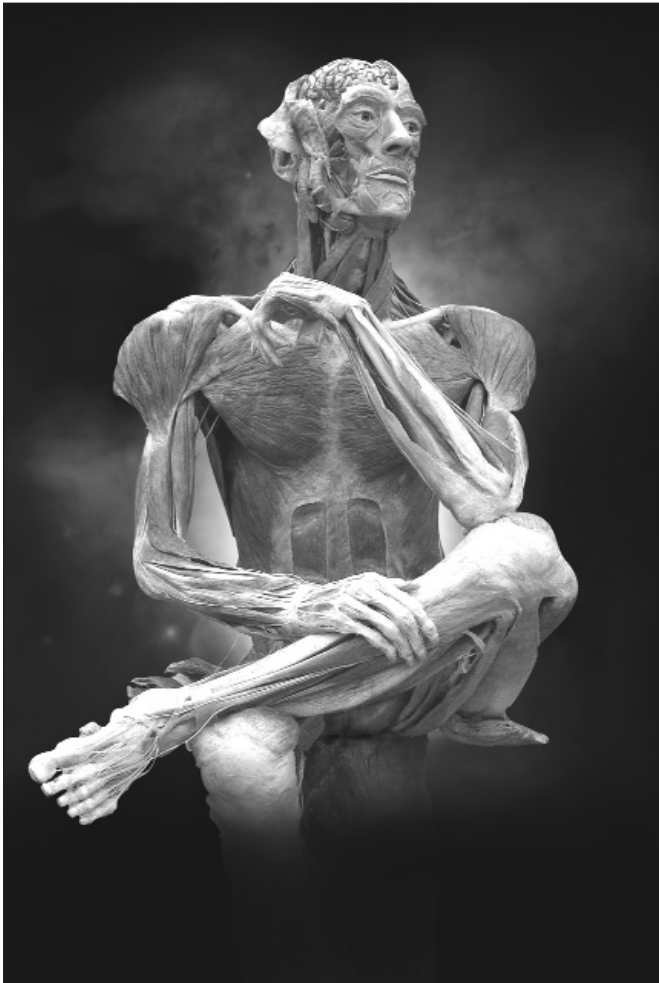


Gunther von Hagens'

BODY WORLDS

The Anatomical Exhibition of Real Human Bodies

2



Educator's Activity Guide Grades 5 – 8

Field Trips

To book a school group
of 15+ students, please contact
group reservations.
Tickets are \$8.00 per student.

Maryland Science Center
410-545-5929

www.marylandsciencecenter.org



Opens February 2, 2008

These materials may only be used for educational purposes with the exhibition BODY WORLDS 2. For all other purposes, these materials are protected under copyright laws and cannot be used without written permission of the Institute for Plastination.

For more info about BODY WORLDS 2, visit www.marylandsciencecenter.org



Educator's Activity Guide Grades 5 – 8

Dear Educator:

The Mission of the Maryland Science Center is to create awareness of the importance of science to our lives and to stimulate people, especially children, to learn science by creating exciting educational experiences. Our school programs are an integral part of that mission. The special exhibition, *BODY WORLDS 2: The Anatomical Exhibition of Real Human Bodies*, provides students and visitors with the opportunity to learn about anatomy, physiology and health by viewing real preserved human bodies.

More than 22 million people worldwide have seen the exhibition. *BODY WORLDS 2* uses modern plastination technology to make it possible for students to understand how the body works when it's healthy and what happens when it breaks down. Students will see how lifestyles may affect the body. For instance, they can see the effects of smoking on the lungs and how artificial joints in knees and hips fit into a human skeleton.

Important information to know about *BODY WORLDS 2*:

- The Body Worlds exhibits come from voluntary body donors: individuals who agreed that upon their death, their bodies could be used for educational purposes for the exhibition.
- Plastination is a process that replaces the natural fluids in the body with a type of flexible plastic. The use of plastics for preservation means that the specimens are odorless and completely dry. Plastination allows the bodies to be fixed into lifelike poses, illustrating how our bodies are structured and how they function when performing everyday activities.
- The whole body specimens are without skin so you can see the bones, muscles, tendons, nerves, blood vessels and organs. Eyes and genitals of the bodies remain. Written descriptions accompany all specimens.

The Maryland Science Center uses a long process of decision making before choosing its special exhibitions. The Center determined that a complete ethical review had been conducted that ensured all of the full body specimens were from donors who had bequeathed that, upon their death, their bodies could be used in an exhibition for the public. We have ensured that any of our visitors or school groups who do not wish to see *BODYWORLDS 2* will still be able to visit the permanent exhibit halls at the Maryland Science Center without viewing any part of the exhibition.

To learn more about the exhibit and to find the answers to some frequently asked questions, please visit www.bodyworlds.com.

Gunther von Hagens'

BODY WORLDS 2

The Anatomical Exhibition of Real Human Bodies



Educator's Activity Guide Grades 5 – 8

The Maryland Science Center requires that all students visiting the *BODY WORLDS 2* exhibition receive permission from their parents/guardians prior to their visit. Teachers are responsible for distributing and collecting the enclosed parental permission form. By entering with your students, you are acknowledging that all of your students have parental permission to view the exhibition. It is not necessary to bring the forms on your visit.

Sample Field Trip Letter

Dear Parent or Guardian,

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Important information to know about *BODY WORLDS 2*:

- The specimens in the exhibit come from voluntary body donors: individuals who agreed that upon their death, their bodies could be used for educational purposes for the exhibition.
- Plastination is a process that replaces the natural fluids in the body with a type of flexible plastic. The use of plastics for preservation means that the specimens are odorless and completely dry. Plastination allows the bodies to be fixed into lifelike poses, illustrating how our bodies are structured and how they function when performing everyday activities.
- The whole body specimens are without skin so you can see the bones, muscles, tendons, nerves, blood vessels and organs. Eyes and genitals of the bodies remain. Written descriptions (English only) accompany all specimens.

To learn more about the exhibit and to find the answers to some frequently asked questions, please visit www.marylandsciencecenter.org. After viewing the exhibition, your child may want to discuss what they have seen with you. On the Maryland Science Center website, you will also find a Family Guide to assist you in answering questions that your child may have.



Educator's Activity Guide Grades 5 – 8

Maryland Science Center recommends that all students visiting the *BODY WORLDS 2* exhibition receive permission from their parents/guardians prior to their visit. By signing this form, you are acknowledging that your child has permission to view the exhibit with a teacher, chaperone or another representative from your child's school. If you do not wish for your child to see this exhibit, please ask your child's teacher to make other arrangements for your child on the day of the field trip.

Sample Field Trip Permission Slip

Yes, I give _____ (print your child's name)
permission to view the BODY WORLDS 2 exhibition at the Maryland Science Center.

Parent/Guardian Name (Please print) _____

Parent/Guardian signature: _____

Date: _____

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Educator's Activity Guide Grades 5 – 8

Classroom Activities

While these activities can be used pre- or post- visit, they are recommended after you and your students have visited the exhibition.

Activity: Two Chairs*

Procedure: Place two chairs at the front of the classroom: the “for-chair” and the “against-chair.” All students are given the opportunity to come to the front, sit down on a chair and voice an opinion which is either for or against the exhibition of plastinates. A few students are given the task of briefly noting the arguments made.

Option: Run the same activity both before and after students have visited the exhibit. Notice if any of their opinions have changed.

*adapted from Wendel Niehl and Arthur Thommes, Munich 1998

Further Discussion Prompts:

- Consider what motivates a donor to allow his body to be plastinated for an exhibition.
- Consider how the friends and relatives of a donor might feel.
- Imagine that a member of your immediate family wanted to be plastinated.
- Would you donate your body for the purposes of plastination?
- What did you learn about your own body from viewing the *BODY WORLDS 2* exhibition?

Extension Activity Ideas:

Science: Arrange students into pairs and ask each student to trace an outline of his or her partners' body on a large piece of butcher paper. Then have each student draw (or create using construction paper) as many body organs as possible within the outline. Encourage students to label their drawings.

More science: Arrange students into groups and ask each group to create a diagram of a major body system. Combine their drawings into a book entitled “The Human Body.”

Vocabulary: Provide students with a list of scientific words and terms related to the human body and ask them to find the definition for each word. Then have students use their definitions to create a personal glossary. Encourage them to illustrate as many of the words and terms as possible.



Educator's Activity Guide Grades 5 – 8

Health: Briefly discuss with students the major body systems and review how those systems function. Brainstorm a list of things kids can do to keep their bodies functioning smoothly. Ask each student to write and illustrate one health or safety rule they can follow. Display the rules on a classroom bulletin board.

Activity: Student Reactions

What effect did the *BODY WORLDS 2* exhibition have on you?

1. Check the boxes. How did you find the plastinates?

- | | |
|---|---|
| <input type="checkbox"/> Fake | <input type="checkbox"/> Like a person |
| <input type="checkbox"/> Complicated | <input type="checkbox"/> Like they were trying to say something |
| <input type="checkbox"/> Scary | <input type="checkbox"/> Interesting |
| <input type="checkbox"/> Like they were made of plastic | <input type="checkbox"/> Serious |
| <input type="checkbox"/> Like a model | <input type="checkbox"/> Like they were made of meat |
| <input type="checkbox"/> Normal | <input type="checkbox"/> Like a corpse |
| <input type="checkbox"/> Lifelike | <input type="checkbox"/> Like someone I knew |
| <input type="checkbox"/> Funny | <input type="checkbox"/> Dumb |
| <input type="checkbox"/> Real | |

2. Put it in your own words:

3. Explain what struck you the most:

4. Which features of the plastinates looked most authentic?

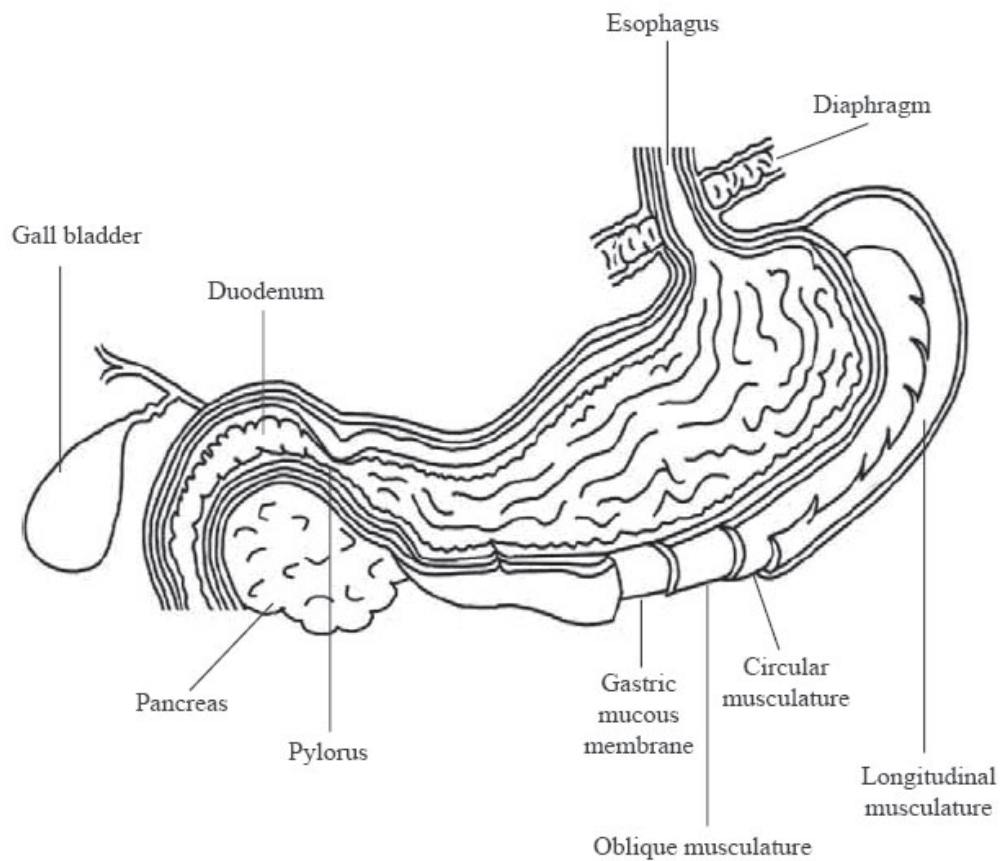
5. How would you describe the behavior of other people looking at the plastinates?

Educator's Activity Guide Grades 5 – 8

Activity: Written Exercise

Stomach

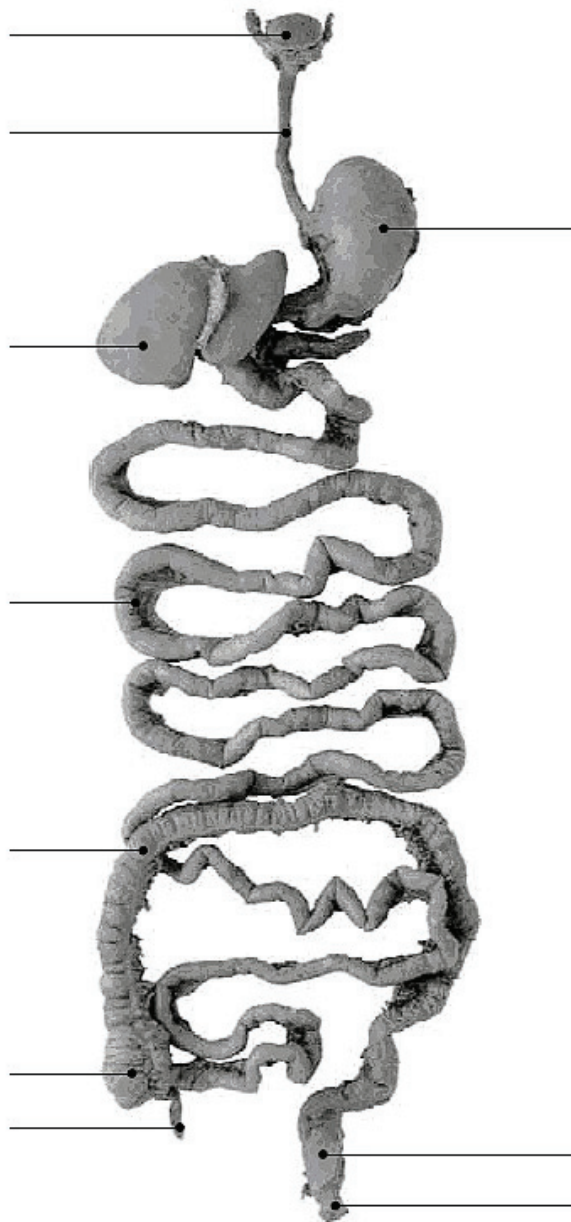
1. Write the biography of a stomach (from beginning to end)
2. While doing so, think about its consequences for the body.
3. Draw pictures to accompany your biography to make a poster.



Educator's Activity Guide Grades 5 – 8

Activity: The Route That Food Takes

1. Name the organs displayed in the illustration which are involved in digestion.





Educator's Activity Guide Grades 5 – 8

2. Summarize the function of the individual sections of the gastrointestinal tract.
Fill in the table.

Organ	Functions

**Educator's Activity Guide
Grades 5 – 8**

The Route That Food Takes

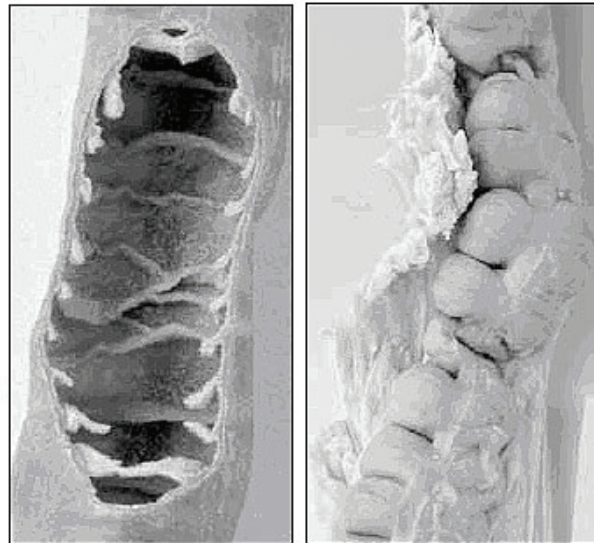
For Teachers Only

1. Name the organs displayed in the illustration which are involved in digestion.
2. Summarize the function of the individual sections of the gastrointestinal tract. Fill in the table.

Organ	Functions
Mouth	Reducing the food pieces in size, insalivation, starch digestion, transportation of the food pulp through the esophagus
Stomach	Collection, mixing, gastric juice is added here, killing of bacteria, digestion of proteins
Small intestine	Juices from the liver and the stomach's salivary glands are added, digestion of the three basic materials (carbohydrates, proteins and fat) absorption into the blood
Colon	Removal of water, transportation of the indigestible remnants, expulsion through the anus

Educator's Activity Guide Grades 5 – 8

Activity: Comparison of the Small Intestine and the Colon



Picture 1: Section of small intestine showing relief of membranous lining (see also Catalogue p. 93, fig. 5.8)

Picture 2: Section of large intestine (colon) (see also Catalogue p. 93, fig. 5.9)

Summarize the differences in a table.

Small Intestine	Feature	Colon
	Position	
	Length	
	Inner Surface Area	
	Functions	
	Passing on the Chyme	

**Educator's Activity Guide
Grades 5 – 8**

Comparison of the small intestine and the colon **For Teachers Only**

Summarize the differences in a table.

Small Intestine	Feature	Colon
Connected to the stomach	Position	On the right side of the stomach, rises up to the liver
4 to 6 metres	Length	1.5 to 2 metres
Made greater by intestinal villi, ring-shaped folds, and epithelial cells	Inner Surface Area	Made greater by crescent-shaped folds
Decomposition of the food into the end products of digestion, absorption	Functions	Regaining of water
Peristaltic movements	Passing on the Chyme	Kneading movements of the colon musculature

Educator's Activity Guide Grades 5 – 8

The Human Facts

Human body facts to share with your students during your visit to *BODY WORLDS 2*:

Musculoskeletal (Locomotive) System

- On average, 40 percent of your body weight is muscles.
- You have 640 muscles that move you.
- Muscles cannot push, they can only pull (they work in pairs).
- You have more than 30 facial muscles that create looks like surprise, happiness, sadness and frowning.
- Eye muscles are the busiest muscles in the body. Scientists estimate they may move more than 100,000 times a day!
- The largest muscle in the body is the gluteus maximus muscle in the buttocks.
- The human hand has 27 bones; your face has 14!
- The longest bone in your body? Your thighbone, the femur—it's about 1/4 of your height. The smallest is the stirrup bone in the ear, which can measure 2.5 millimeters.
- Did you know that humans and giraffes have the same number of bones in their necks?
- Giraffe neck vertebrae are just much, much longer!
- You have more than 230 moveable and semi-moveable joints in your body!

Nervous System

- The brain weighs approx 1.5 kg—2 percent of a total human's weight.
- There are around 100 billion neurons in the brain.
- A nerve cell can transmit 1000 nerve impulses each second.
- The average spinal cord is 45 cm long in men and 43 cm long in women. The spinal cord weighs approximately 35 g.
- Some information travels in the nervous system at a rate of 431 km/hour—about as fast as the world's fastest sports car.
- A baby's brain grows almost 3 times its size at birth during its first year.
- Humans have the most complex brain of any critter on earth!
- Your brain is divided into two sides. The left side of your brain controls the right side of your body; and the right side of your brain controls the left side of your body.

Educator's Activity Guide Grades 5 – 8

Respiratory System

- You breathe in about 20 times a minute.
- Your lungs contain almost 2414 kilometers of airways and more than 300 million alveoli.
- Every minute you breathe in 7 liters of air. When you are doing physical activity this number increases to 57 liters of air per minute.
- Plants are our partners in breathing. We breathe in air, use the oxygen in it, and release carbon dioxide. Plants take in carbon dioxide and release oxygen.
- The wind produced from your sneeze is about 200 km/h—equivalent to wind speeds observed during a tornado!

Cardiovascular System

- Your heart is a muscle about the size of your clenched fist.
- Strung together end-to-end, your blood vessels could circle the globe 2 1/2 times!
- The body of an adult contains over 96,000 km of blood vessels.
- An adult's heart pumps nearly 18,173 liters of blood each day.
- Your heart beats some 30 million times a year.
- The average three year-old has 1.1 liters of blood in their body; the average adult has at least five times more.
- A "heartbeat" is really the sound of the valves in the heart closing as they push blood through its chambers.

Digestive System

- How long are your intestines? At least 7.5 meters in an adult.
Be glad you're not a full-grown horse—their coiled-up intestines are 27 meters long!
- Chewing food takes from 5-30 seconds.
- Digestion from mouth to anus takes about 72 hours.
- Food sloshing in the stomach can last 3-4 hours.
- It takes 3 hours for food to move through the intestine.
- Food drying up and hanging out in the large intestine can last 18 hours to 2 days.
- In your lifetime, your digestive system may handle about 50 tons.
- The average person eats about 1.4 kg of food per day.



Educator's Activity Guide Grades 5 – 8

Additional Resources

National Institutes of Health–The Visible Human Project
http://www.nlm.nih.gov/research/visible/visible_human.html

BBC Science and Nature–The Human Body and Mind
http://www.bbc.co.uk/science/humanbody/body/index_interactivebody.shtml

Kids' Health Organization
<http://www.kidshealth.org/>

Discovery Communications–The Yuckiest Site on the Internet Teacher Guide
<http://yucky.kids.discovery.com/teachercenter/pg000064.htm>