inside your body program content essay

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Cells are the basic unit of life that every living thing starts from and is made up of including humans. Within our bodies, cells form tissues. Smooth muscle tissue in the illustration is made of smooth muscle cells attached to one another. When the muscle cells contract the tissue shortens. Organs are formed from two or more different layers of tissue like the blood vessel in the illustration. Organs work together within an organ system. The circulatory system transports nutrients, oxygen and waste to and from cells within the body.

It consists of the heart, the blood vessels and the blood. We all start out as a single cell, the fertilized egg. The genetic information in that cell came from your parent’s cells. The sperm produced in males is a tiny cell that can swim with its whip-like tail called a flagellum. It is formed by a special cell division process called meiosis that reduces the number of chromosomes in the nucleus to one set, half the number found in our body cells. The egg cell from the mother is formed by meiosis in the ovaries.

When the egg and sperm get together under the right conditions, a sperm nucleus moves into the egg cell and combines with the egg nucleus to form a cell that has two sets of chromosomes, one set from the father and one set from the mother. The fertilized egg makes identical copies of itself by a cell division process called mitosis. Every cell in your body comes from this original cell and has the same genetic information. From a single cell, you become a cluster of hundreds of cells. After about a week those cells split up and begin to form the tissues that form the organs and organ systems of the developing embryo.

As tissues are formed, the dividing cells differentiate into the muscle cells, nerve cells, skin cells, blood cells and other cells that form your body. Your nervous system is the first system to form, followed by the digestive organs and other the internal organs. During the first few weeks you look very strange but after about 8 weeks you are human looking and all of your organs and organ systems are in place. At this point you are a fetus that is only about two inches long and only weighs a few ounces. You will remain in the womb for a total of 40 weeks as you develop into a full term baby hundreds of times that size.

Full-term baby at birth

If you scrape the inside of your cheek with a toothpick you will break cells loose from the tissue lining your cheek. You can smear that on a microscope slide and see the cells that make up that tissue. These cells are flat and transparent. In the tissue they are stacked on top of each other to form a tissue several cell layers thick. In a tissue smear made like this you will see cells still stuck together and a few cells isolated from the others.

These cells have a nucleus that contains the same genetic information that was found in the fertilized egg cell that they originally came from. We now have the capability of cloning humans and other animals. Scientists can take cells like these cheek cells, remove a nucleus and place it in an egg cell that has had its nucleus removed. The egg cell can be stimulated to undergo mitosis and develop into an embryo that has the exact same genetic makeup as the person the cheek cell came from! The illustration of the skin shows

the arrangement of cells in tissue and the arrangement of tissues in our skin, which is the largest organ of our body.

The cells here are similar to the cells lining the cheek. New cells are produced by mitosis in the bottom layer and are pushed up to the top to replace the skin as it wears. In the top layers the cells become very tough and die so that what you see on the outside of your body is dead cells! These layers of skin cells form the outer tissue of the skin called the epidermis. There is a second layer of tissue below this that is made of extremely tough protein and contains the blood vessels of the skin and other organs such as hair follicles, sweat glands, and oil glands.

It is called the dermis and it is what is left of animal skin when we cure it into leather. Dissection of a sheep eye shows the arrangement of tissues in an organ. The white part of the eye is a tough protein layer called the sclera. The clear part in front is called the cornea. It lets light in and plays a big role in focusing. This is the part of the eye that doctors modify in vision correction surgery such as LASIK surgery. The back of the eye has fat attached to it to cushion and protect it in the eye socket. You can also see little bits of muscle that move the eye in the socket.

The optic nerve exits the eye in the back, carrying signals from the inside of the eye to the brain. On the inside of the eye we find the lens and the clear gel that fills up the back of the eye called the vitreous humor. . The front part of the eye has two layers, the outer sclera and cornea along with an inner layer of muscle. Part of that muscle is the iris that forms the opening called the pupil. It changes the size of the pupil to regulate how much light comes

into the eye. The iris is also the colored part of the eye. Another muscle called the ciliary muscle attaches to the lens.

You can see the dark ring around the lens where it attaches. When it moves it changes the thickness of the lens and this is how your eye adjusts its focus. The back part of the eye has three layers. The middle layer inside the sclera is where the blood vessels are located. It has dark pigment to keep light from reflecting inside the eye. The inner layer is made up of millions of light sensitive nerve cells wired back to the brain. This layer is the retina and the cable or wiring carrying the signals to the brain is the optic nerve. This is the functional part of the eye that gives the brain the information it needs to enable us to see.

This arrangement of different tissues layered one on top of each other is how all of our organs are constructed. The eye is one of the most complex organs in the body. It is a sensory organ of the nervous system. Our nervous system controls our body. It receives sensory information from the eyes and other sense organs, analyzes it, and responds by controlling our body through motor nerves. In this sheep brain you can see the tough outer covering called the meninges that protects the brain. The sheep head shows how the skull protects the brain. It also shows some of the different parts of the brain.

The cerebrum is what sets humans apart from other animals with our ability to think and reason. The cerebellum coordinates muscle function. The mid brain and brain stem control our body functions that we do not control consciously such as heart rate and breathing. The spinal cord begins where the brain stem exits the skull. The spinal cord from a cow shows the spinal

nerves that exit from the cord to the body. A fetal pig is a baby pig that was killed when its mother was slaughtered for meat. Sometimes these are sold to companies that preserve them with chemicals so that they can be used for dissection.

All mammals are about the same in the arrangement of their internal organs. Pigs are very much like humans because they are omnivores and their digestive organs are very similar to those of humans. There are two really large cavities or openings where most of our internal organs are located. The thoracic cavity contains the heart and lungs and the abdominal cavity contains digestive and other organs. A wall of muscle called the diaphragm separates these. We will look at some of the organs in the fetal pig by organ system. The respiratory system gets oxygen into our blood.

The larynx contains our vocal chords and prevents food from entering the trachea that carries air to and from our lungs. When the trachea reaches the lungs it branches into smaller and smaller air tubes within the lungs that finally end in microscopic air sacs called alveoli. These are surrounded by microscopic blood vessels called capillaries that pick up oxygen from the air in the alveoli. Breathing moves fresh air into the alveoli. Most of the work in breathing is done by the diaphragm. It pushes down on the abdomen and opens up the chest cavity.

If you put your hand on your abdomen as you breath you will feel it move out as the diaphragm pushes down on it. The circulatory system carries nutrients and oxygen to the cells of the body and picks up the carbon dioxide and waste that they produce. The heart is the pump that circulates the blood

through the blood vessels. It is located between the lungs in the thoracic cavity. It is a hollow organ made mostly of muscle. In the sheep heart, we see where blood flows into the chambers and the muscle contracts to squeeze it out through the blood vessels exiting the heart.

There are two sets of chambers inside of the heart that are separated by a wall of muscle. One side pumps blood from the body to the lungs to pick up oxygen at the same time as the other side pumps the oxygenated blood coming back from the lungs to the body. It is actually two pumps working at the same time! A system of one-way valves keeps the blood moving through the heart in one direction. In the fetal pig, we can also see the blood vessels carrying blood through the neck to the brain. The sheep heart shows the path one of the coronary arteries that supply blood to the heart.

These are the arteries that get blocked when people have a heart attack. Blood is the other componant of the circulatory system. Under the microscope you can see the many red blood cells that carry oxygen and the scattered larger and darker white blood cells that are part of our body’s immune system The digestive system begins with our mouth where we chew our and food and mix it with saliva. We swallow it in little balls that travel down a muscular tube called the esophagus to our stomach. The pictures show the location of the esophagus underneath the trachea in the neck and below the heart in the thoracic cavity.

The fetal pig shows the location of the stomach underneath the liver in the abdominal cavity. The adult pig stomach shows how thick the muscle of the stomach is and where the food enters the stomach from the esophagus and

exits the stomach into the small intestine. The diaphragm has a hole in it to allow the esophagus to pass from the thoracic cavity into the abdominal cavity. The stomach holds lots of food so that we can eat a meal. In humans it can expand from less than a cup to a gallon! It also breaks the food down by mixing it with gastric juice that contains acid strong enough to melt your skin.

After churning is acid for a few hours your food is a liquid that passes through a valve into your small intestine one squirt at a time. The small intestine is the longest and most important organ of digestion. Food is broken down by digestive enzymes here and absorbed into the blood. Tiny molecules from your food actually move into the walls of the intestine and into the microscopic blood vessels or capillaries found there. In the fetal pig, you can see some of the larger the blood vessels that travel out to the small intestine to pick up these digested nutrients and transport them to the liver.

The small intestine empties the food that is left into the large intestine. Some nutrients, vitamins and water are absorbed here but most of the remaining food becomes the waste that is expelled from your body as feces. The large intestine of the fetal pig is arranged differently than the human large intestine but it has the same structure and function. The liver is also a digestive organ but food does not go there directly. The nutrients absorbed into the blood travel there and are processed before they go to the rest of your body.

The liver makes fats and proteins that your body needs and maintains your blood sugar at a constant level by storing sugar after you eat and releasing it

as you need it. The little bag on the back of the sheep liver is the gall bladder. It stores the waste from the liver which is a yellow substance called bile. Bile is released into the small intestine to help with the digestion of fat. When problems occur with the liver your skin turns yellow as your body attempts to excrete the bile through the skin. The urinary system filters waste from the blood and excretes it as urine.

The kidneys are located on either side of your lower back. One kidney in the fetal pig has been dissected away from the back and is held only by the two large urinary blood vessels and the tube called the ureter that carries urine to the bladder. The other side is not dissected and shows how the kidneys are stuck to the back. The bladder is simply a muscular storage bag that holds the urine. Another tube called the urethra drains the bladder. The bladder from an adult pig shows how thick the muscular wall is. As the bladder stretches the wall gets thinner. Creepy, Crawly, Scaly and Slimy.

There are over 30 different major groups of animals. Only one of these groups includes the vertebrate animals. All of the others are invertebrates. The invertebrate group that includes insects, spiders, scorpions, crabs, and lobsters is the Arthropods. All Arthropods have their skeleton on the outside of their body and it also serves as their skin. This type of skeleton is called an exoskeleton. When the Hissing Cockroach sheds, the skin that is left behind looks just like the cockroach. This is because its skin is also its skeleton. Insects are the most important group of animals on earth.

There are more species of insects than there are species of all other animals combined. In fact, if you could gather up all of the insects on earth and weigh

them, they would weigh more than all the other animals on earth combined! If insects suddenly disappeared the food chain would break down and all other animals would die! Insects have six legs and three body segments. Most have antennae that they can use to feel, taste, smell and even hear with. The Giant Hissing Cockroach is an insect that feeds on fruit that has fallen to the ground in the tropical rainforests of Madagascar.

It sounds like a snake or lizard when it hisses. Most insects have breathing tubes along the sides of their abdomen called spiracles that move air in and out to get oxygen into the insect’s body. Hissing Cockroaches have a spiracle opening that is like a whistle and makes a hissing noise when the roach pushes air out. This is the only insect in the world that makes noise like this! The hissing cockroach also has a fake face that makes him look bigger and more ferocious than he really is. Spiders, ticks, mites and scorpions are Arachnids. Arachnids have eight legs, two body segments, and special mouth parts called chelicera.

In spiders the chelicera form the fangs, in ticks they form the blood sucking mouthparts. My spider is a Rose Hair Tarantula from South America. It has what looks like hair covering most of its body. This helps to increase its sense of touch the same way the fine hair on your arms helps you feel a mosquito when it lands on you. Spiders have eight tiny eyes. They produce silk from silk glands in their abdomen. It comes out as a liquid but it quickly dries into a thin thread that is one of the strongest materials known. The silk is used to make webs that have sticky strands to capture prey. It is used like rope to climb up and down.

Spiders make egg cases from silk and some small spiders even use their silk to sail long distances with the wind. Spiders use their fangs to inject venom into their prey. In some spiders the venom paralyzes the prey without killing it. This allows the spider to store its food and eat it later. Spiders are beneficial to people because they are predators of insects that cause problems for us. Rose Hair Tarantula My scorpion is an Emperor Scorpion. These are the largest scorpions in the world; They can grow up to 8 inches long! They live around giant termite mounds in tropical rainforests of Africa where they dig to find termites for food.

Scorpions use their pincers to grab and tear apart smaller prey. They have a long flexible abdomen that ends in stinger which they can use to inject venom into larger prey. Both the stinger and the pincers can be used in self defense. The pincers of an Emperor Scorpion can draw blood and the sting is about like a bee sting. Scorpion babies are born alive and the mother protects them by carrying them around on her back. Scorpions are one of one of the oldest of arthropods adapted for living on land. Scientists have found scorpion fossils that are 425 million years old! The “ Southern Devil” is a species of scorpion that is found in Kentucky.

They are small, timid, and nocturnal so they are rarely seen. Emporer Scorpion Crabs, lobsters, crayfish and shrimp belong to a group of arthropods called Crustaceans. Crustaceans have 10 legs and are mostly aquatic. Many crustaceans are tiny animals that are a part of the plankton that makes up the bottom of the food chain in aquatic ecosystems. Hermit crabs find a shell from the body of a snail-like mollusk and use it for protection. The Hermit Crab’s body is adapted to fit inside the shell and carry

it around. At first glance, you only see six legs. Four legs are missing! In order to see them the crab must come out of its shell.

The other four legs are much smaller and are especially adapted for holding on to the shell and moving in and out of it. Only Hermit Crabs have these specialized legs. There are five different classes of vertebrate animals: fish, amphibians, reptiles, birds and mammals. The name “ Vertebrate” comes from the vertebral column which is also called the spine or backbone. Unlike Arthropods, vertebrate animals have an internal skeleton that is made of bone and cartilage. The backbone connects the other parts of the skeleton and protects the spinal cord that carries the nerve signals to and from the brain.

The vertebrate animals I have are amphibians and reptiles. These animals are cold-blooded which means that their body temperature depends on the temperature of their environment. Cold-blooded animals don’t need to eat as much as warm-blooded animals since they don’t use energy to keep their bodies warm. Most snakes go at least a week between meals! There are two main groups of amphibians, the salamanders and the frogs. Amphibians were the first vertebrate animals to evolve adaptations for living on land. These adaptations include legs and lungs. Amphibians also have two things that limit them as land animals.

For one thing, most amphibians must go back to the water to reproduce. They lay their eggs in water and the eggs hatch into larvae that must live in the water. These larvae gradually go through metamorphosis to change into an adult amphibian. Toad and frog larvae are tadpoles. They are more like

fish than they are like adult frogs. They even have gills like fish. Salamander larvae are similar but they have gills that are outside of their bodies. While all toads and frogs develop into adults with lungs, some salamanders still have gills as adults.