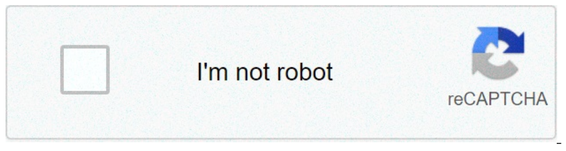

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Structures found only in animal cells

If you’re studying biology, you’ll likely learn about animal cells. Cells are the basic building blocks of all life. Animal cells are types of cells that are specifically found in animals. In this guide, we’ll explain what animal cells are, the difference between plant and animal cells, and other important information. By reading this guide, you’ll learn everything you need to know about animal cells. Animal Cell Definition Animal cells are the types of cells that make up most of the tissue cells in animals. Different kinds of animals have different numbers of cells, but most have millions and millions. Human beings, for instance, have over 40 trillion cells. Animal cells are eukaryotic, which means they have a nucleus that holds DNA. Eukaryotic cells are more complex and have more components than their counterparts, prokaryotic cells. Both plant and animal cells are eukaryotic, though they have other compositional differences. Difference Between Plant and Animal Cells There are a number of differences between plant and animal cells. First, animal cells do not have chloroplasts. In plant cells, chloroplasts assist the plants in performing photosynthesis. Since animals don’t get their energy through photosynthesis (they get it from the food they eat), they don’t need chloroplasts. Animal cells also lack cell walls. In plant cells, the cell wall gives the cell a rigid, rectangular shape. Because plant cells have cell walls, they are often similar sizes and shapes. Animal cells, on the other hand, have more variety, though they are typically smaller than plant cells. Both plant and animal cells have vacuoles, which are like storage containers for nutrients, food, or waste. Most plant cells only have one large vacuole, while animal cells have numerous, smaller vacuoles. Animal cells have a number of other structures that plant cells don’t have, including centrioles, lysosomes, cilia, and flagella. Animal Cell Model and Parts of the Animal Cell Animal cells contain small structures called organelles, which help carry out the normal operations of a cell. Each of the organelles is essential in making sure the cell functions properly. These are the organelles found in most animal cells: Cell Membrane: The cell membrane is the thin membrane that encloses an animal cell’s cytoplasm and all of the organelles in it. Centrioles: Centrioles help organize the assembly of microtubules during cell division, which is one of the stages of mitosis. Cilia and flagella: Cilia and flagella are extensions from a cell’s surface that help it move. Cytoplasm: The cytoplasm is the gel-like substance that holds the organelles in a cell. Cytoskeleton: The cytoskeleton helps to give the cell support and shape. Endoplasmic Reticulum: The endoplasmic reticulum plays a big role in the production and movement of proteins and lipids. Golgi Complex: The Golgi Complex makes, stores, and moves different material for the cell. Lysosomes: Lysosomes aid the cell in digesting things like nucleic acids. Microtubules: These hollow rods help give structure and shape to the cell. Nucleus: The nucleus of a cell contains its DNA and controls the cell’s growth and reproduction. Peroxisomes: These structures help detoxify alcohol and break down fats. Ribosomes: Ribosomes are responsible for assembling proteins for the cell. Kinds of Animal Cells There are many different types of animal cells which vary according to their function and location in the body. These are some of the most common types of animal cells. Skin Cells There are two main types of skin cells: keratinocytes and melanocytes. Keratinocytes produce a protein called “keratin” and make up about 90% of all skin cells. Melanocytes produce “melanin” which give skin its color. Muscle Cells Muscle cells help move an animal’s limbs and organs. There are skeleton muscle cells, cardiac muscle cells, and smooth muscle cells. Blood Cells There are red blood cells and white blood cells. Red blood cells make up over 99% of all blood cells. Red blood cells' job is to deliver oxygen from the lungs to the rest of the body. White blood cells are equally important. White cells help organisms fight infection and disease by killing bacteria. Fat Cells Fat cells store fats and lipids as energy reserves to help give the body power. White fat cells have one large lipid drop within them, whereas brown fat cells have multiple, smaller droplets throughout the cell. Animal Cells: Final Thoughts Animal cells are the building blocks that make up all animal life. Animal cells are made up of organelles, which have different jobs to help the cell function. There are different kinds of animal cells that each have a different job to help the body survive and thrive. What's Next? Need to brush up on more than just animal cells before tackling the AP Biology exam? Here’s a curated list of the best AP Biology books. We put together a complete AP Biology review guide. It breaks down all of the topics that might appear on the exam, so you can figure out exactly what you need to study. The best way to figure out if you’re prepared for the AP Biology test is to take a practice exam. Here’s a list of every AP Biology practice test available. And the best news? They’re free! From the outside, plants seem pretty different from animals. For instance, plants can't walk around and catch food like we do, they give off oxygen instead of carbon dioxide, and they don't have the same sensory organs that help us get out of the way of a fire or sniff out and hunt down a potential meal. But plants and animals are more similar than they seem from the outside. In fact, under a microscope, a plant cell and an animal cell might seem so similar, in some cases you'd really have to know what you're looking at to tell the difference between them.This is because plants and animals both belong to the domain Eukaryota — organisms with cells that are basically sealed baggies full of fluid suspending little factories called organelles, which have different jobs in the cell, depending on the needs of the organism. Plants, animals, fungi and protists are all eukaryotes; these organisms are made up of one or more cells with a variety of membrane-bound organelles, including the nucleus — the big boss organelle that contains all the DNA and all the instructions for making that particular bear or ringworm or ficus tree or fruit fly.Even though a blueberry bush and a corgi don't seem to have much in common, on the spectrum of things, their cells are way more similar to each other than they are to those of a bacteria or archaea, which are both prokaryotes — single-celled organisms that are generally smaller than eukaryotic cells, lack a nucleus to hold their DNA, and contain only a few types of rudimentary organelles. It's kind of a mess inside a prokaryotic cell, while a eukaryotic cell is highly structured. But at the end of the day, eukaryotes and prokaryotes have more in common with each other than they do with a rock. So, there's that.If plants and animals are so similar on a cellular level, why do they seem so different when you take a couple steps back? Well, it's because plants and animals have different goals — each of their eukaryotic cells is customized to make them great at being the thing they are. For instance, it's a plant's job to take carbon dioxide out of the air — which we animals just leave lying around every time we exhale or get in our car — and add a little sunlight and water in order to make literally everything they need to survive. Animals, on the other hand, require oxygen (made by plants) to breathe, but we can't make our own food like plants do, so we've got to go rustle up our own grub. This requires movement, which made it necessary for animals to evolve all kinds of crazy specialized cell types, tissues and organs that a plant can't make because they simply don't need them. Survival is based on getting basic needs met, and the outsourced requirements of an animal far surpass those of plants.Here is a diagram of a typical animal cell:Walls vs. MembranesEven though their cells are constructed similarly, plants and animals have different cellular settings. A really obvious difference is in the outer shell of the cell. In addition to a cell membrane, plants have cell walls made out of tough compounds called cellulose and lignin, which makes them rigid and tough — useful for keeping trees from collapsing into gelatinous piles of plant tissue. Animal cells, on the other hand, are contained within the thin cell membrane, a flexible container a lot like a like a semi-permeable sandwich bag — it provides nothing in the way of structure, but it can regulate what comes in and out of the cell, and it can keep all the organelles contained within it.ChloroplastsAnimals have all kinds of fancy organelles that help them form some pretty mind-blowing structures like bones, muscles and nerves — these organelles are what allows animals to build empires, honestly. But one organelle animals don't have is the chloroplast, which allows plants to photosynthesize, or make sunlight into glucose compounds. So, any green you see on a plant — the leaf, the stem, in the peel of an unripe banana — all comes from the chloroplasts in their cells. Turning light into food — try that, animals!Here is a diagram of a typical chloroplast-containing plant cell:VacuolesOne other important difference between plant and animal cells can be found in another organelle called a vacuole. Some animal cells contain vacuoles, but in a plant cell they're really large and have an important job: keeping the plant from wilting. Vacuoles are basically intercellular water balloons that keeps the cell plumped up from the inside by creating turgor pressure, pushing the cell membrane against the cell wall and helping the plant keep its shape. If you've ever seen a pitiful carrot at the bottom of your crisper drawer, all floppy and unappetizing, it's the loss of turgor pressure in its vacuoles that ultimately landed it in the compost bin.And that's about all that separates you from a plant! Remember that at your next family reunion.Originally Published: Aug 8, 2019 In 2019, the FDA and USDA-FSIS agreed to establish a joint regulatory framework for human foods made from cultured cells of livestock and poultry to help ensure that any such products brought to market are safe and truthfully labeled. Under this agreement, the FDA oversees cell collection, cell banks, and cell growth and differentiation. The FDA transitions oversight to USDA oversight during the harvesting stage of the cell-culturing process. USDA-FSIS will then oversee the further production and labeling of these products. As part of the formal agreement, the FDA and USDA-FSIS are working to develop detailed procedures to facilitate coordination of shared regulatory oversight related to the harvest of the cultured animal cells. Regulatory oversight of human foods comprised of or containing cultured animal cells depends on the animal species used as the original source of cultured cells, and it is based on the agencies’ existing jurisdiction over products. The FDA is responsible for regulating all live animals to be used as food up until processing. For those animals intended for human consumption and regulated under the Federal Meat Inspection Act (FMIA) (i.e., cattle, sheep, swine, goats, and fish of the order Siluriformes) or the Poultry Products Inspection Act (PPIA)(i.e. chicken, turkeys, duck, geese, guineas, ratites, and squab), USDA-FSIS is then responsible for regulation during processing. For foods made from the cultured cells of animals not regulated under the FMIA or PPIA or foods intended for animal consumption, the FDA is responsible for regulation during processing. The FDA has issued applicable requirements under both the Federal Food, Drug, and Cosmetic Act (FFDCA) and Public Health Service Act. Therefore, food products for human consumption made from cells of species not subject to USDA jurisdiction (e.g., seafood other than Siluriformes and game meat), and food products for animal consumption will be regulated solely by the FDA. Food products made from the cells of species regulated by the USDA under the FMIA and PPIA will be regulated by the FDA during cell collection, selection, and growth and by the USDA-FSIS during subsequent processing and labeling. To view the FDA-USDA FSIS Agreement, please visit Formal Agreement Between FDA and USDA Regarding Oversight of Human Food Produced Using Animal Cell Technology Derived from Cell Lines of USDA-amenable Species. Overview of the Pre-Market Consultation Process and Oversight Activities FDA Regulatory Oversight As described in the March 2019 formal agreement, FDA’s approach to regulating products derived from cultured animal cells will involve a thorough pre-market consultation process and inspections of records and facilities. The FDA will ensure that covered entities comply with applicable requirements, including facility registration and FDA’s Current Good Manufacturing Practices and preventive control requirements. The pre-market consultation process includes evaluating the production process and produced biological material, including tissue collection, cell lines and cell banks, manufacturing controls, and all components and inputs. The FDA encourages firms working on the culture of animal cells for food use to contact the agency early in the development phase to begin discussions. For human food, firms may contact the Center for Food Safety and Applied Nutrition, Office of Food Additive Safety at AnimalCellCultureFoods@fda.hhs.gov. If firms intend to market the cultured meat, or any of the byproducts generated during the production of cultured meat, for animal food, firms should contact the Center of Veterinary Medicine, Division of Animal Feeds, at Animalfood-premarket@fda.hhs.gov. The FDA believes that both the agency and individual firms will benefit from ongoing discussions as the firms make technical and strategic decisions and as the agency begins to implement the consultation process. After a successful pre-market safety consultation, the FDA intends to conduct routine inspections on an ongoing basis, as well as other oversight activities at cell banks and facilities where cells are cultured, differentiated, and harvested. These inspections will help to ensure that potential risks are being managed and that biological material exiting the culture process is safe and not adulterated within the meaning of the FFDCA. In conducting inspections and other oversight activities, the FDA will be able to draw on the results of the pre-market consultation and a thorough assessment of production records maintained by the facility. Should FDA inspections uncover areas of noncompliance, the agency will take appropriate action. The FDA also will ensure that labeling of cell cultured products derived from animal species not subject to USDA jurisdiction is truthful and not misleading, consistent with coordinated FDA and USDA-FSIS principles for product labeling and claims. USDA Regulatory Oversight During the cell harvesting stage, when cells are removed from a sealed growth environment and prepared for traditional food processing, the FDA and USDA-FSIS will work together to coordinate the transfer of regulatory oversight to USDA-FSIS. USDA-FSIS will carry out inspections at establishments where cells derived from livestock and poultry are harvested. These establishments will be required to have USDA grants of inspection and meet the USDA-FSIS regulatory requirements, including the requirements for ensuring sanitation and developing and implementing Hazard Analysis and Critical Control Points systems. USDA-FSIS inspectors will review batch records produced during cell culturing and verify compliance with applicable USDA-FSIS regulatory requirements during product processing, packaging, and labeling to verify the cellular products are safe, wholesome, unadulterated, and truthfully labeled. If cells are shipped to other establishments for further processing into human food products, these establishments also will be subject to USDA-FSIS inspection. USDA-FSIS inspection of cell harvest and processing will occur at a frequency of at least once per shift, the inspection frequency also required for processing traditional meat and poultry products. This level of verification is necessary for products to receive the USDA mark of inspection. Finally, the USDA-FSIS will ensure that cell-based products are labeled truthfully and consistent with coordinated FDA and USDA-FSIS principles for product labeling and claims. Under the requirements of the FMIA and PPIA, all labeling of human food products made from the cultured cells of livestock or poultry must by preapproved by FSIS. Imports of USDA-Regulated Meat and Poultry Products Like imports of traditionally produced meat and poultry products, imports of meat and poultry products made from the cultured cells of livestock and poultry must originate from eligible countries and from establishments or plants that are certified to export to the United States. A country becomes eligible to export to the United States following an equivalence process, through which FSIS determines whether its inspection system achieves the same level of public health protection as is applied by FSIS in the United States. Additionally, the foreign food safety inspection system must provide standards equivalent to the FSIS to ensure other non-food safety requirements (such as accurate labeling, and assurance that meat and poultry products are not economically adulterated) are met. Imports of meat and poultry products made from the cultured cells of livestock and poultry will also be subject to all of the other FSIS requirements for imports, including labeling requirements and reinspection by FSIS at an official import establishment. These imports also will be subject to applicable requirements of the USDA Animal and Plant Health Inspection Services (APHIS) and U.S. Customs and Border Protection. Imports of FDA-Regulated Products Like all FDA-regulated foods, imports of foods comprising or containing cultured fish or seafood cells must meet the same legal requirements as domestically produced foods, including requirements related to the absence of unapproved food additives, color additives, or other substances that may adulterate the food. Imported foods comprising or containing cultured fish or seafood cells must also meet specific agency requirements and are subject to oversight through multiple programs, including: registration of any foreign facilities that engage in manufacturing, processing, packaging, or holding of the food, prior notice to the FDA that the food is being imported or offered for import, and implementation of a foreign supplier verification program by the importer to ensure that their foreign supplier is producing food in a manner that provides the same level of public health protection as FDA’s preventive controls regulations and to ensure that the supplier’s food is not adulterated and is not misbranded with respect to allergen labeling. Imported food products are subject to FDA inspection when offered for import at U.S. ports of entry. The FDA may detain shipments of products offered for import that appear to be in violation of FDA requirements. More information about FDA’s requirements for imported food can be found here: