DOWNLOAD PDF ON SOME POINTS IN THE ANATOMY OF THE LIVER OF MAN AND VERTEBRATE ANIMALS

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On Some Points in the Anatomy of the Liver of Man and Vertebrate Animals With Directions for Injecting the Hepatic Ducts, and Making Preparations by Lionel Smith Beale With Directions for Injecting the Hepatic Ducts, and Making Preparations.

Excretion Nutrition Living organisms are made from cells which are organised into tissues and these are themselves combined to form organs and systems. Skin cells, muscle cells, skeleton cells and nerve cells, for example. These different types of cells are not just scattered around randomly but similar cells that perform the same function are arranged in groups. These collections of similar cells are known as tissues. There are four main types of tissues in animals. Epithelial tissues that form linings, coverings and glands, Connective tissues for transport and support Muscle tissues for movement and Nervous tissues for carrying messages. Epithelial Tissues[edit] Epithelium plural epithelia is tissue that covers and lines. It covers an organ or lines a tube or space in the body. There are several different types of epithelium, distinguished by the different shapes of the cells and whether they consist of only a single layer of cells or several layers of cells. Simple Epithelia - with a single layer of cells[edit] Diagram 4. It is found lining the heart, blood vessels, lung alveoli and body cavities see diagram 4. Its thinness allows molecules to diffuse across readily. Cuboidal epithelium Cuboidal epithelium[edit] Cuboidal epithelium consists of a single layer of cube shaped cells. It is rare in the body but is found lining kidney tubules see diagram 4. Molecules pass across it by diffusion, osmosis and active transport. Columnar epithelium Columnar epithelium[edit] Columnar epithelium consists of column shaped cells. It is found lining the gut from the stomach to the anus see diagram 4. Digested food products move across it into the blood stream. Columnar epithelium with cilia Columnar epithelium with cilia[edit] Columnar epithelium with cilia on the free surface also known as the apical side of the cell lines the respiratory tract, fallopian tubes and uterus see diagram 4. The cilia beat rhythmically to transport particles. Transitional epithelium Transitional epithelium - with a variable number of layers[edit] The cells in transitional epithelium can move over one another allowing it to stretch. It is found in the wall of the bladder see diagram 4. Stratified epithelia - with several layers of cells[edit] Diagram 4. Stratified squamous epithelium Epithelia with several layers of cells are found where toughness and resistance to abrasion are needed. Stratified squamous epithelium[edit] Stratified squamous epithelium has many layers of flattened cells. It is found lining the mouth, cervix and vagina. Cells at the base divide and push up the cells above them and cells at the top are worn or pushed off the surface see diagram 4. This type of epithelium protects underlying layers and repairs itself rapidly if damaged. Keratinised stratified squamous epithelium[edit] Keratinised stratified squamous epithelium has a tough waterproof protein called keratin deposited in the cells. It forms the skin found covering the outer surface of mammals. Skin will be described in more detail in Chapter 5. Connective Tissues[edit] Blood, bone, tendons, cartilage, fibrous connective tissue and fat adipose tissue are all classed as connective tissues. They are tissues that are used for supporting the body or transporting substances around the body. They also consist of three parts: Blood[edit] Blood consists of a matrix - plasma, with several types of cells and cell fragments suspended in it. The fibres are only evident in blood that has clotted. Blood will be described in detail in chapter 8. Lymph[edit] Lymph is similar in composition to blood plasma with various types of white blood cell floating in it. It flows in lymphatic vessels. Loose connective tissue[edit] Loose connective tissue is a sticky whitish substance that fills the spaces between organs. It is found in the dermis of the skin see diagram 4. Dense connective tissue[edit] Dense connective tissue contains lots of thick fibres and is very strong. It forms tendons, ligaments and heart valves and covers bones and organs like the kidney and liver. Adipose tissue[edit] Adipose tissue consists of cells filled with fat. It forms the fatty layer under the dermis of the skin, around the kidneys and heart and the yellow marrow of the bones. It consists of a tough jelly-like matrix with cells suspended in it. It may contain collagen and elastic fibres. It is a flexible but tough tissue and is found at the ends of bones, in the nose, ear

and trachea and between the vertebrae see diagram 4. Bone[edit] Bone consists of a solid matrix made of calcium salts that give it its hardness. Collagen fibres running through it give it its strength. Bone cells are found in spaces in the matrix. Two types of bone are found in the skeleton namely spongy and compact bone. They differ in the way the cells and matrix are arranged. See Chapter 6 for more details of bone. Muscle Tissues[edit] Muscle tissue is composed of cells that contract and move the body. There are three types of muscle tissue: Smooth muscle fibres Smooth muscle[edit] Smooth muscle consists of long and slender cells with a central nucleus see diagram 4. It is found in the walls of blood vessels, airways to the lungs and the gut. It changes the size of the blood vessels and helps move food and fluid along. Contraction of smooth muscle fibres occurs without the conscious control of the animal. Skeletal muscle fibres Skeletal muscle[edit] Skeletal muscle sometimes called striated, striped or voluntary muscle has striped fibres with alternating light and dark bands. It is attached to bones and is under the voluntary control of the animal see diagram 4. Cardiac muscle cells are branched cylinders with central nuclei and faint stripes see diagram 4. Each fibre contracts automatically but the heart beat as a whole is controlled by the pacemaker and the involuntary autonomic nervous system. A motor neuron Nervous Tissues[edit] Nervous tissue forms the nerves, spinal cord and brain. Nerve cells or neurons consist of a cell body and a long thread or axon that carries the nerve impulse. An insulating sheath of fatty material myelin usually surrounds the axon. Vertebrate Bodies[edit] We are so familiar with animals with backbones i. There is a well-defined head that contains the brain, the major sense organs and the mouth, a trunk that contains the other organs and a well-developed tail. Other features of vertebrates may be less apparent. For instance, vertebrates that live on the land have developed a flexible neck that is absent in fish where it would be in the way of the gills and interfere with streamlining. Mammals but not other vertebrates have a sheet of muscle called the diaphragm that divides the trunk into the chest region or thorax and the abdomen. Body Cavities[edit] Diagram 4. The body cavities In contrast to many primitive animals, vertebrates have spaces or body cavities that contain the body organs. Most vertebrates have a single body cavity but in mammals the diaphragm divides the main cavity into a thoracic and an abdominal cavity. In the thoracic cavity the heart and lungs are surrounded by their own membranes so that cavities are created around the heart - the pericardial cavity, and around the lungs â€" the pleural cavity see diagram 4. Organs[edit] Diagram 4. For example, connective tissues, epithelial tissues, muscle tissue and nervous tissue combine to make the organ that we call the stomach. In turn the stomach combines with other organs like the intestines, liver and pancreas to form the digestive system see diagram 4. The main organs of the vertebrate body At this point it would be a good idea to make yourself familiar with the major organs and their positions in the body of a mammal like the rabbit. Body Systems[edit] Organs do not work in isolation but function in cooperation with other organs and body structures to bring about the MRS GREN functions necessary to keep an animal alive. For example the stomach can only work in conjunction with the mouth and oesophagus gullet. These provide it with the food it breaks down and digests. It then needs to pass the food on to the intestines etc. The organs involved with the taking of food into the body, the digestion and absorption of the food and elimination of waste products are collectively known as the digestive system. The 11 body systems[edit] Skin The skin covering the body consists of two layers, the epidermis and dermis. Associated with these layers are hairs, feathers, claws, hoofs, glands and sense organs of the skin. Skeletal System This can be divided into the bones of the skeleton and the joints where the bones move over each other. Muscular System The muscles, in conjunction with the skeleton and joints, give the body the ability to move. Cardiovascular System This is also known as the circulatory system. It consists of the heart, the blood vessels and the blood. It transports substances around the body. This fluid is then returned to the blood system. The lymphatic system also makes antibodies that protect the body from invasion by bacteria etc. It consists of lymphatic vessels, lymph nodes, the spleen and thymus glands. Respiratory System This is the system involved with bringing oxygen in the air into the body and getting rid of carbon dioxide, which is a waste product of processes that occur in the cell. It is made up of the trachea, bronchi, bronchioles, lungs, diaphragm, ribs and muscles that move the ribs in breathing. Digestive System This is also known as the gastrointestinal system, alimentary system or gut. It

consists of the digestive tube and glands like the liver and pancreas that produce digestive secretions.

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Chapter 2 : - NLM Catalog Result

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The liver, viewed from above, showing the left and right lobes separated by the falciform ligament The liver, viewed from below, surface showing four lobes and the impressions The liver is grossly divided into two parts when viewed from above â€" a right and a left lobe, and four parts when viewed from below left, right, caudate , and quadrate lobes. From below, the two additional lobes are located between the right and left lobes, one in front of the other. A line can be imagined running from the left of the vena cava and all the way forward to divide the liver and gallbladder into two halves. An important anatomical landmark, the porta hepatis , divides this left portion into four segments, which can be numbered starting at the caudate lobe as I in an anticlockwise manner. From this parietal view, seven segments can be seen, because the eighth segment is only visible in the visceral view. The peritoneum folds back on itself to form the falciform ligament and the right and left triangular ligaments. The visceral surface or inferior surface, is uneven and concave. It is covered in peritoneum apart from where it attaches the gallbladder and the porta hepatis. Underneath the right lobe and to the right of the gallbladder fossa are two impressions, one behind the other and separated by a ridge. The one in front is a shallow colic impression, formed by the hepatic flexure and the one behind is a deeper renal impression accommodating part of the right kidney and part of the suprarenal gland. It is located close to the right of the fossa , between the bare area and the caudate lobe, and immediately above the renal impression. The greater part of the suprarenal impression is devoid of peritoneum and it lodges the right suprarenal gland. This is caused by the descending portion of the duodenum, and is known as the duodenal impression. Cells, ducts, and blood vessels Microscopic anatomy of the liver Types of capillariesâ€"sinusoid on right Microscopically, each liver lobe is seen to be made up of hepatic lobules. The lobules are roughly hexagonal, and consist of plates of hepatocytes radiating from a central vein. The portal triad, misleadingly named, consists of five structures: The duct, vein, and artery divide into left and right branches, and the areas of the liver supplied by these branches constitute the functional left and right lobes. The plane separates the liver into the true right and left lobes. The middle hepatic vein also demarcates the true right and left lobes. The right lobe is further divided into an anterior and posterior segment by the right hepatic vein. The left lobe is divided into the medial and lateral segments by the left hepatic vein. The hilar area of the liver is described in terms of three plates that contain the bile ducts and blood vessels. The contents of the whole plate system are surrounded by a sheath. Liver segment Shape of human liver in animation, eight Couinaud segments labelled In the widely used Couinaud system, the functional lobes are further divided into a total of eight subsegments based on a transverse plane through the bifurcation of the main portal vein. Each segment has its own vascular inflow, outflow and biliary drainage. In the centre of each segment are branches of the portal vein, hepatic artery, and bile duct. In the periphery of each segment is vascular outflow through the hepatic veins. It contains one or more hepatic veins which drain directly into the inferior vena cava. A large fraction of the corresponding liver specific proteins are mainly expressed in hepatocytes and secreted into the blood and constitute plasma proteins. Examples of highly liver-specific proteins include apolipoprotein A II , coagulation factors F2 and F9 , complement factor related proteins , and the fibrinogen beta chain protein. The origins of the liver lie in both the ventral portion of the foregut endoderm endoderm being one of the three embryonic germ layers and the constituents of the adjacent septum transversum mesenchyme. In the human embryo , the hepatic diverticulum is the tube of endoderm that extends out from the foregut into the surrounding mesenchyme. The mesenchyme of septum transversum induces this endoderm to proliferate, to branch, and to form the glandular epithelium of the liver. A portion of the hepatic diverticulum that region closest to the digestive tube continues to function as the drainage duct of the liver, and a branch from this duct produces the

gallbladder. The hepatic endodermal cells undergo a morphological transition from columnar to pseudostratified resulting in thickening into the early liver bud. Their expansion forms a population of the bipotential hepatoblasts. The liver bud separates into the lobes. The left umbilical vein becomes the ductus venosus and the right vitelline vein becomes the portal vein. The expanding liver bud is colonized by hematopoietic cells. The bipotential hepatoblasts begin differentiating into biliary epithelial cells and hepatocytes. The biliary epithelial cells differentiate from hepatoblasts around portal veins, first producing a monolayer, and then a bilayer of cuboidal cells. In ductal plate, focal dilations emerge at points in the bilayer, become surrounded by portal mesenchyme, and undergo tubulogenesis into intrahepatic bile ducts. Hepatoblasts not adjacent to portal veins instead differentiate into hepatocytes and arrange into cords lined by sinudoidal epithelial cells and bile canaliculi. Once hepatoblasts are specified into hepatocytes and undergo further expansion, they begin acquiring the functions of a mature hepatocyte, and eventually mature hepatocytes appear as highly polarized epithelial cells with abundant glycogen accumulation. In the adult liver, hepatocytes are not equivalent, with position along the portocentrovenular axis within a liver lobule dictating expression of metabolic genes involved in drug metabolism, carbohydrate metabolism, ammonia detoxification, and bile production and secretion. Over the course of further development, it will increase to 1. The umbilical vein enters the abdomen at the umbilicus and passes upward along the free margin of the falciform ligament of the liver to the inferior surface of the liver. There, it joins with the left branch of the portal vein. The ductus venosus carries blood from the left portal vein to the left hepatic vein and then to the inferior vena cava , allowing placental blood to bypass the liver. In the fetus, the liver does not perform the normal digestive processes and filtration of the infant liver because nutrients are received directly from the mother via the placenta. The fetal liver releases some blood stem cells that migrate to the fetal thymus , creating the T-cells or T-lymphocytes. After birth, the formation of blood stem cells shifts to the red bone marrow. After 2â€”5 days, the umbilical vein and ductus venosus are completely obliterated; the former becomes the round ligament of liver and the latter becomes the ligamentum venosum. In the disorders of cirrhosis and portal hypertension , the umbilical vein can open up again. Function[edit] The various functions of the liver are carried out by the liver cells or hepatocytes. The liver is thought to be responsible for up to separate functions, usually in combination with other systems and organs. Currently, no artificial organ or device is capable of reproducing all the functions of the liver. Some functions can be carried out by liver dialysis , an experimental treatment for liver failure. Blood supply[edit] Liver veins The liver receives a dual blood supply from the hepatic portal vein and hepatic arteries. The hepatic arteries supply arterial blood to the liver, accounting for the remaining quarter of its blood flow. Blood flows through the liver sinusoids and empties into the central vein of each lobule. The central veins coalesce into hepatic veins, which leave the liver and drain into the inferior vena cava. Enterohepatic circulation Biliary tract The biliary tract is derived from the branches of the bile ducts. The biliary tract, also known as the biliary tree, is the path by which bile is secreted by the liver then transported to the first part of the small intestine, the duodenum. The bile produced in the liver is collected in bile canaliculi , small grooves between the faces of adjacent hepatocytes. The canaliculi radiate to the edge of the liver lobule, where they merge to form bile ducts. Within the liver, these ducts are termed intrahepatic bile ducts, and once they exit the liver, they are considered extrahepatic. The intrahepatic ducts eventually drain into the right and left hepatic ducts , which exit the liver at the transverse fissure , and merge to form the common hepatic duct. The cystic duct from the gallbladder joins with the common hepatic duct to form the common bile duct. The common bile duct and the pancreatic duct enter the second part of the duodenum together at the hepatopancreatic ampulla, also known as the ampulla of Vater. Proteins produced and secreted by the liver The liver plays a major role in carbohydrate, protein, amino acid, and lipid metabolism. The liver performs several roles in carbohydrate metabolism: The liver synthesizes and stores around g of glycogen via glycogenesis , the formation of glycogen from glucose. When needed, the liver releases glucose into the blood by performing glycogenolysis , the breakdown of glycogen into glucose. Adipose and liver cells produce glycerol by breakdown of fat , which the liver uses for gluconeogenesis. It is

also responsible for a large part of amino acid synthesis. The liver plays a role in the production of clotting factors, as well as red blood cell production. In the first trimester fetus , the liver is the main site of red blood cell production. By the 32nd week of gestation , the bone marrow has almost completely taken over that task. The liver is a major site of production for thrombopoietin , a glycoprotein hormone that regulates the production of platelets by the bone marrow. The liver plays a key role in digestion, as it produces and excretes bile a yellowish liquid required for emulsifying fats and help the absorption of vitamin K from the diet. Some of the bile drains directly into the duodenum, and some is stored in the gallbladder. The liver also produces insulin-like growth factor 1 , a polypeptide protein hormone that plays an important role in childhood growth and continues to have anabolic effects in adults. Breakdown[edit] The liver is responsible for the breakdown of insulin and other hormones. The liver breaks down bilirubin via glucuronidation , facilitating its excretion into bile. The liver is responsible for the breakdown and excretion of many waste products. It plays a key role in breaking down or modifying toxic substances e. This sometimes results in toxication , when the metabolite is more toxic than its precursor. Preferably, the toxins are conjugated to avail excretion in bile or urine. The liver breaks down ammonia into urea as part of the urea cycle , and the urea is excreted in the urine. The liver produces albumin , the most abundant protein in blood serum. It is essential in the maintenance of oncotic pressure , and acts as a transport for fatty acids and steroid hormones. The liver synthesizes angiotensinogen , a hormone that is responsible for raising the blood pressure when activated by renin , an enzyme that is released when the kidney senses low blood pressure. The liver produces the enzyme catalase in order to break down hydrogen peroxide, a very toxic substance due to it being a powerful oxidising agent, into water and oxygen. With aging[edit] The oxidative capacity of the liver decreases with aging and therefore any medications that require oxidation for instance, benzodiazepines are more likely to accumulate to toxic levels. However, medications with shorter half-lives , such as lorazepam and oxazepam , are preferred in most cases when benzodiazepines are required in regard to geriatric medicine.

Chapter 3 : Anatomy and Physiology of Animals/Body Organisation - Wikibooks, open books for an open w

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Vertebrates range in size from tiny fish to the whales, which include the largest animals ever to have existed. General features Although the vertebral column is perhaps the most obvious vertebrate feature, it was not present in the first vertebrates, which probably had only a notochord. The vertebrate has a distinct head, with a differentiated tubular brain and three pairs of sense organs nasal, optic, and otic. The body is divided into trunk and tail regions. The presence of pharyngeal slits with gills indicates a relatively high metabolic rate. A well-developed notochord enclosed in perichordal connective tissue , with a tubular spinal cord in a connective tissue canal above it, is flanked by a number of segmented muscle masses. A sensory ganglion develops on the dorsal root of the spinal nerve , and segmental autonomic ganglia grow below the notochord. The trunk region is filled with a large, bilateral body cavity coelom with contained viscera, and this coelom extends anteriorly into the visceral arches. A digestive system consists of an esophagus extending from the pharynx to the stomach and a gut from the stomach to the anus. A distinct heart, anteroventral to the liver, is enclosed in a pericardial sac. A basic pattern of closed circulatory vessels is largely preserved in most living forms. Unique, bilateral kidneys lie retroperitoneally dorsal to the main body cavity and serve blood maintenance and excretory functions. Reproductive organs are formed from tissue adjacent to the kidneys; this original close association is attested by the tubular connections seen in males of living forms. The ducts of the excretory organs open through the body wall into a cloacal chamber, as does the anus of the digestive tract. Reproductive cells are shed through nearby abdominal pores or through special ducts. A muscular tail continues the axial musculature of the trunk. Approximately 45, living species constitute the vertebrates. Species of several classes are found from the high Arctic or Antarctic to the tropics around the Earth; they are missing only from interior Antarctica and Greenland and from the North Polar ice pack. In size, vertebrates range from minute fishes to elephants and whales of up to tons , the largest animals ever to have existed. Vertebrates are adapted to life underground, on the surface, and in the air. They feed upon plants, invertebrate animals, and one another. Vertebrate faunas are important to humans for food and recreation. Natural history In order to give a broad and comparative view of their life histories, the vertebrates are subdivided here into major groups based on morphology: The cyclostomes The cyclostomes include two classes of living, jawless fishes agnathous â€”Petromyzontiformes lamprey eels and Myxiniformes hagfishes. The hagfishes are totally marine, often living in deep waters associated with muddy bottoms. The lampreys may be marine as adults but spawn in fresh waters, where the larvae spend some time before metamorphosing to the adult. Some lampreys live entirely in fresh water and may change only slightly in habit as a result of metamorphosis. Without lateral fins, lampreys swim by undulations of the body and can control direction only for short distances. Hagfishes are primitive, jawless fish. The living agnaths are predatory, the lampreys being well known for attacking salmonoid fishes. The lamprey attaches to its prey using its round, suctorial mouth, and it rasps a hole through the outer tissues using a tongue armed with keratinized teeth. It suctions off bits of tissue, blood, and body fluids. The hagfishes feed somewhat similarly, but on a variety of preyâ€”invertebrates worms and soft-bodied forms and dead fishes. The lampreys produce small eggs, which develop directly into larvae that burrow into the muddy bottom of the stream. With its mouth at the surface of the mud, the larva filter feeds until large enough to metamorphose and swim off as a small adult. In contrast, the hagfishes produce relatively large encapsulated , yolky eggs up to two centimetres in length. When laid, these eggs attach to any available object by terminal hooks. The encased egg develops more or less directly into a miniature adult. The chondrichthyes The sharks , rays, and chimaerids are usually marine, but some sharks have entered fresh waters the Amazon or even live there permanently Lake Nicaragua. In size, sharks range from the whale shark , nearly 10 metres in length, to rather small species, three centimetres in length. They usually weigh 25 to kilograms 55 to pounds. Sharks are predatory animals. Some large shark species basking and whale sharks filter feed on small

crustaceans. Herbivorous sharks are unknown. Most species occur in near-shore waters, but some range widely throughout the oceans. A few are found in deep water. Southern stingrays Dasyatis americana. Bull shark Carcharhinus leucas. Bob Abramsâ€"Bruce Coleman Inc. A few sharks produce live young viviparous after internal fertilization. Most sharks lay large yolky, encapsulated eggs with hooks for attachment. The young develop directly and begin life as miniature adults. In a few cases, the uterine wall secretes nutrients. The teleostome, or osteichthyian, fishes those having an internal bony skeleton can be divided into two groups: The latter group includes the lungfishes , which live in marshes, ponds, or streams, and are frequent air breathers. They lay fairly large eggs, with a limited amount of yolk, that are enclosed in jelly coats like those of an amphibian. The eggs develop into small fishes that feed on live prey. The larvae of the African lungfish have external gills to supplement oxygen intake. The teleostomes Actinopterygian fishes are the common bony fishes of modern aquatic environments. They range in size from fishes that are only millimetres in size to those two or more metres 6. Large species sturgeons are found in fresh waters several other large species are found in the Amazon as well as in marine environments. The diet may include plants, animals, and carrion. Most species are midwater swimmers, but many spend much time lying on the bottom. Tail, pectoral, and even dorsal fins are used in swimming. Reproduction in this group is by way of large numbers of small eggs, which produce small larvae or develop directly to the adult. American paddlefish Polyodon spathula Common mola, or ocean sunfish Mola mola. The tetrapods The tetrapods live primarily on land and are rather similar in habit. Members include the amphibians , reptiles, birds, and mammals. Amphibians are widespread in the warmer parts of the continents, being absent only in the far north and in the Antarctic. Three orders are recognized: Candata the salamanders , the frogs and toads Anura, or Salientia , and the Apoda or Gymnophiona caecilians. Modification takes many forms, from the moist glandular skin some scale remnants persist in apodans to the loss of many of the bones of the skull. Like their ancestors, amphibians are cold-blooded and tend to be aquatic or limited to moist surroundings. Salamanders are seemingly the least modified in body form. They do not actively pursue prey and at best are only marginal swimmers. Frogs and toads hop using hind-limb propulsion and the forelimbs as body props. This dominance of the hind limb in locomotion is best seen in swimming when the forelimbs are drawn back against the body. In contrast to the salamanders and frogs, the burrowing, wormlike apodans are without limbs. European pond turtle Emys orbicularis. There is great variation in foods; only the larvae of frogs and toads appear to be plant feeders, a specialization that is reflected in the highly modified jaws and guts of the tadpoles. Amphibians have retained a simple egg cell with a gelatinous cover. The eggs are laid in ponds, streams, or even in damp places high in trees, usually in great numbers. Fertilized eggs develop into free-swimming larvae, which then metamorphose to adults, but in highly specialized forms. The class Reptilia retains many of the structural characteristics of the ancestral amphibian. While most reptiles are carnivorous, feeding on other organisms, a few are herbivorous e. As cold-blooded animals, reptiles tend to be limited to temperate and tropical areas, but, where found, they are relatively common, although not as large or conspicuous as birds or mammals. Most reptiles are terrestrial, but a few are aquatic. As basic tetrapods, reptiles move about by creeping or swimming in a fashion similar to amphibians. Some reptiles, however, can lift the body from the ground and run rapidly either in a quadrupedal or bipedal fashion. Reptiles lay relatively large, shelled eggs. In a few instances, the eggs and young are cared for by the female; in others, the young are born alive ovovivipary. Birds are warm-blooded, and, although most are capable of flight, others are sedentary and some are flightless. Like their relatives the reptiles, birds lay shelled eggs that differ largely in the amount of calcification hardening of the shell. The young are usually cared for in a nest until they are capable of flight and self-feeding, but some birds hatch in a well-developed state that allows them to begin feeding immediately or even take flight. The megapods lay their eggs in mounds of rotting vegetation, which supplies the heat for incubation. Nesting activities similar to those of some birds are seen in the crocodilians. The mammals range in size from tiny shrews or small bats weighing only a few grams to the largest known animals, the whales. Most mammals are terrestrial, feeding on both animal and vegetable matter, but a few are partially aquatic or entirely so, as in the

case of the whales or porpoises. Mammals move about in a great variety of ways:

Chapter 4 : Full text of "On some points in the anatomy of the liver of man and vertebrate animals"

*On Some Points in the Anatomy of the Liver of Man and Vertebrate Animals [Lionel Smith Beale] on calendrierdelascience.com *FREE* shipping on qualifying offers. This is a reproduction of a book published before*

Skeleton of a diamondback rattlesnake Reptiles are a class of animals comprising turtles , tuataras , lizards , snakes and crocodiles. They are tetrapods , but the snakes and a few species of lizard either have no limbs or their limbs are much reduced in size. Their bones are better ossified and their skeletons stronger than those of amphibians. The teeth are conical and mostly uniform in size. The surface cells of the epidermis are modified into horny scales which create a waterproof layer. Reptiles are unable to use their skin for respiration as do amphibians and have a more efficient respiratory system drawing air into their lungs by expanding their chest walls. The heart resembles that of the amphibian but there is a septum which more completely separates the oxygenated and deoxygenated bloodstreams. The reproductive system has evolved for internal fertilization, with a copulatory organ present in most species. The eggs are surrounded by amniotic membranes which prevents them from drying out and are laid on land, or develop internally in some species. The bladder is small as nitrogenous waste is excreted as uric acid. They have an inflexible trunk encased in a horny carapace above and a plastron below. These are formed from bony plates embedded in the dermis which are overlain by horny ones and are partially fused with the ribs and spine. The neck is long and flexible and the head and the legs can be drawn back inside the shell. Turtles are vegetarians and the typical reptile teeth have been replaced by sharp, horny plates. In aquatic species, the front legs are modified into flippers. There is one living species, Sphenodon punctatus. The skull has two openings fenestrae on either side and the jaw is rigidly attached to the skull. There is one row of teeth in the lower jaw and this fits between the two rows in the upper jaw when the animal chews. The teeth are merely projections of bony material from the jaw and eventually wear down. The brain and heart are more primitive than those of other reptiles, and the lungs have a single chamber and lack bronchi. The tuatara has a well-developed parietal eye on its forehead. This results in the jaws being less rigidly attached which allows the mouth to open wider. Lizards are mostly quadrupeds, with the trunk held off the ground by short, sideways-facing legs, but a few species have no limbs and resemble snakes. Lizards have moveable eyelids, eardrums are present and some species have a central parietal eye. The skeleton consists of a skull, a hyoid bone, spine and ribs though a few species retain a vestige of the pelvis and rear limbs in the form of pelvic spurs. The bar under the second fenestra has also been lost and the jaws have extreme flexibility allowing the snake to swallow its prey whole. Snakes lack moveable eyelids, the eyes being covered by transparent "spectacle" scales. They do not have eardrums but can detect ground vibrations through the bones of their skull. Their forked tongues are used as organs of taste and smell and some species have sensory pits on their heads enabling them to locate warm-blooded prey. The head and trunk are dorso-ventrally flattened and the tail is laterally compressed. It undulates from side to side to force the animal through the water when swimming. The tough keratinized scales provide body armour and some are fused to the skull. The nostrils, eyes and ears are elevated above the top of the flat head enabling them to remain above the surface of the water when the animal is floating. Valves seal the nostrils and ears when it is submerged. Unlike other reptiles, crocodilians have hearts with four chambers allowing complete separation of oxygenated and deoxygenated blood. Bird anatomy Part of a wing. Birds are endothermic , have a high metabolic rate , a light skeletal system and powerful muscles. The long bones are thin, hollow and very light. Air sac extensions from the lungs occupy the centre of some bones. The sternum is wide and usually has a keel and the caudal vertebrae are fused. There are no teeth and the narrow jaws are adapted into a horn-covered beak. The eyes are relatively large, particularly in nocturnal species such as owls. They face forwards in predators and sideways in ducks. The only cutaneous gland is the single uropygial gland near the base of the tail. This produces an oily secretion that waterproofs the feathers when the bird preens. There are scales on the legs, feet and claws on the tips of the toes. Mammal anatomy Mammals are a diverse class of animals, mostly terrestrial but some

are aquatic and others have evolved flapping or gliding flight. They mostly have four limbs but some aquatic mammals have no limbs or limbs modified into fins and the forelimbs of bats are modified into wings. The legs of most mammals are situated below the trunk, which is held well clear of the ground. The bones of mammals are well ossified and their teeth, which are usually differentiated, are coated in a layer of prismatic enamel. Mammals have three bones in the middle ear and a cochlea in the inner ear. They are clothed in hair and their skin contains glands which secrete sweat. Some of these glands are specialized as mammary glands , producing milk to feed the young. Mammals breathe with lungs and have a muscular diaphragm separating the thorax from the abdomen which helps them draw air into the lungs. The mammalian heart has four chambers and oxygenated and deoxygenated blood are kept entirely separate. Nitrogenous waste is excreted primarily as urea. The exception to this are the egg-laying monotremes , the platypus and the echidnas of Australia. Humans have a head , neck , trunk which includes the thorax and abdomen , two arms and hands , and two legs and feet. Generally, students of certain biological sciences , paramedics , prosthetists and orthotists, physiotherapists , occupational therapists , nurses , podiatrists , and medical students learn gross anatomy and microscopic anatomy from anatomical models, skeletons, textbooks, diagrams, photographs, lectures and tutorials, and in addition, medical students generally also learn gross anatomy through practical experience of dissection and inspection of cadavers. The study of microscopic anatomy or histology can be aided by practical experience examining histological preparations or slides under a microscope. Human anatomy can be taught regionally or systemically; that is, respectively, studying anatomy by bodily regions such as the head and chest, or studying by specific systems, such as the nervous or respiratory systems. They are often involved in teaching anatomy, and research into certain systems, organs, tissues or cells. By definition, none of these creatures has a backbone. The cells of single-cell protozoans have the same basic structure as those of multicellular animals but some parts are specialized into the equivalent of tissues and organs. Locomotion is often provided by cilia or flagella or may proceed via the advance of pseudopodia , food may be gathered by phagocytosis , energy needs may be supplied by photosynthesis and the cell may be supported by an endoskeleton or an exoskeleton. Some protozoans can form multicellular colonies. The most basic types of metazoan tissues are epithelium and connective tissue, both of which are present in nearly all invertebrates. The outer surface of the epidermis is normally formed of epithelial cells and secretes an extracellular matrix which provides support to the organism. An endoskeleton derived from the mesoderm is present in echinoderms , sponges and some cephalopods. Exoskeletons are derived from the epidermis and is composed of chitin in arthropods insects, spiders, ticks, shrimps, crabs, lobsters. Calcium carbonate constitutes the shells of molluscs , brachiopods and some tube-building polychaete worms and silica forms the exoskeleton of the microscopic diatoms and radiolaria. The outer epithelial layer may include cells of several types including sensory cells, gland cells and stinging cells. There may also be protrusions such as microvilli , cilia, bristles, spines and tubercles. He observed that when a ring-like portion of bark was removed on a trunk a swelling occurred in the tissues above the ring, and he unmistakably interpreted this as growth stimulated by food coming down from the leaves, and being captured above the ring. Arthropod , Insect morphology , and Spider anatomy Arthropods comprise the largest phylum in the animal kingdom with over a million known invertebrate species. The segments of the body are organized into three distinct parts, a head, a thorax and an abdomen. The thorax has three pairs of segmented legs , one pair each for the three segments that compose the thorax and one or two pairs of wings. The abdomen is composed of eleven segments, some of which may be fused and houses the digestive , respiratory , excretory and reproductive systems. Spiders have no wings and no antennae. They have mouthparts called chelicerae which are often connected to venom glands as most spiders are venomous. They have a second pair of appendages called pedipalps attached to the cephalothorax. These have similar segmentation to the legs and function as taste and smell organs. At the end of each male pedipalp is a spoon-shaped cymbium that acts to support the copulatory organ. Other branches of anatomy[edit] Superficial or surface anatomy is important as the study of anatomical landmarks that can be readily seen from the exterior contours of the body. Superficial is a directional term that indicates that structures are

located relatively close to the surface of the body.

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Chapter 5 : Anatomy - Wikipedia

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Components of the Digestive System Regulation of Appetite Nutrition Learning Objectives Links Animals, for the most part, ingest their food as large, complex molecules that must be broken down into smaller molecules monomers that can then be distributed throughout the body of every cell. This vital function is accpomplished by a series of specialized organs that comprise the digestive system. Representative digestive systems are shown in Figure 1. Digestive System Back to Top Single-celled organisms can directly take in nutrients from their outside environment. Multicellular animals, with most of their cells removed from contact directly with the outside environment, have developed specialized structures for obtaining and breaking down their food. Animals depend on two processes: Animals are heterotrophs , they must absorb nutrients or ingest food sources. Ingestive eaters , the majority of animals, use a mouth to ingest food. Absorptive feeders , such as tapeworms, live in a digestive system of another animal and absorb nutrients from that animal directly through their body wall. Filter feeders , such as oysters and mussels, collect small organisms and particles from the surrounding water. Substrate feeders , such as earthworms and termites, eat the material dirt or wood they burrow through. Fluid feeders , such as aphids, pierce the body of a plant or animal and withdraw fluids. The digestive systems of representative animals. Images from Purves et al. Plans and Locations Back to Top The digestive system uses mechanical and chemical methods to break food down into nutrient molecules that can be absorbed into the blood. There are two types of animal body plans as well as two locations fordigestion to occur. Sac-like plans are found in many invertebrates, who have a single opening for food intake and the discharge of wastes. Vertebrates, the animal group humans belong to, use the more efficient tube-within-a-tube plan with food entering through one opening the mouth and wastes leaving through another the anus. Where the digestion of the food happens is also variable. Some animals use intracellular digestion , where food is taken into cells by phagocytosis with digestive enzymes being secreted into the phagocytic vesicles. This type of digestion occurs in sponges, coelenterates corals, hydras and their relatives and most protozoans. Extracellular digestion occurs in the lumen or opening of a digestive system, with the nutrient molecules being transferred to the blood or some other body fluid. This more advanced type of digestion occurs in chordates, annelids, and crustaceans. Stages in the Digestive Process Back to Top Food for the most part consists of various organic macromolecules such as starch, proteins, and fats. These molecules are polymers made of individual monomer units as discussed in an earlier chapter. Breaking these large molecules into smaller components involves: Absorption is the passage of food monomers into the blood stream. Assimilation is the passage of the food molecules into body cells. Components of the Digestive System Back to Top The human digestive system, as shown in Figure 2, is a coiled, muscular tube meters long when fully extended stretching from the mouth to the anus. Several specialized compartments occur along this length: Accessory digestive organs are connected to the main system by a series of ducts: The human digestive system. The Mouth and Pharynx Mechanical breakdown begins in the mouth by chewing teeth and actions of the tongue. Chemical breakdown of starch by production of salivary amylase from the salivary glands. This mixture of food and saliva is then pushed into the pharynx and esophagus. The esophagus is a muscular tube whose muscular contractions peristalsis propel food to the stomach. In the mouth, teeth, jaws and the tongue begin the mechanical breakdown of food into smaller particles, as shown in Figure 3. Most vertebrates, except birds who have lost their teeth to a hardened bill , have teeth for tearing, grinding and chewing food. The tongue manipulates food during chewing and swallowing; mammals have tastebuds clustered on their tongues. Salivary glands secrete salivary amylase, an enzyme that begins the breakdown of starch into glucose. Mucus moistens food and lubricates the esophagus. Bicarbonate ions in saliva neutralize the acids in foods. Swallowing moves food from the mouth through the pharynx into the esophagus and then to the stomach. A mass of chewed, moistened food, a bolus, is moved to the back of the moth by the tongue. In the pharynx, the

bolus triggers an involuntary swallowing reflex that prevents food from entering the lungs, and directs the bolus into the esophagus. Muscles in the esophagus propel the bolus by waves of involuntary muscular contractions peristalsis of smooth muscle lining the esophagus. Peristalsis is shown in Figure 4. The bolus passes through the gastroesophogeal sphincter, into the stomach. Heartburn results from irritation of the esophagus by gastric juices that leak through this sphincter. Structure of the throat and the mechanics of swallowing. Image from Purves et al. Peristalsis and the movement of food from the mouth to the stomach. The Stomach or Churn, Churn, Churn During a meal, the stomach gradually fills to a capacity of 1 liter, from an empty capacity of milliliters. At a price of discomfort, the stomach can distend to hold 2 liters or more. Epithelial cells line inner surface of the stomach, as shown in Figure 5, and secrete about 2 liters of gastric juices per day. Gastric juice contains hydrochloric acid, pepsinogen , and mucus; ingredients important in digestion. Secretions are controlled by nervous smells, thoughts, and caffeine and endocrine signals. The stomach secretes hydrochloric acid and pepsin. Hydrochloric acid HCl lowers pH of the stomach so pepsin is activated. Pepsin is an enzyme that controls the hydrolysis of proteins into peptides. The stomach also mechanically churns the food. Chyme, the mix of acid and food in the stomach, leaves the stomach and enters the small intestine. Scanning electron micrograph of the stomach lining of a mammal, X This image is from http: Hydrochloric acid does not directly function in digestion: Pepsinogen is an enzyme that starts protein digestion. Pepsinogen is produced in cells that line the gastric pits. It is activated by cleaving off a portion of the molecule, producing the enzyme pepsin that splits off fragments of peptides from a protein molecule during digestion in the stomach. Carbohydrate digestion, begun by salivary amylase in the mouth, continues in the bolus as it passes to the stomach. Protein digestion by pepsin begins. Alcohol and aspirin are absorbed through the stomach lining into the blood. Epithelial cells secrete mucus that forms a protective barrier between the cells and the stomach acids. Pepsin is inactivated when it comes into contact with the mucus. Bicarbonate ions reduce acidity near the cells lining the stomach. Tight junctions link the epithelial stomach-lining cells together, further reducing or preventing stomach acids from passing. Ulcers Peptic ulcers result when these protective mechanisms fail. Bleeding ulcers result when tissue damage is so severe that bleeding occurs into the stomach. Perforated ulcers are life-threatening situations where a hole has formed in the stomach wall. Other factors, including stress and aspirin, can also produce ulcers. The Small Intestine The small intestine , shown in Figure 6, is where final digestion and absorption occur. The small intestine is a coiled tube over 3 meters long. Coils and folding plus villi give this 3m tube the surface area of a m long tube. Final digestion of proteins and carbohydrates must occur, and fats have not yet been digested. Villi have cells that produce intestinal enzymes which complete the digestion of peptides and sugars. The absorption process also occurs in the small intestine. Food has been broken down into particles small enough to pass into the small intestine. Sugars and amino acids go into the bloodstream via capillaries in each villus. Glycerol and fatty acids go into the lymphatic system. Absorption is an active transport, requiring cellular energy. Structure and details of the small intestine. Food is mixed in the lower part of the stomach by peristaltic waves that also propel the acid-chyme mixture against the pyloric sphincter. Increased contractions of the stomach push the food through the sphincter and into the small intestine as the stomach eempties over a 1 to 2 hour period. High fat diets significantly increase this time period. The small intestine is the major site for digestion and absorption of nutrients. The small intestine is up to 6 meters long and is centimeters wide. The upper part, the duodenum , is the most active in digestion. Secretions from the liver and pancreas are used for digestion in the duodenum. Epithelial cells of the duodenum secrete a watery mucus. The pancreas secretes digestive enzymes and stomach acid-neutralizing bicarbonate.

Chapter 6 : Comparative Vertebrate Anatomy - Lecture Notes 7

On some points in the anatomy of the liver of man and vertebrate animals; with directions for injecting the hepatic ducts, and making preparations.

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