نموذج أجابة للفرقة الثانية جيولوجى نظام قديم.

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نموذج أسئلة

Benha University — Second Session, June, 2013
Faculty of Science — Second Year Geology
Zoology Department — Time Allowed: 2hrs.

General Zoology

Please illustrate your answers with a clear labeled diagrams whenever possible.

Answer the following questions:-

1.Mention in detail the general characters of class Mammalia. 12 marks.

2. Give a full account about the phylogenetic origin of Tetrapoda limbs and the origin of the circulatory system of Amphibia. 24 marks.

3.Give afull description for the alimentary canal and method of feeding in *Amphioxus lanceolatus*. 22 marks.

4.Describe the following items :-

a.The urinogenital system of *Columba livia.* 12 marks.

b. The digestive system of *Chalcides ocellatus.*10 marks.

اجابة السؤال الأول

Mammalia is the dominant class in the word today . They are characterized by: .

1- Body usually covered with hair; skin is provided with mammary glands .

2- Skull with two occipital condyles; cervical vertebrae are usually !% • seven ; tail usually long and mobile .

3- The middle ear with three small ossicles; the malleus, incus and stapes. These extend from the ear drum to the inner ear .

4- Teeth are present on the upper and lower jaws. Dentation is heterodontous type because the teeth are differentiated and usually not alike . In each mammalian order or species they are specialized for the kind of food used. Tongue usually mobile; eyes with movable lids; ears with external pinnae.

5- Four limbs; each with five or fewer digits. They are adapted for walking , running , climbing, burrowing, swimming or flying . Digits are provided with horny claws, nails or hoofs .

6- Heart four - chambered (two auricles and two distinct ventricles) . Only the left aortic arch is present. Red blood cells usually circular , biconcave and non - nucleated except the camel , where the red blood cells are biconcave and nucleated .

7- Respiration only by lungs ; the glottis is guarded by a structure known as epiglottis to close the glottis during the passage of food . The larynx has vocal cords. A muscular diaphragm separates the thoracic cavity from the abdominal cavity .

8- A urinary bladder is present.

9-Twelve pairs of cranial nerves are present, brain highly developed, cerebrum and cerebellum are large . The optic lobes are four in number.

10 The body temperature is regulated.

11-The copulatory organ of male is penis . Fertilization is internally ; eggs usually small without shells and retained in uterus of female for development. Mammals are viviparous except Prototheria or Monot-remata which lay eggs .

اجابة السؤال الثانى

Phylogenetic origin of tetrapod limbs :

In tetrapods, the skeleton of the limbs is not the same, but it is built of several parts arranged in a same plane. The skeleton of the fore limb consists of humerus , radius and ulna, carpals , metacarpals and phalanges and in the same plane the skeleton of the hind limb (femur, tibia and fibula, tarsals, metatarsals and phalanges . Also the skeleton of pectoral girdle is composed of scapula, precoracoid and coracoid and related to it the skeleton of pelvic girdle (ilium, pubis and ischium)

The fossil remains of rhipidistian crossopterygian indicate that the skeletal parts of the fins of this primitive fish can be closely homolog-ized with those of the limbs of tetrapods.

Each fin of rhipidistian crossopterygian has a chain of bones along the postaxial side, from which a series of radials comes off. It is believed that the first bone at the base of the fin is equivalent to the humerus (femur), and the second to the ulna (fibula). The first radial is comparable to the radius (tibia). The rest of the radials are believed finally to have become carpal (tarsal) bones whereas metacarpals (metatarsals) and phalanges have arisen as new distal outgrowths from the margin of the fleshy , muscular portion of the paddle- like fin .

Circulatory system :

The circulatory system of Amphibia is characterized by presence of two streams of blood, one oxygenated and the other partially oxygenated enter the heart (a double type of circulation) . In amphibians the sinus venosus has shifted its position so that it opens into the right auricle. The system of bloodvessels coming from the lungs to the heart and those emerging from the heart to the lungs is called the pulmonary circulation (smaller circulation) . Another circulation (systemic or larger circulation), in which the blood vessels are distributed to the body in general and then returned to the heart, is present.

The embryonic stages of fishes and members of the higher classes have a six pairs of aortic arches connect dorsal and ventral aorta. But the number six may be regarded as the primitive number for vertebrates. In most sharks only five aortic arches persist, the first one is degenerated. Although five afferent branchial arteries are present on each side, there are usually four pairs of efferent vessels. In teleosts and most other fishes only the last four pairs of aortic arches remain (numbers one and the second reduced to small branches of the third **One).**

The aortic arches in Amphibia and the remaining vertebrate classes, do not break up into afferent and efferent portions, since in these higher forms internal gill lamellae do not develop , In Amphibia , the first, the second and the fifth aortic arches disappear. Also the connection between the third and the fourth aortic arches on each side degenerated. In the same time the anterior continuations of the ventral aorta become the external carotid arteries . The third aortic arch with the anterior portion of the connection on that side becomes the internal carotid artery. The portion of the ventral aorta from which the internal and external carotids arise becomes the common carotid. The fourth aortic arches persist as the systemic arches which unite posteriorly to form the dorsal aorta. On each

side, the arch number six sends a branch to the developing lung and to the skin to become the pulmocutaneous artery.

The venous system of Amphibia is based on the same plane of Dipnoi (lung fishes). The lateral abdominal veins fuse to form the anterior abdominal vein . The posterior cardinal veins are replaced by the posterior vena cava. The cuvierian ducts are transformed to anterior venae cavae.

اجابة السؤال الثالث

Alimentary canal of *Amphioxus lanceolatus*:-

A mouth lead into an oral hood which in turn is open into the vestibule. The enterostome of the velum leads into a wide cavity (Pharynx) which forms about half the length of the gut. Its sides are perforated with gill slits (160), which lie obliquely . The gill slits are separated from each other by gill bars. These bars are primary and secondary. The latter arises in development by the downgrowth of a tongue- shaped process from the top of the primary slit to dividing the original slit into two secondary openings which become the permanent slits. The primary gill bars are distinguished from the secondary ones by the presence of the coelomic diverticula , secondly the primary gill bars are connected together by transverse rods (synapticula) of which two or three cross each slit and thirdly the ventral ends of primary gill bars are forked, while they are unforked or simple in the secondary gill bars.

At the floor of the pharynx the ciliated groove (endostyle) is situated. The endostyle extends throughout the whole length of the phayle extends throughout the whole length of the pharynx and contains four group of mucous secreting cells .

The endostyle is connected with two ciliated bands (peripharyngeal bands) . These bands extend from the ventral to the dorsal side of the pharynx. The peripharyngeal bands are connected with another ciliated groove which extends in the roof of the pharynx end (epibranchial groove).

The pharynx leads to a narrow tube (the esophagus) which in turn leads into a wider part (stomach). The anterior end of the stomch extends anteriorly as a hollow sac(liver diverticulum). It passes in the atrial cavity and lies on the right side of the pharynx. The liver diverticulum is a digestive gland and is comparable to a vertebrate pancreas .

The stomach is continued into a narrow tube (The intestine) which opens by the anus , where the caudal fin begins .

Method of feeding :-

The oral hood is extended and oral cirri are turned inwards to prevent sand from entering the mouth. The movements of the cilia of the wheel organ create a current of water which enters through the enterostome into the cavity of the pharynx carrying with it the minute food particles . This current of water is pushed backwards. The gland cells of the endostyle secrete a mucus . The frontal cilia of the inner margins of the gill bars derive the mucus from the ventral to the mid-dorsal side of the pharynx. The mucus carries with it any food particles which are contained in the current of water . The mucus with food particles pass from the lower side into the epibranchial groove since the movement of the cilia beat backwards the mucus and food into the esophagus.

The peripharyngeal bands collect and pass to the epibranchial groove any food particles which fall out of the water current at the anterior end of the pharynx.

Digestive enzymes are secreted by the gut and liver diverticulum. Digestion starts in the stomach and is continued in the intestine. This is extracellular digestion type . Intracellular digestion occurs since the food particles are taken into the epithelial cells of the intestine and digested there .

Absorption of digested food takes place mostly in the intestine .

اجابة السؤال الرابع الجزئية (a)

The urogenital system of *Columba:-*

The kidneys are metanephros type. Each one of them is flattened and composed of three lobes reddish in colour. The ureters are short and straight. They open independently into the urodaeum part of cloaca. Generally, the birds have no urinary bladders except of ostrich. Urinary wastes, chiefly in the form of uric acid, are eliminated via the cloaca along with the faeces .

In case of the male there are two testes. Each testis is an oval body attached by mesentery to the inner border of the anterior lobe of the corresponding kidney . From each testis arises a convoluted vas deferens slightly enlarging at its posterior end to form a vesicula seminalis. It also opens in the urodaeum .

In case of female, the right ovary with right oviduct are degenerate, and only the left ovary and left oviduct are functional. Both oviducts are formed in the embryo at the same time , but on the right side fails to develop and only vestiges remain .

The left oviduct is long, coiled , and made up of several regions. The ostium is bordered by a funnel through which the egg enters the oviduct. This is followed by a glandular portion in which albumen is secreted. Then follows a short isthmus in which inner and outer shell

membranes, made up of a fibrous meshwork are deposited around the albumen . The isthmus leads to a dilated uterus, or shell gland, where the hard calcareous shell of the egg is formed . The uterus opens in the urodaeum.

There are no copulatory organs in the pigeon. Copulation takes place by opposition of the cloaca of the male with that of the female. Fertilization takes place in the upper end of the oviduct.

اجابة السؤال الرابع الجزئية(b)

The digestive system of *Chalcides ocellatus* :

The mouth is guarded by two jaws, each carries one row of small, strong teeth and are conical in shape. They are all alike in shape and structure (homodont dentation) . The mouth cavity contains two palatal folds in its roof , one on either side . These are horizontal, shelf-like projections of the premaxilla, maxilla and palatine. The palatal folds do not meet in the median line, thus forming a palatal cleft through which the nasal and mouth cavities are in communication. At the floor of mouth there is a tongue which is forked at its anterior extremity. The pharynx is short. The esophagus is long due to presence of a neck region . The esophagus leads to the fusiform stomach which lies on the left side of the body cavity . There is a clear line of> demarcation between stomach and esophagus . Also a distinct pylorus is present between the stomach and intestine. The latter is differentiated into duodenum , ileum and rectum . The duodenum forms with the stomach a u-shaped loop . The ileum is coiled. But the rectum is much wider than the ileum and at their connection there is a short rectal caecum . The rectum opens into the cloaca.

The liver is large and consists of two lobes. The bile duct opens into the duodenum. All reptiles possess gall bladders. The pancreas lies between the stomach and duodenum. The spleen situates close to the stomach.

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