أسئلة وأجوبة إمتحان الأوليات 301 ح

(ورقة إمتحانية كاملة)

كلية: العلوم

قسم: علم الحيوان

المستوى: الثالث

الشعبة: بيوتكنولوجى

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الممتحنون: أ.د/ جزاء حسن مرسى

د/ داليا سعيد حمزة

Benha University **January 2016**
Faculty of Science **Protozoa (301 Z)**
Zoology Department **Third Level of Biotechnology**
Time Allowed: 2 Hours

1. Write short account on: **(18 Mark)**

1. Metastatic lesions.
2. *Tritrichomonas foetus*.
3. Malarial paroxysm.
4. Pathogenic soil amoebae.
5. Espundia and Kala-azar.
6. Redwater fever.

7. Compare between the life cycles of *Toxoplasma gondii* and *Eimeria* spp.

1. Mark)

2. Write about each of the following: **(24 Mark)**

1. Nucleus of Protozoa.
2. Types of pseudopodia.
3. Encystment in Protozoa.
4. Parasitic nutrition in Protozoa.
5. Sexual reproduction in Protozoa.
6. General characters of Sarcomastigophora.

With Best Wishes

Prof. Dr. Gazaa Hassan Morsy
Dr. Dalia Said Hamza
4/1/2016

Answers

1. Write short account on:
(18 Mark)

1. Metastatic lesions.

Entamoeba histolytica parasites may spread, by way of the blood and lymph vessels to other places causing various forms of metastatic lesions. Metastatic types are serious complications of intestinal amoebiasis. The spreading *amoeba* invades and destroys tissues in various organs, forming amoebic abscesses, which may become very large. The commonest site is the liver (hepatic amoebiasis) to which the parasites are carried by the portal circulation, but they may found in almost any organ, including lung and even brain.

2. *Tritrichomonas foetus*.

A parasite of cattle and in pregnant cows it may lead to abortion. Probably all parasites are expelled with the aborted foetus and placenta, but males should be slaughtered because treatment is expensive.

3. Malarial paroxysm.

Malarial paroxysm occurs at the end of the schizogonic cycle of Plasmodium, when the merozoites of the mature schizonts, together with their pigments and residual erythrocyte debris, erupt from infected red cells and are released into the circulation.

The paroxysm in regular and takes 48 hours in *P*. *vivax*, *P*. *ovale* and *P*. *falciparum*, and 72 hours in *P*. *malariae*. When the erythrocytes rupture, fever and other symptoms take place.

4. Pathogenic soil amoebae.

Very recently, it has been discovered, in several occasions, that some soil amoebae may infect man. *Naegleria*, *Acanthamoeba* and *Hartmanella* are free living, in soil, water and sewage.

Many cases of primary amoebic meningoencephalitis caused by *Acanthamoeba* and *Naegleria* have been identified. Almost all of them were fatal. The sources of infections were traced to swimming pools, warm ponds, and streams. The portal of entry is the nasal mucosa, from which the amoebae reach the meanings and brain. In some cases, amoebae have been found in human eye.

5. Espundia and Kala-azar.

Espundia: A type of American leishmaniasis caused by *Leishmania braziliensis* that affects the mucous membranes, particularly of the nose and mouth, resulting in grossly destructive changes. Also called Breda's disease**.**

Kala-azar: Visceral leishmaniasis, also known as kala-azar, caused by *Leishmania donovani.* It is characterized by irregular bouts of fever, substantial weight loss, swelling of the spleen and liver, and anaemia (which may be serious). If the disease is not treated, the fatality rate in developing countries can be as high as 100% within 2 years.

6. Redwater fever.

Babesiosis is an infection of the red blood cells by a single cell parasite of the genus *Babesia*. The disease is spread between cattle by ticks. The *babesia* is injected into the bloodstream by the tick and then invades the red blood cells and begins dividing, eventually rupturing the cell. Clinical signs begin around 2 weeks after infection. Babesiois is rare except in known tick areas. However in these areas even though disease is often relatively mild there is a significant impact on productivity and fertility in affected cattle.

1. Compare between the life cycles of *Toxoplasma gondii* and *Eimeria* spp.

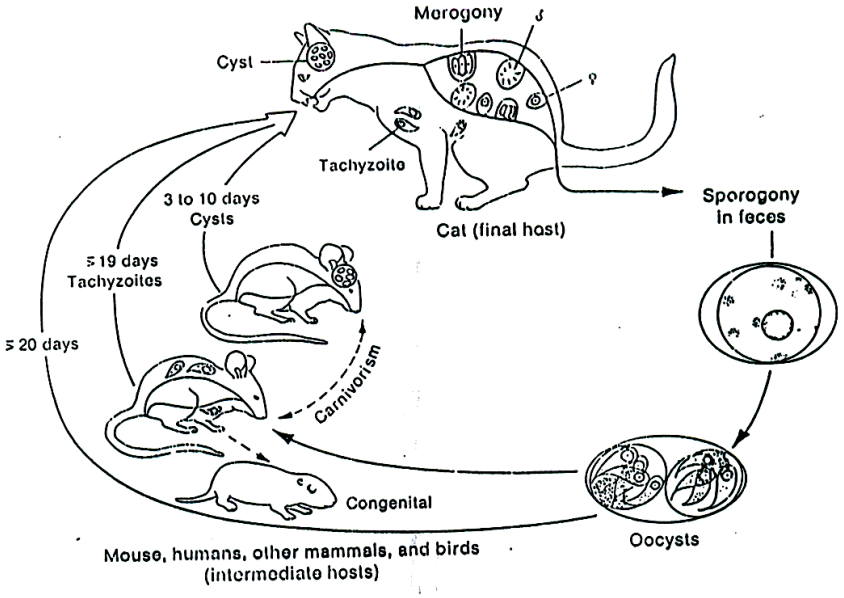
(7 Mark)

Life cycle of *Toxoplasma gondii*:

In the nature cycle, mice and rats containing infective cysts are eaten by the cat, which serves as definitive host for the sexual stage of the parasite. The cyst wall is digested, releasing organisms that penetrate epithelial cells of the small intestine of the cat. Several generations of intarcellular multiplication occur, finally, the parasite develops micro and macrogametes, then fertilization occurs, and

oocytes are developed and discharged into the intestinal lumen. Oocyst requires 1-5 days to sporulate.

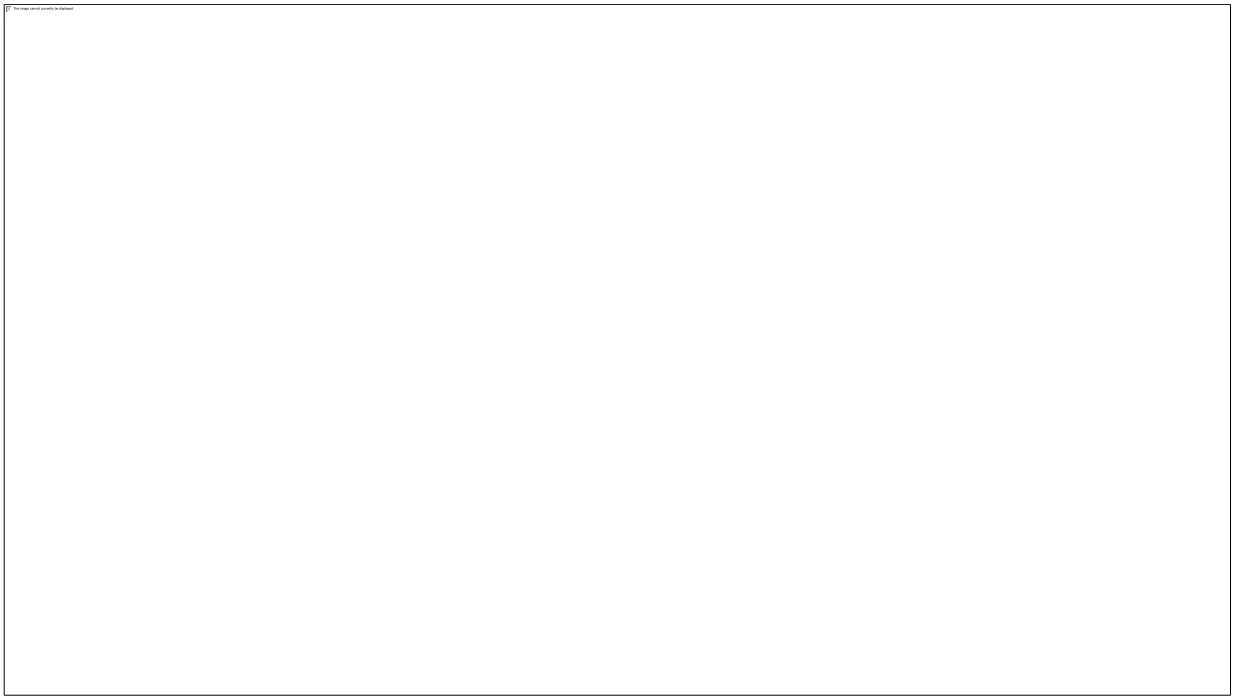
Human or animal infections can result from ingestion of material contaminated with infected cat feces, or by eating raw or partially cooked meat and drinking unboiled milk.



Life cycle of *Eimeria* spp.

These are primarily parasites of terrestrial birds and mammals. The host ingests a sporulated oocyst. Within the intestine 8 sporozoites are released from the oocyst. Sporozoites penetrate epithelial cells in the gastrointestinal tract at a species-specific location. The sporozoite becomes a schizont, in which nuclear division followed by cytokinesis produces a large number of merozoites. The infected cell ruptures and each merozoite penetrates a new epithelial cell. The process of schizogony repeats 1-4 times, depending upon the species involved. Then, following penetration of a new epithelial cell, the merozoite develops into either a macrogametocyte or amicrogametocyte. Microgametocytes produce microgametes that burst from the infected cell, enter cells containing macrogametes, and fertilize them. The resulting zygotes lay down an impervious cyst wall around themselves and are now oocysts. Oocysts rupture from the host cell and are excreted in the host's waste. Initially, the oocyte is unsporulated, containing only a zygote that is not yet infective to a new host. After a few days, 8 sporozoites are formed within the oocyst. It is now sporulated and infective.

Infections with *Eimeria* are self-limiting and the host develops some degree of immunity against reinfection.



2. Write about each of the following: (24 Mark)

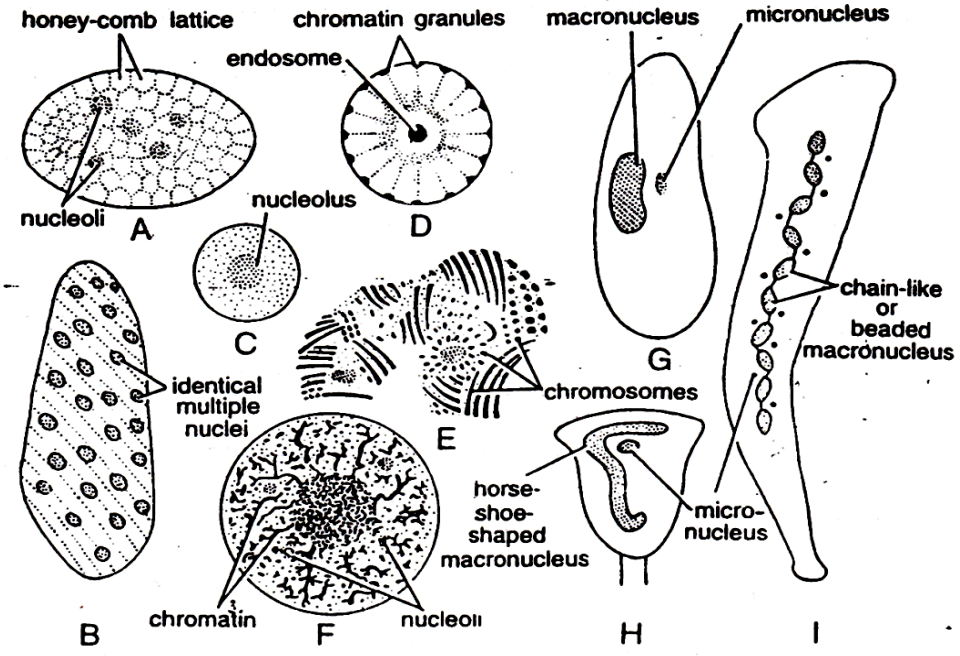
1. Nucleus of Protozoa.

Nucleus is the seat of control of all the vital activities of the protozoan body. The nuclei of Protozoa exhibit a greater variety of size, shape and structure than the nuclei of Metazoan. The nucleus of protozoa has a nuclear membrane, nucleoplasm, oxychromatin, basichromatin, and there may be a nucleolus. The nuclear membrane remains intact even in cell division. The nucleus is therefore the most important organelle of every protozoan. Majority of protozoa have a single nucleus, except at the time of multiplication, when two or even more may present. Some protozoan have two similar or dissimilar nuclei for the greater part of their life & are thus, binucleate, e.g. *Paramecium*. The two nuclei differ not only in size & shape, but also in function. The large nucleus, called the macronucleus, is polyploidy & controls the vegetative activities, whereas the smaller nucleus, termed the micronucleus, is diploid & governs of sexual reproduction. This phenomenon is known as the nuclear dimorphism. A few forms carry several nuclei, & are said to be multinucleate; e.g., *Opalina*.

The nucleus is generally spherical. Macronucleus of ciliates varies considerably in form. It is rounded in *Podophrya*, ovoid in *Balantidium*, kidney-shaped in *Nyctotherus*, horse-shoe-shaped in *Vorticella*, moniliform in *Stentor* & branched in *Ephelota*.

The protozoan nucleus shows two main types of structure: vesicular & compact or granular. In a vesicular nucleus, the nuclear membrane is visible & the chromatin material is aggregated into one or more prominent bodies, the nucleoli, also called the karyosomes or endosomes. The vesicular nucleus is usually found in

Mastigophora & Sarcodina, e.g., *Euglena*, *Amoeba* & *Arcella*. In a compact nucleus, the nuclear membran is inconspicuous & the chromatin material is scattered as grains throughout the nucleus. Compact nuclei usually occur in ciliates, e.g. *Paramecium*.

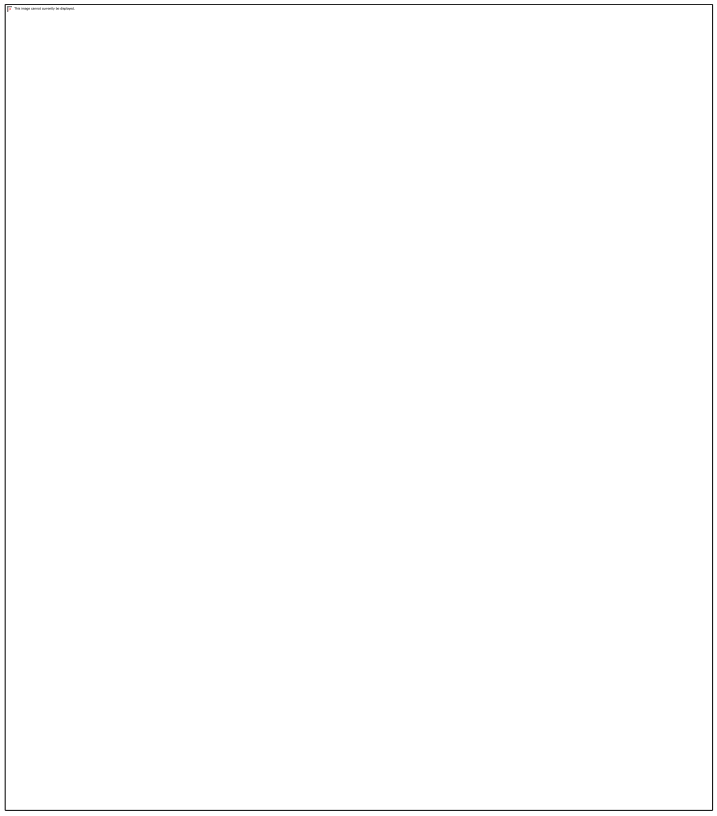


Protozoan nuclei: A- Vesicular nucleus of *Amoeba proteus*, B- Multiple nuclai of *Opalina*, C- Vesicular micronucleus of *Paramecium aurelia*, D- Vesicular nucleus of *Entamoeba*, E- Chromosome nucleus of *Amoeba sphaeronucleus*, F- Polyploid nucleus of *Aulacantha scolymantha*, G- Compact macronucleus and vesicular micronucleus of *Paramecium caudatum*, H- Horse-shoe-shaped micronucleus of *Vorticella*, I- Beaded macronucleus of *Stentor*.

2. Types of pseudopodia.

There are four types of pseudopodia:

1. Lobopodia: Finger shaped rounded tipped pseudopodia that usually contain both ectoplasm and endoplasm (e.g. *Amoeba* and *Arcella*).
2. Filopodia: Are fine, long threads, often with rounded ends, they may branch; they are made of only hyaline ectoplasm (e.g. *Euglypha*).
3. Rhizopodia or reticulopodia: Are thin, long and branching. The branches of adjacent pseudopodia may anastomose to form a network which also serves as a trap for capturing food (e.g. *Globigerina*).
4. Axopodia: Are long, stiff threads made of ectoplasm, with a hard central axial filament of endoplasm, unlike others they are semipermanent (e.g. *Actinophrys*). Axopodia are not organelles of locomotion but are only for capturing food.



5. Encystment in Protozoa.

Many protozoan animals secretes a protective cyst which resists unfavourable conditions (e.g. Free-living Protozoa) and for dispersal (e.g. Parasites, which usually pass from one host to another as cysts or spores, covered by a resistant membrane that protects them while out of the host).

6. Parasitic nutrition in Protozoa.

The parasitic forms feed either holozoically or saprozoically. Thus, the parasites may be grouped into two categories on the nature of food and their mode of feeding:

Food-robbers: The parasites feeding upon the undigested or digested food stuffs of their hosts are known as food-robbers, such as some ciliate parasites like *Nyctotherus*, *Balantidium*. These parasites feed holozoically on solid food particles, while few others like *Opalina* feed upon the liquid food by the process of osmosis through their general body surfaces. The food-robbers are generally non-pathogenic to their hosts.

Pathogenic: The protozoan parasites causing harm to their hosts, usually feed upon the living tissues of the host. They absorb liquid food through their general body surface, e.g., *Trypanosoma*, *Plasmodium*, etc.

7. Sexual reproduction in Protozoa.

The most common sexual reproduction in protozoans is by conjugation or syngamy.

Conjugation: It is a temporary pairing of 2 parents to exchange male and female gametes, through a temporary cytoplasmic bridge. Ciliate protozoans like *Paramecium* reproduce by this type.

Syngamy: It is the complete and permanent fusion of 2 haploid gametes to form a diploid zygote. When the 2 fusing gametes are morphologically and physiologically similar to each other, the process is called isogamy (e.g. *Monocystis*). When the 2 fusing gametes are dissimilar the process is called anisogamy (e.g. *Plasmodium*).

8. General characters of Sarcomastigophora.

The phylum Sarcomastigophora includes many abundant and ecologically important forms. All are either unicellular or colonial, and may be either autotrophic or heterotrophic.

Characteristics of Subphylum: Sarcomastigophora

1. Simple nucleus.
2. Locomotion through flagella, pseudopodia or both.
3. Asexual reproduction by binary fission and multiple fission.
4. Sexual reproduction through syngamy.
5. It includes three superclasses; Mastigophora, Opalinata and Sarcodina.