



# IQRA NATIONAL UNIVERSITY

(ALLIED HEALTH SCIENCES)

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**SUBJECT:** MEDICAL MICROBIOLOGY

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**PAPER**

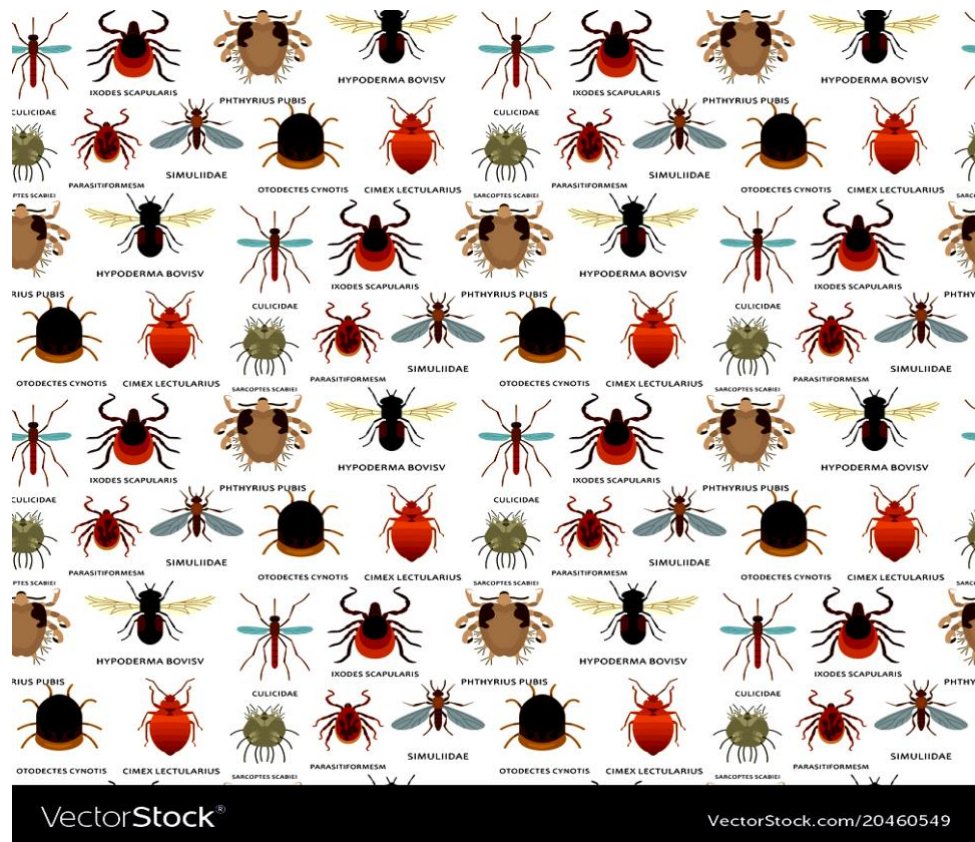
**QUESTION NO 1:**

**PARASITES:**

- Parasites are basically plant or an animal organism that lives in or on another and

takes its nourishment from that other organism (host).

- Parasitic diseases include infections that are due to protozoa, helminthes, Bacteria, viruses, fungi & arthropods etc.
- For example: malaria is caused by Plasmodium, parasitic protozoa.



## **CLASSIFICATION of PARASITES:**

- **ECTO-PARASITE:** A parasite that lives outside or superficial tissues the body of the host.

**Example:** fleas, head lice and bed bugs etc

- **ENDO-PARASITE:** A parasite that lives within the body of the host

**Example:** Leishmania, plasmodium vivax, Enterobuis vermicularis, Brugia malayi etc

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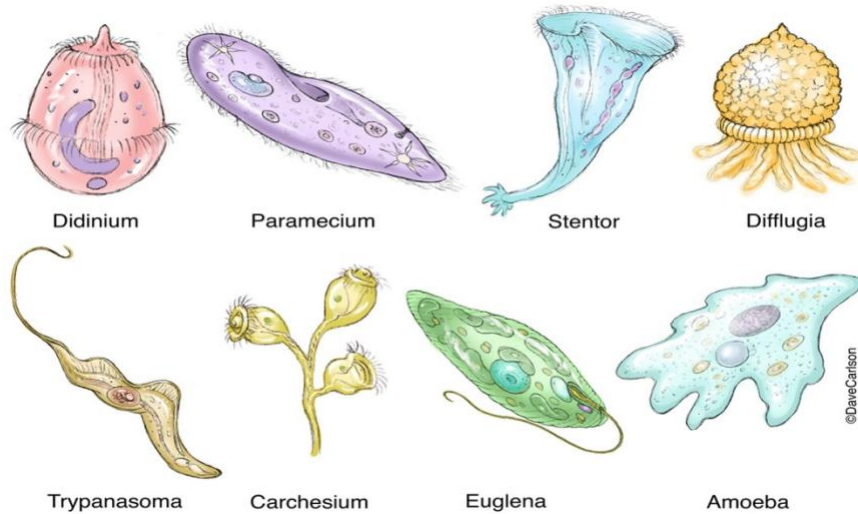
## **QUESTION NO 2:**

### **PROTOZOA:**

Protozoa is a Greek word which means “first animal”, Protozoa are single celled organisms (may be multicellular). They come in many different shapes and sizes ranging from an Amoeba which can change its shape to Paramecium with its fixed shape and complex structure.

They live in a wide variety of moist habitats including fresh water, marine environments and the soil.

- **Constitute a large group of more than sixty thousands species, which are mostly harmless but few are the harmful which cause infection to humans**



## **CHARACTERISTICS:**

- Unicellular
- Chemo-hetrotrops
- They have have organelles which provide motion e.g. flagella, cilia
- No germ layers
- All symmetries are present
- Most are microscopic
- They include free living, mutualistic and parasitic form

## **MORPHOLOGY:**

- Eukaryotic resemble to animal cell contain major cells organelles (Nucleus, mitochondria)
- For movements they have specialized appendages Flagella and Cilia
- Microscopic size < 50  $\mu\text{m}$
- Cytoplasm of protozoa divided into two part Ectoplasm (help in movement, feeding and protection) and Endoplasm (contain nucleus, mitochondria and food)
- Fresh water protozoa have Contractile vacuoles to pump out excess water

- Etc

## TYPES On The Basis Of MOTILITY and REPRODUCTION:

- **FLAGELLATES:** Flagella (a tail like structure) that provide Whip like Movement.

Example: Giardia (INTESTINAL PARASITE) etc

- **CILIATES:** Cilia (a fine hair like structure attached with their body) provide movements may be help in attachment and feeding.

- Most are harmful

- **SARCODINA:** In sarcodina major loco-motor organelles is pseudopodia (means false foot)

- Most are harmful

- Example: AMEIBA

- **SPOOROZOITES:**

- Only motile protozoa, well developed sexual and a-sexual stages
- Harmful in nature
- EXAMPLE: Sporozoites infections plasmodium, Toxoplasma gondii etc

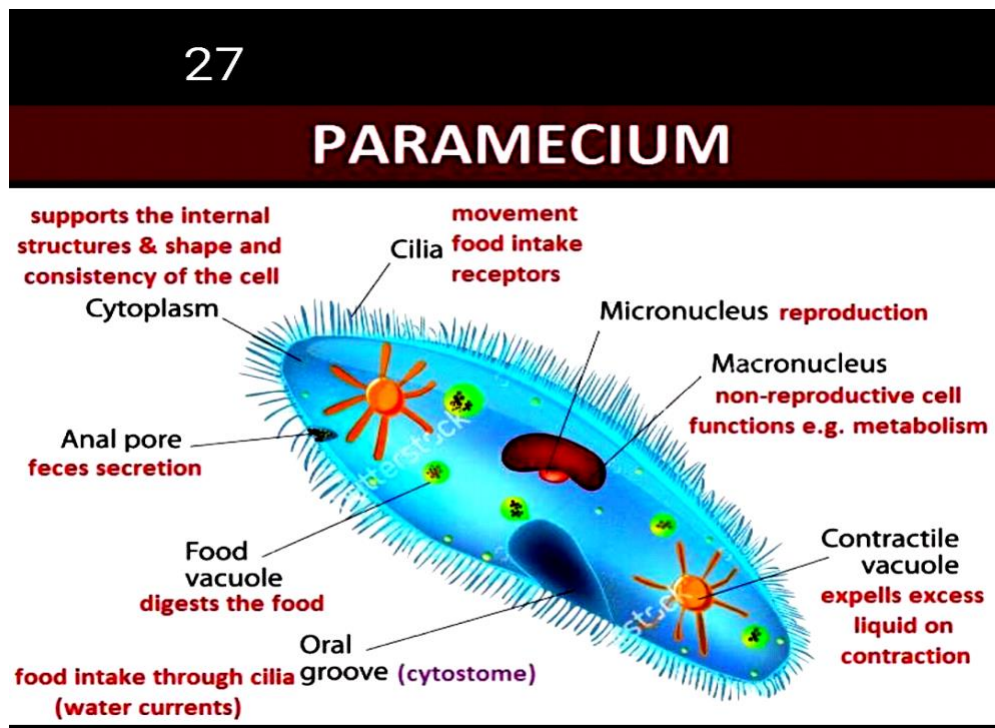
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## QUESTION NO 3:

### PARAMECIUM:

Organelles and its function:

- Cytoplasm ( supports the internal structure an shape and consistency of the cell)
- Cilia (Movement, food intake receptors)
- Micronucleus (reproduction)
- Micronucleus ( Non-reproductive cell functions)
- Anal pore (feces secretion)
- Food vacuole (digest the food)
- Oral groove (food intake through cilia (water currents))
- Contractile Vacuole (expels excess liquid on contraction)

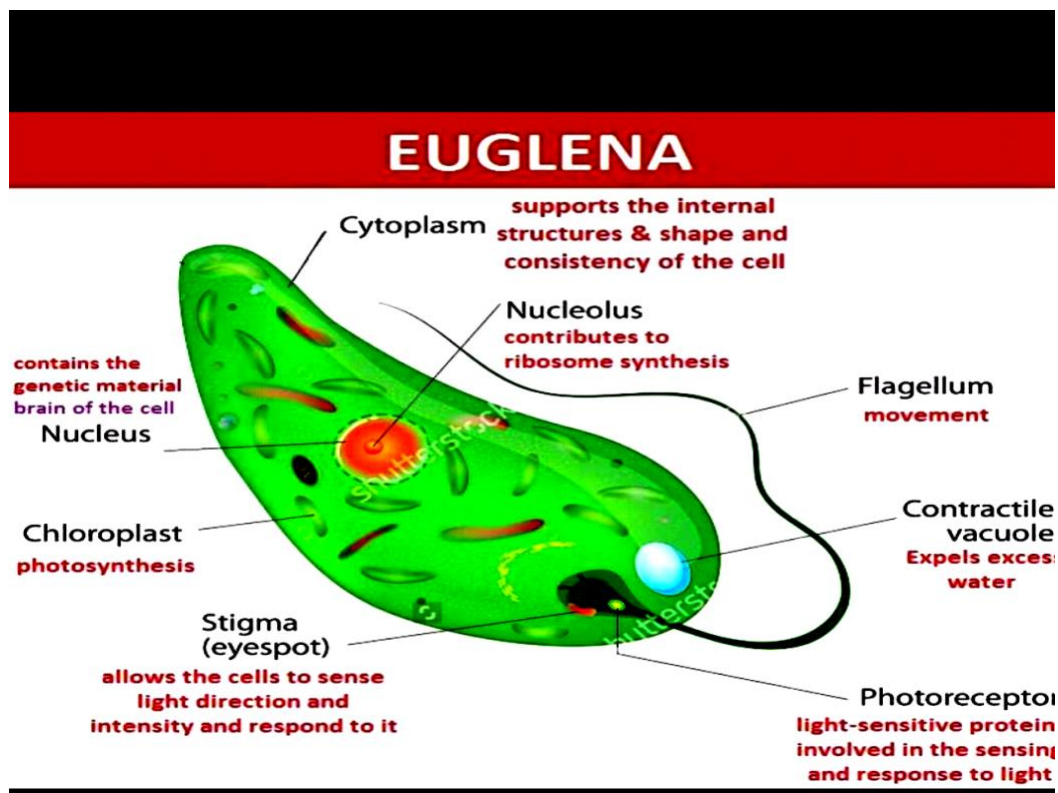


## EUGLENA:

### Organelles and its function:

- Cytoplasm ( supports the internal structure an shape and consistency of the cell)
- Contractile Vacuole (expels excess liquid on contraction)

- Flagellum (movement)
- Nucleus (contains the genetic material brain of the cell)
- Nucleolus (Contributes to ribosome synthesis)
- Chloroplast (photosynthesis)
- Stigma (eyespot) (allows the cell to sense light direction and intensity and respond to it)
- Etc



## QUESTION NO 4:

**ANTI-BIOTIC RESISTANCE:**



Resistance to an antibiotics means “The drug is no longer effective against the infecting bacteria”. OR When Bacteria develop new ways to defend against the antibiotics, This is called anti-biotic resistance.



➤ **MECHANISM of ANTI-BIOTIC RESISTANCE:**

- a) **DENIED ACCESS:** When the bacterial cell membrane becomes impermeable for antibiotics but antibiotic wants to pass this membrane e.g. imipenem
- b) **ANTI-BIOTIC MODIFICATION:** By the help of bacterial enzyme antibiotic becomes modified e.g. beta lactamase inactivates penicillin
- c) **ALTERED TARGET SITE:** When the target itself has been modified, so the antibiotics cannot bind to its intended target
- d) **PUMPING OUT:** The anti-biotic faster than it gets in e.g. tetracyclines
- e) **ALTERNATIVE TARGET:** same as “c” but in this step include typically enzyme e.g. Alternative penicillin binding protein in MRSA

➤ **CAUSES of ANTI-BIOTIC RESISTANCE:**

- a) **OVER PRESCRIPTION OF ANTI-BIOTICS:**



- i. Without detecting pathogens and the physicians prescribe medicines
- ii. When narrow spectrum is actually needed and physicians prescribe broad spectrum antibiotics

**b) PATIENT NON-COMPLIANCE:**

- i. Patients forget to take medicine on right time
- ii. Unable to afford full course
- iii. Antibiotics are prescribe in a specific dose regimen

**c) OVER DOSE OF ANTIBIOTICS:**

- i. Patient demand for anti-biotic for normal cold, fever
- ii. Antibiotics taken as OVER THE COUNTER drug
- iii. Retail drug store presents a chaotic situation during drug distribution

**d) USE OF ANTIBIOTICS ON DOMESTIC ANIMALS:**

- i. A good chance for antibiotics to develop resistance
- ii. Spreading of microbes through water and food

**e) POOR QUALITY OF ANTIBIOTICS:**

- i. Expired and fake antibiotics
- ii. Due to lack of quality compliance and monitoring

**f) POOR HYGIENE AND SANITATION:**

- i. In some areas waste water from hospitals or poorly filtered which allows resistance bacteria to escape
- ii. The bacteria spreads when people drink this water

➤ **SOLUTION TO THIS RESISTANCE:**

- i. Never use left-over antibiotics

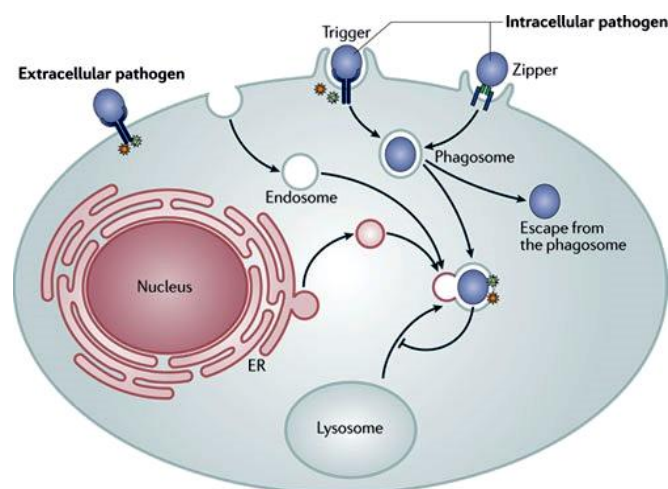
- ii. Never share antibiotics with other
- iii. Make information available on the impact of antibiotic resistance
- iv. Never demand antibiotics if your health worker says you don't need them
- v. Only use antibiotics when prescribed by a certified health professional.

## QUESTION NO 5:

### MECHANISMS OF BACTERIAL PATHOGENICITY:

A pathogen is a microorganism that is able to cause disease in a plant, animal or insect. Pathogenicity is the ability to produce disease in a host organism.

Microbes express their pathogenicity by means of their virulence, a term which refers to the degree of pathogenicity of the microbe. Hence, the determinants of virulence of a pathogen are any of its genetic or biochemical or structural features that enable it to produce disease in a host.



Two broad qualities of pathogenic bacteria underlie the means by which they cause disease:

- **Invasiveness:** Invasiveness is the ability to invade tissues.
  - It encompasses mechanisms for colonization (adherence and initial multiplication), production of extracellular substances which facilitate invasion (invasins) and ability to bypass or overcome host defense mechanisms.

- **Toxigenesis:** Toxigenesis is the ability to produce toxins.
  - Bacteria may produce two types of toxins called exotoxins and endotoxins.
  - **Exotoxins** are released from bacterial cells and may act at tissue sites removed from the site of bacterial growth.
  - **Endotoxins** are cell-associated substance. (In a classic sense, the term endotoxin refers to the lipopolysaccharide component of the outer membrane of Gram-negative bacteria). However, endotoxins may be released from growing bacterial cells and cells that are lysed as a result of effective host defense (e.g. lysozyme) or the activities of certain antibiotics (e.g. penicillins and cephalosporins).
  - Hence, bacterial toxins, both soluble and cell-associated, may be transported by blood and lymph and cause cytotoxic effects at tissue sites remote from the original point of invasion or growth.
  - Some bacterial toxins may also act at the site of colonization and play a role in invasion.

- **BACTERIAL PATHOGENESIS:**

- I. INFECTION/ENTRY
- II. VIRULENCE FACTORS
- III. PATHOGENESIS
- IV. ESCAPE OF IMMUNE SURVEILLANCE

- **PATHOGENIC ACTION OF BACTERIA:**

- Tissue destruction > flesh-eating bacteria (clostridium perfringens)
- Obstruction > Cystic fibrosis

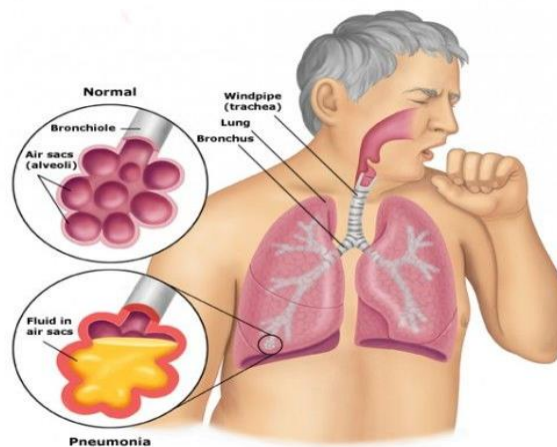
- Toxins (exotoxin and endotoxin) > bacterial component that directly harm tissue or trigger disease symptoms
- Immunopathogenesis > excess immune responses or autoimmunity

## **BACTERIAL DISEASES:**

### **PNEUMONIA:**

Inflammation of the lungs caused by bacteria, viruses, or chemical irritants called Pneumonia. The sacs fill with with pus and other liquid.

- Most common of which is streptococcus pneumonia



### ➤ **SYMPTOMS:**

- SHAKING, CHILIS

- CHATTERING TEETH
- SEVERE CHEST PAIN
- HIGH TEMPERATURE
- HEAVY PERPIRING
- RAPID PULSE
- RAPID BREATHING
- BLUISH CLOR TO LIPS AND NAIL BEDS
- CONFUSED MENTAL STATE or DELIRIUM
- COUGH THAT PRODUCES RUST-COLORED or GREENISH MUCUS

### **THYPOID:**

Its bacterial disease caused by Salmonella typhi, Transmitted through ingestion of food or drink contaminated by the feaces or urine of infected people.



### ➤ **SYMPTOMS:**

- HEADACHE/ANOREXIA
- ABDOMINAL DISCOMFORT

- LATHERGY
- DIARRHEA
- SUSTAINED FEVER AS 103 or 104 F
- CHEST CONGESTION
- VOMITING
- SLOW HEART BEAT
- SOFT PALPABLE SPLEEN
- HEPATOMEGALY

**CAUSES:**

- Contact with chronic asymptomatic typhoid carrier
- Water is contaminated with sewerage system

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**THANK YOU SO MUCH**



