BT 102 Subjective

Midterms Past Papers

2 marks

1. What is flagellum? Give its functions?

Long filamentous structure that propels bacteria is called flagellum. It helps bacteria to move.

2. What is phosphorylation?

The addition of an inorganic phosphate group to a chemical compound is called phosphorylation. e.g addition of P to ADP for synthesis of ATP during metabolic reactions.

3. Name two basic dyes?

In basic dye the color is in the positive ion. e.g

I. 1-Crystal violet

II. 2-Methylene

III. 3-blue Malachite green IV. 4-Safranin

4. Difference between viable count and direct count?

Viable count:

Viable count is a method used in cell culture to determine the number of living cells in a culture. This is different from other cell counting techniques because it makes a distinction between live and dead cells

Direct count:

Direct counting methods include microscopic counts using a hemocytometer or a counting chamber. The hemocytometer works by creating a volumetric grid divided into differently sized cubes for accurately counting the number of particles in a cube and calculating the concentration of the entire sample.

5. Define pilli and also its functions?

These are hair-like structure composed of pilin, usually one to ten in number.

➢ Longer than fimbriae Used for attachment to:

- Host cells
- Bacteria

➢ Used for DNA transfer from on bacterium to another:

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- ➢ Conjugation (Sex pili)
- ➢ Also function in twitching Motility
- ➢ Gliding Motility is also the function of the pili.

6. Write the name of three steps of glucose respiration. Respiration of glucose takes place in three general steps:

• Glycolysis: Oxidation of glucose to pyruvic acid

• Krebs cycle: Oxidation of acetyl CoA to CO2

• Electron Transport Chain: Coenzymes that carry electrons from Krebs cycle or glycolysis are oxidized to create ATP.

• Respiration is further divided into two types:

Aerobic Respiration: If in the electron transport chain, the final electron acceptor is oxygen, it is called an aerobic respiration.

Anaerobic Respiration: If in the electron transport chain, the final electron acceptor is any inorganic compound other than oxygen, it is called an anaerobic respiration.

This final electron acceptor may be a nitrate ion, a sulfate ion, or a carbonate ion.

7. What is fluorochromes?

Fluorochromes are substances that absorb short wavelength of light and emit longer wavelength (visible light spectrum). The fluorochromes are used in fluorescent microscopy. These are attached to antibodies that are specific to organisms. So, if an organism is present in the specimen, we can use specific antibodies to determine the presence of those organisms by use of fluorochrome tagged antibodies.

8. What is buffer?

Buffers are used to maintain desired pH o Peptones and amino acids are used as buffers o Phosphates are also used for buffers.

A buffer is a solution that can maintain a nearly constant pH if it is diluted, or if relatively small amounts of strong acids or bases are added. A buffer solution can be made by mixing a weak acid with one of its salts OR mixing a weak base with one of its salts.

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9. What is resolution?

Resolution is the ability of the lenses to distinguish between two closely lying objects as separate. Light microscope resolving power is 0.2 µm. n = refractive index, 1.5 for immersion oil o Resolution (d) in the formula given in the diagram is directly proportional to the wavelength of the light used. As resolution is the smallest distance between two closely lying points, use of light with smaller wavelength gives better resolution. That is why it is find blue filters for blue light as illumination for the microscope, as blue light has the shortest wavelength in the visible spectrum.

10. What is sporulation?

Formation of spores takes place within a vegetative cell and the process is called sporulation or sporogenesis. It is initiated when nutrients become unavailable.

11. Why solid medium is good than liquid medium for the growth of bacteria?

Solidification of the medium is done for purifying organisms from each other as solid medium provides surface for individual colonies to grow well separated from each other. A well isolated colony is assumed to be the progeny of a single cell. Purification of organisms is done by streaking the organisms. Secondly, the solid media are used to study the colony characteristics.

12. What is function of cell wall?

Cell wall is the most important layer in bacteria. It is rigid layer just outside the plasma membrane.

1. It provides shape to the living organisms.

2. It protect from osmotic lysis.

3. It is also involve in pathogenocity.

Q.5 Difference Between simple staining and differential staining (2 marks)

Simple staining:

- A single stain is used.
- Stain is washed off.
- A mordant is added, sometime.
- Microbes seen under the microscope.

Examples of simple stain:

- Methylene Blue and crystal violet

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Differential staining:

Differential stains react differently with different kinds of bacteria.

- Most common is Gram staining.
- 1884, by Hans Christian Gram Crystal Violet is added.
- It is primary stain
- Crystal violet is washed off.
- Iodine is added to enhance binding.
- Iodine is mordant.
- The slide is washed off with alcohol.
- Decolorizing agent

Examples of differential staining:

- Fuchsin or safranin

13. Write name of three passive movements.

Simple diffusion, Facilitated diffusion. Osmosis

32. What are microaerophiles (2)

Microaerophiles need oxygen because they cannot ferment or respire anaerobically. However, they are poisoned by high concentrations of oxygen. They gather in the upper part of the test tube but not the very top

33. Glycocalyx 2

It is the outermost layer, viscous and gelatinous in nature that surrounds the cells. It is composed of polysaccharide and polypeptide or both. If glycocalyx is organized and firmly attached to the cell, it is called a capsule.

1. Stages of Germination spore. (3)

• Spore germinates when it finds a conductive environment for its growth. Germination has 3 phases or stages:

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• Activation: It prepares the spore for germination. Heat can activate the spore when appropriate moisture and nutrients are present in the environment.

• Germination: Spore starts swelling and losing its coats etc. It becomes metabolically active.

• Outgrowth: New components are made.

2. What is refractive index?

It is the ratio of the velocity of light in a vacuum to its velocity in a specified medium. Refractive Index: Ability of a medium to bend the light.

Refractive Index: Ability of a medium to bend the light

- Light rays move in a straight line through a single medium
- To increase contrast, we stain the specimen.

3. Write down the parts of flagella.

A flagellum consists of the following 3 parts as shown in the accompanying diagram below:

Filament: It is made of a protein called flagellin, which makes H antigen that can be used for server identification in gram negative bacteria.

Hook: A different protein

Basal Body: The most complex

18. Define Ribosome?

Ribosomes are non-membranous organelles present in both prokaryotes and eukaryotes and involved in protein synthesis. Their composition in prokaryotes is as follow

• 70S ribosomes (when two units are combined into one unit) 50S: one rRNA and ribosomes and inhibit protein synthesis

• Streptomycin attach to 30S

21. What is chemotaxic and phototaxic?

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Movement of organism in response a chemical is called chemotaxix. Movement of organism in response to light stimulus is called phototaxix.

22. What is endospore?

A resistant dormant structure formed within a bacterial cell to pass unfavorable conditions.

• Specialized resting cells

• Highly durable, dehydrated forms of bacteria

• Formed inside a bacterium

• Survive extremes of temperatures; resistant to heat; needs to be autoclaved in order to be killed.

• Survive lack of water; can survive in high salt concentrations. Clostridia spores can survive in honey and that is one reason, honey is not recommended for infants, because spore can cause tetanus in babies.

• Survive radiation danger

• Survive in the toxic environment as well.

• Mostly formed by Gram positive bacteria Genus Clostridium Genus Bacillus

• One gram negative: Coxiella burnetii also has it.

• Formation of spores takes place within a vegetative cell and the process is called sporulation or sporogenesis. It is initiated when nutrients become unavailable.

24. Metachromatic granules

Also called volutin, they stain red with certain dyes such as methylene blue. That is why they are called metachromatic (stain in different color as methylene blue gives blue color but the color on these granules is red). • Large inclusions • These inclusions contain inorganic phosphates. Inorganic phosphates are used up in ATP synthesis. • Characteristics of Corynebacterium diphtheria: This bacterium can be identified by the presence of these granules in it. coenzymes are organic nonprotein molecules that bind with the protein molecule (apoenzyme) to form the active enzyme (holoenzyme). Coenzymes such as NAD, NADP, FAD, FMN etc. are used as carriers of these electrons in oxidation reduction reactions.

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27. Subgroup of spiral bacteria.

Spirals are curved shaped bacteria. They are further divided into 3 more subgroups. Vibrio: curved rods Spirillum: Helical but rigid Spirochete: Helical but flexible

28. Methods used for viable counting of microbes.

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• Pour plate method

• Spread plate method

29. Major two prokaryutes group?

Domain Archea

Domain eubacteria

30. Write down three advantages of staining?

Advantages of staining

1. It gives quick results when examining infections.

2. It is simple and cost-effective.

3. It helps with determining appropriate treatments for infection.

4. It allows for various methods of testing.

5. It is basically a key procedure in identifying bacteria.

31. How bacteria got nitrogen?

By decomposing proteins

From Nitrates

From NH_4^+ ions

Use Gaseous N_2 is nitrogen fixing bacteria.

What is a passive moment write its types?

Movement of substances with the concentration gradient. This means that substances will move from higher concentration of a substance to lower concentration. Gradient provides the force for movements of molecules and this happens with no energy expenditures.

• Passive Movement is divided into two groups.

1. Simple Diffusion

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2. Facilitated Diffusion

- Passive Movement

Movement of substances with the concentration gradient. This means that substances will move from higher concentration of a substance to lower concentration. Gradient provides the force for movements of molecules and this happens with no energy expenditures.

Passive Movement is divided into two groups:

1. Simple Diffusion;

Area of high concentration to low concentration. This continues until ions or molecules are evenly distributed. When this happens (equal distribution through), it is called a point of equilibrium. O2 and CO2 are examples of simple diffusion.

2. Facilitated Diffusion

i. Integral proteins act as channels or carriers in facilitated diffusion i. Integral proteins are called transporters.

ii. No energy is required during transportation of substances through these integral proteins.

iii. Two kinds of transporters are known:

i. Nonspecific transporters

ii. Ions specific transporters 1. Change in shape 2. Sugars, vitamins

Examples of facilitated diffusion include:

i. Large molecules degraded by extracellular enzymes

ii. Smaller molecules then bind transporter

iii. Water molecules can pass through lipid bilayer by simple diffusion or though water channels, aquaporin's

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Short questions marks 3

1. What is culture medium, culture and inoculums?

This term is used to define growth of microbes. In other words, microbial growth in the lab is called a culture. A nutrient material that supports the growth of microbes in the lab is called a culture medium o Microbes introduced into a culture medium that initiates growth of organism

Three differences between prokaryotes and eukaryotes.

1- Prominent nucleus is found in eukaryotes while it is absent in prokaryotes.

2- Membrane bound organelles are found in eukaryotes and absent in prokaryotes.

3- No histones are found in prokaryotes while present in eukaryotes.

Examples prokaryote bacteria and archea all organism found in domain Eukarya are eukaryotes.

3. Write the name of five layers of endospore

Exosporium: A thin delicate outermost covering of the spore

Spore coat: 2nd layer underneath the exosporium. It is thick and composed of several protein layers. Resistant to chemicals. It contains enzymes for germination. Germination of spores into vegetative form occurs when environment becomes favorable for their growth.

Cortex: It is the 3rd layer from outside in. It has peptidoglycan in it.

Spore cell wall or core wall: Surrounds the protoplast or spore core

Spore core: Contains nucleoid and ribosomes

3. Describe structural functions following: I. Ribosomes ii. Cell wall iii. GFlagella.

Ribosomes

Composed of proteins + ribosomal RNA

• 70S ribosomes (when two units are combined into one unit)

50S: one rRNA

30S: two rRNA

Several antibiotics act on ribosomes and inhibit protein synthesis

• Streptomycin attach to 30S ii.

Cell wall

Cell wall is the most important layer in bacteria. It is rigid layer just outside the plasma membrane. Most important structure in prokaryotes It provides shape to the organism. It provides protection from osmotic lysis. It is involved in pathogenicity (ability of the organism to cause the disease). Several antibiotics act on it.

iii. Flagella

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Long filamentous structure that propels bacteria. A flagellum consists of the following 3 parts.

Filament: It is made of a protein called flagellin, which makes H antigen that can be used for serovar identification in gram negative bacteria. • Hook: A different protein • Basal Body: The most complex

6. Describe 5 bacteria which need oxygen for growth?

1-Nocardia asteroids 2-Myoacterium tuberculosis 3-Bacillus anthracis 4- Psedomonas aeurginosa 5- Neisseria gonorrhea

7. What are physical requirements for the growth of bacteria.3

• Temperature

• pH

• Osmotic Pressure

8. Write down type of bacteria?

Bacteria can be classified on different basis like photosynthetic saprotrophic heterotrophic on the basis of mode of obtaining food. Aerobic and anaerobic on the basis of oxygen requirment. gram positive and negative on the basis of cell wall composition. Fermentor and non fermentor on the basis of fermentation carrying out ability and so on.

9. What is function of i) illuminator ii) condenser iii) Objective lens

- Illuminator: a light source
- Condenser: Directs the light through the specimen
- Objective Lenses: Close to the specimen

11. Differentiate b/w phase contrast and dark field microscopy.

Dark field microscopy: Arrangement of the condenser in dark field microscopy throws light rays at an oblique angle so that if the specimen is not present on the slide, there will be no image formed. However, if the the organisms are present on the glass slide, those organisms will reflect the light into the objective lens and we will see the cells as bright objects in a dark background much like we see stars in the sky at night. o The beauty of this microscope is that one does not have to stain the organisms to see them under the microscope.

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Phase contrast microscopy: This instrument is built on the concept of phases of light waves. The light ray that passes through an organism gets retarded about ¼ of its wavelengths than the light that passes outside the organism To further retard the retarded light ray, a phase plate is inserted into the body of the microscope (above the objective lens) which is thicker in the center than the ends. This arrangement causes the

Dark field microscopy:

- This microscope makes use of a special condenser that provides illumination from the sides.
- The beauty of this microscope is that one does not have to stain the organisms to see them under the microscope.

Phase contrast microscopy:

- This instrument is built on the concept of phases of light waves.
- This method for visualizing organisms also does not involve staining.

12. Characteristics of algae.

These are eukaryotes. Their cell wall consists of cellulose. These are photosynthetic and produce oxygen. They are usually unicellular, but multicellular algae are also common. Seaweeds and pond scum are some of the examples.

14. What is fimbriae? Write its location and function.

Hair-like small appendages on around the entire

Fimbriae help bacteria attach to surfaces before they can secrete biofilm Fimbriae also help attach to Neisseria gonorrhoeae.

15. What is Magnetosomes?

• Inclusions of iron oxide • Surrounded by invaginations of plasma membrane • Present in G negative bacteria • Act like a magnet. Bacteria can stick to iron containing rocks for nutrition. • Decompose H2O2 which is toxic for cells.

16. Function of cell wall in bacteria.

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• Selective permeable barrier • Passive and Active Transport • Respiration in microbes (bacteria) • Photosynthesis in microbes • Lipid synthesis • Cell wall parts are transported by a molecule called bactoprenol which is present in the plasma membrane. • PM has many receptors in it with which various ligands can bind and initiate signals for gene expression etc.

Cell wall is the most important layer in bacteria. It is rigid layer just outside the plasma membrane.

Most important structure in prokaryotes

It provides shape to the organism.

It provides protection from osmotic lysis.

It is involved in pathogenicity (ability of the organism to cause the disease).

Several antibiotics act on it.

TEM revealed true differences

Peptidoglycan thick in G +ive cells

14. Inclusions and its types.

Inclusions are concentrating nutrients in the form of inclusions avoids the increase in osmotic pressure due to accumulation of nutrients in one place. Not all organisms accumulate them. So, inclusions vary from bacteria to bacteria. They can also serve as markers for bacterial identification as some are limited to specific organisms. The followings are some of the important inclusions:

- Metachromatic granules
- Polysaccharide granules
- Lipid inclusions • Sulfur granules etc.

Pili and its functions

These are hair-like structure composed of pilin, usually one to ten in number.

- Host cells • Bacteria

Conjugation (Sex pili)

Longer than fimbriae • One or two per cell • Used for attachment: – Host cells – Bacteria. Used for attachment: – DNA transfer: Conjugation (Sex pili) – Twitching Motility – Gliding Motility.

Stages of growth curve 3

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There are four distinct phases of this curve.

1. The Lag Phase: cells prepares for growth in this phase. No growth is observed during this period or phase, however. Cells are metabolically very active during this phase.

2. The Log Phase: During this phase, organisms multiply exponentially or logarithmically. Generation time becomes constant during this phase and that is the reason, the log graph will show a straight line. Cells are in the most active stage during this phase of growth curve. For commercial applications such as vaccine production, cells have to remain in this phase in order to reproduce most efficiently resulting in increased cell mass or number. Another application of this phase of growth is to determine the generation time.

3. The Stationary Phase: This is also called a period of equilibrium as microbial deaths equal production of new cells. In other words, organisms start dying during this phase, however, the number of dead organisms is replaced by new organisms because there is still replication of cells going on. So, overall number of organisms does not change. This is the reason, it is called a stationary phase.

4. The Death Phase: The number of deaths exceeds the number of new cells formed during this phase. In other words, overall number decreases. It is also called logarithmic decline phase. Why there is a decline phase or death phase. The reason is simple: Nutrients are depleted and waste products which are toxic to the cells accumulate suppressing the growth and killing the cells.

15. 3 parts of lipopolysaccharides.3 marks

Lipopolysaccharide molecule consists of 3 parts:

1. Lipid A: endotoxin

– Fever, vasodilation and shock

2. Core polysaccharide

a. Structural support

3. O side chain

a. Antigenic much like teichoic acid in gram positive bacteria

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22. What are the physical and chemical methods for making Smear on the slide

• Staining starts with making a smear using a glass slide.

• Using a platinum loop, a colony of a drop of broth culture can be smeared into a thin film on a glass slide for making a smear.

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• The specimen is spread into a thin film (smear).

• Smear is air-dried.

• Smear is fixed (attached) to the slide before staining.

• Heating the slide is one way of fixing the smear.

• Methyl alcohol can be used.

23. Name types of culture on the basis of function.

1-Defined media.

2-Complex media. Defined and complex media can further be divided into General purpose media, Selective media, Differential media, and Enrichment media.

24. Define antisepsis.

Antisepsis: Removing pathogens from living tissue

25. Differentiate between clone and strain?

Clone: Population of cells derived from a single cell that are genetically identical.

Strain: A genetic variant of a clone is called a strain.

27. Write characteristics of integral proteins.

Integral proteins are inserted in the membrane or embedded in the membrane. integral proteins are not static in position in the membrane. They can diffuse laterally and change positions in the membrane from time to time. So, plasma membrane is like water pond and integral proteins are like plastic bags people throw in the pond. These plastic bags swim and move by air currents. Membranes are much like that.

Integral proteins act as channels or carriers in facilitated diffusion. Integral proteins are called transporters or permeases.

Long Questions (5 marks)

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1. Function of cell membrane (5 marks)

Cell membrane is composed of a phospholipid molecules arranged tail to tail with heads facing away from each other. This makes lipid molecules to appear as a bilayer. So all membranes enclosing the organelle in the cell or the cell itself look as bilayer structures. This is the basic design of the plasma membrane. Protein and carbohydrates are also inserted into the plasma membrane as can be seen in the accompanying diagram.

Functions:

• Selective permeable barrier • Passive and Active Transport • Respiration in microbe (bacteria) • Photosynthesis in microbes • Lipid synthesis • Cell wall parts are transported by a molecule called bactoprenol which is present in the plasma membrane. • PM has many receptors in it with which various ligands can bind and initiate signals for gene expression etc.

3. Write names of 5 kingdom system (5)

In 1969, five kingdom classifications was proposed by Robert Whittaker as under:

Monera: Bacteria

•Plantae: plants

•Animalia: Animals

•Fungi: Yeasts, molds and mushrooms

•Protista: These are unicellular eukaryotes. Organisms that do not fit into any other category are placed in Protista. They are larger than prokaryotes. They include algae, protozoa, slime molds and water molds.

1. Animalia

2. Plantae

3. Fungi

4. Monera

5. Protista

4. Enlist five bacteria that need oxygen for growth (5)

Characteristics of metachromatic granules5 • Also called volutin, they stain red with certain dyes such as methylene blue. That is why they are called metachromatic (stain in different color as methylene blue gives blue color but the color on these granules is red).

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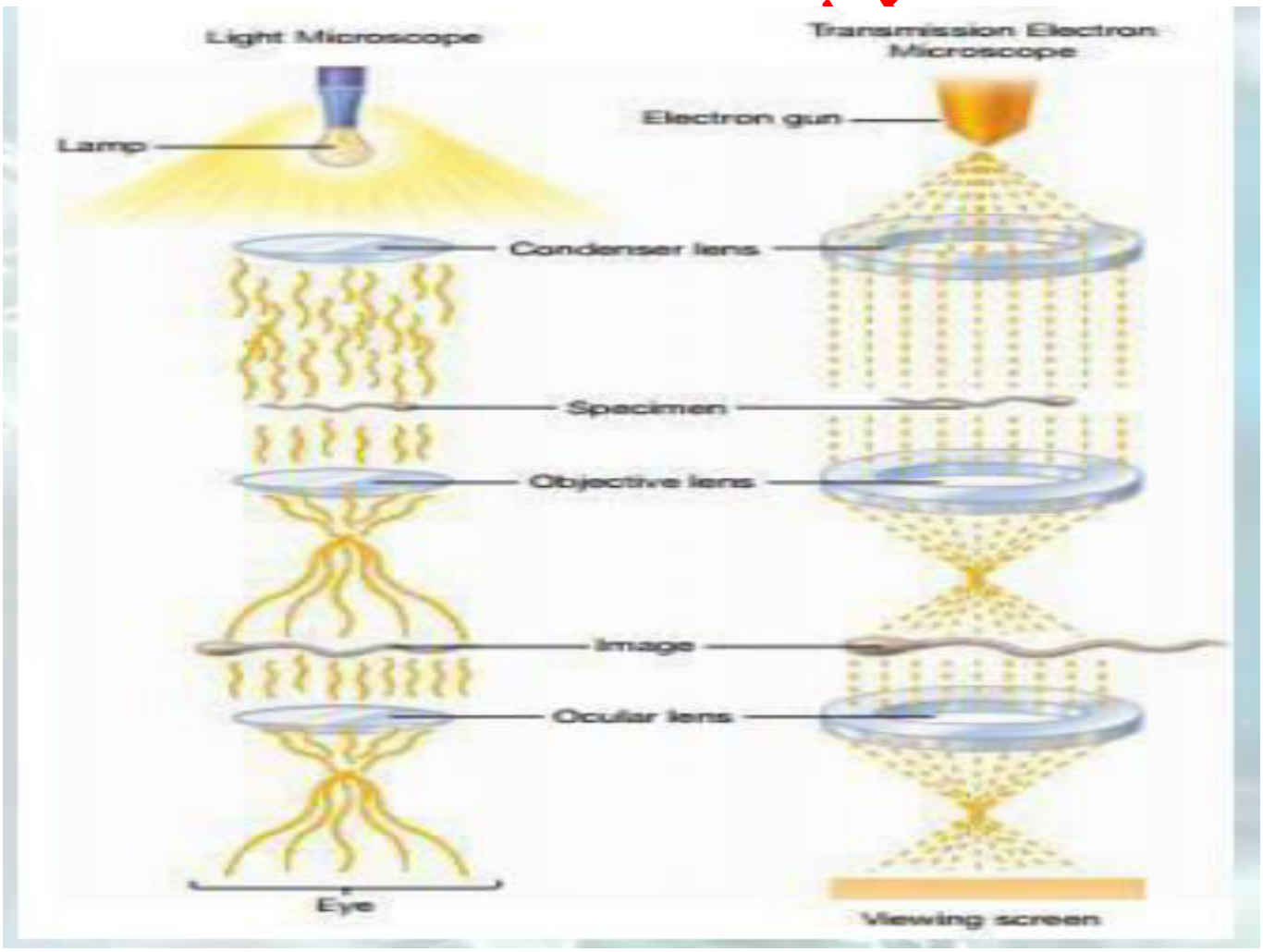
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- Large inclusions • These inclusions contain inorganic phosphates.

Inorganic phosphates are used up in ATP synthesis. • Characteristics of Corynebacterium diphtheria: This bacterium can be identified by the presence of these granules in it.

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5. Label diagram of electron microscope.



6. 5 layers of Endospore.5 marks

Exosporium: A thin delicate outermost covering of the spore

Spore coat: 2nd layer underneath the exosporium. It is thick and composed of several protein layers.

Resistant to chemicals It contains enzymes for germination. Germination of spores into vegetative form occurs when environment becomes favorable for their growth.

Cortex: It is the 3rd layer from outside in. It has peptidoglycan in it.

Spore cell wall or core wall: Surrounds the protoplast or spore core

Spore core: Contains nucleoid and ribosomes.

7. Explain methods of microbial control in detail.

These methods can be broadly classified into four groups: Physical, Mechanical, Chemical and

Biological Physical methods:

Heat: It is the cheapest sources of all and easily available to control microbial growth. There are a few heat related concepts that we must appreciate. Heat denatures enzymes.

Thermal Death Point: It is the lowest temperature at which all cells in a culture are killed in 10 min. It will be a specific temperature for a specific species of organism.

Thermal Death Time: Time (minimum) during which all cells in a culture are killed at a given temperature. This will vary from temperature to temperature for the same organism. Obviously, higher temperatures will take less time to kill the organisms than low temperatures dry and moist heat methods.

Form of dry heat include:

1. Dry heat (hot-air oven),

2. Flaming (Platinum loop sterilization in the flame of Bunsen burner),

3. Incineration (burning to ashes).

t can also be grouped into autoclaving (15psi), boiling at 100oC, and Tyndallization (100oC for 3 consecutive days to sterilize sugar solution that can be degraded by autoclaving) and pasteurization (usually at low temperature than 100oC).

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Pasteurization: This technique typically employs low heat for killing pathogenic and food spoiling bacteria in milk. However, it does not kill thermoduric organisms. Thermoduric organisms are not pathogenic though. Products other than milk, such as ice cream, yogurt, and beer, all have their own pasteurization times and temperatures, which often di er considerably. Dairy industry tests phosphatase to determine if pasteurization of dairy product has occurred effectively because phosphatase present in raw milk gets inactivated with effective pasteurization temperatures. The following three equivalent heat treatments can be given to achieve pasteurization of milk: 63°C for 30 min o High-temperature short-time: 72°C for 15 sec o Ultra-high-temperature: 140°C for 4 sec

Other Physical Methods: Low temperature inhibits microbial growth by slowing down chemical reactions.

Refrigeration: Materials stored at 2-8°C can last for a day or two.

Deep-freezing: Long term storage of materials is possible at minus temperatures in the deep freezers. Lyophilization: Freeze drying is another method for long term storage of food and other materials. o High pressure deshapes and denatures proteins: This technique is used for preserving juices and wines.

Desiccation prevents metabolism: This method is very old and still in use today. Food stored in high concentrations of salt or sugar solution can keep for long.

Osmotic pressure causes plasmolysis. High salt concentrations for example can take the water content of the cells out leaving them starved of water.

PHYSICAL METHODS OF MICROBIAL CONTROL

Filtration: It is also a physical method. It can be used to filter air (using high efficiency particulate air filter) or liquid medium using membrane filters. Radiation:

Ionizing and non-ionizing radiation

Ionizing Radiation: High energy waves that destroys microbes. -energy electron beams. The ionizing radiation possesses a wavelength shorter than that of nonionizing radiation, less than about 1 nm. All these short wavelengths cause ionization of water generating high reactive hydroxyl radicals which are damaging to the cells as they bind to DNA and results in mutations. Medical plastic supplies, medicines and meat products can be sterilized by radiation. -ionizing Radiation: wavelengths longer than 1nm fall into non-ionizing radiation. The best example is UV light. UV light causes mutations in the DNA by dimerization of thymidine bases. These thymine dimers inhibit correct replication of the DNA during reproduction of the cell. The most useful wavelength is 260 nm. This wavelength is specifically absorbed by DNA. UV radiation is used to control organisms in the air mostly. However, surfaces are also sterilized by UV radiation. UV light cannot penetrate deep into the fluids, so only surface bacteria are killed. See the range of UV light that is useful for microbial killing.

Gases with microbial activity: o Ethylene Oxide: Many heat-sensitive items such as disposable plastic, petri dishes and syringes, heart-lung machine components, sutures, and catheters are sterilized by ethylene oxide. Ethylene oxide is a strong alkylating agent that kills by reacting with functional groups of DNA and proteins to block replication and enzymatic activity. It rapidly penetrates packing materials, even plastic wraps. EtO is explosive, supplied in a 10% to 20% concentration mixed with either CO2 or dichlorodifluoromethane. A

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clean object can be sterilized if treated for 5 to 8 hours at 38°C or 3 to 4 hours at 54°C when the relative humidity is maintained at 40 to 50% and the EtO concentration at 700 mg/L.

Chemical methods:

Chemicals are used to control microbial growth. Factors that influence the efficacy of a chemical disinfectant include the concentration of the disinfectant, presence of organic matter in the environment (matrix) where the disinfectant is being used, pH of the environment (disinfectants are more effective at acidic pH), and time of exposure to the disinfectant.

Alcohols: Ethanol, isopropanol are examples. Alcohols denature proteins, and dissolve lipids. Alcohols require water for being more effective. This is the reason that seventy percent alcohol is more effective than 100%. Please note that alcohols can effectively kill vegetative form of bacteria, and fungi but not spores. Alcohols are not very effective on wounds. Commonly used in hand sanitizers.

Heavy Metals and Their Compounds: Silver, zinc, mercury and copper have biocidal and antiseptic activity. Heavy metals can be effective at very low concentration. This property is called oligodynamic action. Heavy metals denature proteins. o Silver nitrate (1%): Commonly used as a disinfectant. o Silver and sulfadiazine combination: used on burns.

Mercuric chloride: It is bacteriostatic in nature. This compound is toxic though and its use is not favored very much.

Copper sulfate: A commonly used disinfectant for controlling green algae in water ponds.

Zinc chloride: Commonly used in mouthwashes.

Surface Active Agents (Surfactants): They decrease surface tension among molecules of a liquid.

Soap and detergents fall into this category.

Soaps and Detergents: These have no antiseptic activities. They cause mechanical removal of germs by emulsification. This mechanical removal is also called degerming activity.

Quaternary Ammonium Compounds (Quats): The most common ones are cationic detergents. They do not kill endospores and mycobacteria though. They are more active against gram positive than gram negative bacteria. The affect plasma membrane, inhibit enzymes and denature proteins.

Benzalkonium chloride is an example of a Quat.

Chemical Food Preservatives: These chemicals are used in the food to retard food spoiling bacteria. These chemicals are either simple organic acids or their salts (that are easily metabolized in the body if eaten, therefore are safe) and include sodium benzoate, sorbic acid, and calcium propionate. Sodium nitrate and sodium nitrite are also used to preserve meat and meat products.

Antibiotics: Although antibiotics are used to kill organisms in disease states, some antibiotics are not very effective for this purpose; however, these antibiotics could be used in food to prevent food spoilage. Nisin and natamycin prevent spoilage of cheese.

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Aldehydes: These are the most effective antimicrobials. Two examples are formaldehyde and glutaraldehyde. They inactivate proteins by forming covalent cross-links with several organic functional groups on proteins (—NH2, —OH, —COOH, and —SH).

9. Explain salient features of viruses, virions, viroids and prions.

VIRUSES: They are acellular structures that consist of a protein capsid enclosing either DNA or RNA (but never both) and sometimes may contain an extra membrane called envelope. VIROIDS:They are composed only of circular single stranded (ss) RNA.

VIRUSOIDS: They contain circular ssRNA that need helper viruses for replication and encapsidation.

They are also called satellite viruses.

PRIONS: These are basically infectious proteins formed inside the body. They behave like organisms as they can be transmitted from one individual to another. Extremely resistant to heat.

10. Write names of types of bacteria with respect to temperature?

Organisms are basically classified into three groups based on the temp requirements:

1. Psychrophiles: These are further divided into strict psychrophiles and psychrotrophs: o Psychrotrophs: Cold loving: 15 0C.

2. Psychrotrophs: Optimum temp is 20-30 0C. Food spoilage bacteria that can spoil food during refrigeration.

3. Mesophiles: 25 – 40 0C: These are the ones that cause diseases in animals and humans. o

Moderate temp loving organisms o Optimum: 37 0C as this is the body temperature of humans and animals.

4. Thermophiles: 50 – 60 0C Heat loving o Important in organic compost piles o These are further divided into hyperthermophiles that grow optimally at 80 0C. They live in hot springs.

11. Describe five types of microscopy.

1. Dark field microscopy:

This microscope makes use of a special condenser that provides illumination from the sides only as depicted in the diagram below: o This special arrangement of the condenser throws light rays at an oblique angle so that if the specimen is not present on the slide, there will be no image formed. However, if the the organisms are present on the glass slide, those organisms will reflect the light into the objective lens and we will see the cells

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as bright objects in a dark background much like we see stars in the sky at night. The beauty of this microscope is that one does not have to stain the organisms to see them under the microscope.

2. Phase contrast microscopy:

This instrument is built on the concept of phases of light waves. The light ray that passes through an organism gets retarded about ¼ of its wavelengths than the light that passes outside the organism (through the glass slide only). To further retard the retarded light ray, a phase plate is inserted into the body of the microscope (above the objective lens) which is thicker in the center than the ends. This arrangement causes the retarded light to further slow down about ¼ of its wavelength, which when recombines with the un-retarded light creates a contrast which makes the cells/organisms visible. This method for visualizing organisms also does not involve staining.

3. Fluorescent microscopy

This microscope is equipped with UV light that provides the source of light for illumination. However, this light source does not pass through the slide, it instead falls over the slide (having specimen) and creates fluorescence. o Fluorochromes are substances that absorb short wavelength of light and emit longer wavelength (visible light spectrum). The fluorochromes are attached to antibodies that are specific to organisms. So, if an organism is present in the specimen, we can use specific antibodies to determine the presence of those organisms by use of fluorochrome tagged antibodies. See the accompanying diagrams for details. Look for UV lamp (Mercury Lamp).

4. Transmission electron microscope:

Electron microscope (EM) makes use of electron beam as an alternative to light rays. Since electron beam has much shorter wavelength, resolution of EM is 0.1nm compared with light microscope which is 200nm. Second difference of EM with light microscope is that focusing of electron beam is done not by glass lenses but by electromagnets that acts like lenses. The third difference in EM is that the image of the specimen is formed on a fluorescent screen like a TV screen.

5. Scanning electron microscope:

This is a modified version of electron microscope. Electron beam is allowed to fall on to the specimen and the image is formed from the reflected electrons that are collected and assembled into an image by the detector.

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Q.2 Functions of cell membrane? (5marks)

- Selective permeable barrier
- Passive and active transport
- Respiration in microbes (bacteria)
- Photosynthesis in microbes
- Liquid synthesis

- Cell wall parts of transported by a molecule called bactoprenol which is present in the plasma membrane
- PM has many receptors in it which varies ligands can bind and initiate signals for gene expression etc.

Q.3 what is coenzyme give its example? (3marks)

A coenzyme is an organic non protein compound that binds with an enzyme to catalyze a reaction.

Coenzymes are often called cofactors, but they are chemically different.

A coenzyme is an organic non-protein compound that binds with an enzyme to catalyze a reaction. ... A coenzyme cannot function alone, but can be reused several times when paired with an enzyme. ...

Without coenzymes or cofactors, enzymes cannot catalyze reactions effectively. Example: example is thiamine pyrophosphate (TPP).

Examples:

NAD, NADP, FAD, FMN etc.

Q.4 Two basic stains? (2marks)

Basic dye: The color is in the positive ion

- Crystal violet
- Methylene blue

Q:6 Two benefits of using solid medium? (2marks)

Solidification of the medium is done for the purifying organisms from each other as solid medium provides surface for individual's colonies to grow well separated from each other.

A well isolated colony is assumed to be the progeny of a single cell.

The solid media are used to study the colony characteristics. (VU Biology Zone Talha & team)

Q: 8 Difference between oxidation and reduction? (2marks)

Oxidation = loss of electrons, or gain of oxygen, or loss of hydrogen

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Reduction = gain of electrons, or Loss of oxygen, or gain of hydrogen Oxidation: Removal of electrons from an atom

• Reduction: Gain of electron • Oxidation and reduction reactions are coupled.

Q9: Write names of five layers of endospores? / Five names of walls of endospores?

Exosporium: A thin delicate outermost covering of the spore

Spore coat: 2nd Layer underneath the exosporium. It is thick and composed of Several protein layers. Resistant to chemicals

- It contains enzymes for germination. Germination of spores into vegetative Form occurs when environment becomes favorable for their growth.

Cortex: It is the 3rd

- Layer from outside in. It has peptidoglycan in it.
- Spore cell wall or core wall: Surrounds the protoplast or spore core
- Spore core: Contains nucleoid and ribosomes

Q11: Components of polysaccharides granules?

Typically consists of glycogen or starch can be demonstrated by iodine which makes glycogen appear reddish brown while Starch appears blue.

Q12: What are inclusion bodies and its types?

Inclusions are reserved deposits of nutrients. Bacteria accumulate nutrients when nutrients are plentiful.

The followings are some of the important inclusions:

- Metachromatic granules
- Polysaccharide granules
- Lipid inclusions
- Sulfur granules etc.

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Q13: Structure and functions of ribosomes?

Composed of proteins + ribosomal RNA

2 subunits

- 70S ribosomes (when two units are combined into one unit) 50S: one rRNA

30S: two rRNA

Several antibiotics act on ribosomes and inhibit protein synthesis

- Streptomycin attach to 30S

Passive Movement is divided into two groups:

1. Simple Diffusion

- Area of high concentration to low concentration
- This continues until ions or molecules are evenly distributed. When this happens (equal distribution thought), it is called a point of equilibrium.
- O2 and CO2 are examples of simple diffusion.

2. Facilitated Diffusion

i. Integral proteins act as channels or carriers in facilitated diffusion

ii. Integral proteins are called transporters or permeases ii. No energy is required during transportation of substances through these integral proteins.

iii. Two kinds of transporters are known: Nonspecific transporters

Examples of facilitated diffusion include:

i. Large molecules degraded by extracellular enzymes

ii. Smaller molecules then bind transporters

iii. Water molecules can pass through lipid bilayer by simple diffusion or though water channels, aquaporin's.

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Q.15 Types of microbes based on oxygen requirements?

1. Obligate Aerobes
2. Facultative Anaerobes
3. Obligate Anaerobes
4. Aero tolerant Aerobes

5. Obligate Aerobes

Oxygen must be present for their growth. These Organisms do not grow if O2 is not present in the medium. If you test these organisms in a tube containing nutrient agar, the growth will Remain confined to the surface only (see the diagram for the concept). Mycobacterium tuberculosis is an example of such an organism.

Facultative Anaerobes:

These organisms prefer aerobic respiration; however, if oxygen is not available, they can use anaerobic respiration or fermentative modes for generating ATPs. These organisms will be Present throughout the tube; however, more growth will be seen on the Top (close to the surface) because these organisms prefer using oxygen if it is available.

Obligate Anaerobes:

Although, these organisms do not use oxygen, they cannot grow in the presence of oxygen. The reason is that oxygen creates toxic) compounds which can kill these cells. Normally, oxygen

Toxic compounds are eliminated by the cells, however, strict anaerobe do not have a system to get rid of these toxic compounds when they are made in the cells.

Aero tolerant Aerobes:

These organisms do not use oxygen and also are not bothered by the presence of oxygen. In other words, they have a Better system to dispose of toxic oxygen compounds.

Q.17 Write characteristics of Agra? Characteristics of Agar (Solidifier of a medium):

- Agar is derived from a sea weed.
- It is a complex carbohydrate which is not used by bacteria during the growth.
- It liquefies at 850C and solidifies at 43C.
- Agar could be used to solidify medium in Petri plates or slants.

Q.18 Difference between Eukaryotes and prokaryotes?

Prokaryotes and eukaryotes are chemically similar. All made up of nucleic acids, protein, lipids, and carbohydrates.

Prokaryotes have the following features:

- DNA is not enclosed in a nuclear membrane.

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- Chromosome: mostly single, circular
- DNA not associated with histones
- No membrane enclosed organelles
- Cell wall has peptidoglycan, a complex carbohydrate.
- Divide by binary fission.

Eukaryotes have the following features:

- DNA is enclosed in a membrane-Bound nucleus.
- DNA is found in multiple Chromosomes.
- Chromosomes are linear, thread-Like structures.
- DNA is associated with histones.

Q.19 Types of bacteria?

Three types of bacteria are as follows:

1. Coccus
2. Bacillus
3. Spiral Coccus:

These are circular or spherical in shape. Bacillus:

These rod shaped bacteria.

Spiral: These are curved shaped bacteria.

Q.20 Types of spiral bacteria? / Sub groups of spiral bacterium?

Spiral: These are curved shaped bacteria.

They are further divided into 3 more subgroups.

Vibrio:

Curved rods

Spirillum: Helical but rigid

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Spirochete: Helical but flexible. Spirochetes move by axial filaments which are enclosed by the outer membrane.

Q.21 Function of pili?

- These are hair-like structure Composed of pilin, usually one to ten in number.
- Longer than fimbriae
- Used for attachment to:
- Host cells
- Bacteria
- Used for DNA transfer from on bacterium to another: Conjugation (Sex pili)
- Also function in twitching Motility
- Gliding Motility is also the function of pili

Q.22 Steps for germination of spores? / Stages of Germination spore?

Spore germinates when it finds a conducive environment for its growth.

Germination has 3 phases or stages:

- Activation: It prepares the spore for germination.

Heat can activate the spore when appropriate moisture and nutrients are present in the environment.

- Germination: Spore starts swelling and losing its coats etc. It becomes metabolically active.
- Outgrowth: New components are made.

Q.24: Five names of microscopy?

1. Dark field microscopy
2. Phase contrast microscopy
3. Fluorescent microscopy
4. Transmission electron microscopy
5. Scanning electron microscopy

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Q.25 what is microareophiles?

A microaerophile is a microorganism that requires oxygen to survive, but requires environments containing lower levels of oxygen than are present in the atmosphere.

Produce O_2 toxic compounds if exposed to more O_2.

- Listeria, Vibrio

.

Q.27 What is fimbriae also give location and function?

Hair-like small appendages on G-neg cells

Composed of pilin, a protein

Can be at one pole or around the entire cell

Used for attachment to surfaces or epithelial cells

Fimbria: Singular

Example: Neisseria gonorrhoeae

Q.29 Write three steps respiration of glucose? / Three methods of glucose?

Respiration of glucose takes place in three general steps:

- Glycolysis: Oxidation of glucose to pyruvic acid
- Krebs cycle: Oxidation of acetyl CoA to CO2
- Electron Transport Chain: Coenzymes that carry electrons from Krebs cycle or Glycolysis is oxidized to create ATP.

Q.32 What is function and structure of the following a) ribosomes b) flagella

Flagella structure:

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A flagellum consists of the following 3 parts

- Filament: It is made of a protein called flagellum, which makes H antigen that can be used for server identification in gram negative bacteria.
- Hook: A different protein • Basal Body: The most complex
- Function:

Flagella are used for motility. Motility can be demonstrated by use of a cavity slide and a Coverslip by hanging drop method.

Ribosomes:

Composed of proteins + ribosomal RNA 2 subunits

- 70S ribosomes (when two units are combined into one unit) 50S: one rRNA 30S: two rRNA

Several antibiotics act on ribosomes and inhibit protein synthesis • Streptomycin attach to 30S

Q. Flurochromates?

Fluorochromes are substances that absorb short wavelength of light and emit longer wavelength (Visible light spectrum)

Q.42 Writes four phases of growth curve?

1. The Lag Phase:
2. The Log Phase:
3. The Stationary Phase:
4. The Death Phase:

Q.42 Defines virulence?

Virulence is a pathogen's or microbe's ability to infect or damage a host. In the context of gene for gene systems, often in plants, virulence refers to a pathogen's ability to infect a resistant host. Salts OR mixing a weak base with one of its salts.

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Q.43 Write three components of LPS?

LPS consists of three components or regions: Lipid A, an R polysaccharide and an O polysaccharide. Region I. Lipid A is the lipid component of LPS. It contains the hydrophobic, membrane-anchoring region of LPS.

Q. 43 write two prokaryotic groups?

Prokaryotic cells are divided into the domains Bacteria and Archaea.

Q.44 write three names of bacteria classified on the basis of optimal temperature?

1. Psychrophiles:

2. Mesophiles: 25 – 40

3. Thermophiles: 50 – 60

Q. 45 write methods of viable counting?

The plate count

Separate count.

Q.46 what is function of illuminator, objective lens and condenser?

Illuminator: a light source

Condenser: Directs the light through the specimen

Objective Lenses: Close to the specimen

Q.48 Name three buffers used for controlling PH of culture medium? 3

- Peptones
- amino acids

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- PBS

Q.49 Three shapes of bacteria? 3

- Coccus
- Bacillus
- Spiral

Q.50 Classification of bacteria based on temperature? 5

- Psychrophiles: Cold loving: 15 0C
- Mesophiles: 25–40C
- Moderate temp loving Optimum: 37 0C
- Thermophiles: 50 – 60 0C Heat loving

Q.51 Industrial microbiology?

It is a branch of biotechnology that applies microbial sciences to create industrial products in mass quantities. There are multiple ways to manipulate a microorganism in order to increase maximum product yields

Use of microbes or their enzymes for large scale production of biomolecules.

Q.52 How to make smear?

- Staining starts with making a smear using a glass slide.
- Using a platinum loop, a colony of a drop of broth culture can be smeared into a thin film on a glass slide for making a smear.
- The specimen is spread into a thin film (smear).
- Smear is air-dried.
- Smear is fixed (attached) to the slide before staining. Heating the slide is one way of fixing the smear.
- Methyl alcohol can be used.

Q.53 Glycocalyx and composition. 2

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It is the outermost layer, viscous and gelatinous in nature that surrounds the cells. It is composed of polysaccharide and polypeptide or both.

Q.54 Vertical Gene Transfer

This is a normal way of transferring genes from parents to offspring. This happens when a cell divides. Each daughter cell receives exactly what its parent cell has.

How bacteria get sulphur? 3

- Sulfate ions
- Hydrogen sulfide
- Sulfur containing amino acids

3 differences between prokaryotes and eukaryotes.... 3

Prokaryotes	Eukaryotes
Cell type	Cell type
Mostly unicellular(some cyanobacteria may be	Mostly multicellular
Nucleus	Nucleus
True nucleus is absent. Nucleus lack nuclear membrane and nucleolus.Such nucleus is called nucleoid.	Nuclear membrane and nucleolus are present.
Chromosome	Chromosome
Usually single circular without histones.	Multiple linear with histones

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Why solid medium is more better... 2

- Pure culture is easy to obtain by streaking the organisms
- Colony characters can be studied

Names of basic amino acids. 2

1. Arginine (Arg)
2. Lysine (Lys)

Flagella 2

- Flagellum: Long filamentous structure that propels bacteria
- Classification of bacteria based on flagella
- Atrichous: No flagellum
- Peritrichous: Distributed over the entire cell
- Polar: Monotrichous Amphitrichous Lophotrichous

CLASSICAL METHODS OF BACTERIAL IDENTIFICATION 5 marks

A classification system provides a basis for characterization and comparison that ultimately helps us in their identification as an individual. Although, the methods for classifying microbes may be different from the methods that are used for identification of microbes for treatment purposes, however, both share the same basic theme: grouping organisms based on their similarities with each other.

It may also be noted that large organisms such as plants and animals can be grouped on the basis of morphology alone; such a characteristic does not strictly apply to the bacteria which more or less have the same shape. In other words, morphology alone cannot help microbes in their classification or identification. That is the reason, classification and identification of microbes involves detection of enzymes of various

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metabolic pathways in these cells. So, biochemical testing is integral part of microbial (prokaryotes) classification and identification.

o Most of these identification schemes have a dichotomy. In other words, if an enzyme or a character is present, we call this as positive for that enzyme, and if the organism is negative with respect to the character under question, we place the organism into another group (negative group). This type of yes and no situations leads to a classification or identification scheme as is depicted in the accompanying figure for identifying selected genera of enteric bacteria.

Microbes especially bacteria (disease causing) can be identified by three methods:

Classical or Conventional Method o Serological Methods

Nucleic Acid based Methods

Classical methods of microbial identification involve differential staining of the sample before it its culturing, culturing the sample onto nutrient agar, blood agar and MacConkey's agar, purifying the culture (colonies expected to be involved in the disease) and detection of various enzymes that belong to various metabolic pathways. Classically, such methods used to take a long time to perform (3 days at least); however, rapid identification methods have become available now which use preformed media that can be used for testing the presence of metabolic enzymes.

SEROLOGICAL METHODS FOR BACTERIAL IDENTIFICATION

Serological methods involve antibodies and antigen interactions. Antibodies are produced by B lymphocytes against any foreign antigens such as bacteria and their toxins that enter the body of animals or humans. Antibodies are very specific in their interaction. In other words, antibodies made against E. coli do not bind or interact with Staphylococci or vice versa.

Although, there are many serological techniques that can be successfully used for identification of microbial infections, we will focus on only a few of them. The main advantage of using serological method is the speed and economy. In other words, serological methods are quick to do (take only about an hour) and can work directly on the sample (sample does not have to be cultured and purified as is needed in conventional methods of identification).

Serological methods can be performed on cultured microbes as well which again speed up the diagnosis. Also remember that in all these serological tests, either the serum or the antigen should be known to us.

Fluorescent Antibody Test (FAT):

This test identifies an antigen in the sample. So, antibodies should be known to you. For examples, a brain sample of rabid dog has been submitted to you in the lab and you need to know if the dog was suffering from rabies (caused by a virus). As we know the virus is an antigen in this test, we will supply antibodies from the lab and these antibodies, as I mentioned earlier, will be known to us to be specific for rabies virus. So, in order to see if rabies virus is present in the brain, we will rub the brain on a glass slide (it will make a smear), air dry

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it, and then the smear is stained with the rabies specific antibodies that have already been tagged with some fluorescent dye.

We then wash these antibodies after a few minutes to remove unbound antibodies and observe the smear under the UV equipped microscope. If rabies virus is present in the brain, we will see fluorescent spots in the smear as depicted in the figure below. Sample tested by this method does not have to be a purified sample. In other words, it could be mixed culture. Because antibodies are specific to the antigen, therefore, purification of the antigen is not necessary.

Slide Agglutination Test

Agglutination is a process in which soluble antibodies interact with a particulate antigen. Precipitation is a process in which soluble antibodies interact with a soluble antigen. Now let's talk about a few examples of agglutination tests:

Blood Grouping:

This is a typical agglutination test which involves antibodies (that are always soluble in nature) and RBCs (that are particulate in nature).

Rose Bengal Plate Agglutination Test:

This test is used to diagnose Brucellosis in animals in which serum of animals suspected for Brucellosis is mixed with Brucella antigen (bacterium). The resulting positive interaction is seen as flocculation as are shown in the accompanying figure:

Widal Test: This test involves Salmonella cells (Antigen) and Salmonella antibodies.

Coombs Test:

This involves antibodies coated RBCs (antigen) and antiantibodies.

Western Blotting:

We can use this technique for the detection of antigen in the serum. Microbial proteins can be separated on SDS-PAGE by electrophoresis and the presence of these proteins can be detected by enzyme-tagged antibodies specific to those proteins. A color band will be seen where the specific protein (antigen) is present on the gel. Please remember that proteins in the gel are first transferred to a paper strip before they could be detected by specific antibodies.

1. Plasmogamy: A haploid nucleus of a donor cell (+) penetrates the cytoplasm of a recipient cell (-). Both cells are haploid (one set of chromosomes)

2. Karyogamy: The (+) and (-) nuclei fuse to form a diploid zygote nucleus.

3. Meiosis: The diploid nucleus gives rise to haploid nuclei (sexual spores).

Economic use of fungi 3

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Saccharomyces are used for alcoholic beverages under anaerobic conditions for alcohol production (fermentative). However, if Saccharomyces are incubated aerobically (for bread making), they metabolize glucose to produce CO2 (some ethanol is also produced but gets evaporated during baking) which expands the dough causing it to rise.

This yeast is also extensively used for molecular biology work and vaccine production. Vitamin C is obtained from Aspergilla's Niger; cellulase from Trichoderma, antibiotics from many fungi and anticancer Taxol from Taxomyces are some other examples of useful fungal products.

Entomophaga (kills gypsy moth), hence is used as a biological pest control. Mushrooms can be cooked and eaten as a source of proteins for humans.

Two name of basic stains?

Positive Staining

1. Crystal violet
2. Methylene blue
3. Malachite green
4. Safranin.

Negative Staining

• Eosin • Acid fuchsin • Nigrosin.

1- Medical Microbiology?

Medical Microbiology: Deals with diseases of humans and animals • Identifications of disease causing agents • Control and elimination of microbes • Tracking down new pathogens.

2- Passive Transport? Types of passive transport?

Passive Movement Movement of substances with the concentration gradient. This means that substances will move from higher concentration of a substance to lower concentration. Gradient provides the force for movements of molecules and this happens with no energy expenditures.

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Passive Movement is divided into two groups: 1. Simple Diffusion 2. Facilitated Diffusion.

Characteristic Magnetosomes?

Magnetosomes: • Inclusions of iron oxide • Surrounded by invaginations of plasma membrane • Present in G negative bacteria – Act like magnet – Decompose H2O2.

Chemical damage of plasma membrane? Name of Chemical that Cause Disrupt of Plasma membrane?

Phenol and Phenolics

• First widely used antiseptics

• Disrupt plasma membranes.

Endospore? Endospore Staining?

Endospore: A resistant dormant structure within a cell • Position of the endospore varies within the cell

• Appear as a clear hallo in Gram stained smears. Malachite green: Primary stain • Heated to steaming for 5 min. • Washed with water. • Counterstained with safranin.

Discus stage involve in the germination of spore?

Activation: Prepares spore for germination. – Heating can initiate it. • Germination: Spore starts swelling and loosing its coats etc. – Metabolically active • Outgrowth: New components are made.

Integral protein with example?

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Integral proteins – Imbedded in the membrane – Insoluble in water – Amphipathic in nature • Some act as receptors. Integral proteins are not static in position • Can diffuse laterally and change position in the membrane.

Characteristic Metachromatic granules?

Metachromatic Granules: Also called volutin • Large inclusions • Stained red with methylene blue • Contain inorganic phosphates • Characteristics of Corynebacterium diphtheria.

Define lysosome?

An organelle in the cytoplasm of eukaryotic cells containing degradative enzymes enclosed in a membrane.

Sulfur Bacteria Source?

Sulfur-oxidizing bacteria produce effects similar to those of iron bacteria. They convert sulfide into sulfate, producing a dark slime that can clog plumbing. Sulfur-reducing bacteria (SRBs) live in oxygen-deficient environment of the two types, sulfur-reducing bacteria are the more common.

Chemotaxis and Phototaxis Sporulation?

Phototaxis is a kind of taxis, or locomotory movement, that occurs when a whole organism moves towards or away from stimulus of light. ... This is analogous to positive chemotaxis except that the attractant is light rather than a chemical.

Sporulation Formation of spores takes place within a vegetative cell and the process is called sporulation or sporogenesis. It is initiated when nutrients become unavailable.

Prokaryotic and Eukaryotic Difference?

The main difference between prokaryotes and eukaryotes is this: eukaryotic cells contain membrane-bound organelles, such as the nucleus, while prokaryotic cells do not.

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