

(1)

QND: 1

(1)

ENUMERATION

The action of mentioning a number of things one by one

ENUMERATION IN MICROBIOLOGY

Enumeration in microbiology is the determination of the number of individual viable microbes in a sample.

Enumeration of microorganisms is especially important in daily microbiology, food microbiology and water microbiology.

Since it involves the use of extremely small dilutions and extremely large numbers of cells, scientific notation is routinely used in calculations.

METHODS

There are various methods used which are following:

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Direct Count of cells

Cells are counted directly under the microscope or by a electronic particles counter.

Indirect count of the cells

Microorganisms in the sample are diluted or concentrated and grown on a suitable medium. The development of growing microorganisms is then used to estimate the numbers of microorganisms in the original sample.

Direct Measurement of Microbial Biomass

Cell mass is determined directly by weighing whole cells, biomass can be correlated with cell numbers by reference to standard curve.

Indirect Measurement

Microbial biomass is estimated by measuring relatively constant biochemical components of microbial cell, such as protein, ATP, lipopolysaccharides etc. can also be estimated by measured turbidity.

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(2)

What type of microorganisms are found in soil, water and milk?

WATER MICROBIOLOGY

Water microbiology is concerned with the microorganisms that live in water, or can be transported from one habitat to another by water.

Water can support the growth of many types of microorganisms. This can be advantageous.

TYPES OF MICROORGANISMS

There are many microorganisms found which are:

Yeasts provide us with beer and bread.

Bacteria, Escherichia coli, salmonella, Shigella, and vibrio are present in human gut in water.

And another group is protozoa which are ciliardia and cryptosporidium.

They are also found in saltwater which includes algae, protozoa, cyanobacteria.

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Microorganisms in soil

Soil microorganisms can be classified as bacteria, actinomycetes, fungi, algae, protozoa and viruses.

Function and benefits:

- Fertile soil team with microorganisms, which directly contributes to the biological fertility of that soil.
- Soil microorganisms also play essential roles in the nutrient cycle that are fundamentally important to life.
- They also play role in nutrient cycle.

MICROORGANISMS IN MILK

Common bacteria which are found in milk are Bacilli, staphylococci, Lactobacilli, pseudomonas, and coliforms.

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QNO: 2

(a) Differences between phosphorous and nitrogen cycle

The phosphorous cycle does not include an atmospheric component because phosphorous does not cycle through the atmosphere. In comparison important process of the carbon and nitrogen cycle occur in the atmosphere.

- Nitrogen is recycled whereas phosphorous is not.

- Nitrogen is lost to the oceans while phosphorous is not.

Nitrogen has a gaseous phase whereas phosphorous does not.

(b) Foodborne infection

Foodborne infection is caused by the ingestion of food containing live bacteria which grow and establish themselves in the human intestinal tract.

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Food borne Intoxication

Foodborne intoxication is caused by ingesting food containing toxins formed by bacterial growth in the food items.

(c) Fermentation

Fermentation is a metabolic process that produces chemical changes in organic substrates through the action of enzymes. In biochemistry, it is narrowly defined as the excretion of energy from carbohydrates in the absence of oxygen.

Pasteurization

Pasteurization is a process in which water and certain packaged and non packaged foods are treated with mild heat, usually to less than 100°C to eliminate pathogens and extend shelf life.

(d) Settle plate

IS usually performed with passive air monitoring settle

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plate - Standard petri dishes contain
-ing culture media that are
exposed to the air for a
given time and then incubated
to allow visible colonies to
develop and be counted.

Slit sampler

Casella slit sampler,
in which the slit is positioned ab-
ove a turnable on which is pla-
-ced on agar plate. As air is
drawn through the slit, the agar
plate rotates, so that particles are
deposited evenly over its surface.

(e) Ultrafiltration and nanofiltration

Ultrafiltration remo-
ves bacteria, protozoa and some
viruses from the water.

Nanofiltration removes these microbes
as well as most natural
organic matter and some natural
minerals, especially divalent ions
which cause hard water. However
it does not remove dissolved comp-
onents.

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Q No: 3

(a) GIARDIASIS

Giardiasis is a diarrhoeal disease caused by the microscopic parasite *Giardia*. A parasite is an organism that feeds off of another to survive. Once a person or animal has been infected with *Giardia* the parasite lives in the intestine and is passed in feces.

trophozoite and cyst *Giardia*

Excystation produces a trophozoite from the cyst stage and it takes place in the large intestine of the host after the cyst has been ingested. Cysts are smaller than trophozoites, measuring 40-60 μ m across. Cysts are round and have a tough, heavy cyst wall made of one or two layers.

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(b) Malaria parasite

Malaria is caused by red blood cells infections forms of plasmodium parasites resulting in illness and death.

Erythrocytic cycle

To begin the sexual cycle in human, an infected female Anopheles mosquito injects sporozoites into the new human host during the blood meal. Upon release the merozoites invade the red blood cells where they undergo another asexual cycle called erythrocytic schizogony. This is known as the erythrocytic cycle.

Ex-erythrocytic

That is the first life stage of plasmodium. The next stage in malaria life cycle is the one of asexual reproduction that is divided into different phases: the preerythrocytic and erythrocytic phase.

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Q.No: 4

(a)

(1) TRANSFORMATION

To make multiple copies of DNA, called DNA cloning.

To make large amount of specific human proteins, for example, human insulin, which can be used to treat people with Type I diabetes.

To genetically modify a bacterium or other cell.

(2) TRANSDUCTION

Transduction is the process by which DNA is transferred from one bacterium to another by a virus. It also refers to the process where by foreign DNA is introduced into another cell via a viral vector. Transduction does not require physical contact between the cell donating the DNA and the cell which receives the DNA and it is DNA resistant. Transduction is a common tool used by molecular biologist.

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to gene stably into introduce a host cell's foreign genome.

CONJUGATION

It is used in nature to share beneficial genetic material between bacteria, such as antibiotic resistance. However, manually inserting genes into the F-plasmid would allow for scientists to have bacterial transfer almost any gene to other cells, including our AMP kill switch.

(b)

Lytic and lysogenic cycle

Lytic cycle

The lytic cycle involves the reproduction of viruses using host cell to manufacture more viruses. The virus then bursts out of the cell.

Lysogenic cycle

It involves the incorporation of the viral genome

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into host cell genome, infection
it from with in.

SIMILARITIES

Life cycle of both occur only
inside the host.

Both cycles are viral reproductive
mechanisms.

Both cycles produce thousands
of original viruses copies.

Both cycles moderate the protein
synthesis and DNA replication of
the host cell.

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Qno: 5

BLOOD SMEAR

A blood smear is a sample of blood that's tested on a specially treated slides. For a blood smear test a laboratory professional examines the slide under a microscope and looks at the size, shape and number of different types of blood cells. These include:

- Red blood cells which carry oxygen from your lungs to the rest of your body
- White blood cells, which fight infection
- platelets, which help your blood to clot

Types

It has two types:

thick and thin

In thick we have observed malaria parasite and in thin we have observed TLC and PLC

(12)

(14)

PROCEDURE OF LEISHMAN STAINING

It is a neutral stain for blood smear which was derived by the British surgeon W.B. Leishman. It consists of a mixture of eosin and methylene blue in methyl alcohol and is using diluted and buffered during the staining procedure. Pour Leishman's stain drop wise on the slide and wait for 2 minutes. This allows the fixation of the PBF methyl alcohol. Add double the quantity of buffer water drop wise over the slide. Mix by jacking for 8 minutes. Wash in water for 1 to 2 minutes. Dry in air and examine under oil immersion lens of the microscope.