hello students i'm miss lynette
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science.
today we will be studying about the
microorganisms
in water. Here we will be
studying about the variability in
aquatic environments
and the different microorganisms present
in fresh waters
and marine waters and the factors
affecting the microbial growth
in stored waters. Today's module
recognizes the variability
in the aquatic environments. It explains
the microbial biodiversity in aquatic environments and it cites
the factors affecting microbial flora in water.
What is aquatic microbiology? It is the
study of microorganisms and their activities
in fresh water, estuarine waters and marine waters. The microorganisms
present in these water bodies may be
indigenous or they may be transient. If they are
transient they might be
reaching there from the air column or due to the runoff from the soil surface or from industrial
or domestic wastes.
Various habitats can be recognized
within the aquatic environment
such as the freshwater habitats,
marine water habitats, estuarine habitats, flowing waters and steady
waters.
So because of all these variabilities
different types of microorganisms
will be found in each of these habitats.
so microbial biodiversity is very high
in aquatic environments. Certain species
of microbes are indigenous
to a specific habitat. Each habitat
is characterized by one or more of
microbial communities.
Water cycle - earth's moisture is in
continuous circulation. From the air or from the
atmosphere, it reaches the earth's surface in the
form of rain, snow, hail and from here the water gets into the ground water and then some of it even
flows to the oceans and then ultimately this water is evaporated back again and thus
in the water cycle we find water
in the atmosphere, on the surface and

the groundwater. So microorganisms of
various kinds are present in the different stages of this cyclic process. Natural waters are
of three types, atmospheric waters
surface waters and groundwaters in the case of the atmospheric waters, this is the moisture
which is present in the clouds and it is precipitated as snow, hail and rain and brought to the surface of
the earth. During this time the microflora which is present in the
atmosphere is also washed down to the earth's
surface. Next is the surface waters - surface
waters are made up of waters in
lakes, streams, rivers, oceans, estuaries.
They contain indigenous microflora
and the transient microorganisms.
In the case of the ground waters - ground
waters are subterranean waters.
Very few microorganisms are present here
because as the water percolates down
most of the water gets filtered
due to the various layers of soil
and sand through which it has to pass.
Surface waters are of three types marine waters, estuarine waters and fresh waters.
All of these three, show different types
of conditions and different factors determine
the microbial growth in each of these.
Therefore large microbial
biodiversity is observed here.
In the case of the fresh waters, these
are stagnant waters in ponds, lakes, river waters, streams, etc. So some of this water
is stored water. It is stored in large
reservoirs or it might just be present stagnant
in ponds and lakes. The aquatic
microorganisms generally experience highly fluctuating and highly varying environmental
conditions. The conditions which affect
the aquatic microorganisms
are 1. Temperature.Temperature can be
zero degrees c in the aquatic conditions
as in the case of arctic regions
or it might be about 30 degrees c in the
case of the equatorial regions.
2. Hydrostatic pressure is also varying.
It might be one atmosphere at the
surface and it might be
1000 atmospheres at the greater depths
of the ocean.
3. Light - light penetration is seen only up to a
certain depths of the oceanic waters or
the waters in the lakes.
4. Salinity - salinity is almost zero in the

fresh waters and it is quite high in the case of the marine waters
5. Turbidity, pH, inorganic and organic constituents are some of the other factors which affect the aquatic microorganisms and will decide what type of microorganisms which will be present in the aquatic conditions and their number also. Microorganisms in water are both saprophytes as well as pathogenic microorganisms are present so also the photosynthetic groups.
So groups of algae, bacteria, fungi, nematodes and protozoans are present here. Several animal viruses are transmitted through water. Large number of micro fungi are present in various waters including the potable water.
Groups of bacteria that are usually found in these waters are fluorescent group of bacteria, chromogenic rods, coliform bacteria, proteus group, non-gas forming, non-chromogenic and non-spore forming rods, spore formers of genus bacillus, pigmented and non-pigmented cocci. Microorganisms of the fresh waters - when we are talking about the fresh waters we are speaking about the streams, rivers or lakes, ponds.
These waters might be polluted waters. they might be eutrophic waters or they might be oligotropic waters.
in the case of eutrophic waters these are the ones which are very rich in organic matter, so the microorganisms present here will be in large numbers and in the case of oligotropic - they are nutrient poor waters so the number of microorganisms also will be lesser in the case of the polluted waters.
A large number of Enterobacteriaceae members are usually found.
these are usually present in the fecal matter of men and animals.
Besides that, the saprophytes are also present and they are usually derived from the soil.The river bottoms in the case of the rivers will show anaerobic species clostridium species,the sulfur vibrio species.
In the rivers, the type of microflora which is present is usually dependent upon the type of agricultural practices or industrial

practices which are going on
near these rivers. In the lakes
there are different zones present - the limnetic zone and the littoral zone. These are zones
get light sunlight therefore
these will have microorganisms which are
photosynthesizers mostly then we have the benthic region. In the benthic zone there are
mostly the saprophytes present.
In the case of the littoral benthic zone
the microorganisms that are present
may be photosynthesizes as well as the
saprophytes and the type of organisms that are
present might are usually derived from the soi.l
Microorganisms of the fresh waters are
Anabaena, Microcystis, Nostoc, Oscillatoria,
Oedogonium, Spirulina, Diatoms, protozoans,
Vibrio, Micrococcus, yeasts, moulds, etc besides the ones which were already discussed.
Stored waters - what are stored waters?
These are the waters which are held
in ponds, lakes or artificial reservoirs
for a very long time.
There are several factors which affect
the microbial flora here. The microbes present in these waters usually settle towards the bottom of
these lakes or artificial reservoirs along with the suspended particles. These water bodies are exposed
to continuous
sunlight. Some of the microorganisms
are not able to withstand this, as the
radiations are too much for them.
so they die. Temperatures - some
microorganisms are able to grow at
higher temperatures.
Some microorganisms cannot withstand
higher temperatures. Food supply -
food supply plays a very important role
in the number of microorganisms that might
be present there like for example if there is a lot of organic matter, lots of microorganisms
will be present.
In the case of the algae if algae are
present microorganisms
are also usually associated with this
algae because they get food supply as well as
they can adhere to them and form colonies on these algal forms.
Then there are other organisms present
here such as the protozoans.
In the presence of high
oxygen levels the protozoans
engulf these bacteria and
they kill the bacteria and the number of the bacteria will come down and

as the number of the bacteria comes down
the number of the protozoans
which depend on these
bacterial forms will also start coming down.
Microorganisms of the marine environment.
Marine environment is vast
and the entire vast marine environment
has various factors which determine the type of
microorganisms present
and the number of microorganisms present.
There are the planktons
which are divided into two types -
phytoplanktons and zooplanktons.
phytoplanktons are present in the
surface waters. Diatoms,
Dinoflagellates, blue-green algae chlamydomonads, chrysomonades, etc.these are some of the phytoplanktons.
Bacteria belonging to genera Pseudomonas
Vibrio, flavobacterium. Etc.- these are also present along with the algal phytoplanktons.
Zooplanktons here are the protozoa and
the minute animals.
Then there are the benthic microorganisms,
most of which are anaerobic bacteria,
protozoans and archaeons. These predominate the benthic areas of the aquatic marine environment. Other microbes which are
present here are yeasts, molds, photosynthetic purple sulfur bacteria, luminous bacteria, transient bacteria.
Bacteria are also sensitive to hydrostatic pressures in the marine environment. Baro
tolerant bacterial forms are present between 0 to 400 atmospheric pressure.
Moderate barophiles are present at
400 atmospheric pressure but they can still
grow at one atmospheric pressure.
Then there are the extreme barophiles-
these are capable of tolerating
very high pressures and so they are
found at greater depths of the ocean floor.
Role and importance of the aquatic
microorganisms -
These micro organisms occupy a key role
in the food chain of the aquatic
environment. They are the primary
producers. They produce food for
the next level in the food chain. Besides
this, there are the consumers which are also
microorganisms such as the protozoa. Then
there are also very important saprophytes
of the aquatic ecosystem.

Major biochemical activities of the
bacterial flora is dissimilation and mineralization of organic matter,
biogeochemical cycling of nitrogen,
carbon, sulfur and phosphorus also needs
the role of aquatic microorganisms.
With this, we have covered up with the different types of microorganisms which are
present in water.Here we have studied about aquatic environment which has various types of habitats and which decides the variations in the microbial biodiversity in aquatic environments and the various factors that can affect
microbial growth in the aquatic environments.
These are the references. Thank you.