

Tarapada Dey
Educational Institution
PPT of Life Science

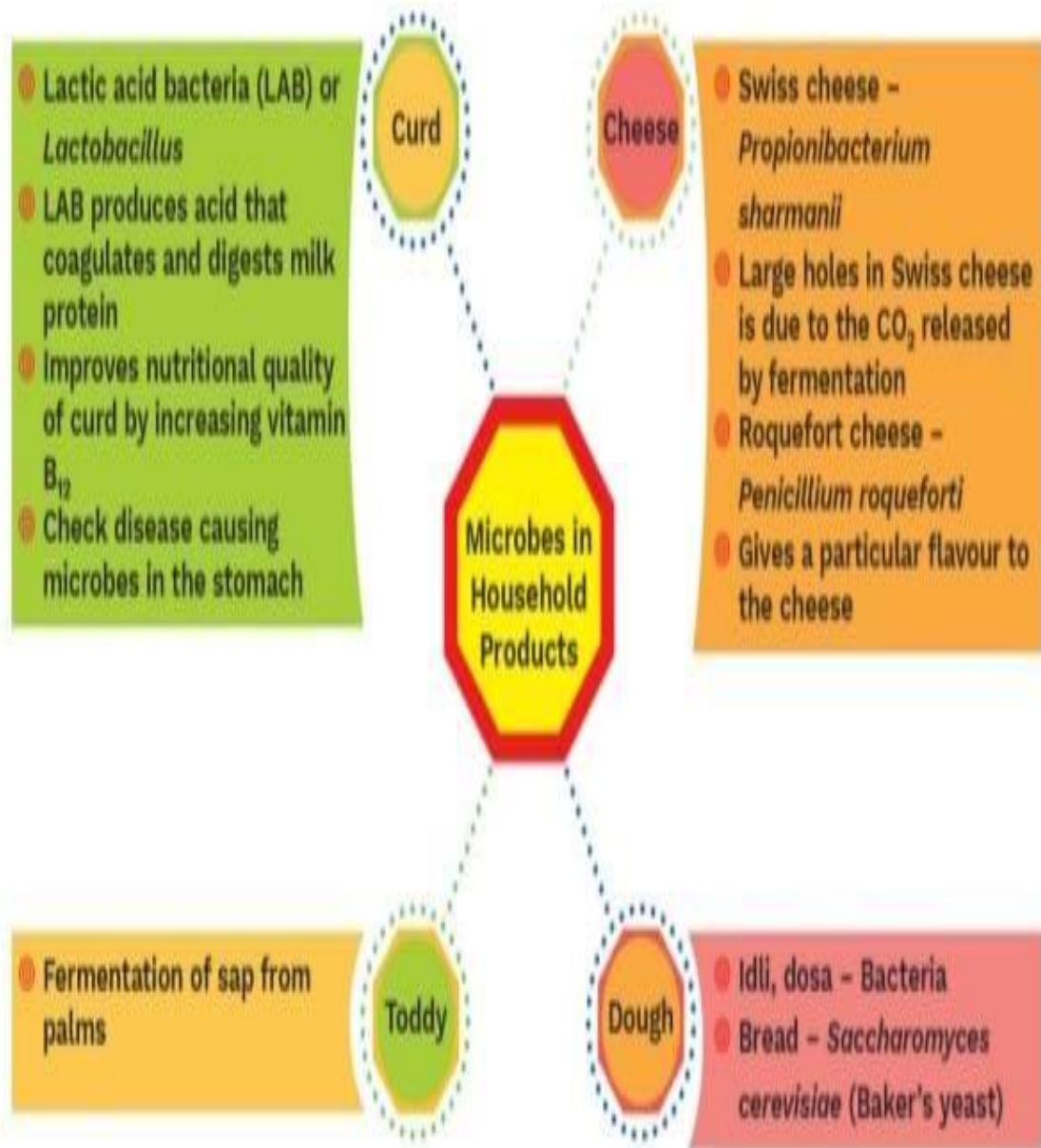
TOPIC 1 :- MICROBES IN HUMAN WELFARE



INTRODUCTION:

Organisms that are visible only under a microscope are known as microbes. They are present in different habitats, from deep ocean beds to high mountain areas, in plants, animals, humans, in air, water, soil, etc. Some different microbes are viruses, viroids, prions, bacteria, fungi protozoans and some algae. Microbes are harmful to humans and also useful to mankind in many ways.

MICROBES IN HOUSEHOLD:



MICROBES IN **INDUSTRIES:**

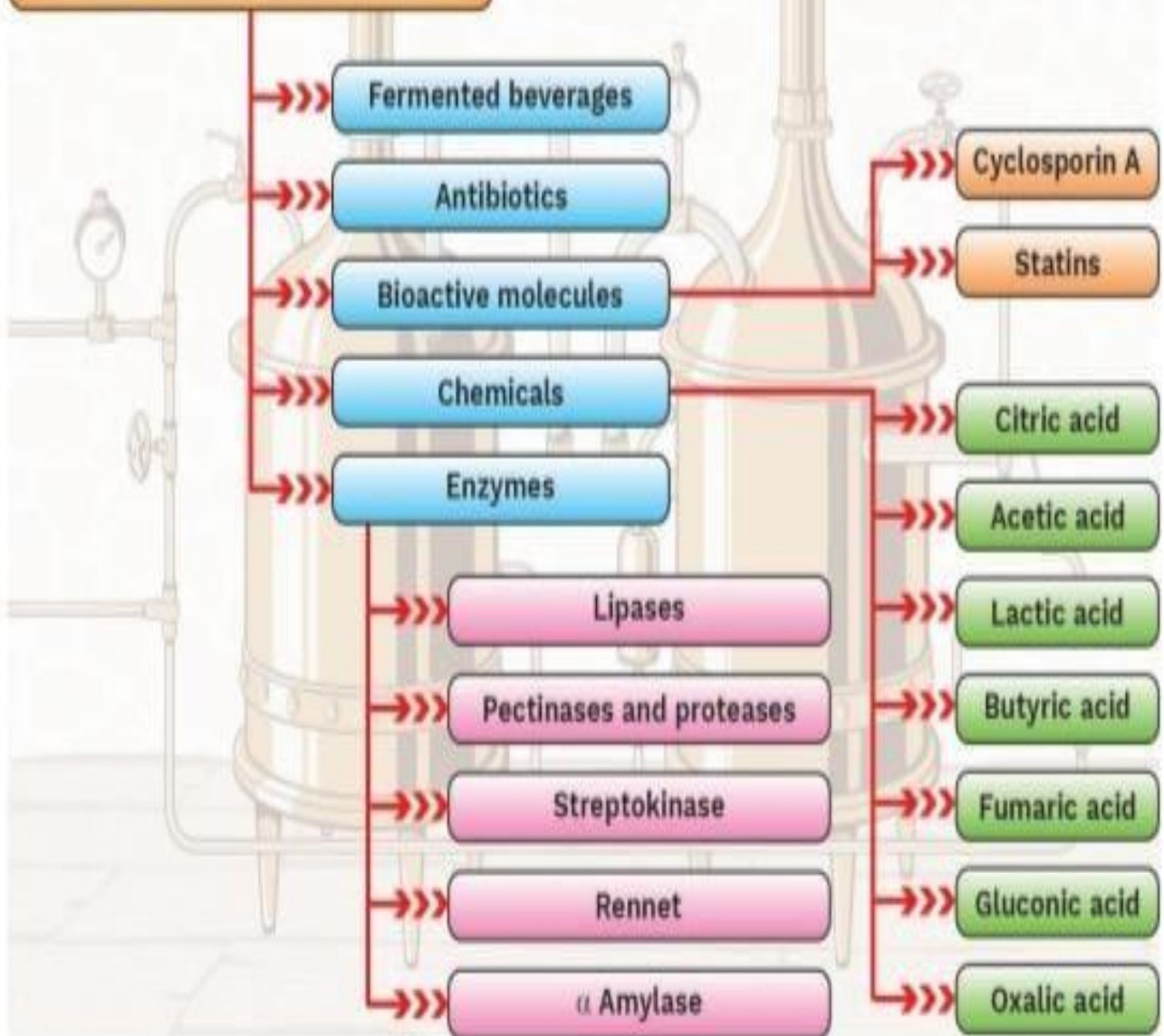
Even in industry, microbes are used to synthesise a number of products valuable to human beings. Beverages and antibiotics are some examples. Production on an industrial scale, requires growing microbes in very large vessels called fermentors

Microbes especially yeasts have been used from time immemorial for the production of beverages like wine, beer, whisky, brandy or rum. For this purpose the same yeast *Saccharomyces cerevisiae* used for bread-making and commonly called brewer's yeast, is used for fermenting malted cereals and fruit juices, to produce ethanol.

Depending on the type of the raw material used for fermentation and the type of processing (with or without distillation) different types of alcoholic drinks are obtained.

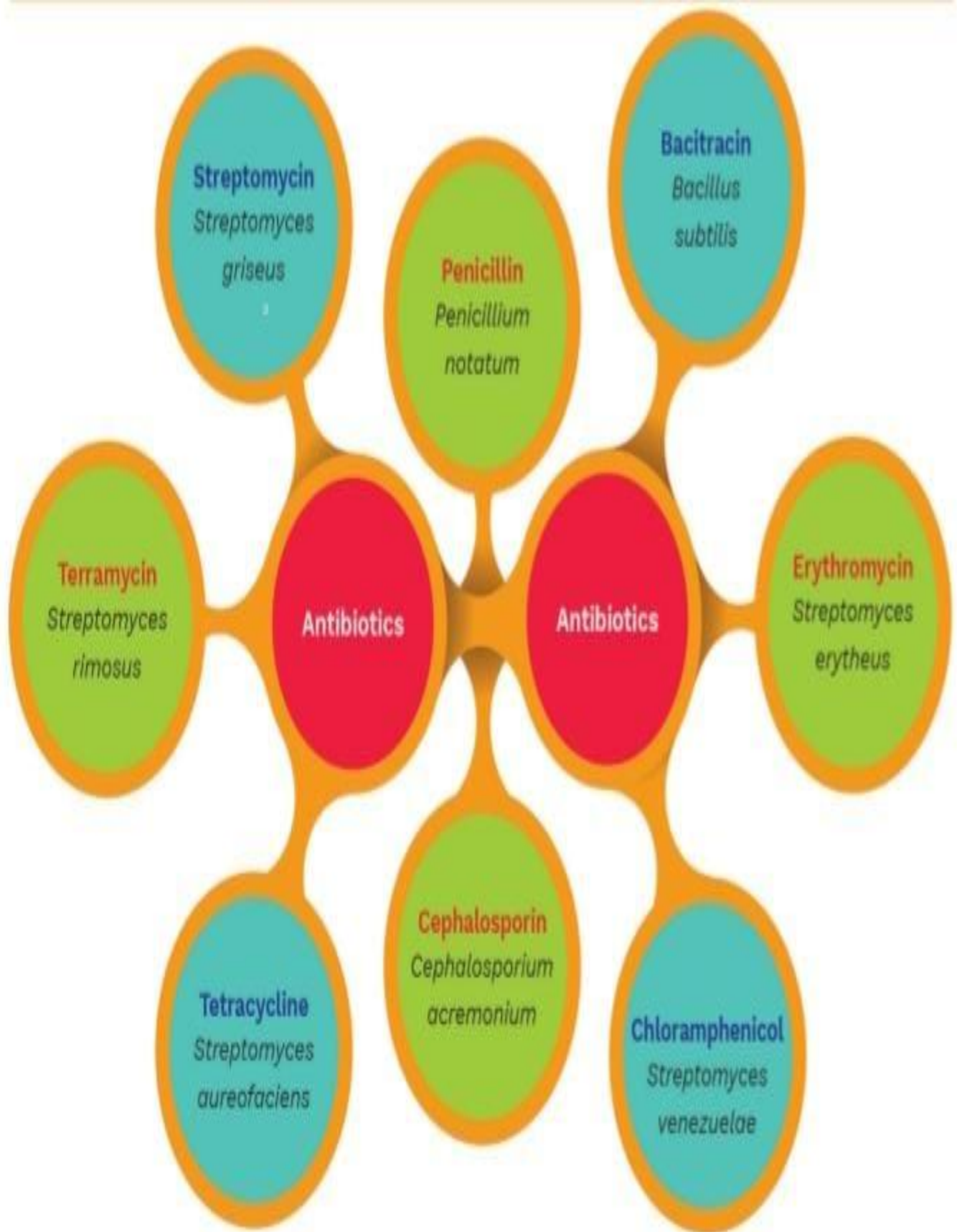
Beverages	Raw Material
Gin	Rye, barley
Sake	Rice
Fenny	Apple
Vodka	Potato
Whisky	Cereals
Rum	Molasses
Wines and brandy	Juice

Microbes in Industrial Products



ANTIBIOTICS

Antibiotics are chemical substances, which are produced by some microbes and can kill or retard the growth of other (disease-causing) microbes. yeast (*Saccharomyces cerevisiae*) is used for commercial production of ethanol. Microbes are also used for production of enzymes. Lipases are used in detergent formulations and are helpful in removing oily stains from the laundry. You must have noticed that bottled fruit juices bought from the market are clearer as compared to those made at home. This is because the bottled juices are clarified by the use of pectinases and proteases. Streptokinase produced by the bacterium *Streptococcus* and modified by genetic engineering is used as a 'clot buster' for removing clots from the blood vessels of patients who have undergone myocardial infarction leading to heart attack. Antibiotics have greatly improved our capacity to treat deadly diseases such as plague, whooping cough (kali khansi), diphtheria (gal ghotu) and leprosy (kusht rog), which used to kill millions all over the globe.



ORGANIC ACID

ORGANIC ACIDS	MICROBES
Citric acid	Aspergillus niger(fungus)
Acetic acid	Acetobacter aceti(bacterium)
Butyric acid	Clostridium butylicum(bacterium)
Lactic acid	Lactobacillus casei(bacterium)
Fumaric acid	Rhizopus nigricans
Gluconic acid	Aspergillus, Penicillium, Mucor
Oxalic acid	Aspergillus niger

ENZYMES

The enzyme produced with the help of microbes are:

Lipases

Candida lipolytica

Present in detergent. Helpful in removing oily stains from clothes.

Pectinases and Proteases

Aspergillus niger

Used to clear the fruit juices during bottling. Thus home made juices are pulpy while bottled juices are clear.

Streptokinase

Streptococcus

Used as 'clot buster' for removing the blood clots from the blood vessels of patients who have suffered from myocardial infarction.

Rennet

Mucor

Used for manufacturing of cheese.

Alpha Amylase

Rhizopus japonicus

Digestion of starch. Softening of bread.

Bioactive Molecules

Cyclosporin A

**Produced by the fungus, Trichoderma polysporum.
yIt is used as an immunosuppressive agent during organ-transplant.**

Statin

**Produced by a type of yeast, Monascus Purpureus.
It is used for lowering the levels of blood-
cholesterol, as it inhibits the enzyme involved in
cholesterol synthesis**

MICROBES IN SEWAGE TREATMENT

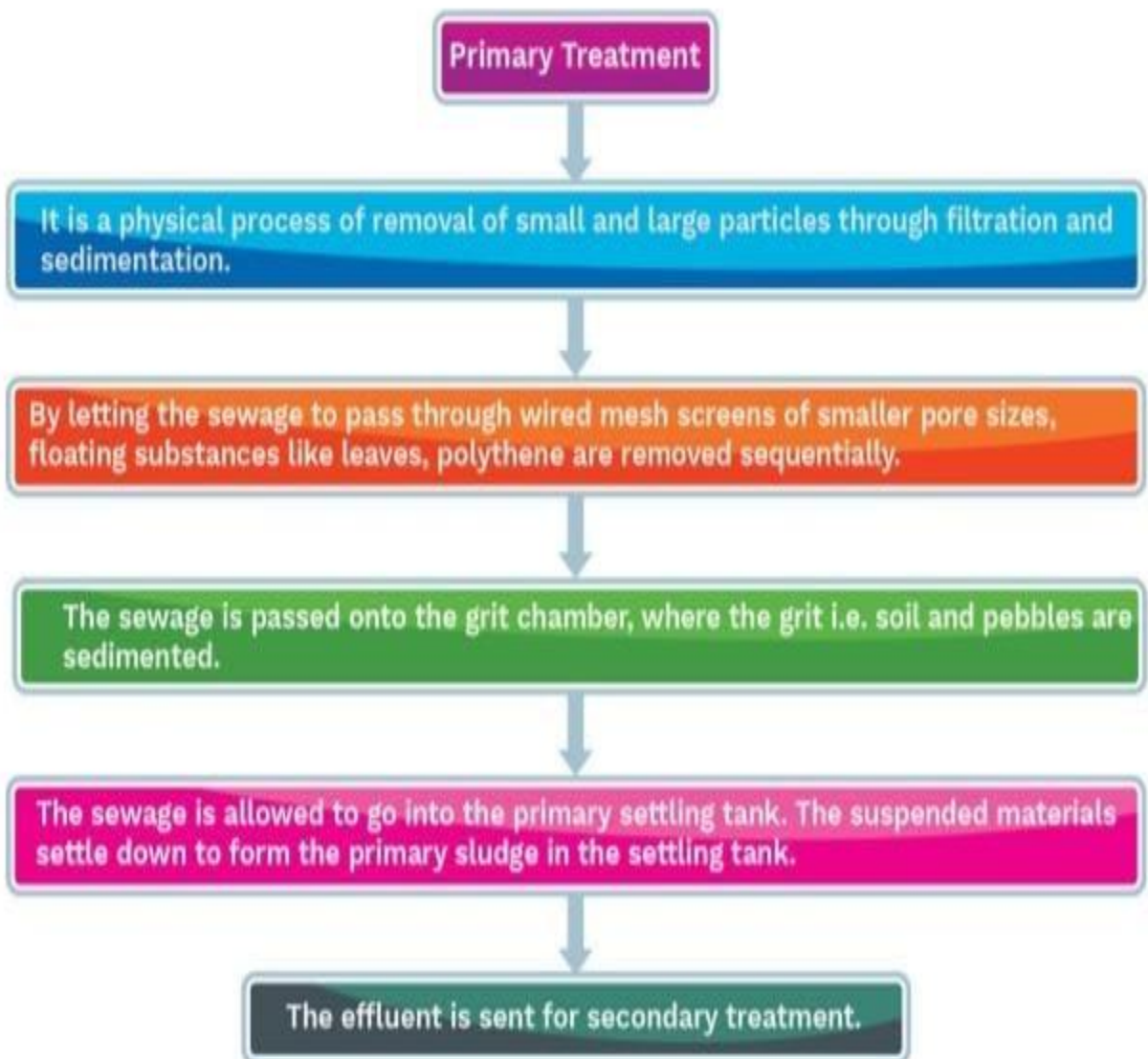
The municipal wastewater (sewage) contains large amounts of organic matter and microbes. The sewage is treated in sewage treatment plants (STPs) before it is discharged into water bodies to reduce the pollution level in the water bodies. The programmes like Ganga Action Plan and Yamuna Action Plan, initiated by the Ministry of Environment and Forests of India.

Ganga Action Plan: It started on 14th January 1985 to improve the water quality by treatment of domestic wastes. This was withdrawn on 31st March 2000.

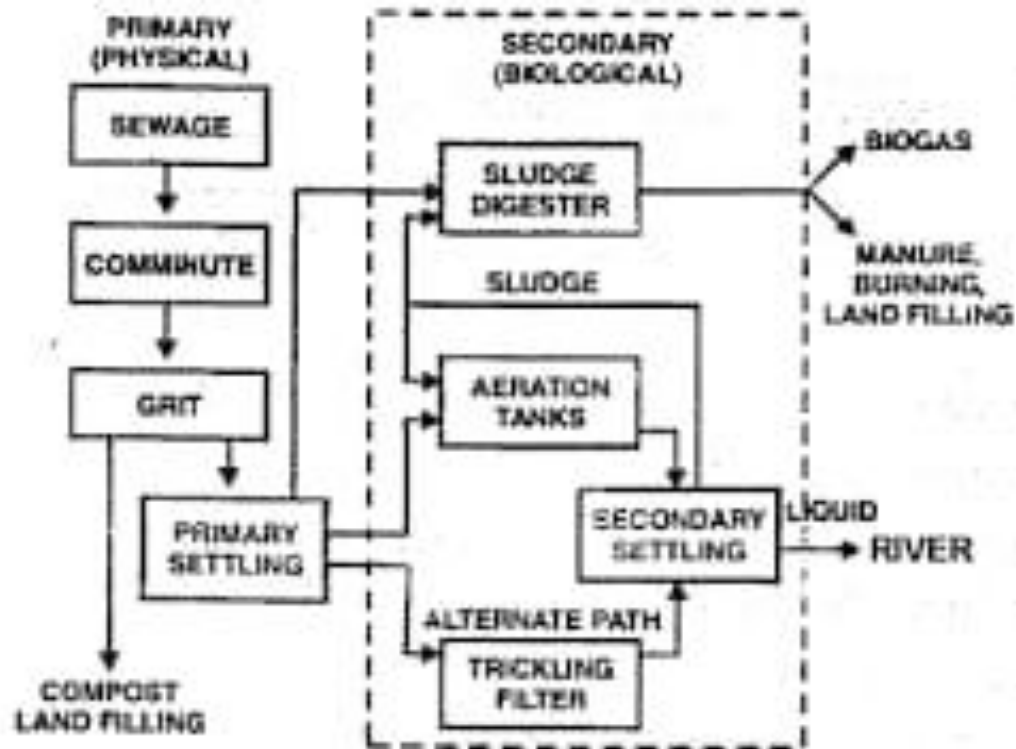
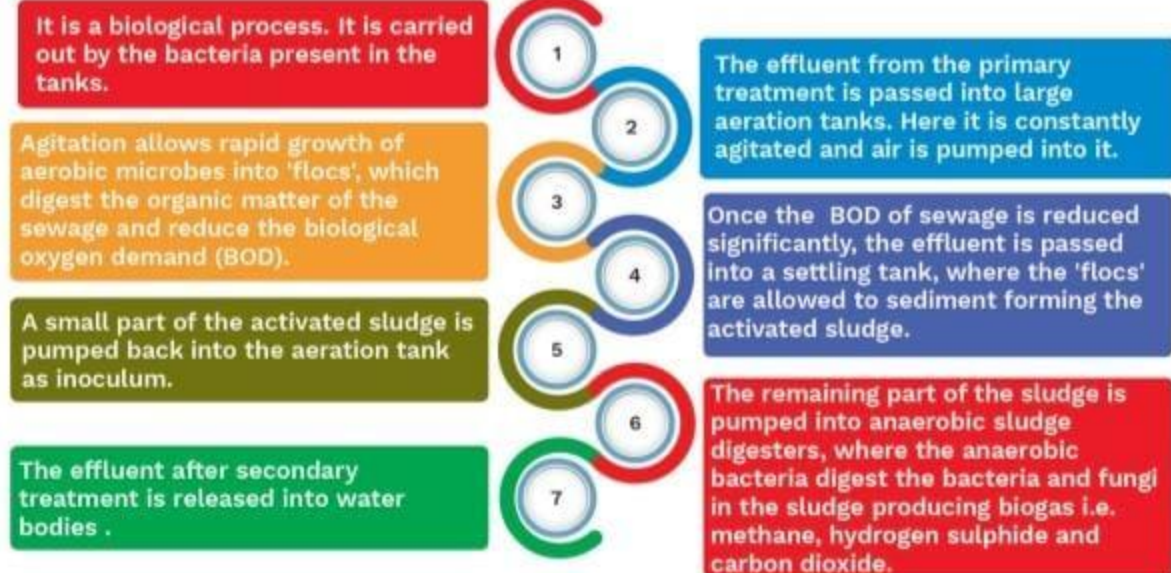
Ganga Action Plan II: It started in 1993 with the aim of analysing the water quality of the river

Ganga.Yamuna Action Plan I: It started in 1993. The YAP was funded by a loan from the Japan Bank of International Co-operation to the National River Conservation Directorate, Government of India. It aimed at creating public awareness about the importance of Yamuna and the major source of its pollution.

The work continued with the launch of Yamuna Action Plan II in the year 2001. The Sewage treatment involves two steps: Primary Treatment Secondary Treatment



Secondary Treatment



MICROBES IN THE PRODUCTION OF BIOGAS

Biogas predominantly contains:

- **Methane (60-70%)**
- **Carbon dioxide(25-35%)**
- **Hydrogen sulphide(1-5%)**
- **Hydrogen**

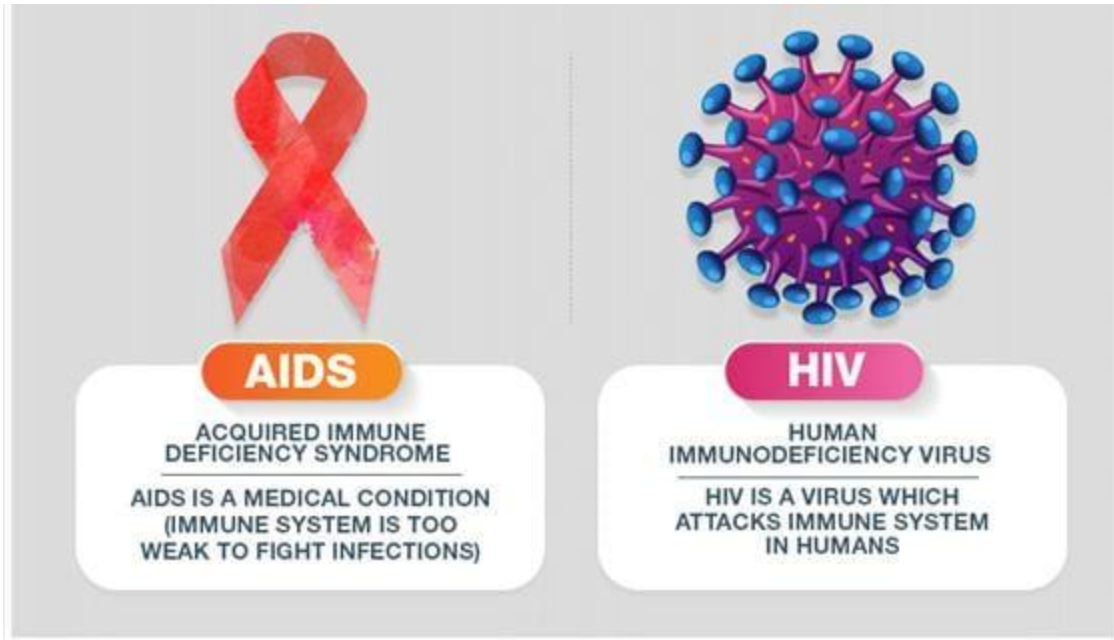
They are present in:

- **Anaerobic sludge**
- **Rumen of cattle**
- **Rice fields**
- **Marshy places**

Cattle dung is used for the production of biogas as it contains cellulosic materials as well as methanogens.

The technology of biogas production was developed in India by Indian Agricultural Research Institute (IARI) and Khadi and Village Industries Commission (KVIC)

TOPIC-2 : AIDS/HIV



The word **AIDS** stands for **Acquired Immuno Deficiency Syndrome**. This means deficiency of immune system, acquired during the lifetime of an individual indicating that it is not a congenital disease. ‘Syndrome’ means a group of symptoms. **AIDS** was first reported in 1981 and in the last twenty-five years or so, it has spread all over the world killing more than 25 million persons. **AIDS** is caused by the Human Immuno deficiency Virus (**HIV**), a member of a group of viruses called retrovirus, which have an envelope enclosing the RNA genome

Transmission of HIV-infection generally occurs by (a) sexual contact with infected person, (b) by transfusion of contaminated blood and blood products, (c) by sharing infected needles as in the case of intravenous drug abusers and (d) from infected mother to her child through placenta. So, people who are at high risk of getting this infection includes - individuals who have multiple sexual partners, drug addicts who take drugs intravenously, individuals who require repeated blood transfusions and children born to an HIV infected mother.

The Red Ribbon

The red ribbon has become an internationally recognized symbol for AIDS awareness, worn by people throughout the year in support of people living with HIV and in remembrance of those who have died



AIDS (Acquired Immuno Deficiency Syndrome)

Due to HIV infection, this is an immune system illness. HIV damages the immune system's CD4 T lymphocytes (CD4 cells), making the body prone to infections and malignancies that can be fatal. The most severe form of HIV infection is acquired immunodeficiency syndrome (AIDS). A person with HIV must have an AIDS-defining condition or a CD4 count of less than 200 cells/mm³ in order to be diagnosed with the disease (regardless of whether the person has an AIDS-defining condition).

The human immunodeficiency virus causes this condition (HIV). Those with acquired immunodeficiency syndrome are more likely to develop certain malignancies and illnesses that are more common in people who have a weak immune system. Also known as AIDS. Certain blood tests (CD4+ counts) can also be used to diagnose AIDS in HIV-positive people who haven't had any major diseases. When HIV impairs the immune system, "opportunistic" viruses can exploit this weakness and cause sickness. Kaposi's sarcoma and pneumocystis carinii pneumonia are both opportunistic diseases. A robust immune system can effectively control many of these disorders. It's not the same as having AIDS if you've been infected with HIV (and have HIV antibodies in your blood).

Due to HIV infection, this is an immune system illness. HIV damages the immune system's CD4 T lymphocytes (CD4 cells), making the body prone to infections and malignancies that can be fatal. The most severe form of HIV infection is acquired immunodeficiency syndrome (AIDS). A person with HIV must have an AIDS-defining condition or a CD4 count of less than 200 cells/mm³ in order to be diagnosed with the disease (regardless of whether the person has an AIDS-defining condition).

The human immunodeficiency virus causes this condition (HIV). Those with acquired immunodeficiency syndrome are more likely to develop certain malignancies and illnesses that are more common in people who have a weak immune system. Also known as AIDS. Certain blood tests (CD4+ counts) can also be used to diagnose AIDS in HIV-positive people who haven't had any major diseases. When HIV impairs the immune system, "opportunistic" viruses can exploit this weakness and cause sickness. Kaposi's sarcoma and pneumocystis carinii pneumonia are both opportunistic diseases. A robust immune system can effectively control many of these disorders. It's not the same as having AIDS if you've been infected with HIV (and have HIV antibodies in your blood).

Symptoms

HIV-positive people may be unaware that they are infected. Fever, headache, muscle and joint pain, stomachache, enlarged lymph nodes, or a one-to-two-week-long skin rash are among the flu-like symptoms experienced by some people. Before the immune system responds, the virus replicates in the body for weeks or even months. A person will not test positive for HIV infection during this time, but they will be able to infect others. To replicate itself, the virus uses CD4 T cells, a type of white blood cell that fights infection. The immune system is weakened as a result of this process, which eliminates CD4 T cells. For several weeks without treatment, a person may endure fevers, night sweats, diarrhoea, or swollen lymph nodes. When HIV turns into AIDS, it occurs when:

The CD4 T cell count of an HIV-positive person falls below 200 cells/mm.

An HIV-positive person develops an ailment that is relatively uncommon in non-HIV-positive people.

The following are examples of AIDS-related opportunistic illnesses:

Pneumocystis carinii pneumonia is a lung infection caused by *Pneumocystis carinii*.

Skin cancer Kaposi's sarcoma.

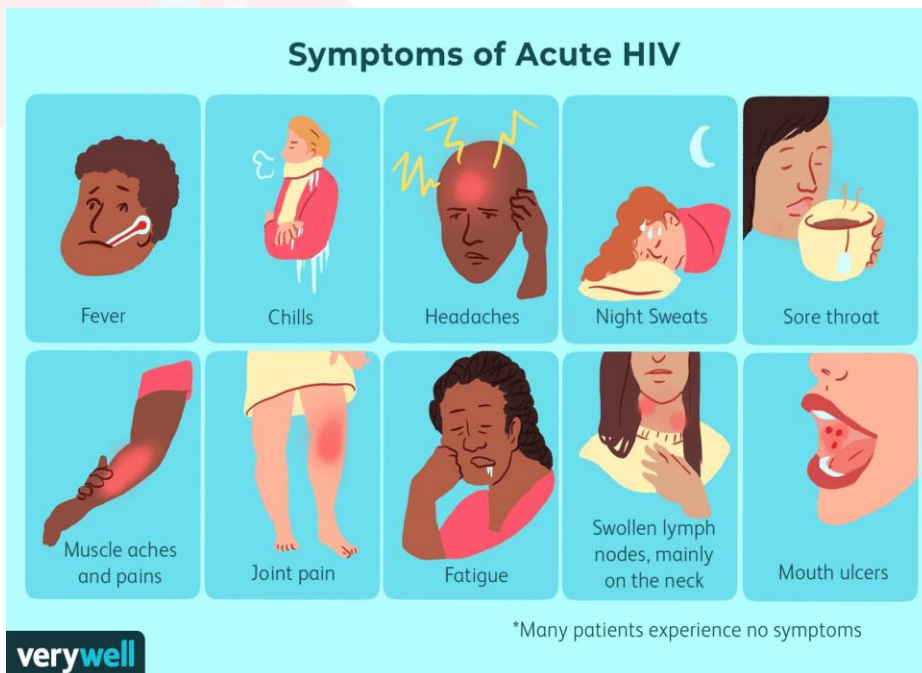
Cytomegalovirus is a virus that primarily damages the eyes.

Candida is a fungus that can cause thrush, a white film, and infections in the mouth, throat, and vaginal area.

Cervical cancer that has spread throughout the body

Serious weight loss and brain tumours are other AIDS-related disorders.

The symptoms of AIDS differ from person to person. Even after being formally diagnosed with AIDS, some people die soon after becoming infected, while others enjoy relatively normal lives for many years.



Causes and Risk Factors

HIV infection is the cause of AIDS. AIDS patients around the world have only one thing in common: HIV infection, regardless of their sexual preferences, lifestyles, health, sexual practises, age or gender.

While there is still much to understand about HIV and AIDS, several circumstances can increase a person's chances of contracting it, including:

Exposure to HIV-infected body fluids, such as blood, sperm, vaginal fluid, breast milk, or other fluids that are normally only dangerous to healthcare personnel (cerebrospinal fluid surrounding the brain and spinal cord, synovial fluid surrounding bone joints and amniotic fluid surrounding a fetus)

Sharing needles or syringes with an infected person

Being born to or breastfed by an HIV-positive woman

Not using a safer method of sex (use of a latex condom)

Diagnosis

When a person is infected with HIV, his or her body produces antibodies that can be detected in laboratory tests within three months. A doctor may wish to run further tests after taking a medical history and performing a physical exam, such as:

- *A full blood count is performed.**
- *An analysis of your blood chemistry**
- *Hepatitis B and C blood tests.**
- *CD4 T cell count is determined using a blood test. A low CD4 T cell count is a sign of illness progression because the virus needs these cells to replicate itself, killing CD4 T cells in the process.**
- *A blood test that determines the viral load, or the amount of HIV in a blood sample. Those who have a high viral load are more likely to develop AIDS than those who have a low viral load.**
- *Screening for syphilis**
- *A skin test for tuberculosis**

Treatment

At this time, there is no cure for HIV infection or a way to get rid of the virus. Drug therapy, on the other hand, can help to reduce the virus's spread and the immune system's damage. Other medications can be used to prevent or cure opportunistic infections, which can be fatal for HIV patients. Several factors must be taken into account when determining whether to begin HIV treatment:

The CD4 T cell count results are shown below.

The viral load test's findings

Willingness of the patient to adhere to pharmacological therapy on a regular basis.

Treatment programmes for HIV can be extensive, requiring you to take up to 25 medicines every day. Some must be consumed on an empty stomach, while others can be consumed with food. It's possible that the patient's treatment will have to be sustained for the rest of their lives.

Whether the patient has AIDS or is in the advanced stages of HIV infection.

CONCLUSION

Here I have come to an end of this project on ‘Microbes in human welfares’ and ‘AID/HIV’.

While doing this project I got to know more about these scecific topics. It helped me to gain deep knowledge and to do a deep research.

It was a fascinating and intiguing experience .

BIBLIOGRAPHY

1. [Ncert book](#)
2. [www.google.com](#)
3. [www.wikipedia.com](#)
4. [www.cdc.gov](#)