

## Micro Organisms – Bacteria and Virus an Overview

### Abstract

Microbiology is the gaining knowledge of microscopic organisms, like bacteria, viruses, archaea, fungi and protozoa that affect the humans, the disorder they reason, their analysis, prevention and remedy. An essential expertise of the way a mobile works has come through the study of microorganisms. Microbes are imperceptible. This field consists of critical research on the biochemistry, physiology, cell biology, ecology, development and scientific characteristics of microorganisms, with the host response to these dealers. Microbiology also is an applied technological know-how, assisting agriculture, health and medicine and maintenance of the environment, in addition to the biotechnology industry.

**Keywords:** Bacteria, Virus, Immunity, Cell Structure.

### Introduction

Microorganisms are incredibly essential in our normal lives. "Antonie Philips van Leeuwenhoek is known to as 'the father of Microbiology'. He turned into recognised so due to his involvements towards the established order of microbiology. He changed into scientist from Delft, Netherlands and is considered to be 'the first Microbiologist in the international'. Microorganisms are a heterogeneous group of several classes of living beings. They were initially classified below plant and animal domains. As this proved unsatisfactory, they were classified under a 3rd kingdom, the Protista. supported the differences in cellular organisation and biochemistry, the dominion Protista has been divided into two groups prokaryotes and eukaryotes. Bacteria and blue chlorophyte are prokaryotes, while fungi, other algae, slime moulds and protozoa are eukaryotes.

### Bacteria

Bacteria are prokaryotic microorganisms that don't contain chlorophyll. They found in most habitats on the world. They're unicellular and don't show true branching, the unit of measurement utilized in bacteriology is that the micron. they're tiny microorganisms that are made from one cell. They're living cells which may be either beneficial or harmful to other organisms. In harsh conditions like acidic hot springs, radioactive material and deep portions of Earth's crust. They form dense aggregations by attaching to surfaces. These aggregations are mat-like structures called biofilms. Bacterial cells are edged by a cell wall. The membrane-enclosed cytoplasm nutrients, proteins, DNA and other essential components of the cell. Bacteria are prokaryotes and lack membrane-bound organelles. Protein localization is administered by their cytoskeleton. one circular chromosome is found within the nucleoid. this easy arrangement of bacteria is mentioned as "Bacterial hyper- structures". Murein forms a cell wall external of the bacterial cell membrane. The thicker cell membrane is assessed as gram-positive, and therefore the thinner cell membrane is assessed as gram-negative within the gram staining of bacteria. Flagella are used for the mobility. Fimbriae are the attachment pili. they're utilized in amphimixis of bacteria, which is understood as conjugation. the whole cell is roofed by glycocalyx which forms the capsule [4].

### DNA of Bacteria

Comparable to other organisms, bacteria too strain true and preserve their features from generation to generation, yet at an equivalent time, exhibit variations especially properties during a small proportion of their progeny. However, heritability and difference in bacteria had been noticed from youth of bacteriology, it had been not realised then that bacteria too obey the laws of genetics. The "central dogma" of biology is that desoxyribonucleic acid (DNA) carries genetic information, which is transcribed onto RNA (RNA) then translated because the particular

### A.Devasena

Professor,  
Dept. of ECE,  
Dhanalakshmi College of  
Engineering,  
Chennai, India

### S.Vijayanand

Professor,  
Dept. of ECE,  
Dhanalakshmi College of  
Engineering,  
Chennai, India

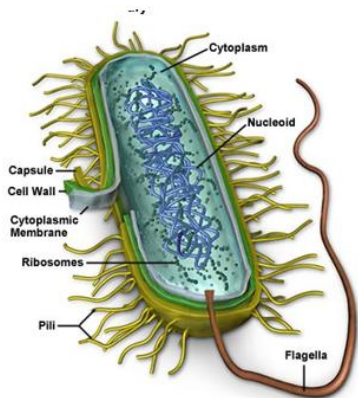
### A.Niranjil Kumar

Professor,  
Dept. of ECE,  
Dhanalakshmi College of  
Engineering,  
Chennai, India

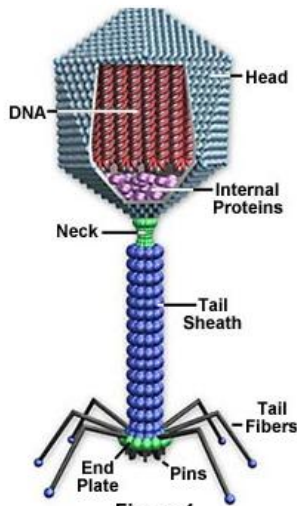
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polypeptide. Because the nature and functions of a cell are basically determined by the precise polypeptides that constitute its protein and enzymes, it's evident that essential material of hereditary is DNA which is that the storehouse of all information for protein synthesis. The DNA molecule consists of two chains of nucleotides wound together within the sort of "double helix". Each chain features a backbone of deoxyribose and phosphate residues arranged alternately. Attached to every deoxyribose is one among four nitrogenous bases, the purines, adenine (A), and guanine (G), and therefore the pyrimidines, thymine (T) and cytosine (C). [4,5]. Figure 1- Shows Prokaryotic cell structure.

**Prokaryotic Cell Structure**



**Figure 1- Prokaryotic cell structure**



**Figure 2 - Virus Cell Structure**

## Virus

Unicellular organisms could also be classified in descending order of complexity as eukaryotes, like bacteria, mycoplasmas, rickettsiae and chlamydiae. Viruses don't fall strictly into the category of unicellular microorganisms as they are doing not possess a cellular organisation. Even the only of microorganisms are cells enclosed within a cell

membrane, containing both sorts of macromolecule (DNA and RNA), synthesising their own macromolecular constituents and multiplying by binary fission. Viruses on the opposite hand, don't have a cellular organisation and contain just one sort of macromolecule, either RNA or DNA but never both. they're obligate intracellular parasites. They lack the enzymes necessary for protein and macromolecule synthesis machinery of host of cells. They multiply by a posh process and not by a binary fission. They unaffected by antibacterial antibiotics. Viruses are much smaller than bacteria [2].

## Genetic Material of Virus

Viruses contain just one sort of macromolecule, either single or double stranded DNA or RNA. during this respect, viruses are unique, for nowhere else in nature is genetic information solely carried by RNA. Viral nucleic acids could also be extracted by treatment with detergents or phenol and, just in case of some viruses, the extracted macromolecule is capable of initiating infection when introduced into host cells. Viruses also contain protein which makes up the capsid, viral protein, besides protecting the macromolecule, also determines the antigenic specificity of the virus. Enveloped viruses contain lipids derived from the host cell wall. Some viruses also contain bit of carbohydrate [2] Figure 2 - shows virus cell structure.

Viruses are deactivated through sunlight, UV rays and ionising radiations. They are, generally, more resistant than bacteria to chemical disinfectants, probably because they lack enzymes. Phenolic disinfectants are only weakly virucidal. The foremost active antiviral disinfectants are oxidising agents like peroxide, permanganate of potash and hypochlorites. Organic iodine compounds are actively virucidal. Chlorination of beverage kills most viruses but its efficacy is greatly influenced by the presence of organic matter [2].

The action of lipid solvents for example ether, chloroform and bile salts are selective, the enveloped viruses being sensitive and therefore the naked viruses resistant to them. The sensitive action is beneficial within the identification and classification of viruses [2].

## Virus – Host Interaction

Virus-host interactions could also be considered at different levels- the cell, the individual and therefore the community. In some instances, the virus and host cell enter into a peaceful coexistence, both replicating independently with none cellular injury, a condition referred to as steady state infection. Cellular injury could also be thanks to variety of causes. Early or non-structural viral proteins often cause a shutdown or non-structural viral proteins often cause a shutdown of host protein and DNA synthesis. Many viruses produce alterations within the cytoplasmic membrane of infected cells. Virus coded antigens could seem on the peripheral of infected cells. These antigens may confer new properties on the cells. Bacteriophages (phages) are viruses that

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infect bacteria Phages play a crucial role within the transmission of genetic information between bacteria by the method of transduction. The presence of phage genome integrated with bacterial chromosomes confers on bacteria certain properties by a process referred to as phage concentration [2].

## Infection

Infection and immunity involve interaction between the physical body (host) and within the infecting microorganism. Supported their relationship to their hosts, microorganisms are often classified as saprophytes and parasites. Saprophytes are life style microbes that subsist on dead or decaying organic matter. They're found in soil and water and play a crucial role within the degradation of organic materials in nature. They're generally incapable of multiplying on living tissues and thus are of little relevance in communicable disease. Parasites are microbes which will establish themselves and multiply in hosts. Parasitic microbes could also be pathogens or commensals. Pathogens are microorganisms that are capable of manufacturing disease within the host. Commensal microbes sleep in complete harmony with the host without causing any damage to that. Infections could also be classified in various ways. Initial infection with a parasite within the host is termed primary infection. Subsequent infections by an equivalent parasite within the host whose resistance is lowered by a pre-existing communicable disease, this is often termed secondary infection. Cross-infections occurring in hospitals are called nosomial infections. Counting on whether the source of infection is from the host's own body or from external sources, infections could also be classified as endogenous or exogenous respectively [6].

## Immunity

The term immunity conventionally denotes to the fight showed by the host to injury caused by microorganisms and their products. However, protection against infectious diseases is merely one among the results of the immune reaction, which in its entirety cares with the reaction of the body against any foreign antigen. The differences in innate immunity displayed by dissimilar individuals in a contest is known as distinct immunity. The genetic basis of individual immunity is evident from studies on the incidence of communicable diseases in twins.

Some contagions similar to poliomyelitis and chickenpox incline to be more severe in adults than in young children, due to hypersensitivity that basis greater tissue damage. Contrary hepatitis B virus contagions in the new born are usually asymptomatic because clinical disease requires adequate immune response which is lacking at that age. Old persons are highly vulnerable to infections thanks to the waning of their immune responses and other infirmities like enlarged prostate leading to urinary stasis [1].

Autoimmunity is a complaint in which physical or practical injury is produced by the action of immunologically capable cells or antibodies against the typical components of the body. Autoimmunity means protection against self but it actually implies "injury to self". When the concept of autoimmunity came to be accepted as a pathogenic mechanism, an outsized number of diseases were suggested to possess an autoimmune etiology, supported the finding of autoantibodies within the patients.

Cells or tissues may undergo antigenic alteration as a result of physical, chemical or biological influences. Such reformed or "neoantigens can rise in a variation of ways. Physical agents like irradiation can cause antigenic alteration [1].

## Conclusion

In this paper, we have discussed about the study of microbiology, and in detail we have discussed about Bacteria, DNA structure of bacteria, Virus, Genetic material of virus, virus-host interaction, and how the infection occurred because of these virus and Bacteria, and how the human reacts to these infections in terms of immunity and Auto immunity.

## Reference

1. *Armstrong A. 2001, "Cellular immunotherapy for cancer" BMJ, 323:1289*
2. *Collier L. and J Oxford 2000. Human Virology London Oxford University Press.*
3. *Kwaitkowsky D. 2000, "Susceptibility to infection." Br Med J 321:1061.*
4. *Patrick S and MJ Larkin 1995. Immunological and Molecular aspects of Bacterial Virulence Chichester: Wiley.*
5. *Watson JD et al. 1983. "Recombinant DNA" New York: Scientific American Books.*
6. *Tompkins L.S. 1992, "The use of molecular methods in infectious diseases, New Engl. J. Med. 337:1290".*