Bacteriophage and depolymerase



Introduction

Bacteriophage which is also known as bacteria eater refers to viruses that infect bacteria. Bacteriophages are known to only replicate within host cells and must attach to a specific receptor on the surface of a bacteria cell to initiate infection. The contact between the phage and the receptor is very definite which means that a phage type will only bind to a particular receptor molecule thus all bacteriophage are not alike.

Depolymerase refers to an enzyme that catalyses the breakdown of macromolecules to simpler molecules.

Pseudomonas aeruginosa is commonly described as an opportunistic pathogen that causes morbidity and mortality in humans, animals and plants. Due to its exceptionally high metabolic versatility in utilizing numerous organic compounds and its adaptability to various conditions, it can be commonly found in terrestrial soil, fresh water environments and can grow in a variety of low-nutrient conditions.

Bacteria and depolymerase are linked together due to the fact that the depolymerase helps the bacteria by breaking down large molecules and making it easier for the bacteria to attach to the host.

Figure 1-Diagram of a bacteriophage

Background information-basic information on Bacteriophages

Bacteriophage are host specific viruses that targets only certain types of bacteria. They are made up of outer protein caspid enclosing a genetic

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material which could be SSRNA, dsRNA, ssDNA or dsNA. Bacteriophages are very common in places like soil, sewage or reservoirs infected by bacteria hosts. It's been suggested that bacteriophage might be an effective way to treat bacterial infections but studies showed that they are quickly removed from the body and hence show little clinical value therefore mostly used in the laboratory. Biofilms are made up of bacteria and other microbial cells attached directly to a solid phosphate or indirectly through associated expolysaccharides and other polymetric material. The nature of a biofilm depends on the nature of the attached microorganisms and of polymers which they secrete. The physiological conditions also greatly affect biofilm thickness and physical properties. Large numbers of phages are found in many environments as biofilms.

The evidence of the ability of bacteriophage -borne polysaccharide depolymerase enzymes to degrade bacterial polysaccharides have been proved (Adams &Park 1956), Phage polysaccharide depolymerase are commonly seen in electron micrographs as spikes attached to the phage baseplate. In a liquidculture, degredation of bacterial capsular material by phage-borne polysaccharide depolymerise occurs in a defined sequence. The phage depolymerise binds to the capsular material which is the secondary receptor and degrades the polymer until it reaches the cell surface where it binds to an outer membrane receptor which is the primary receptor and infects the bacterium. Therefore, bacterial lysis will occur. This however results to a clear area in the lawn of growing cells host cells. The clearing that occurs is called a plaque and each plaque is believed to have originated from the replication events that began with one bacteriophage (virion). When the number of plaque forming units is counted, the number of virus infectious units present in the original sample can be calculated.

This procedure also permits the isolation of pure virus stains. If a plaque originated from a single virion, then all the virons in that plaque should be genetically identical. Some of the virus from the plaque can be picked and inoculated into a fresh bacterial culture inorder to establish a pure virus line (Madigan et al 2007)

The purpose of this review is to isolate a bacteriophage capable of infecting a specific host bacterium. The improvement of an environmental sample ie water, for the presence of bacteriophages infecting a particular host can be carried out by inoculating water sample with the host organism and waiting for lysis to occur. Isolating of bacteriophage allows the determination of bacteriophage particles which are capable of initiating productive infections of their host bacterium in the original sample. The use of the selective enrichment in this review is to increase the probability that colonies of the desired organism would be formed.

Any type of bacteria strain can be infected by bacteriophage like ecoli, pseudomonas, and salmonella.

This study is based on the isolation of a bacteria strain of pseudomonas aeruginosa, not all pseudomonas strains are similar but Variability exists in the growth, curves and antibiotic resistance of different pseudomonas aeruginosa isolates. Different hypothesis have shown that isolates of p. aeruginosa could also possess some differences in their surface molecules and as a result differences in the phage receptors present on their surfaces. https://assignbuster.com/bacteriophage-and-depolymerase/ Mechanisms by which bacteria Infects host cells are: Adsorption, Sheath Contraction and Nucleic Acid Injection.

Different methods are used for the isolation of bacteriophage from water according to different articles.

Khan, N. H., Shii, Y., Kimata-Kino, N., Esaki, H., Nishino, T., Nishimura, M., & Kogure, K. (2007). stated that bacteria can be isolated by different ways which include:

Water sampling- In this process, selective and non selective agar culture were used for to isolate and identify P. aerruginosa and appropriate volumes of water samples are filtered using sterilized plates and Nutrient Broth agar.

Identification by BD phoenix system-The phoenix system uses one identification (ID) and AST (antimicrobial susceptibility) combination panel with the ID substrates on one side and the microbial drugs on the other.

Serotyping- Sereotyping for O-group specific abntigen was carried out by using P. aeruginosa kit and all isolates were tested for O-goup specific antigens.

Purified Gel Electrophoresis-This was used to clarify genetic relatedness among the strains.

Wuthiekanun V, Dance DAB, Wattanagon Y, SupputtamonGKOL Y, Chaowagul W and White N. J(1990) isolated pseudomonas using Ashdown's medium. The use of this

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