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LETTERS TO THE EDITOR

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BACTERIOPHAGES

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LETTERS TO THE EDITOR

Mr. Editor

Viruses which parasitize bacteria, known as bacteriophages or phages, are coming back to current science, evidenced fact with the establishment of the Howard Hughes Medical Institute in United States of America (USA), or the CRU-MEDI Institute in United Kingdom; this changing focus its due to the possibility of using them in antibacterial therapy, against multi-resistant bacteria[(1)].

Knowledge of these viruses started with Frederick Twort' studies in 1915, when he demonstrated that:"there are viruses which infect bacteria and kill them". But it was Félix d'Herelle who developed, successfully, therapeutic protocols for digestive infections in animals and humans. Bacteriophages have been lab primary tool for the development of sciences in terms of virology and molecular biology[(1)].

Bacteriophages, like all viruses, have an obligated intracellular life and they are composed by a nucleic acid molecule, their size varies between 20 and 200 nanometers and they participate actively in bacteria life codifying enzymes and toxins production, as well as in gene transfer between bacteria. Most of them possess deoxyribonucleic acid (AND) and they are classified according to their morphology under the electron microscope, for example, icosahedral, tail or no tail, and filamentous.

Bacteriophages can present two functional states: "lytic state" or "virulent", in which, the phage replicates and causes lysis of host bacterium, releasing new phages; or "prophage state" or "temperate", in which the phage settles in the bacterial chromosome, it replicates with the chromosome, but does not cause neither alteration in the bacterial cell, nor release of new phages; that is why it is said the host cell lies in lysogenic state. The presentation of both these functional states depends on gene activity: of repressive, cl, which inhibits lytic activity, and of regulator, cro, which blocks the function of repressive gen.

Bacterial infection's mechanism by these viruses is very particular. Due to the fact that in outer layer of bacterial wall or pili (micro-villus which surround certain bacteria), it exists a chemical structure which works out as the bacteriophage receptor. This receptor is specific for certain types of phages, which makes relevant its use in biology and medicine. For example: diphtheria toxin is a polypeptide codified by the beta bacteriophage which possess the gen tox+; similarly as the exotoxin produced by Clostridium botulinum. In other cases, specificity is such narrow that it is used as a bacterial identifying marker; for instance: gamma phage in Bacillus anthracis diagnostic. There are bacterial groups which own various receptors, thus, several bacteriophages can stick to bacterium and enter, for example: the case of enterobacteria; for that reason, in order to track causal species of an epidemic outbreak by Salmonella, "panels" of phages are employed[(2)].

For separating bacteriophages (prophages) inside a bacterial host cell, we employ easy procedures based on action of ultraviolet radiation or chemical solutions, which provoke the rupture of bacterial cell and the release of viral particles. Subsequently, it is incubated together with a culture of the host strain under examination, in a liquid medium and in exponential phase (4 hours of incubation). Later, bacteria are destroyed by action of the chloroform and the supernatant (with bacteriophages), then it is filtered by 0.45 mu Milli-Pore.

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Demonstration of bacteriophages' presence it's carried out with bacteriological procedures, for instance, clearance of liquid culture of host bacteria with eight hours of incubation; lack of development of host bacteria in a solid culture (spot), and observation of lack of development plates in a sowing by the "inverted plate" method, recommended for counting viral particles[3].

In the last decade, in international literature, we read articles which evidence the various practical uses of bacteriophages. Which is the case of controlling drinking water quality, whose normal procedure is founded on searching Escherichia coli bacteria, as an expression of fecal contamination of drinking water. Current trend is searching the presence of E. coli bacteriophages in drinking water already treated, as a quality control of water treatment process[4].

Research centers of international reference in terms of bacteria which cause epidemic outbreaks dispose of panels of marker phages, which allow tracking or searching the origin of certain epidemic outbreak[5].

The industry dedicated to the manufacture of prostheses, concerned for bacterial pollution during the implant process or after this, stocks up on a mix ("cocktail") of various bacteriophages of saprophytic or pathogenic bacteria, with which it covers the prostheses in the form of layer, to destroy the polluting bacteria. The food industry of dairy products and meat does not ignore the use of bacteriophages; since they use phages or enzymatic derivatives produced by them to prevent pollution with Listeria monocitógenes bacterium[6], which is able to multiply at refrigeration temperatures.

Global concern for limitations in the treatment of patients with infectious processes caused by multidrug resistant bacteria has forced to look at history of bacteriophages. Conventionally, extracting them from the bacterium which causes the infection to use them as a therapeutic tool, on their own or associated with orthodox anti-infective therapy[7]. For all that, it is necessary to review concepts and working methods in terms of bacteriophages.

LETTERS TO THE EDITOR

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