Research Analysis of Virology and Retrovirology

Kwanighee Lee
Yonsei University, South Korea

The history of virology – the scientific study of viruses and therefore the infections they cause – began within the closing years of the 19th century. Although Pasteur and Jenner developed the primary vaccines to guard against viral infections, they didn't know that viruses existed. The first evidence of the existence of viruses came from experiments with filters that had pores sufficiently small to retain bacteria.

In 1892, Dmitri Ivanovsky utilized one among these channels to call attention to that sap from an ailing tobacco plant stayed irresistible to sound tobacco plants in spite of having been separated. Martinus Beijerinck called the separated, irresistible substance an "infection" and this revelation is considered to be the beginning of virology.

The resulting disclosure and incomplete portrayal of bacteriophages by Frederick Twort and Félix d'Herelle further catalyzed the area , and by the principal twentieth century numerous infections had been found. In 1926, Thomas Milton Rivers characterized infections as commit parasites. Infections were shown to be particles, rather than a liquid, by Wendell Meredith Stanley, and hence the development of the magnifying instrument in 1931 permitted their intricate structures to be envisioned.

Bacteriophages are the infections that taint and imitate in microscopic organisms. They were discovered within the early 20th century, by English bacteriologist Frederick Twort (1877–1950). But before this point , in 1896, the bacteriologist Ernest Hanbury Hankin (1865–1939) reported that something within the waters of the River Ganges could kill Vibrio cholerae – the explanation for cholera. The agent in the water could be passed through filters that remove bacteria but was destroyed by boiling. Twort discovered the action of bacteriophages on staphylococci bacteria. He noticed that when grown on nutrient agar some colonies of the bacteria became watery or "glassy". He collected a number of these watery colonies and passed them through a Chamberland filter to get rid of the bacteria and discovered that when the filtrate was added to fresh cultures of bacteria, they in turn became watery. He proposed that the agent could be "an amoeba, an ultramicroscopic virus, a living protoplasm, or an enzyme with the facility of growth".

Félix d'Herelle (1873–1949) was a for the most part self-trained French-Canadian microbiologist. In 1917 he found that "an undetectable rival", when included to microscopic organisms agar, would deliver regions of dead microorganisms. The adversary, presently known to be a bacteriophage, could experience a Chamberland channel. He precisely weakened a suspension of those infections and found that the absolute best weakenings (most minimal infection fixations), rather than murdering all the microorganisms, framed discrete zones of dead living beings. Counting these areas and multiplying by the dilution factor allowed him to calculate the amount of viruses within the original suspension. He realised that he had discovered a replacement sort of virus and later coined the term "bacteriophage". Between 1918 and 1921 d'Herelle discovered differing types of bacteriophages that would infect several other species of bacteria including Vibrio cholerae. Bacteriophages were heralded as a possible treatment for diseases like typhoid and cholera, but their promise was forgotten with the event of penicillin. Since the early 1970s, bacteria have continued to develop resistance to antibiotics such as penicillin, and this has led to a renewed interest in the use of bacteriophages to treat serious infections.

Early research 1920–1940, D'Herelle travelled wide-

ly to market the utilization of bacteriophages within the treatment of bacterial infections. In 1928, he became professor of biology at Yale and founded several research institutes. He was convinced that bacteriophages were viruses despite opposition from established bacteriologists such as the Nobel Prize winner Jules Bordet (1870–1961). Bordet argued that bacteriophages were not viruses but just enzymes released from "lysogenic" bacteria. He said "the invisible world of d'Herelle does not exist". But in the 1930s, the proof that bacteriophages were viruses was provided by Christopher Andrewes (1896–1988) and others. They showed that these viruses differed in size and in their chemical and serological properties. In 1940, the primary electron micrograph of a bacteriophage was published and this silenced sceptics who had argued that bacteriophages were relatively simple enzymes and not viruses. Numerous other types of bacteriophages were quickly discovered and were shown to infect bacteria wherever they are found. Early research was interrupted by World War II. d'Herelle, despite his Canadian citizenship, was interned by the Vichy Government until the top of the war.

Modern era, Knowledge of bacteriophages increased in the 1940s following the formation of the Phage Group by scientists throughout the US. Among the members were Max Delbrück (1906–1981) who founded a course on bacteriophages at Cold Spring Harbor Laboratory. Other key members of the Phage Group included Salvador Luria (1912–1991) and Alfred Hershey (1908–1997). During the 1950s, Hershey and Chase made important discoveries on the replication of DNA during their studies on a bacteriophage called T2. Together with Delbruck they were jointly awarded the 1969 Nobel prize in Physiology or Medicine "for their discoveries concerning the replication mechanism and therefore the genetic structure of viruses". Since then, the study of bacteriophages has provided insights into the switching on and off of genes, and a useful mechanism for introducing foreign genes into bacteria and many other fundamental mechanisms of molecular biology.

Retroviruses were discovered at the turn of the century in two investigations devoted to neoplastic diseases in chickens. In 1908, the Danish physician-veterinarian team of Vilhelm Ellermann and Oluf Bang showed that chicken leukosis, a form of leukemia and of lymphoma, was caused by a virus. The discovery of the first human retrovirus. Reverse transcriptase activity was detected by Gallo's group in a T-cell line established (using IL-2) from a patients diagnosed originally with mycosis fungoides in1979. To show that this was indeed a new human retrovirus Gallo and coworkers set out to show that the same virus could be isolated from primary tissue samples of the same patient by culturing primary T-cells with IL-2; demonstrate that the virus was novel, i.e., not any of the known animal retroviruses; show it could infect human T cells in vitro; demonstrate specific antibodies to the virus within the serum of the patient; demonstrate that proviral DNA might be found integrated within the DNA of the cells from which the virus was isolated; and supply evidence that this wasn't a one-time affair by showing serological evidence of specific antibodies not only within the patient but in some others as well.