

A Brief note on Animal Virus

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Description

Viruses of vertebrates are divided into two groups those that primarily infect humans and those that primarily infect other animals. The two fields of study are medical (or clinical) virology and veterinary virology. Despite not being the first to be discovered and characterized human-infecting viruses are the most studied. Viruses can infect all organs and tissues of the body causing symptoms ranging from mild to life-threatening. Humans are not susceptible to plant or insect viruses, but they are susceptible to viruses from other vertebrates. This is referred to as zoonotic infections or viral zoonoses. Rabies, yellow fever and papataci fever are a few examples.

Companion animals such as cats, dogs and horses can become infected with serious viruses if they are not vaccinated. Canine parvovirus 2 is caused by a small DNA virus and infections in puppies are often fatal. The disease spread quickly around the world and thousands of dogs died as a result of the infection. The virus originated in cats which are the vectors of feline panleukopenia but a mutation that changed only two amino acids in the Viral capsid Protein 2 (VP2) caused it to spread enabled it to cross the species barrier and unlike cats, dogs had no resistance to the disease. Canine distemper virus is related to measles virus and is the most common viral disease in dogs.

Arthropods are the largest animal group and have been shown to be a major reservoir of various viruses including Insect-Specific Viruses (ISV) and viruses that can infect both vertebrates and invertebrates more commonly known as arthropod-borne viruses (arboviruses). Insect-specific viruses as the name implies are distinguished by their inability to infect vertebrates. This can be determined by inoculating Mammalian, Avian or Amphibian cell lines with a virus. Stollar and Thomas discovered the first (ISV) over 40 years ago. It was isolated from an *Aedes aegypti* cell culture that contained a large number of syncytia and the virus was dubbed Cell Fusing Agent Virus (CFAV). Furthermore, no Cyto-Pathic Effect (CPE) was

observed when the virus was inoculated on different vertebrate isolates and the virus was able to replicate.

Invertebrates lack the adaptive immune system based on lymphocytes that is required for vertebrate immunity but they can mount effective immune responses. Phagocytosis was discovered in invertebrates and including other innate immune responses, plays an important role in virus and pathogen immunity. Invertebrate Hemolymph contains many soluble defense molecules such as Hemocyanins, Lectins and Proteins which protect the animals from invaders.

The honey bee (*Apis mellifera*) is susceptible to a variety of viral infections and its population has been steadily declining globally. This virus has spread because these bees are frequently infested with varroa mites which serve as vectors for deformed wing virus. become one of the most widely distributed and contagious insect viruses on the planet. Because the virus causes stunted wings infected bees are unable to leave the hive and forage for nectar. Symptomatic bees have a life span of less than 48 hours and are frequently expelled from the hive by other bees. Baculoviruses are among the most thoroughly researched invertebrate viruses. They infect and kill several agricultural pests and have been used as natural insecticides to control insect populations in Brazil and Paraguay such as the velvet bean caterpillar (*Anticarsia gemmatilis*) a pest of soy beans. Viruses are an appealing alternative to chemical pesticides because they are non-hazardous to other wildlife and leave no residue. Viruses can also manipulate the behaviour of their insect hosts for their own benefit. A BaculoVirus of the gypsy moth (*Lymantria dispar*) causes caterpillars to climb to the tops of trees and die. They do so by releasing a shower of millions of progeny viruses which then infect more caterpillars.

How to cite this article: Wondimu, Anteneh. "A Brief note on Animal Virus." *J Vet Sci Technol* 12 (2021) :105.

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Received: December 03, 2021; **Accepted:** December 17, 2021; **Published:** December 24, 2021