

Viruses - UPSC Notes

Microorganisms including viruses are a significant part of General Science for the UPSC Exam. It is important not only from the science point of view but also because diseases and how to contain them are major topics in social issues and even polity/governance. This article tells you all about viruses for the [IAS Exam](#).

This topic can also be related to various issues in [Current Affairs](#). Furthermore, topics like Health, Disaster Management and Government Organisations related to Viruses and its consequences on the society can be expected as potential questions in the UPSC Exam or any other [Government Exam](#). Aspirants preparing for such exams should be well aware of the topic in order to tackle such questions.

What is a Virus?

Viruses are non-cellular, microscopic infectious agents that can only replicate inside a host cell.

- From a biological perspective, viruses cannot be classified either as living organisms nor non-living.
 - This is due to the fact that they possess certain defining characteristic features of living organisms and non-living entities.
- In a nutshell, a virus is a non-cellular, infectious entity made up of genetic material and protein that can invade and reproduce only within the living cells of bacteria, plants and animals.
 - They are called non-cellular because they don't have a cell structure, rather only the genetic material.
- Viruses are the border between living and nonliving organisms.
 - They act as living organisms when they are present in a host organism (cell),
 - Otherwise, they are nonliving organisms.
 - They are crystal-like structures when they are outside, and becomes infecting and lethal when they enter a living cell.
 - Viruses are inert outside a host cell, and then they are called virions.
- Some viruses partially contain DNA (DeoxyRibonucleic acid) or RNA (Ribonucleic acid) with single or double strands. It can get into the DNA of the host organism.
- Viruses are classified on the basis of genetic material - ds DNA (polio), dsRNA, ssDNA, ssRNA (orthomyxoviruses).
- Viruses cause diseases among animals and plants. Potato mosaic and tobacco mosaic are the common viral diseases among plants; chickenpox, AIDS and Ebola are the common viral animal diseases.
- Viroids and prions are the infecting proteins and RNA, they lack cell covers like a virus or any other eukaryotes. They were discovered by T Diener in 1971 and these are also responsible for diseases among animals. E.g. mad cow disease.

Table: Some Diseases caused due to Viruses

Some Diseases caused due to Viruses			
Sr. No	Disease	Disease-Causing Virus	Transmission & Cause
1	AIDS	Human Immunodeficiency Virus (HIV)	Transmission: Exchange of Blood Cause: Human & Primates

2	Chicken Pox	Varicella Zoster Virus (VZV)	Transmission: Through Contact or Air Cause: Humans
3	Chikungunya	Chikungunya virus	Transmission: Aedes Mosquitoes Cause: Humans
4	Cold, influenza (flu) and most coughs	Rhino viruses	Transmission: AirBorne (Sneeze droplets) Cause: Humans
5	Dengue fever	Flavivirus	Transmission: Aedes Mosquitoes (Female) Cause: Humans
6	Ebola	Ebola virus	Transmission: Man to Animal Contact Cause: Humans & Few Animals
7	Foot and Mouth Disease	Picornavirus [genus Aphthovirus]	Transmission: Close-contact animal-to-animal spread Cause: Animals
8	Hepatitis B	Hepatitis B Virus (HBV)	Transmission: STD or Exchange of Blood Cause: Humans
9	Measles	Measles Virus	Transmission: AirBorne Cause: Humans
10	Polio or Poliomyelitis	Poliovirus	Transmission: Water Borne or Faecal to Mouth Cause: Humans
11	Smallpox	Variola major and Variola minor	Transmission: Through Air, Water or Contact Cause: Humans
12	Zika	Zika virus	Transmission: Aedes Mosquitoes Cause: Humans & Primates

Coronavirus [COVID-19]

Coronaviruses are a large family of viruses that are common in various species of animals, such as cattle, camels, bats, and cats. They cause diseases ranging from cold to SARS.

- In some cases, animal coronaviruses can infect humans, which can then spread from person to person.

- This happened in the case of the SARS and MERS coronaviruses. It is also suggested that this might be happening in the current [COVID-19 pandemic](#).
- Coronaviruses cause respiratory infections in humans which are generally mild, but sometimes, can be fatal.
- Coronaviruses are physically large as far as viruses go (26 – 32 kilobases), having a surface of spike projections (which resembles a crown and hence the name ‘corona’).

Watch and Learn - [Coronavirus & Impact on Economy: RSTV – Big Picture](#)

COVID - 19 and India’s Response

The Department of Science and Technology and the Science and Engineering Research Board (SERB) called for a Short-term Research Grant for Nano Coating COVID-19 in April 2020.

This rapid project was necessary for the emerging health care requirements in order to combat the COVID-19 Pandemic. The projects are discussed in the table below:

Project	Objective
Project 1	<ul style="list-style-type: none"> • Searching Metabolite Biomarker Signature for the Virus. • Purpose of this is to understand the infected Cell/Organism activity. • Understanding these activities will help in developing a vaccine/drug.
Project 2, 3 and 4	<ul style="list-style-type: none"> • These projects revolve around the main objective of <ul style="list-style-type: none"> ◦ Developing Viricidal Coating or Anti-Viral Coating • This will be used to spray on Medical Equipments and Protective gear (Masks and Suits) to prevent the spread of Highly Contagious Viruses • These coatings are aimed to be of Polymeric Compounds which may kill the virus completely upon contact.
Project 5	<ul style="list-style-type: none"> • Developing Lipid-based Gel that can inactivate/kill the COVID-19 using the captured antibodies.

Click on the link to read more about [Nano Mission](#) launched by the Government of India.

Yara Virus Brazil

The virus has been named Yaravirus after ‘Yara’, a water-queen figure in Brazilian mythology.

Researchers have discovered an unusually small virus in a lake in Brazil.

The Yaravirus infects amoeba and has genes that have not been described before, something that could challenge how Deoxyribonucleic Acid (DNA) viruses are classified. The Yaravirus' capsid doesn't resemble any previously known protein. The Yaravirus does not infect human cells.

Watch and learn - [Coronavirus & Digital Solutions: RSTV- Big Picture](#)