



Highly Commended

# Models & Inventions

## Year 5-6

Dhairya Chousalkar

Mawson Lakes School

## Origin and Evolution of Coronavirus

### Scientific Principal

In 2019, several pneumonia cases of unknown cause appeared in humans in China. The International Committee on Taxonomy of Viruses announced “severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)” as the name of the new virus. This name was chosen because the virus is genetically related to the coronavirus responsible for the SARS outbreak in 2003. The World Health Organisation announced “COVID-19” as the name of this new disease. There are various theories about the origin and evolution of COVID-19 (SARS-CoV-2) so I decided to develop a 3 D model to understand the interspecies transmission of different coronavirus evolved over the years.

### Construction

I used polystyrene balls, cotton buds, marker pens, glue, colour, coloured papers, thin wire, and small beads for making 3D coronavirus models. I printed, cut the animal shapes to mount them on a cardboard to prepare a flow diagram to demonstrate the interspecies transmission of coronavirus from primary to intermediate host (an animal that supports the immature or non-reproductive forms of a virus) and then in humans.

### Operation

The operation of this model is based on the flow of interspecies transmission from a primary host, intermediate host, and then to humans. Coronaviruses that caused severe human illness are marked with a red arrow while those caused mild illness are marked with green arrows. All coronavirus that caused severe human illness originated from bats, adapted in intermediate hosts such as civets for SARS-COV, camels for Middle East respiratory syndrome coronavirus (MERS-CoV) and pangolins for COVID-19.

Coronavirus types HCoV-229E and HCoV-NL63 originated from bats caused mild infections in immunocompetent humans. The other two coronavirus type CoV-OC43 and HKU1 originated in rodents and can cause common cold in humans.

The risk assessment for this model is provided separately. I received help from my mother during the construction of this model.

### The novelty of my model

This is an inexpensive 3D model for students, scientists, and the general public to understand the origin and evolution of coronavirus and the role of primary and intermediate hosts.