



## Udai Pratap (Autonomous) College, Varanasi

### E-learning Material

|                   |   |
|-------------------|---|
| Module/Lecture    | 01  |
| Subject           | Zoology                                       |
| Year/Semester     | M. Sc. II Semester (Minor)                    |
| Unit              | I   |
| Topic             | Applied Zoology                               |
| Sub-topic         | <b><i>SARS COVID VIRUS II</i></b>             |
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| Name              | Dr Sanjay Kumar Srivastava                    |
| Department        | Department of Zoology                         |
| Faculty           | Assistant Professor                           |
| College           | Udai Pratap (Autonomous) College,<br>Varanasi |
| <b>Mobile No.</b> | <b>9415390652</b>                             |

## SARS Covid Virus II

**Severe acute respiratory syndrome, or SARS**, was a contagious and potentially fatal respiratory illness. An outbreak occurred from 2002 to 2003, but the disease is no longer circulating.

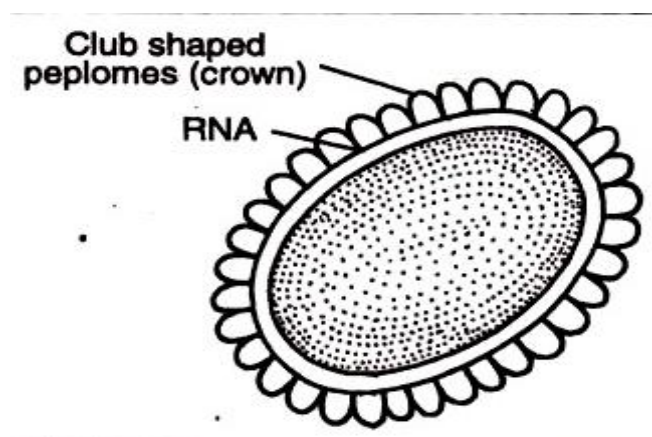
SARS was the result of infection by a coronavirus that scientists named SARS-associated coronavirus (SARS-CoV). SARS-CoV is related to SARS-CoV-2, the virus that causes COVID-19 infection.

The respiratory illness known as SARS first appeared in China in November 2002, and scientists identified it in February 2003. SARS spread to over 24 countries before health authorities managed to contain it. Nevertheless, between November 2002 to July 2003, there were 8,098 Trusted Source cases worldwide and 774 deaths.

The coronavirus SARS-Corona Virus causes SARS. A coronavirus is a common form of virus that typically leads to upper respiratory tract illnesses, including the common cold. The virus that causes a respiratory disease called coronavirus disease 19 (COVID-19). SARS-CoV-2 is a member of a large family of viruses called coronaviruses.

These viruses can infect people and some animals. SARS-CoV-2 was first known to infect people in 2019. The virus is thought to spread from person to person through droplets released when an infected person cough, sneezes, or talks. It may also be spread by touching a surface with the virus on it and then touching one's mouth, nose, or eyes, but this is less common. Research is being done to treat COVID-19 and to prevent infection with SARS-CoV-2. Also called severe acute respiratory syndrome coronavirus 2.

Corona viruses (Corona, meaning crown) are spherical (100-150 nm in diam.), pleomorphic, enveloped RNA viruses containing petal- or club-shaped peplomers (spikes) on the surface.



## Spread

Experts believe that coronaviruses, such as SARS-CoV, spread through close human contact and in droplets from coughing and sneezing. The viruses may be airborne or travel in ways that scientists do not yet know about. The body likely absorbs the respiratory droplets through the mucous membranes of the mouth, nose, and eyes.

## Ways of transmitting the virus may include:

- Hugging and Kissing
- Sharing utensils for eating and drinking

- Speaking to others within a distance of 3 feet
- Touching someone directly

If droplets from one person land on an object such as a door handle or a telephone, someone else can pick up the virus if they touch these items.

In 2015, scientists believed that SARS-CoV might survive on a dry surface for extended periods, possibly for several months.

SARS was a zoonotic disease, meaning it was of animal origin but passed on to humans. The Center for Disease Control and Prevention (CDC) note that of emerging infectious diseases come from animals, including rabies and Ebola.

When **Swine flu (H1N1)** first appeared in 2009, for example, there were concerns that a pandemic could develop. Now, it is one of the seasonal flu strains that pharmacists include in the annual flu vaccine. Many people also have immunity to H1N1.

In 2019, a new coronavirus, which scientists identified as SARS-CoV-2, began making people sick in China. This is the virus causing the current COVID-19 pandemic.

### Pathogenesis of Corona Viruses:

They are widespread in nature and infect a wide range of hosts. They have a variable tissue tropism in man. They cause Severe Acute Respiratory Syndrome (SARS). Corona virus family contains 11 recognised species which are divided into five groups on the basis of antigenic structure of N and M peplomer protein. Corona viruses have tropism for respiratory and gastrointestinal tract epithelial cells. There are various types of Corona virus groups are reported in different animals as given in animals.

**Table 66.1 Corona Virus groups**

| Group | Virus  | Host   |
|-------|--|--------|
| 1.    | Avian infectious bronchitis virus (IBV)                | Bird   |
| 2.    | Turkey corona virus (TCV)                              | Turkey |
| 3.    | Human corona virus (HCV) 229 E                         | Man    |
|       | Porcine transmissible gastrointestinal virus (PTGEV)   | Pig    |
|       | Canine corona virus (CCV)                              | Dog    |
| 4.    | Feline infectious peritonitis virus (FIPV)             | Cat    |
|       | Human corona virus (HCV) OC 43                         | Man    |
|       | Rat corona virus (RCV)                                 | Rat    |
|       | Rat sialodacryo-adenitis virus (RSDV)                  | Rat    |
|       | Bovine haemagglutinating encephalomyelitis virus (HEV) | Pig    |
| 5.    | Porcine epidemic diarrhoea (FEDV)                      | Pig    |

### Human Corona Virus 2(HCV):

In man, they cause upper respiratory tract diseases like common cold, severe acute respiratory syndrome (SARS). This HCV is responsible for 10% cases of common cold. It causes more coryza and discharge than rhino virus. Acquired immunity is not absolute. Reinfection with the same type of HCV is common in children of 4-10 years of age group.

SARS was reported first in China, then Hong Kong, Singapore. In India, the first SARS case has come from the place of sea and sand (Goa; Prasheet Warclhe (32 year old Goa), engineer who had sailed to Hong Kong and Singapore on March 30, 2003. He remained at the port for four hours before returning to Mumbai (India) on April 1, 2003.

His blood, sputum was found positive for SARS by **National Institute of Communicable Disease (NICD) New Delhi (India)**, admitted at Goa Medical College Hospital, treated in isolation ward, a second round of test confirmed that he was SARS positive based on sample drawn on April 18, 2003. Later, he was discharged after few days' treatment.

This disease, which is fatal in more than five per cent of cases and has no known cure has now killed 203 people and

infected 3,900 around the world after first surfacing in southern China.

Suspected SARS cases were reported from different parts of India (New Delhi, Nasik, Jaipur, Kerala, Kolkata, Pune, Mumbai). The total number of SARS cases in India had now gone up to seven confirmed. Nine more SARS cases, mostly of health workers had been confirmed from Pune taking a total number of those WHO have tested positive to 19. In Amritsar (Punjab) a 85 year old man, who did not travel to any of the SARS affected countries, was tested positive for SARS in the initial tests.

The global toll from SARS climbed above 500 dead, 7,000 infected on Thursday (May 8, 2003 as the World Health Organisation (WHO) declared that the disease is far more deadly than it was previously thought.

**Heinz Felfmann**, head of WHO investigating team, confirmed SARS virus spreads by droplets and is not borne.

By July 3, when the pandemic was controlled, it had affected over 30 countries, with many thousand cases & over 800 deaths. India escaped the epidemic. No further outbreak

has occurred after that till 2011 but reappear in 2019 and 2020.

## Symptoms

When SARS was occurring, its symptoms appeared 2–7 days after a person was exposed to the virus, but they could also take up to 10 days.

The first symptom was a high fever of more than 100.4°F (38.0°C). Other mild respiratory symptoms were similar to those of flu.

### Other early symptoms included:

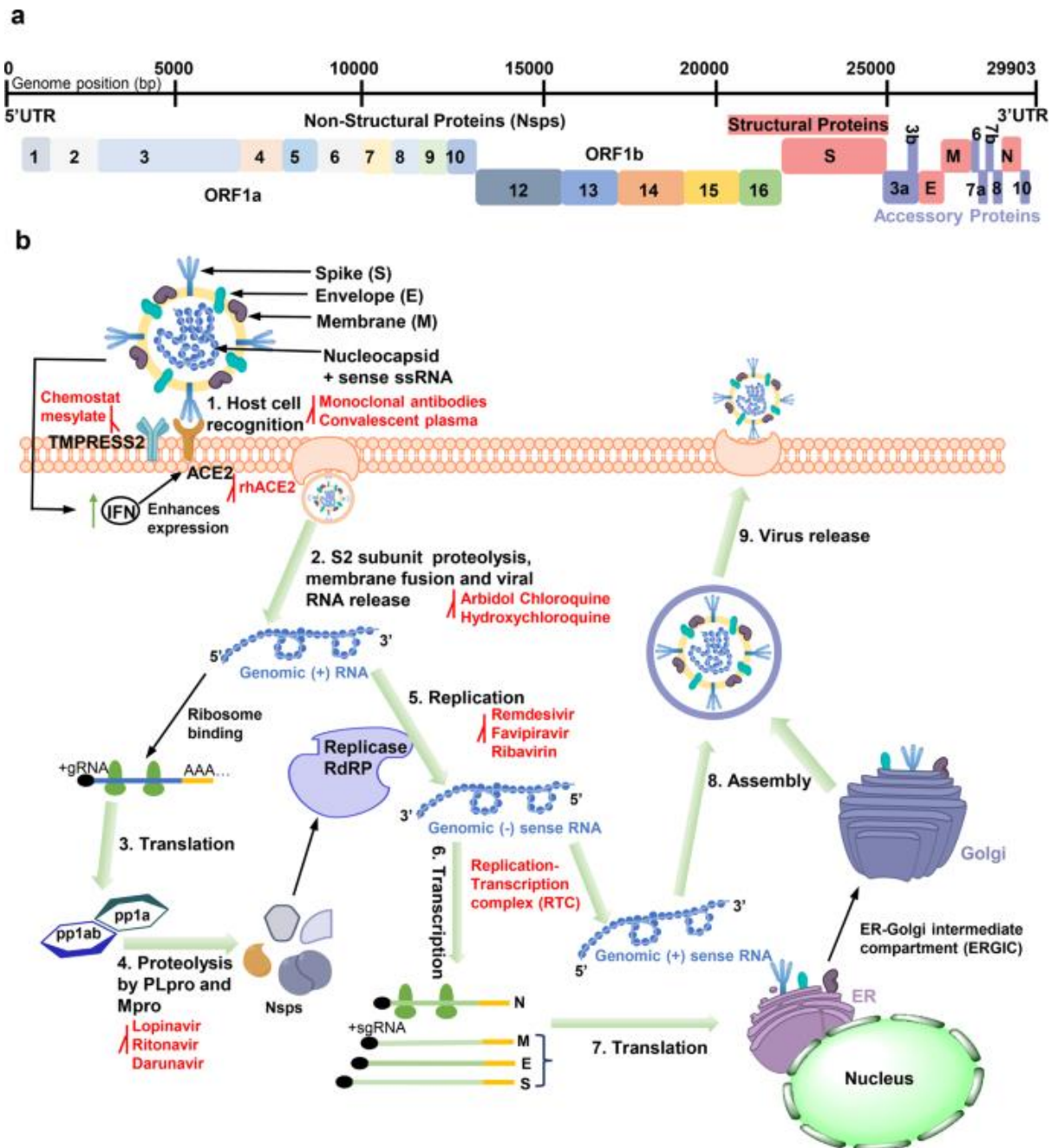
- Aches
- Chills
- Diarrhoea in 10–20% of people

These symptoms developed over the course of 7 days. After 7–10 days, the person might then have noticed:

- A dry cough
- Shortness of breath
- Low oxygen levels in the body known as hypoxia







(The whole-genome composition and replication cycle of SARS-CoV-2 and potential targets. **a** The viral genome encodes 16 nonstructural proteins (Nsps) required for replication/transcription and structural proteins required for the assembly of new virions. **b** the SARS-CoV-2 mainly infects lymphatic epithelial cells and type II pneumocytes with the initiation of human body's innate response by producing interferons (IFNs). However, IFN activates expression of ACE2 protein which acts as receptor for virus attachment to host cells. Interaction between S protein and ACE2 leads to proteolytic cleavage at the S1–S2 boundary and S2' site mediated by transmembrane protease serine 2

(TMPRSS2), further inducing the viral and host cell plasma membrane fusion. The single-stranded RNA in the viral genome is translated by host machinery to produce viral polypeptides (pp1a and pp1ab), which undergo proteolytic cleavage by PLpro and Mpro proteins to synthesize Nsps. These Nsps encode replication transcription complex (RTC), which continuously replicates and produces a series of subgenomic messenger RNAs that encode the accessory and structural proteins. The viral genomic RNA and proteins are assembled to form the virus particles in the ER-Golgi intermediate compartment (ERGIC). The vesicle-containing virus then fuses with plasma membrane of the host, releasing the viral particles out of the cell. The antiviral molecules with target sites are highlighted in red)

## Diagnosis

To diagnose SARS, a doctor would ask the individual about symptoms and carry out a physical examination. They would likely ask whether the person had recently spent time in an area where SARS was present or taken care of a person with SARS.

According to the World Health Organization (WHO), for a diagnosis of SARS, a person must have :

- ❖ A fever of at least 100.4°F (38°C)
- ❖ One or more symptoms of lower respiratory tract illness, such as cough, difficulty breathing, shortness of breath
- ❖ Radiographic evidence to suggest pneumonia

❖ No alternative diagnosis to explain the illness

When it was occurring, SARS was rare, and the symptoms overlapped with those of the flu and pneumonia.

It would only be possible for a person to have SARS if there was a current outbreak, and they had been to an area where the illness was occurring.

**Tests : Laboratory tests can help identify SARS-CoV.**

These include:

- Blood tests
- Stool tests
- Tests of nasal secretions
- Imaging tests to detect pneumonia

These tests might not be reliable Trusted Source during the early stages of infection.

**Laboratory Diagnosis of Corona Viruses:**

1. Isolation of human corona virus in cell culture is difficult. Some strains have been grown in organ cultures of human embryonic trachea in research centre.
2. Direct demonstration of virus respiratory secretions can be made by ELISA test with high titre anti-serum.
3. Serological test: CFT, ELISA and haemagglutination test become positive

### **Treatment :**

SARS is a disease have a medical emergency. During the 2003 outbreak, people with SARS in the U.S. did not need to enter quarantine. The WHO recommended isolating patients and using barrier techniques to prevent the spread of the virus, including filter masks and goggles.

No drugs, including antibiotics, appeared to be effective against SARS. Instead, healthcare providers offered supportive care, including the use of medications to relieve symptoms, such as fever and a cough. In the hospital, some people needed a ventilator to help them breathe.

## Prevention

As with other infectious diseases, some simple steps would help prevent the spread of SARS-CoV if it were to occur again.

These include:

- Washing hands frequently or cleaning with an alcohol-based detergent
- Avoiding touching the eyes, mouth, and nose with unclean hands
- Covering the mouth and nose with a tissue when coughing or sneezing
- Avoiding sharing food, drinks, and utensils
- Staying at least 3 feet away from other people
- Regularly cleaning surfaces with disinfectant

Similarly, anyone with symptoms of SARS would limit interaction with other people until 10 days after their symptoms improve.

SARS appeared to be contagious only after symptoms emerged, and it was most likely to spread during the second week of illness, according to the CDC.