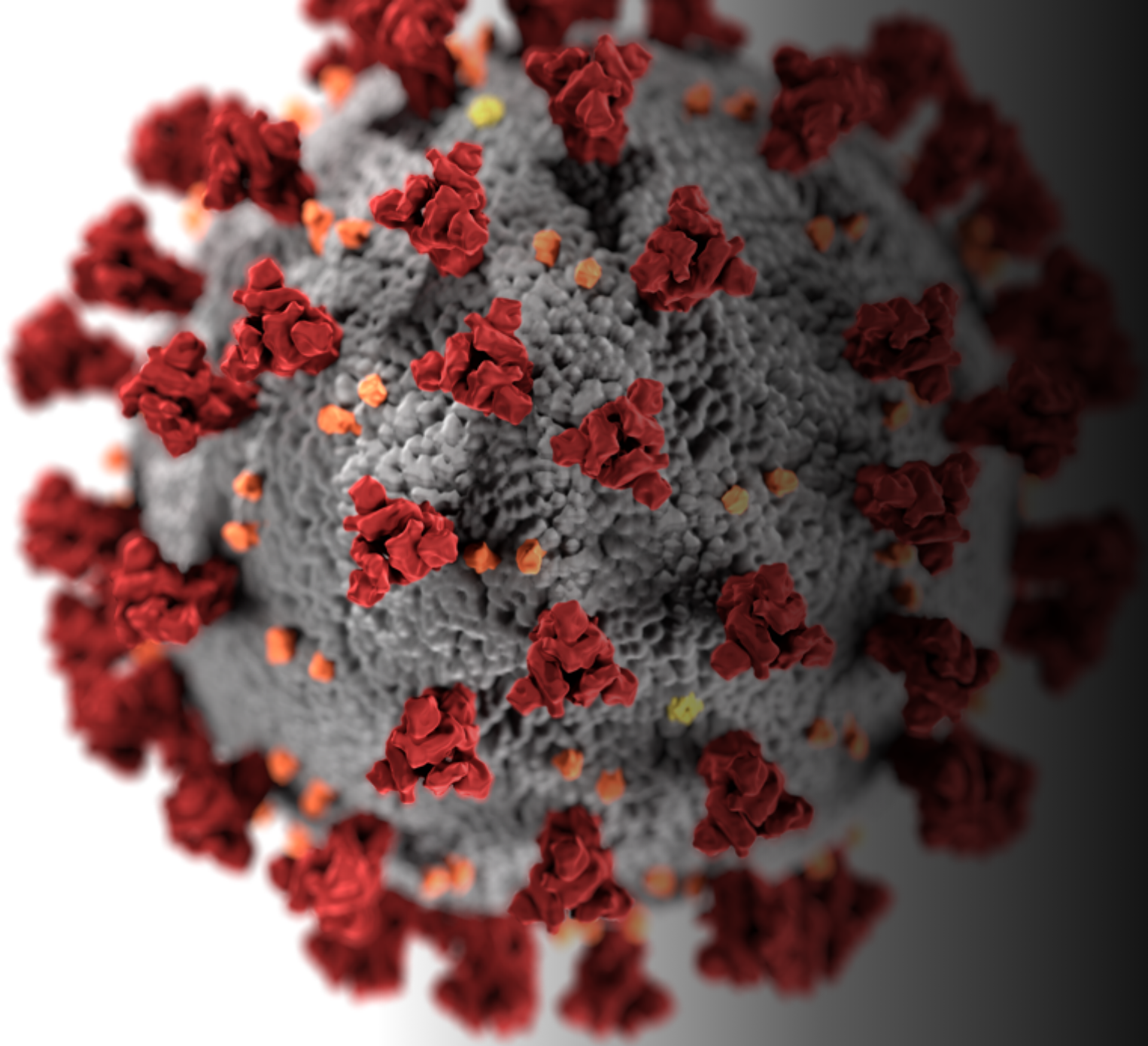


COVID-19 Overview for Radon Mitigators

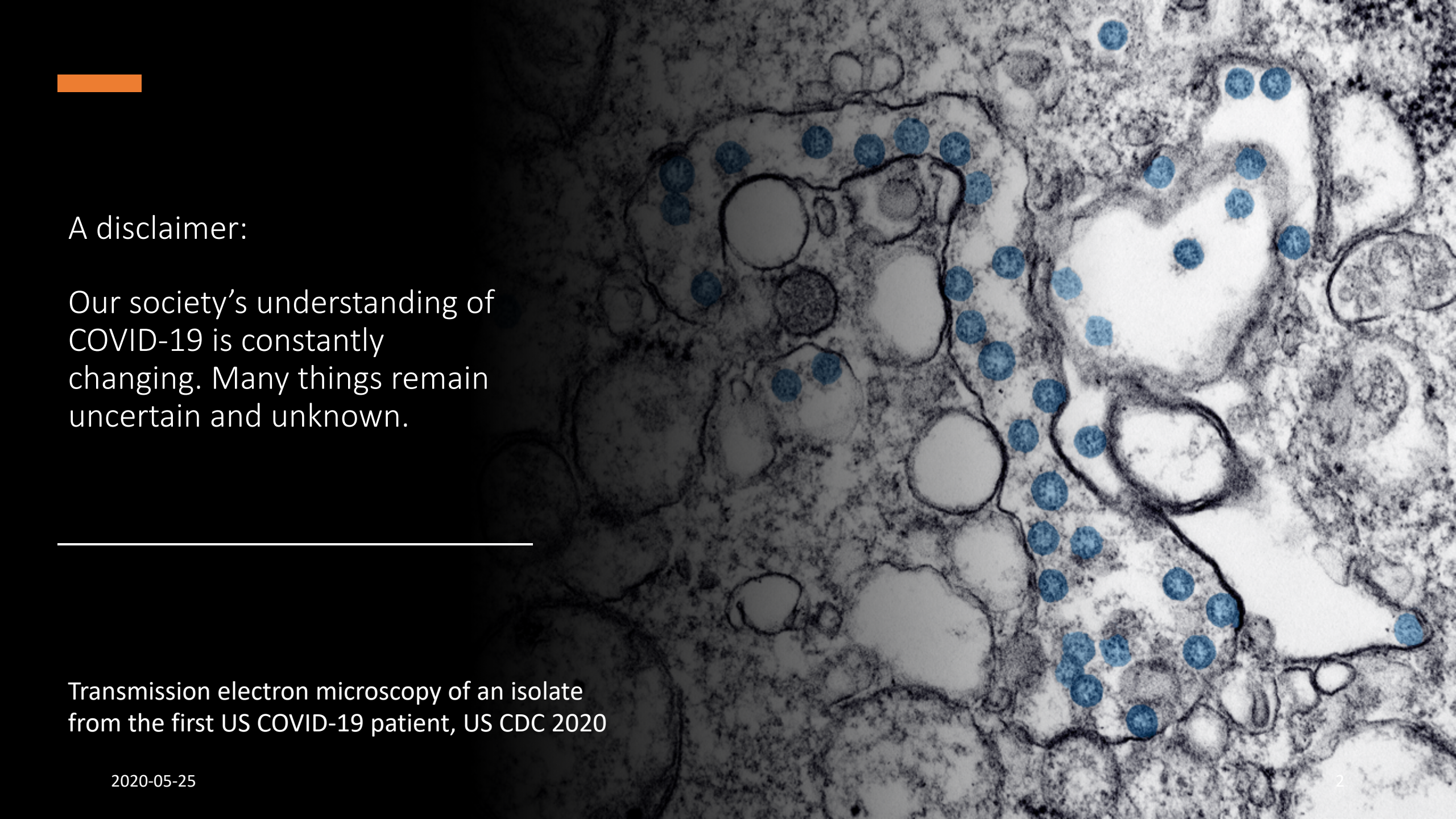
Anne-Marie Nicol, MES PhD

Associate Professor of Professional Practice

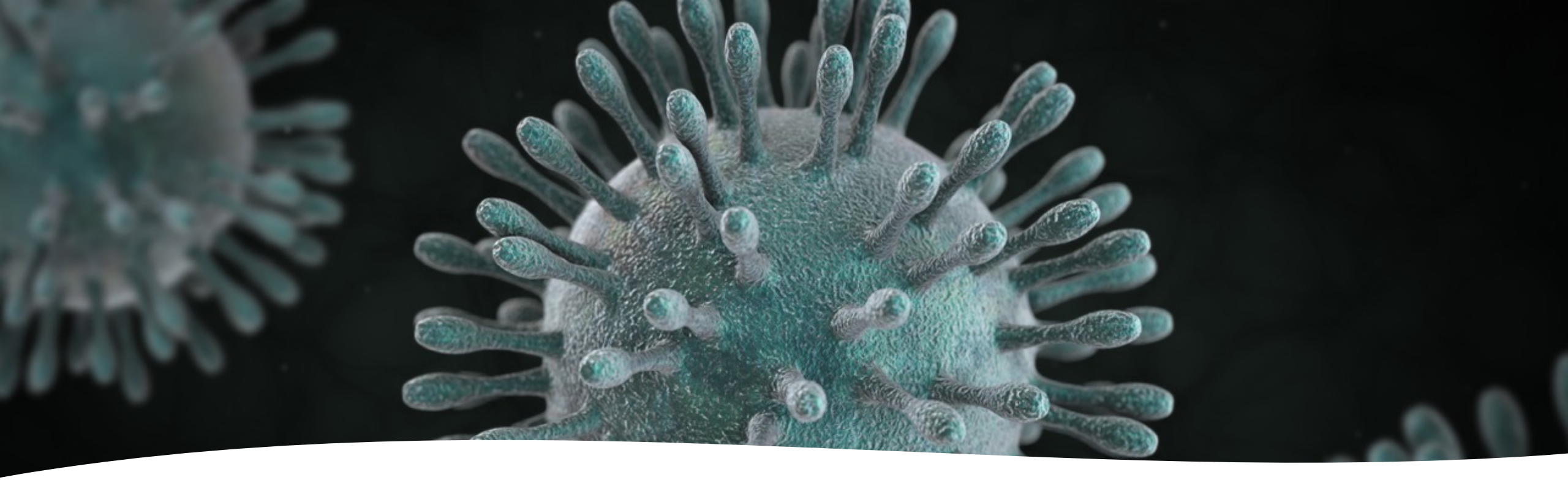
Faculty of Health Sciences, Simon Fraser University

A disclaimer:

Our society’s understanding of COVID-19 is constantly changing. Many things remain uncertain and unknown.



Transmission electron microscopy of an isolate from the first US COVID-19 patient, US CDC 2020

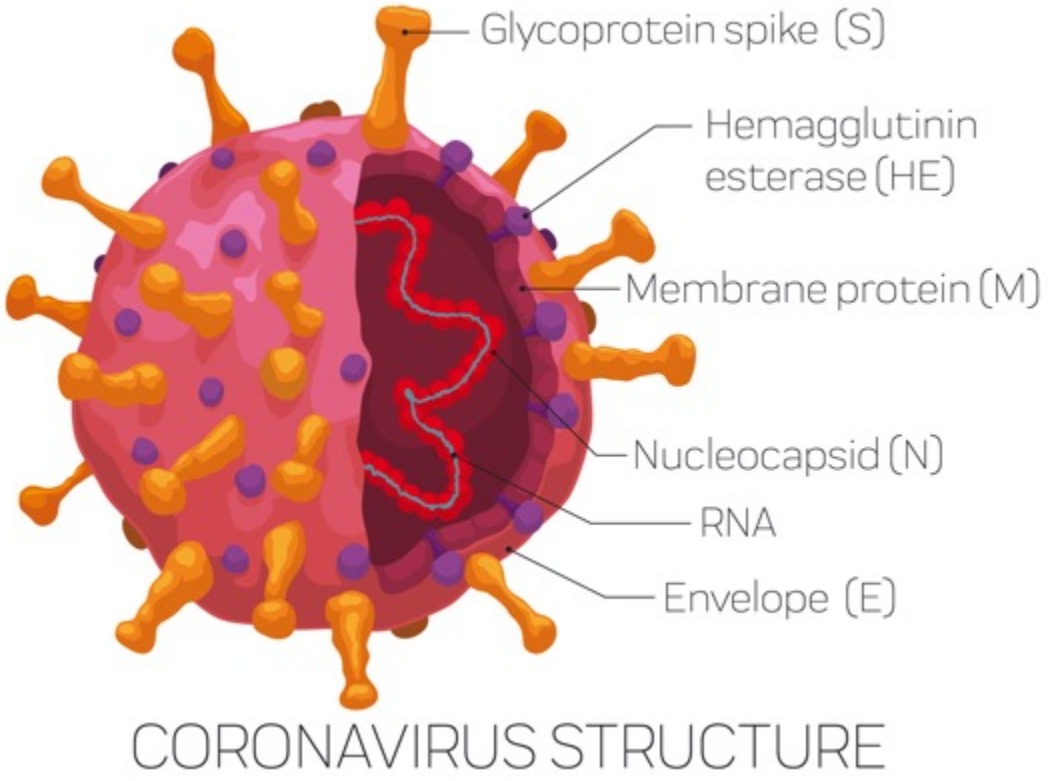


What is a Coronavirus?

- Single strand RNA virus
- Member of the Coronaviridae family of viruses that includes:
  - SARS CoV (2003)
  - MERS CoV (2015)
  - 229E
- Virions covered by a “halo” or corona of viral spikes
  - These help the virus attach to a host cell

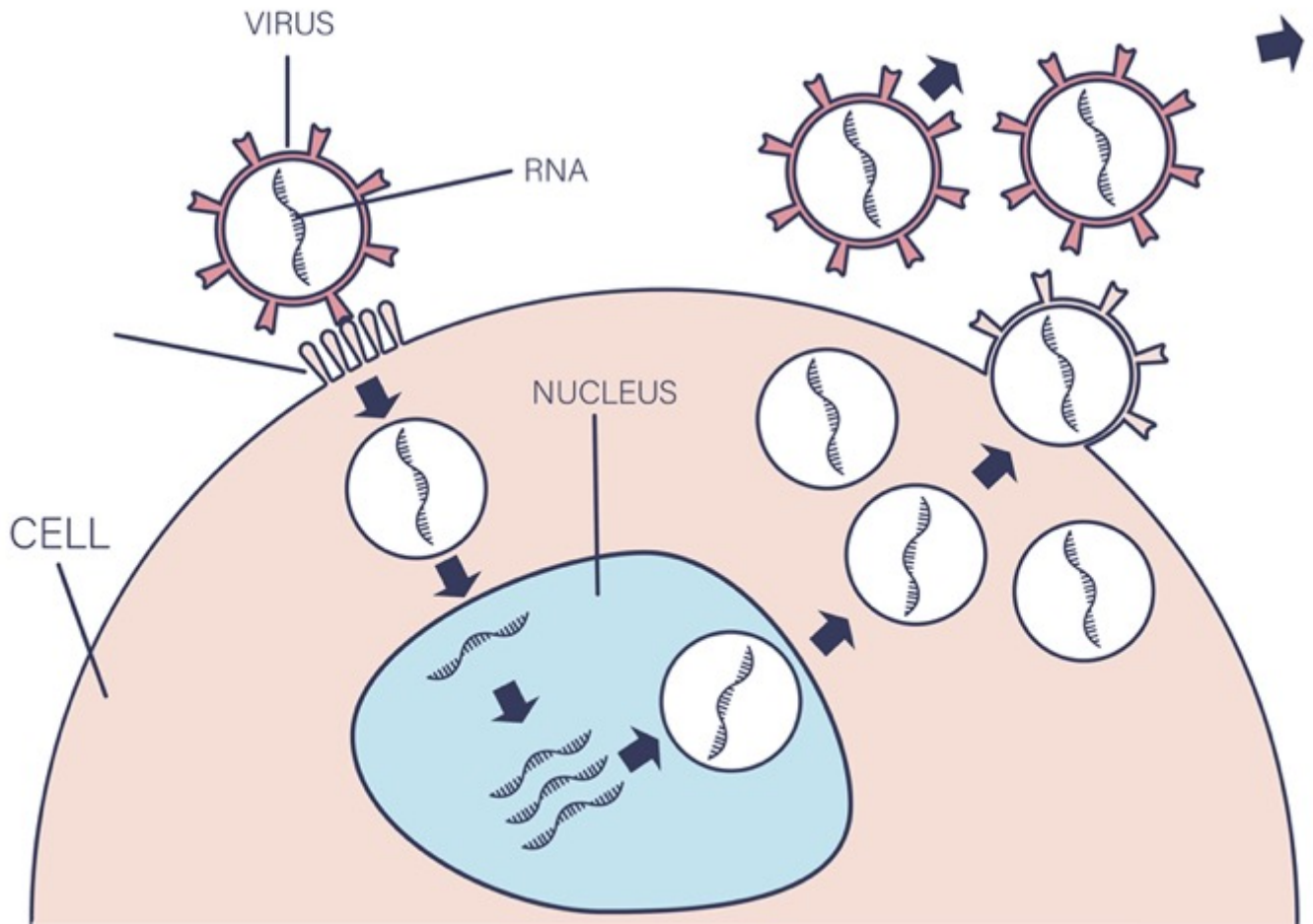
COVID-19 naming and structure

- **Co**rona**vi**rus **D**isease 20**19 = COVID-19**
- Virus that causes the disease has been named SARS-CoV-2
- SARS= “Severe acute respiratory syndrome”
- Virus surrounded by a **lipid membrane**
- Attaches to human ACE2 receptor cells
  - Found mostly in the Lungs and Trachea
  - Some receptors in GI tract



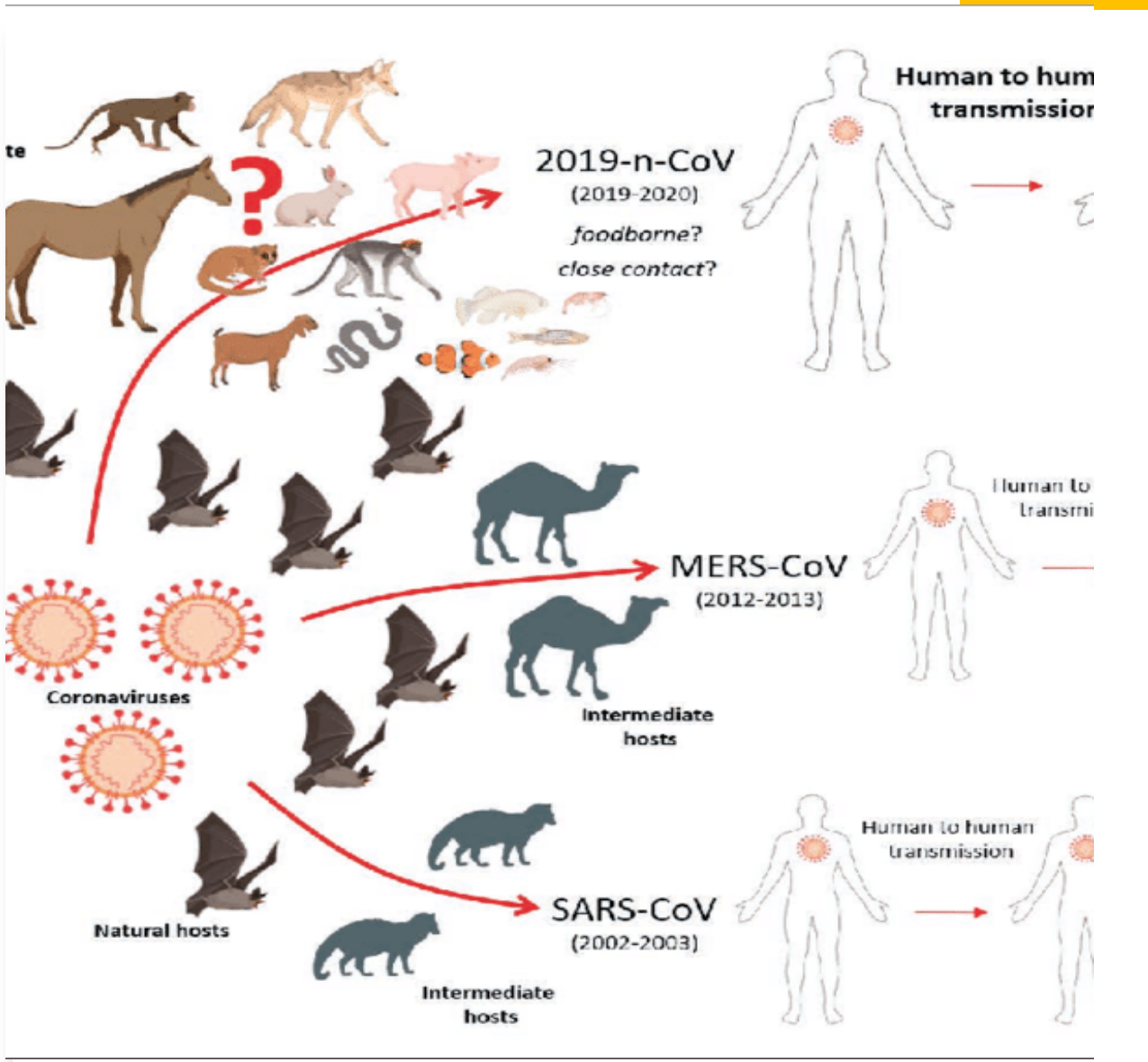
CORONAVIRUS 2019 - nCoV

TYPICAL VIRUS REPLICATION CYCLE



We do we know about COVID-19 origins?

- Many animals are coronavirus hosts and intermediate hosts
- Origins and “patient(s)” zero still unknown
- Potentially exposure through bat guano or exhalation from an intermediate host
- Forensic analyses of samples
  - France and China had cases as early as mid-November
  - Many stored samples around the world could be tested

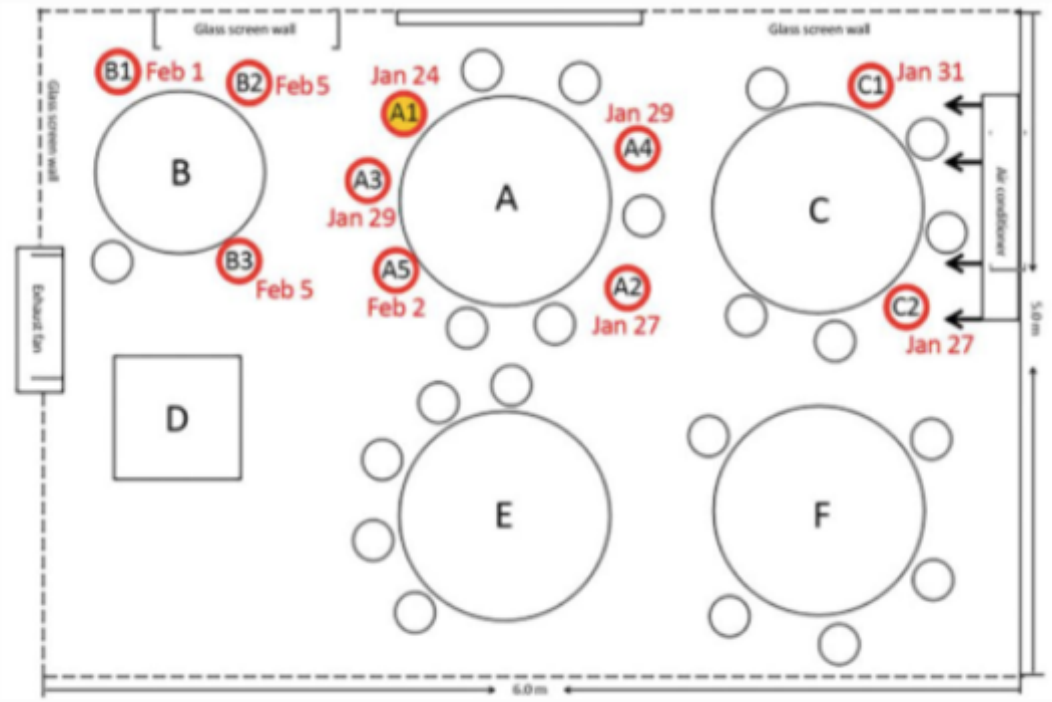


Alfonso J. Rodriguez-Morales, pre-print 2020

What do we know about transmission?

- Primary transmission through **droplet exposure**
  - Coughing or sneezing
  - Talking
  - Laughing and Singing
  - Sharing a meal
- Restaurant research
  - Limited patrons
  - Air conditioned, no windows
  - Patient A was *presymptomatic*

SARS-Cov-2 COVID-19 Research



Index case-patient denoted by a yellow-filled red circle. Red circles indicate seating of future ... [+] CDC

COVID-19 Outbreak Associated with Air Conditioning in Restaurant Guangzhou, China, 2020, Lu et al. *Research Letter*

Mt Vernon Choir (n=61)

Washington State outbreak with clearly identified contact tracing

No physical contact

2.5 hours of singing

Shared cookies and tea

Stacked chairs

Symptoms evolved 1-12 days later

87% developed COVID-19, 2 died to date.

A graphic released with the study. Centers for Disease Control and Prevention

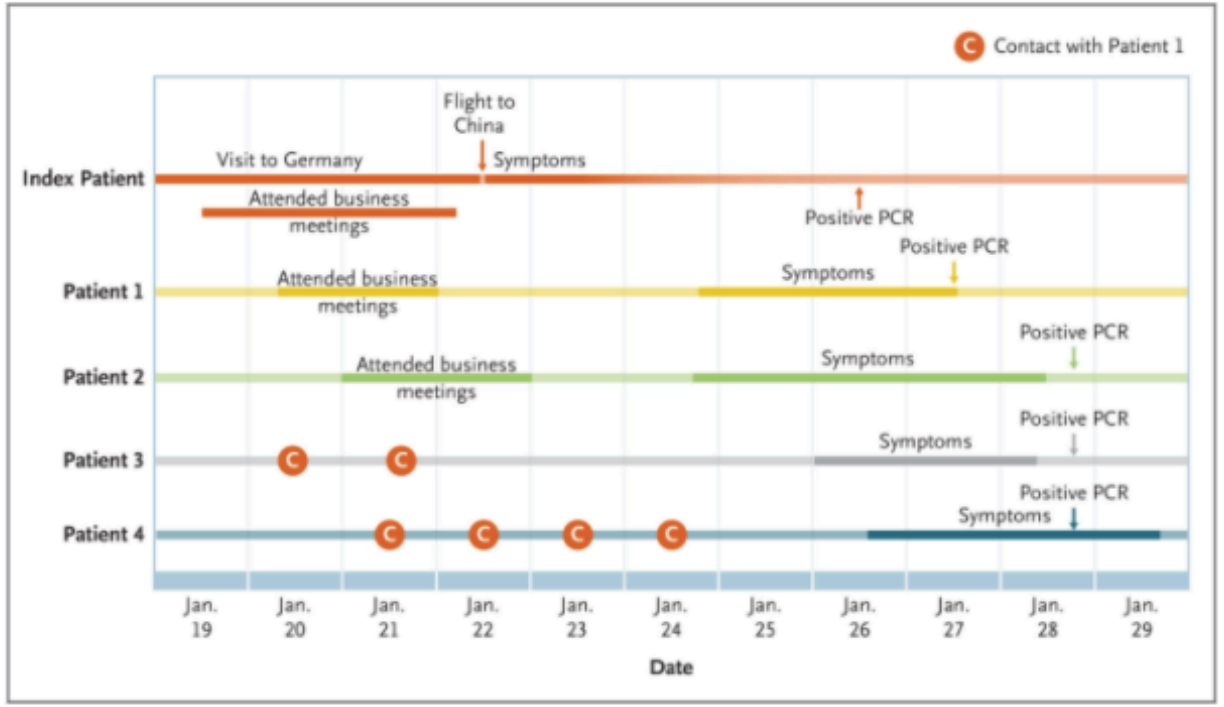
Early German company transmission chain

Index Patient from Asia had very mild symptoms (headache) for which she took a headache. Had visited parents from Wuhan.

Attended meeting In Munich (Webasto- German auto supplier)

Employee had meetings and ate lunch in the cafeteria

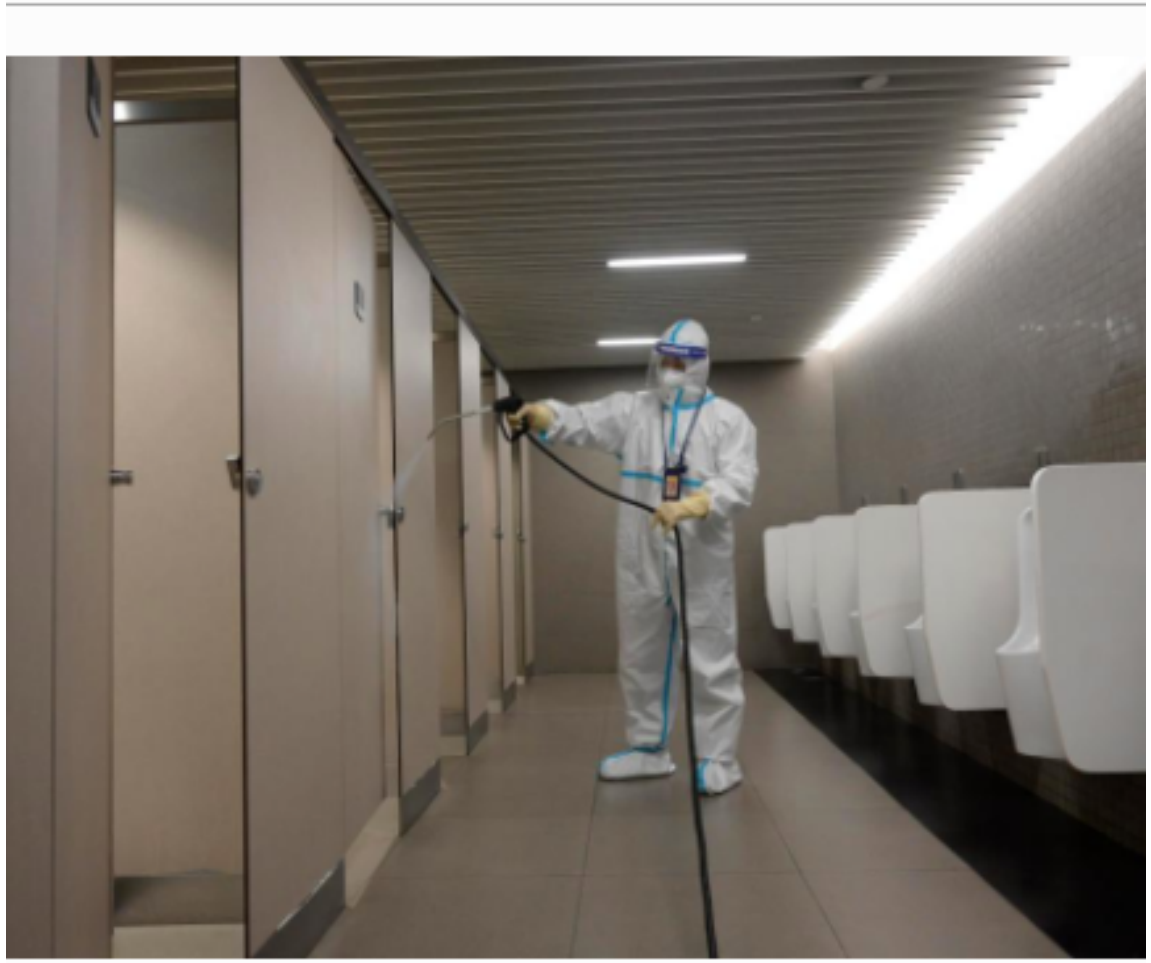
One person was infected after Patient zero passed them a shaker of salt.



A German man appears to have caught 2019-nCov at a business meeting with his colleague from China, who didn't show symptoms at the time. Above, an image depicting the timeline of exposure between the colleague from China (the index patient), the German man (patient 1) and three additional German coworkers (patients 2-4). The image also shows when each patient started showing symptoms.
(Image credit: The New England Journal of Medicine ©2020)

Aerosol and fecal transmission routes

- Aerosol transmission has not been ruled out
  - Research shows that the virus can be aerosolized
  - Toilet plumes can aerosolize viruses
  - Finding **evidence** of aerosol transmission is currently **difficult**



GZHOU, CHINA - APRIL 01: A staff member wearing protective suit spays ectant liquid at a ... [+] JI DONG/CHINA NEWS SERVICE VIA GETTY IMAGES

Feces, urine and transmission

Fecal and urine transmission

- Virus found in these fluids, no evidence of cause are primary outbreaks, yet...

Concern may be for “Toilet Plumes”

- Aerosolized droplets made from flushing with lid up

SARS (2003) did have one major fecal tranmission outbreak.

Figure 4-2. Toilet flush showing aerosol and particle deposition.

SARS 2003 outbreak

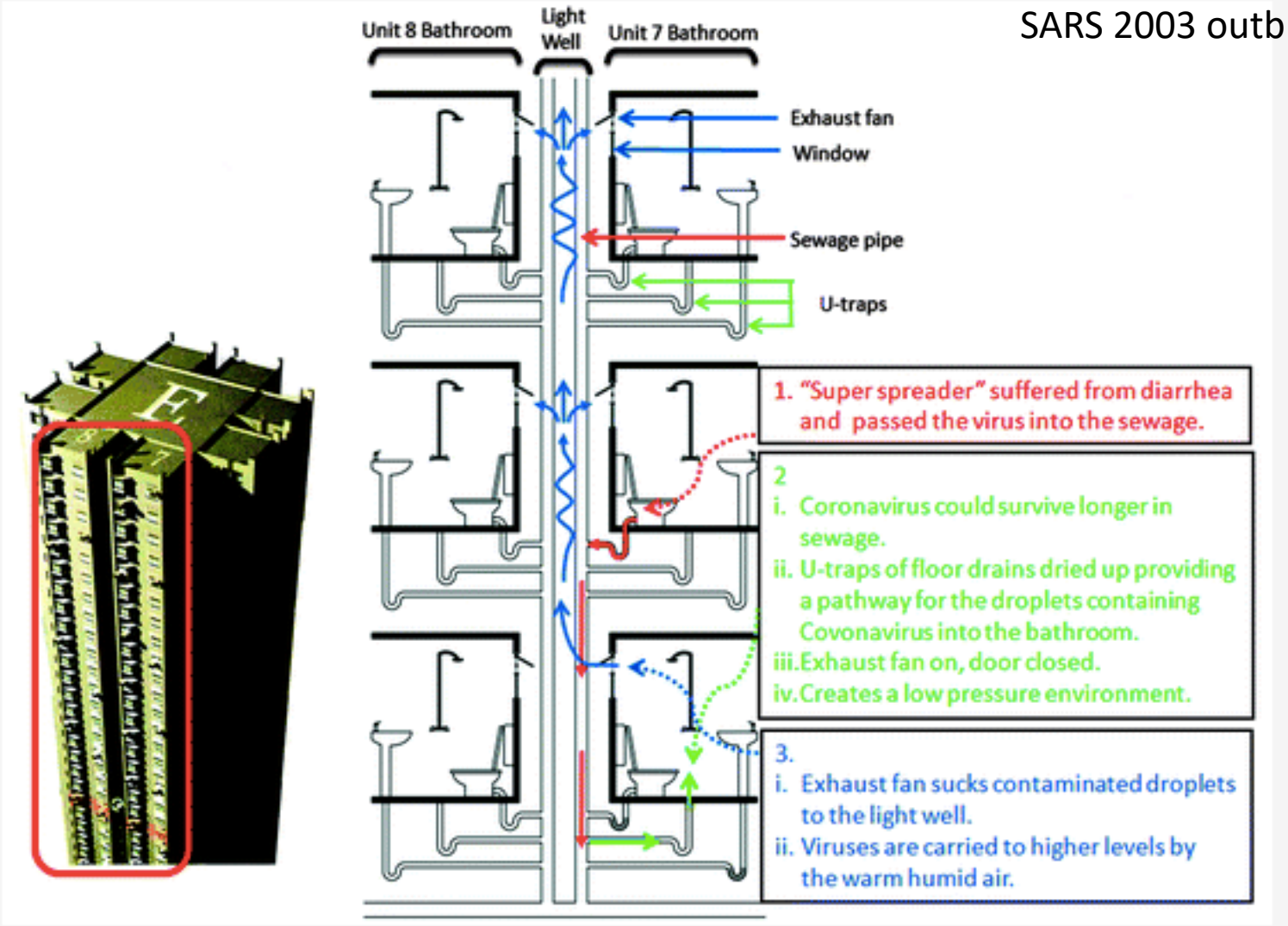


Fig. 13.3

Diagrammatic representation of the model which explains the peculiar infection pattern and its fast transmission rate

Lessons learned from SARS Cov-1 research

Amoy Gardens

Index SARS case had diarrhea

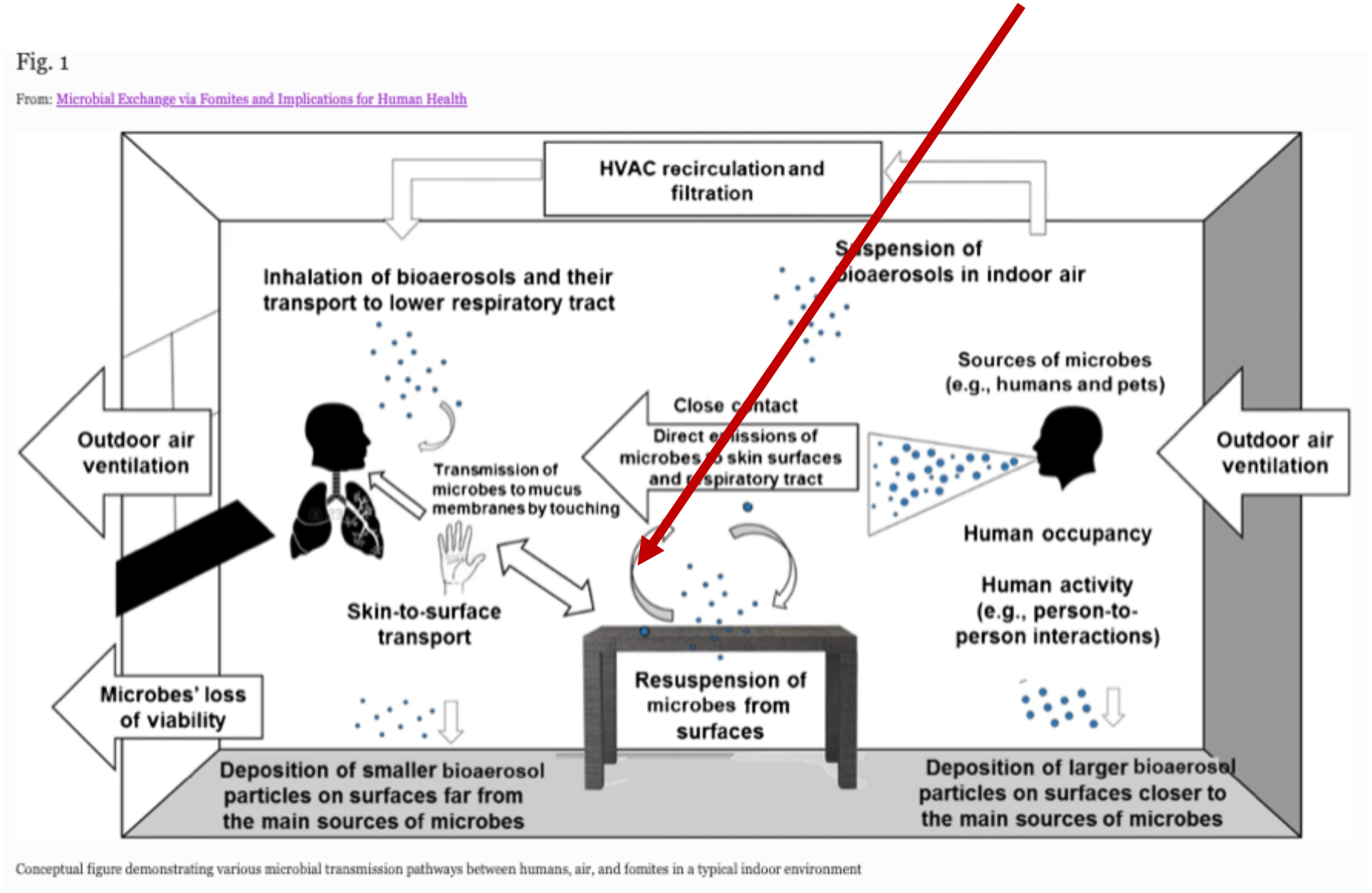
321 people were infected total in the buildings

42 died of SARS

At least 4 towers impacted

Wong et al. Scientific Models in the SARS Research and Biology

Contaminated surfaces (aka *Fomite transmission*)



Stephens et al. 2019 https://link-springer-com.proxy.lib.sfu.ca/article/10.1007/s40726-019-00123-6/figures/1

Fomite transmission varies by viral persistence

Surface	Persistence of virus on surface
Paper/Cardboard	Paper and tissue: up to three hours Cardboard: up to 24 hours
Stainless Steel	3-4 days
Copper and Aluminum	Up to 4 hours
Plastic	At least 3-4 days* - *could be longer*
Wood	Up to 2 days
Glass	Up to 4 days
Cloth	Up to 2 days

Non-porous and and less conductive surfaces allow virus remain longer

What are the symptoms of COVID-19?

Most well established- **Cough, shortness of breath fatigue, muscle aches, fever >39.4**

Other known symptoms:

- Headaches
- Loss of smell
- Diarhhea/nausea, loss of appetite
- “COVID toes” –in children
- Runny nose
- Sore throat
- Chills

Other issues

- Stroke (in younger people)
- Cardiac involvement
- Rashes

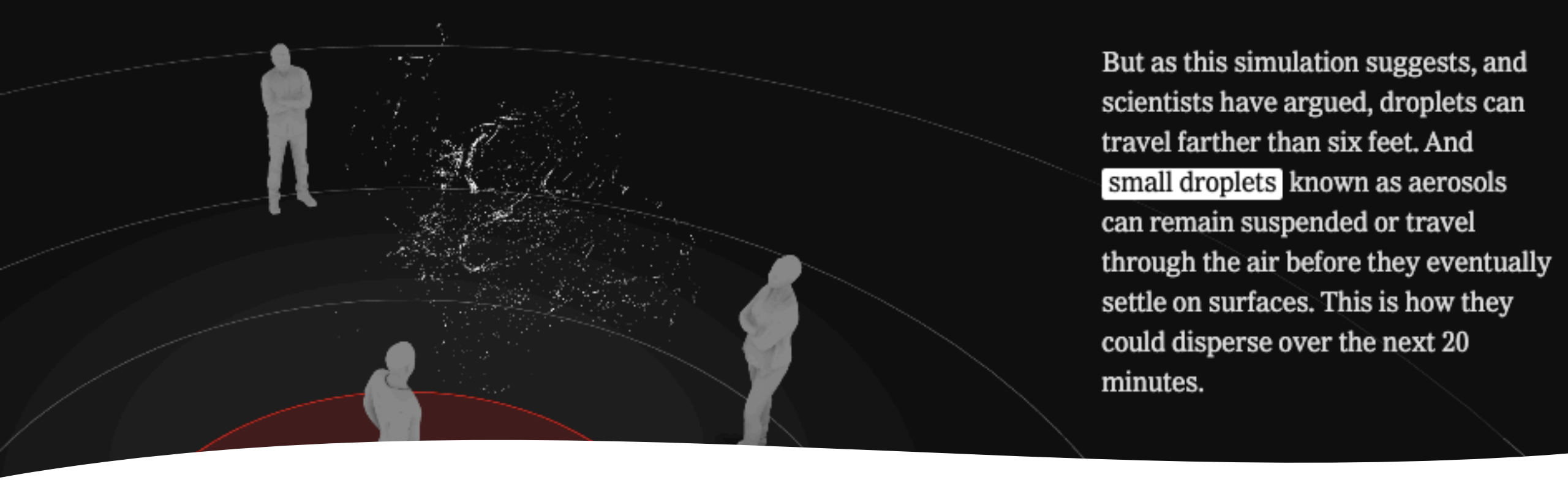
Asymptomatic and Pre-symptomatic Transmission possible

- Evidence exists of transmission BEFORE more severe symptoms develop
- Estimates suggest 44% or more transmissions may occur PRIOR to onset of symptoms
  - Preliminary research only, from different countries with small sample sizes
- Younger people generally have milder symptoms
- Bottom Line: you don’t need to be sick to transmit the virus to someone else
- Transmission more likely and successful when people are symptomatic

Preventing viral transmission

Handwashing with soap works *really well, why?*

- Enveloped virus with a fatty lipid layer around the outside
- Soap degrades lipid layer, breaking up the virus
- Needs time though- hence the “at least 20 seconds”
- Rinse broken down viral particles down the drain



Preventing transmission continued

[Image from: NYT https://www.nytimes.com/interactive/2020/04/14/science/coronavirus-transmission-cough-6-feet-ar-ul.html]

Staying at home works *really well*

- staying away from others reduce risk considerably

Social distancing works *really well*

- Staying at least 6 feet away keeps to avoid droplets
- Aerosol transmission still unclear- research on-going

Besides sneezing and coughing, laughing, eating, singing- all generate droplets,

Cleaning and Disinfection

- Bleach solutions work very well
- Alcohol >60% useful
- Surfaces in bathrooms should be sanitized frequently if used by people who are going out
- Shared objects important
  - Phones
  - Pens
  - Touch screens

Government of Canada | Gouvernement du Canada

Search Canada.ca

MENU

Canada.ca > Departments and agencies > Health Canada > Drugs and health products > Hard-surface disinfectants and hand sanitizers (COVID-19)

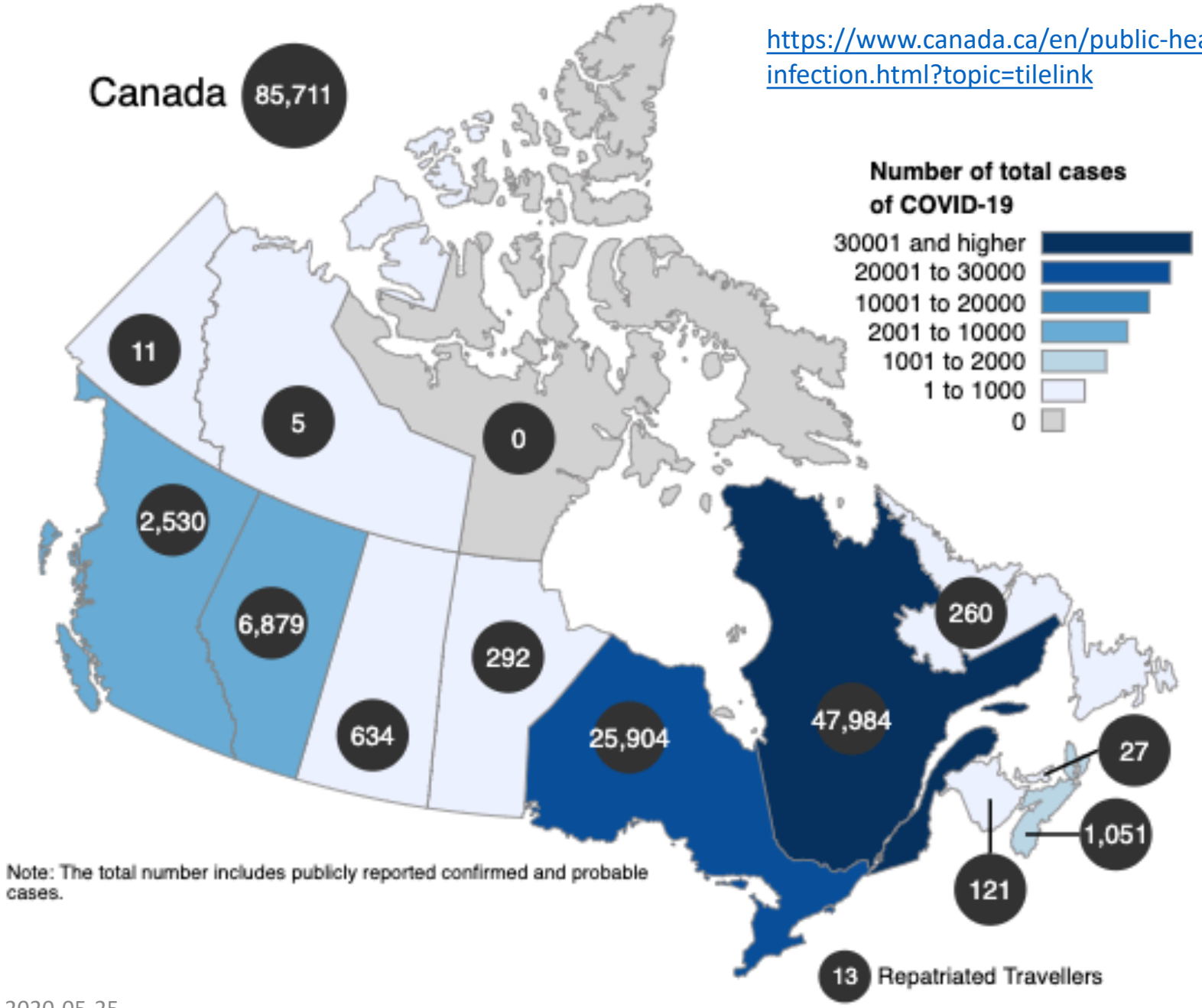
Hard-surface disinfectants and hand sanitizers (COVID-19): Information for manufacturers

Overview | List of disinfectants (COVID-19) | List of approved hand sanitizers

Information for manufacturers | Products accepted under interim measure

Check your disinfecting products here, many common products are NOT approved for COVID

https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection.html?topic=tilelink



The number of total cases of COVID-19 in **Northwest Territories** was **5** as of May 25, 2020.

▶ Play .csv

Thank-you! Any questions?