Week 10
BIO-1306 - Biology 2 – ICB textbook

Hello and Welcome to the weekly resources for BIO-1306 - Biology 2 – ICB textbook!

This week is Week 10 of class, and typically in this week of the semester. your professors are covering these topics below. If you do not see the topics your particular section of class is learning this week, please take a look at other weekly resources listed on our website for additional topics throughout of the semester.

We also invite you to **look at the group tutoring chart on our website to see if this course has a group tutoring session offered this semester**.

If you have any questions about these study guides, group tutoring sessions, private 30 minute tutoring appointments, the Baylor Tutoring YouTube channel or any tutoring services we offer, please visit our website www.baylor.edu/tutoring or call our drop in center during open business hours. M-Th 9am-8pm on class days 254-710-4135.

Keywords: *Pathogen, ssRNA, Antibodies*

TOPIC OF THE WEEK: Transmission of Disease

This week we will be looking at how disease, specifically SARS, broke out in China and how researchers were able to track down its origin.

- Pathogen → Agent that causes disease (virus or bacteria)
- ssRNA → single-stranded RNA
- Antibody → Protein in the blood produced in response to a pathogen infecting the body

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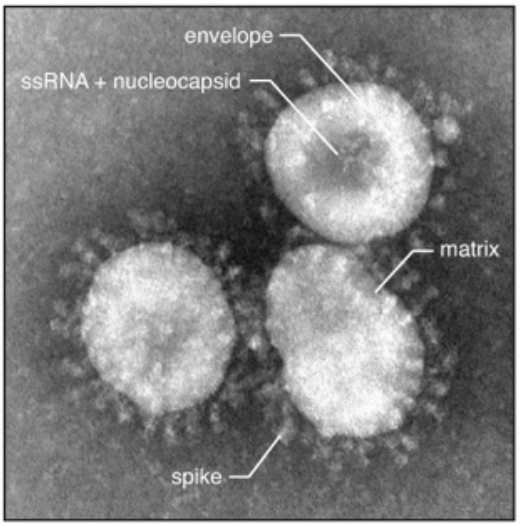
HIGHLIGHT #1: Coronavirus Disease



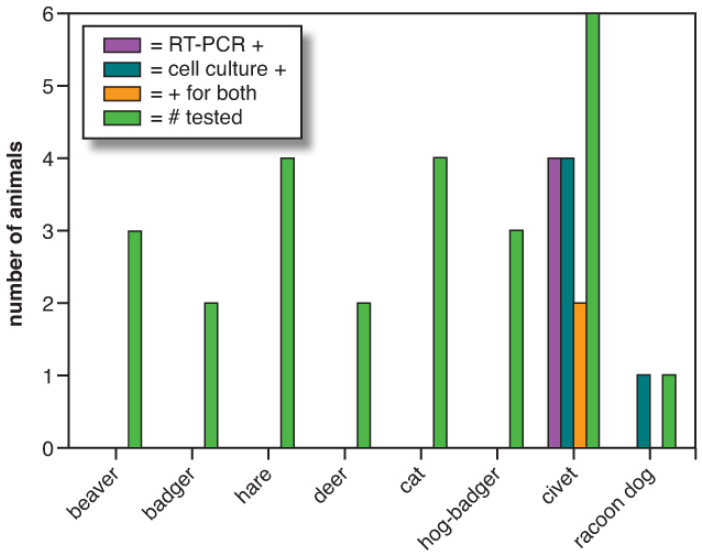
New flu-like symptoms were presented in patients from Guangdong Province in late 2002. Further research showed that this was a new disease, and it was named SARS for sever acute respiratory syndrome. The pathogen of SARS causing the disease was the **coronavirus**, a spherical viral particle with spikes projecting on the outside of the envelope. To start off, **how did researchers find that this was a novel disease?**

Antibodies are produced by our immune system when we come in contact with a pathogen. Every time we get sick, antibodies are produced so that we are able to gain resistance to the disease. For those with SARS, researchers expected to see antibodies present in them.

patient condition	positive for antibodies against SARS coronavirus
atypical pneumonia paired samples 5 to 12 days apart ($n = 22$)	20 (91%)
atypical pneumonia single samples ($n = 33$)	28 (85%)
healthy adults ($n = 60$)	0

Something interesting researchers saw was that healthy individuals did not have any antibodies against SARS coronavirus. If there were no antibodies present, this showed that the virus was not previously present in the human population and it was newly emerging. If this was an older virus, then even healthy individuals would've had antibodies and those antibodies would've aided with resistance ot the disease.

To further track down the source of the disease, researchers decided to learn more about the second patient infected with SARS, who was a chef. This chef had come into contact with exotic wild animals, so researchers decided to test common animals served in China at restaurants.



What did they see? Researchers conducted RT-PCR and also completed cell cultures using tissues from each of the animals. Reverse Transcription polymerase chain reaction is when RNA is first reverse transcribed into its DNA complement. A specific section of the DNA is then amplified using primers specific to the human SARS coronavirus. If the section of DNA is amplified, then that means the coronavirus is present in the sample. If the DNA is not amplified, then the coronavirus is not present. If you want to learn more about RT-PCR and how to works, you can check out this video: https://www.youtube.com/watch?v=1vqNZ-H7Pq0

Out of all the animals tested, the **civet** was the only animal that showed the presence of coronavirus from both methods.

After looking at the specific animals, the researchers further tested their hypothesis of the disease originating from animals by testing people with specific occupations for SARS antibodies.

human population	% testing positive for SARS coronavirus antibody
wild animal traders (n = 20)	40
butchers (n = 15)	20
vegetable retailers (n = 20)	5

20% of butchers and 40% of wild animal traders tested positive for the SARS coronavirus antibody but only 5% of vegetable retailers tested positive. **They**

hypothesized that since wild animal traders and butchers come into contact with these exotic wild animals, more people with that occupation were exposed to the SARS coronavirus and therefore have the antibody. This provided a little more evidence to support their inference that coronavirus originated from an animal.

Although researchers detected the presence of the coronavirus particles in civets, they could NOT conclude that the disease originated from that animal because there were still other animals in the market they hadn't tested. Any of the animals they hadn't tested could've also infected the civets in the market so they could not make a clear conclusion.

CHECK YOUR LEARNING:

1. What is the genetic material stored in coronavirus?
2. If Person A had been infected with a new disease, would they have antibodies? What about Person B who has never been infected with the disease?

THINGS YOU MIGHT STRUGGLE WITH:

1. Understanding RT-PCR so just look at the video in the resource and some more online to understand why/how it's used

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Thanks for checking out these weekly resources!
Don't forget to check out our website for group tutoring times, video tutorials and lots of other resources: www.baylor.edu/tutoring ! Answers to check your learning questions are below

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Answers:

1. ssRNA
2. Person A would have antibodies but Person B would not