

DISCUSSION QUESTIONS FOR HIGH SCHOOL TEACHERS AND THEIR STUDENTS



October 2019

For all four articles:

The materials presented here represent authentic research that is probably pretty specific (i.e. not directly covered in your high school course work). What parts of your curriculum (your course outline) are directly related to the topics written about in each of the four papers (or choose one)?

For each of the four topics presented (or choose one), how would you build a model using recycled materials to illustrate the key concepts of the topic?

These materials describe scientific discoveries that can benefit human medicine. However, many discoveries don't necessarily start off with the intent of being used in medicine. Research for the sake of curiosity and general knowledge (i.e. not deliberately thinking about applications) is often referred to as **basic research**. Why do you think basic research is so important for science and for society?

For “Plants: Amazing Phyto-Pharmacies”:

Phytochemicals are often the reason why many herbal remedies work. But how is a medicine in the form of a phytochemical different from that of an herbal remedy?

Do a little research on the term **biopiracy**. What do you think of this issue?

For “Kinesin: The Little Engine that Could”:

The paper mentioned that a cell has a sort of “skeleton” of its own, called a **cytoskeleton**. The paper also mentioned a few reasons why this is important - can you highlight them? Can you think of other reasons why a cytoskeleton might be important?

The fact that Dr. Vale discovered kinesin using nerve cells from giant squids might sound strange, but in

biology, it's not uncommon to make discoveries by studying other organisms. Why do you think this is the case? Look up the term **model organism**, and discuss an example of a model organism.

For “DNA Replication: Not your Office Photocopier”:

What would happen to your cells if they were only able to initiate replication at one site of each cell's genome? What would happen to you?

Cancer often requires the accumulation of multiple mutations in the DNA (i.e. lots of things need to go wrong for a cancer effect to be seen). As outlined in the paper, often one of the first mutations involves one that makes DNA replication itself more error prone. Why might this lead to a cascading effect, and ultimately lead to the cancer itself?

For “Integrins and the Social Network of Cells”:

If you've had an infection before, what are some of the symptoms that you are familiar with? Do any of these seem to relate directly to how integrins might be involved?

The paper made mention of cancer. Look up the word **metastasis**, and discuss in the context of how a defective integrin protein might contribute.

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