

## Task #3

### Determining the “Big Picture” – Analyzing a Scientific Paper

**Due: Friday, September 30<sup>th</sup>**

*Reading scientific literature can be, in a word... EXHAUSTING! But there are several other words to describe that feeling when you finally have the “Ah-ha!” moment after diligently attacking a complex paper... words like: exhilarating, insightful and rewarding! We want you to feel this way. That will require hard work and patience on your part. You will likely also need to be humble and ask your teammates and teacher questions about what you are reading. Reading is an important skill in science. This is an opportunity to practice!*

Your teacher has been provided 3 articles that describe the practice protein you will be modeling during the Qualification Phase, **Glutathione-S-Transferase epsilon 2 (GSTe2)**.

1. A nice introduction and overview with visual models: David Goodsell’s August 2017 “Molecule of the Month” from the PDB101 site.
  - a. *This is going to be the least complex paper, written for a general audience. Read this first, and in its entirety.*
  - b. *For your future R&D model, if there’s no Goodsell article on your topic, ask your Mentor to recommend either a “Review” article, or a lay-audience article from a reputable newspaper or magazine (Time, Newsweek, etc).*
2. The primary citation for the 3zmk PDB file: Riveron, et al. A single mutation in the GSTe2 gene allows tracking of metabolically based insecticide resistance in a major malaria vector. *Genome Biology*. 2014. 15:R27.
3. An additional GSTe structure paper: Wang et al. Structure of an insect epsilon class glutathione S-transferase from the malaria vector *Anopheles gambiae* provides and explanation for the high DDT-detoxifying activity. *Jo. Structural Biology* 164. 2008. 228-235.
  - a. *Both of these papers (#2-3) are complex, peer-reviewed, scientific papers written for a scientific audience... so they will be more challenging. But they are necessary to tell the structure-function story.*
  - b. *We recommend you tackle both papers in this sequence: **Introduction, Results/Discussion, Summary/Conclusions, and Abstract**. While reading the materials and methods section can be informative, you may not find it necessary to tell your structure-function story.*

Thoroughly read (and re-read) each article (per guidelines above), and discuss with your team. Your goal with this activity is to wrap your brain around this story, and create an outline that will later help you write a clear, descriptive and succinct abstract to tell the molecular story of Glutathione-S-Transferase epsilon 2. Consider, discuss, and come up with an answer to the following questions:

**The “Big Picture” Outline:** (remember to read all 3 papers first!)

1. Identify the specific protein you are studying – both the full name and its abbreviation.
2. In what organism(s) is it found?
  - a. *Is this protein part of a larger family of proteins? Explain.*
3. Give supporting information on the molecular function of the protein.
  - a. *What does this protein do? What is its job?*
  - b. *Where can you find the protein within the tissues or cell?*
  - c. *Does it contain or interact with other molecules (a ligand, toxin, drug...)? If so, describe...*
4. Describe what would/could happen if the protein is missing or altered.
  - a. *Would this be lethal? Does a disease or disorder result? Or might it be beneficial to survival?*
  - b. *How might an improper or missing protein impact other molecules/cells within the organism?*
  - c. *Is there a known mutation that can alter this protein? If so, describe it.*
5. Thoroughly describe the physical structure of the molecule.
  - a. *How many amino acids is it made of?*
  - b. *Describe the overall shape.*
  - c. *Is it sub-divided into domains or motifs?*
  - d. *What secondary structures are present?*
  - e. *What specific amino acids aid in or perform the function you are describing? How?*
  - f. *Is there a ligand present in the molecule? If so, describe its structure.*
6. Why should people care about the study of this protein? Relate it to everyday life. Is there a regional or global impact?
7. What future research is needed to help advance our understanding or use of this protein? Your answer should address what you are discussing directly above in #6.

**\*\*Do NOT copy** phrases and sentences directly from articles or any other resources. **This is plagiarism, and it is strictly prohibited.** Your writing is your own work and therefore needs to be your own words.

Email your big-picture outline to Judy ([birschbach@msoe.edu](mailto:birschbach@msoe.edu)) no later than

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***First, second and third place WILL be awarded for Task#3!***