**Theory Questions Assignment Series 3 Reverse Genetics F13**

**Part I Short Answer Questions: (5pt)**

1. Draw a **basic** picture of the flow of genetic information in the central dogma. Use the following terms in your drawing: polypeptide, protein, gene, mRNA, transcription, translation. Then indicate where dsRNA can cause an RNA interference (RNAi) effect on the flow of genetic information.

2. What is the general function of molecular chaperones? In 2 sentences or less, describe the role of molecular chaperones following cellular stress.

3. Draw and describe the way green fluorescent protein (GFP) is used in our study as a reporter for *hsf-1* expression. What characteristics make GFP a good “reporter” molecule?

4. Use one sentence to summarize the potential power of RNAi for research (described in the NOVA video found at http://www.pbs.org/wgbh/nova/sciencenow/3210/02.html).

5. In our study, in which organism is the dsRNA made?

Which organism will show the effect of the RNAi?

Briefly, how will dsRNA be introduced into the organism that will show the effect of downregulation of gene expression?

**Part II.** Your answers to the following questions will be in discussion format. Please use full sentences and provide reference citations where appropriate. You should have a separate Literature Cited section for each question. Include both a narrative AND at least one effective figure/table with a caption for each question. Since you will not use experimental data in these figures/tables, they will serve the purpose of helping your reader visualize complex or conceptually difficult information. You figures must be original: you may NOT use illustrations created and published by others even with citation, although you may adapt previously published work. (5 pt each)

1) **What is the heat shock response and how does it work in *C. elegans*?**

**2) What is RNAi and how does it work in *C. elegans*?**

**3) What is a transcription factor and how does it regulate gene expression? What is HSF-1? What role does HSF-1 play during a cell’s stress response?**

***HSF-1* is described as part of the basic helix loop helix class of TFs with leucine zipper motifs. Describe what this molecular structure means and explain how this structure is critical to HSF-1’s function.**

4) **How will we silence or knockdown of expression of *hsf-1*?** (Describe your experimental design rather than describing protocols: avoid a Materials & Methods type description.) **How will we know that we achieved knockdown or silencing? What are other tools/methods that would be useful to assess knockdown?**

5) **Why is the *C. elegans rrf-3* mutant enhanced for RNAi downregulation of gene expression compared to nematodes of the *N2* wild type strain?**