

RNA Group Assignment #1

BMS 894 Demystifying the RNA World

Your job is to learn more about the function and structure of a _____

To this end you will accomplish the following tasks:

- 1.) Find a journal article describing the crystal structure of your RNA. To do this, you can use pubmed (<http://www.ncbi.nlm.nih.gov/pubmed/>) and use search terms like “RNA_NAME crystal structure.” You will have to read some of these papers to identify the actual document describing the structure. What you are particularly interested in getting is the PDB ID associated with the RNA. This will be in the text of the paper. Alternatively, you can search for the structure in the pdb database (<http://www.rcsb.org/pdb/home/home.do>) and then find the primary citation from there. This assignment will also be simpler if the structure you choose has been analyzed by FR3D, check out their list at (<http://rna.bgsu.edu/FR3D/AnalyzedStructures/>)
- 2.) Find a secondary structure diagram of your RNA. Usually, the primary citation will have such a diagram as one of the figures or in the supplementary material.
- 3.) Predict the secondary structure of your RNA using mFold (<http://mfold.bioinfo.rpi.edu/>) and RNAfold (<http://rna.tbi.univie.ac.at/cgi-bin/RNAfold.cgi>). Identify some of the differences between the two predictions, and identify at least three base-pairs either of these two programs gets wrong and three base-pairs they get correct (using your secondary structure diagram). Note you can copy the sequence of your RNA from NDB, just search for your PDB ID at <http://ndbserver.rutgers.edu/>.
- 4.) Download and install molecular viewing software. For example, Rasmol or Pymol (<http://www.umass.edu/microbio/rasmol/>, or <http://pymol.sourceforge.net/>) are free. Also download the pdb file, which corresponds to the PDB ID from your paper from <http://www.rcsb.org>.
- 5.) Visualize at least three canonical base pairs in the structure and take screen shots for your presentation. Indicate for each base pair, its location on the secondary structure diagram. Congratulations, you just made three slides for your presentation!
- 6.) Identify at least one non-canonical base-pair, visualize it and make a slide from it. Indicate what type of non-canonical base-pair it is. Hint (Look at the base-pair classification at <http://rna.bgsu.edu/FR3D/basepairs/>) and see if your structure has been analyzed by FR3D (<http://rna.bgsu.edu/FR3D/AnalyzedStructures/>).
- 7.) Prepare a 15-minute presentation on your RNA. Your presentation should cover the function of your RNA, its secondary structure, three canonical base-pairs, a non-canonical base-pair, and its predicted secondary structure.