Summary of Science Afternoon at NIST with a Focus on Transcription and Translation

Dr. Alison Kraigsley talked about gene expression and the genetic code, and how the use of green fluorescent protein (GFP) has revolutionized the way we study gene expression. She explained how GFP is used, what it does, and some of the things we have learned. Intermixed with the lecture was information about the background of the scientist, how she became interested in science, her research at NIST, and why this is important information for teachers and students. After the interactive lecture we went to a nearby lab and Dr. Kraigsley walked the teachers through the steps of transforming *E. coli* with the plasmid for GFP, and then selecting transformed bacteria and growing them with detection with the use of a black light. The purpose of the experiment was to help teachers distinguish between gene transcription and translation, since the GFP gene is *not* fluorescent and the GFP protein *is* fluorescent. To learn this the teachers, and in turn their students, learn about how scientists work with bacteria, and the many ways GFP can be used to study cell biology and gene expression.

Follow-up information (sent out to participants the day after the NIST Science Afternoon):
Here's a picture of GFP: http://www.rcsb.org/pdb/explore.do?structureId=1GFL. If you choose to view in Jmol you can turn the structure around and see it in 3D. Also, http://www.rcsb.org/pdb/static.do?p=education_discussion/molecule_of_the_month/pdb42_1.html has some good information about GFP.

Also try googling Green Fluorescent Protein and select "images" to see lots of cool and sometimes grotesque images of GFP inserted into animals, etc.

I've attached a picture of a plate of *Staph aureus* with antibiotic impregnated disks on it, showing which antibiotics are effective. It came from http://www.healthhype.com/lab-tests-for-staph.html. I don't think this is what we meant exactly, so if this is important maybe one of y'all can help.

Remember however that Alison and I encourage you to reach out to scientists and laboratories near you for materials, when you need them. (Not to say that we at NIST are not available, just encouraging you to investigate other possibilities, too!)

And more follow-up information from Alison Kraigsley:
For GFP, one of the Nobel Prize winners has optimized GFP and created a whole suite of other colours. His website is cool.
http://www.tsienlab.ucsd.edu/Images.htm
http://www.conncoll.edu/ccacad/zimmer/GFP-ww/tsien.html

I agree that there are lots of cool images for GFP. "Mr. Green Genes" is a transgenic cat that was made to see if they could introduce GFP without any deleterious effect. This cat seems to be healthy and suffer no ill effects for have GFP tagged cells (nose, mouth, something else).

The staph picture that you attached it the "correct" way to do zone of inhibition tests. The agent of interest is placed on a sterile filter disc so that the size of each agent is consistent. If they just spot the agent on the agar plates, different agents will spread differently. Using the disc fixes that problem. If the teacher don't want to use the disc then they can just spot on the plates, but the differences between the different sizes of the zone of inhibition won't be as meaningful...but it's still a fun demonstration. They can also wait until the agent is dry and then draw a rough outline on the bottom of the plate so that they have an idea of where the agent was on the pate. They don't need to use a mechanical pipette, they can use one of the transfer pipettes in the kit or an eye dropper (just make sure that they rinse it well between the different agents).

We used a kit from Bio-Rad, simply because it has all the necessary components and a clear and detailed instruction manual (which is freely available on the web page and describes all the kit components - see “download free manual”). http://www.bio-rad.com/prd/en/US/adirect/biorad?cmd=BRCatgProductDetail&productID=195301&vertical=LSE&country=US&lang=en. Most of the materials used in the lab are readily available, including Petri plates and agar. You probably need to contact a local life science laboratory for the materials needed to transform the bacteria with GFP.

Please note: Certain commercial equipment, instruments, or materials are identified in our program material or on this website are to specify the experimental procedure adequately. Such identification is not intended to imply recommendation or endorsement by the National Institute of Standards and Technology, nor is it intended to imply that the materials or equipment identified are necessarily the best available for the purpose