

Bio-Link Discussion Group

January 2006—April 11, 2006

Cleanroom video (January 2006)

Can anyone help me obtain a copy of the video “Behavior in the Cleanroom?” or any similar video materials? *Community College of Rhode Island* (#1506)

- Try this;
<http://www.semizone.com/webcast/product?usca%5fp=t&product%5fid=1841&corporate%5fp=0&partner%5fid=0> Northeast Energy Efficiency Partnerships, Inc. (#1507)

Human genetics activity (January 2006)

For those of you who do projects or activities with human genetics, I updated some of the genetics tutorials on our web site. (An update that was long overdue I'm afraid). The activity and tutorials are geared towards college and high school students and they emphasize human genetics. The tutorials are at: <http://www.geospiza.com/education/materials.html#tutorials>. The newly updated tutorials are grouped together under the heading: Allelic Variants of SOD1. It guides students through the following steps: 1. Finding stories about people with amyotrophic lateral sclerosis (or really another other genetic disease); 2. Finding background information on a genetic disease (the sites used are the Genetics Home Reference at the National Library of Medicine and GeneTests.org at the University of Washington); 3. Using the NCBI Gene database to get a map of a gene, finding which chromosome it maps to, getting the number of exons, the protein sequence, etc; 4. Using OMIM to get a list of allelic variants. SOD1 is good for this since OMIM lists about 33 different places where there's an amino acid change; 5. Using Cn3D to see where one (or more) of the mutations map in the structure of the SOD1 protein; 6. Using PubMed and PubMedCentral to find current research articles and articles that are available on-line (for free!). There is a worksheet that accompanies the tutorial on the same page at: <http://www.geospiza.com/education/materials.html#worksheets>. The password for the answer key is the same as the password for Head, Shoulder, Knees, and Toes; and Blasting through the Kingdom of Life. Write me off list if you need it and send your name and school. *Geospiza, Inc.* (#1508)

RNA purification (January 2006)

I would like to do an RNA purification lab involving an agarose gel with my second semester biotechnology students. Does anyone have any experience with a relatively inexpensive kit that they would recommend for use with students? *Delaware Technical and Community College* (#1509)

- I have successfully used Trizol (Invitrogen) on bacteria with students. While Trizol is not real cheap the rest of the reagents are inexpensive and a small bottle of Trizol will serve a lot of students. This gives you total RNA that you can then use for electrophoresis or cDNA production. (#1510)
- You can use a number of column kits such as mobio or Qiagen, but these are usually quite expensive (~ \$4/isolation; ~\$200 for 50 columns). However, mobio will provide you with free samples (I think the limit is 3 x 2-3 columns) upon request...
http://www.mobio.com/products/categorylist.php?cat_id=25. We use Trizol isolation which is a little cheaper (~\$1/ isolation; 100ml is around \$100) and works very well for both eukaryotes and prokaryotes. We also have our students run both denaturing (northern) and non-denaturing (verify quality of RNA) gels. I can send you our protocols if you like. *Mesa Community College* (#1513)

- Promega's RNA Easy kit worked well for me. They sometimes give free samples to educators! (#1536)

“Hands-on” demos (January 2006)

Does anyone have any suggestions for safe, cheap, and relatively fast "hands-on" biotech demos that I could use for junior high and high school students? Our career tech school is participating in a career paths fair in February. We spent the past two weeks hosting sophomore tours from all of our sending schools (phew), and it has been mentioned on multiple occasions that it would be nice if we had hands-on activities for the students in addition to the displays that we have set up. I agree, but I'm at a loss. I'm new to teaching and am still learning this as I go along. Everything I can come up with is either too expensive or will take too long (there will be about 2250 8th and 11th graders at this job fair). Does anyone have any suggestions? Meridian Technology Center (#1517)

- Plant tissue culture can be easily and cheaply done as a hands-on demo. How much time are you allowing for the demos? Let me know if you want some help on this. Kitchen Culture Kits, Inc. (#1518)
- When we have "science day" at MCC for k-8, we usually have the students isolate DNA from strawberries or green onions. The supplies you need are essentially dishwashing soap, meat tenderizer, cheese cloth, and 90+ % 2-propanol (Iso) or Ethanol (I think you can get this at Walgreens). Takes about 20 minutes if you pre-prepare the plant tissue. A little more advanced lab would be transforming bacteria with Red/Green/Blue fluorescent genes. For this you need LB agar, water bath (for heat shock), plasmid, and competent cells and a long wave UV source. I can provide you with cells and plasmid. This takes a 24h incubation, although the procedure is about 30 min. Let me know if you want either protocol and I can have our lab techs fax to you. Mesa Community College (#1519)
- The strawberry DNA extraction protocol is one of my favorite demos. It's cheap (strawberries, zip loc bags, detergent, and salt), quick, and foolproof - perfect for the age range you are talking about. Visit our website at <http://ppge.ucdavis.edu/Equipment/protocols.cfm> to download a copy of the protocol if you don't already have one. Feel free to contact me directly for more protocol suggestions. University of California Davis (#1521)
- You might consider providing the opportunity for participants to extract their own cheek cell DNA. This can be done very easily & cheap too. Omaha North High School (#1522)
- We have a HS biotech program at Minuteman Tech in Lexington MA. Fast and relatively cheap demo is to separate Kool-Aid on waters/division of millipore sep-pak columns. Part no WAT 039545. I can send you the protocol if interested. It is generally a crowd pleaser. Also, you can run chromatography on paper using colored markers, pens etc. Isolation of DNA from strawberries etc. takes 1 1/2 hours or so but is also a crowd pleaser. If you can use high tech equipment, electrophoresis is also good using simple colored dyes. (#1526)
- The DNA extraction from cheek cells is a great protocol! Just a word of caution – some high school districts do not allow the use of any body fluids (including saliva) in the classroom. Might want to check the situation in your area. University of California Davis (#1528)
- I agree with the DNA extraction from Strawberries or Bananas. I do this with elementary students often. Also, if you can have them take some DNA home as an ethanol precipitate in a microfuge tube - they love that. How about using the HIC chromatography of GFP kit from Bio-Rad? I've seen it done, and GFP is very engaging. It doesn't take long. Solano College (#1530)
- Demos for large number of K-8 students. All tested. All take about 20min so students can move from station to station. DNA spooling from strawberries, bananas, kiwis, peas, calf thymus, and human cheek cell DNA. The cheek cells would need a little more equipment

and materials. Cystic Fibrosis. Take spooled DNA and digest with DNase. Always nice to bring in the health benefits of biotech. Pipette Art. Use donated clear 96-well plates, colored water, micropipettors, and clear packaging tape. Sort of like the game Battleship. Use a grid system to pipette colored water to make images of flower, car, rocket ship, etc. Seal top with packaging tape unless you also get plate sealers donated. A great activity that can be adapted for younger and older kids. Combine science with art and math! Kool-Aid Electrophoresis. Horizontal agarose electrophoresis with Kool-Aid dyes. You can serve the Kool-Aid, have packets present to show the colored dyes listed on the back and ask them to predict what they will see. There are even "Mad Scientist" Kool-Aids! Just mix the Kool-Aid powder (without sugar) in water, buffer, and glycerol. Students can pipette the samples into well. You'll see separation in less than 10min of running. Veggie Electrophoresis. Filtered blender extracts of vegetables and flowers like petunias, purple cabbage, red chard, and canned beets. Run in gel box with and with out buffer, no agarose gel! See separation of color and compare between gel boxes. Petri Dish Electrophoresis. Very simple and cheap if you don't have gel boxes and power supplies. Origami DNA. Template and instructions on DNAi web site. [San Jose State University](#) (#1531)

- When I'm going out for public demonstrations. I make up plates of the pGLO plasmid (from BioRad) in DH5alpha and bring along a couple of black lights. What's fun is to get some stamps with your logo on them and then grow the bacteria to confluence and stamp it on a clean plate. It will grow in the shape of your logo and people seem to love to see the difference between the glowing and non-glowing bacteria. It's cheap, easy, and very transportable. [Washington State University](#) (#1532)
- I'd like to add that cranberries work well with the strawberry DNA protocols and the kids love working with the extract, because it happens to look like blood. As such is a good accompaniment to an introductory forensics discussion for young students. [Community College of Rhode Island](#) (#1533)
- I'm tracking down the sep-pak catalog number for everyone. It is absolutely essential to use the c-18 columns. When I find the info I will send the activity. (#1539)

Bioinformatics "hands-on" demos (January 2006)

Does anyone have any suggestions for safe, cheap, and relatively fast "hands-on" bioinformatics demos that I could use for high school students? Our school is participating in a High Tech Science Fair in March and we want to have an interactive hands-on bioinformatics demo/project that the students can interact with. We would like to do something that involves the human genome and disease process. (#1529)

- There's a great resource for bioinformatics at <http://www.bioservers.org/bioinformatics/modules/>. (#1534)
- Also there's great information on Life Science Informatics (that includes bioinformatics) on www.biotechworkforce.org (click on education and training and then on Bellevue CC). Here's the direct link: <http://www.bcc.ctc.edu/informatics/>. (#1535)
- We have recently updated and expanded a series of tutorials at our site that go through many of the different steps students might take in studying a genetic disease. The title of this series of tutorials is: Allelic Variants of Superoxide Dismutase. This series is focuses on the SOD1, a gene linked to amyotrophic lateral sclerosis (ALS), but the methods presented here are applicable to any human genetic disease. Students begin this six part series by reading about Dr. Stephen Hawking. Through the next steps in the tutorials, students learn how to: 1. Use the National Library of Medicine's Genetics Home Reference to find other stories about people with ALS; 2. Find background information on genetic diseases from GeneTests.org and the Genetics Home Reference; 3. Use the NCBI Gene database to find gene maps, chromosome position, and information about reference messenger RNA sequences and proteins; 4. Use OMIM to find mutation sites;

5. Use Cn3D to find where mutations map in a protein; 6. Use PubMed to find current research articles and PubMed Central to find full-text articles that are available on-line.

This set of tutorials can be found at:

<http://www.geospiza.com/education/materials.html#tutorials>. A worksheet is available to accompany these activities. This can be found at:

<http://www.geospiza.com/education/materials.html#worksheets>. The worksheet answer key is password-protected to limit access by students. The password for the answer key is the same as that for BLASTing through the kingdom of life. If you wish to get the password, e-mail sandy@geospiza.com with your name, position, and school name.

Geospiza, Inc. (#1540)

Lab fees (February 2006)

Just a quick question. Our college is looking into instituting a laboratory fee as part of the tuition for our lab courses. For the community college folks out there - do you charge a lab fee? Could you provide me with some details? If you do not want to reply to the entire group, my direct contact information is below. Thanks for any help you can give me on this one. Finger Lakes Community College (#1544)

- At the community colleges in CA we only can charge for consumables...nonconsumables are not charged. Each class has a varying set of consumables...so the fees are different. A consumable by definition, depends on the school some say anything a student can take home, other say anything that can't be re-used. Golden West College (#1545)
- There are no lab fees at City College of San Francisco for biotech courses. City College of San Francisco (#1546)
- Our biotech courses at Burlington County College (New Jersey) do have lab fees. The minimum is \$50. Burlington County College (#1547)
- Our college charges a \$20 lab fee for all science labs, including biotechnology. (#1549)
- Austin Community College charges \$24.00 for all lab courses and a insurance fee of \$3.50. Austin Community College (#1550)

Lab insurance (February 2006)

I am wondering how you all deal with liability issues for biotechnology courses with labs...I mean in case of any injuries of students or lab accidents. Is there any insurance fee associated with or included in the lab fees? Galveston College (#1548)

- Yes, the students sign and date a safety contract and included in their lab fee is a small insurance policy. In order to claim on the policy, we have an incident report that must be completed at the time of accident. (#1551)

HPLC (February 2006)

We will be adding HPLC to our curriculum and I would greatly appreciate any advice on systems to purchase (cost, student friendly, etc, protocols, and any other words of wisdom). Pima Community College (#1556)

- You should talk to John Zikopoulos in Chemistry. They just bought an HPLC that they use for the new biochem class at MCC. Mesa Community College (#1561)

Images for brochure (February 2006)

We are updating our brochure. I would like very much to add an electropherogram, but do not know how to convert chromas to JPEG or similar format, and have been unable to find a free or even a stock image. Pima Community College (#1557)

- I can send you a picture from our free chromatogram viewer/editor FinchTV. (you can download this at www.geospiza.com) Send me an e-mail off list with the dimensions you need and I can send you a JPG or TIFF file. Geospiza, Inc. (#1560)

- Talk to Scott Bingham at the ASU sequencing core.
<http://sols.asu.edu/faculty/sbingham.php>. He has tons of images! *Mesa Community College* (#1562)
- I can send some images as reported on the Internet: <http://www.montegen.com/Montegen/MPSA/mpsa.htm>. (i) HVPE pH 6.8 (ii) Fingerprinting (HVPE at pH 1.2 and chromatography) referred to peptide separation. (#1574)

Solution prep animation (February 2006)

A while ago I found a great animation that illustrates the steps one would follow during the making of a solution in the lab. Unfortunately, I failed to bookmark it. Can anyone help me find it? *Community College of Rhode Island* (#1576)

- The following website has several animations, though I am not sure this is exactly what you are looking for: <http://science.nhmccd.edu/biol/biol1int.htm#chemistry>. *Madison Area Technical College* (#1578)

pH meter manual (March 2006)

We are resurrecting an older model non-digital Corning 215 pH meter. Unfortunately, the manual has been lost. Does anyone out there happen to have it? If so, could you reply off-list? *Community College of Rhode Island* (#1594)

- link below to site:
<http://www.umd.umich.edu/casl/natsci/slc/slconline/PHM/operate.html>. (#1595)

Opinion regarding resume content (March 2006)

I have a concern regarding resume content and the appropriate level of specificity regarding the listing of technical skills. In my experience, those graduates that list very specific technical and job related skills are the most successful. However, the career counselors often counsel that resumes should be more general in their descriptions. As a result, I find myself giving advice to my students which conflicts with what they get when they seek “official” career counseling. *Community College of Rhode Island* (#1600)

- Personally, I find the counseling department to be of little value on specifics about jobs and careers in Science. Most are not knowledgeable enough to give good advice. They have so much to remember on transfer requirements and personal advising...asking them to know how to apply for science jobs is just a bit much--in their defense. I tell my students to directly address the important/required aspects of each job description--meaning you might have to change your CV for each job to ensure you have covered what they want in their new hire. A generic job CV is OK for most.com but for specialty jobs like science and biotechnology. Being specific to the job description is key. *Mt San Antonio College* (#1601)
- I agree that students should list those all-important buzz words for the industry of their choice. I believe that this helps the recruiter/interviewer get a quick understanding of specific skills rather than a vague understanding. *Berdan Institute* (#1602)
- This is a great topic for this forum and something I am experiencing with students right now. We have students job searching right now and also seem to be giving advice that varies from the career counselors. I agree with your advice and tell students to give more technical information. My industry contacts also suggest that specific skills that match the job posting are what they want to see. I find that recruiters look for a match between job requirements and an applicants skill set. The technical skills an applicant includes gives them a better idea of what the applicant can do and helps them sort through the huge volume of resumes. Also, if a resume is too general it puts the onus on the employer to do legwork and find out details. If other resumes supply the details, then the more

general ones are not even called. In the past when I've looked to fill a position the resume that does the work for me is the one I gravitate to. Red River College (#1603)

- I always had students list relevant techniques since that's the kind of information that companies want. If they want to hire someone to do fluorescent cell sorting, for example, they're not going to look at a resume unless that applicant lists "FACS" as a technical skill. The same is true for programming jobs. If we wanted to hire a programmer and they've never used the languages or the databases that we use, we'd probably just toss the resume. The University of Washington used to have an application where they listed all laboratory techniques and included a check box. If an applicant checked a box, there were additional questions where the applicant was required to explain where they had used the technique and how they had used it. We had all of our students fill this out for practice. I thought that this was a nice format since it gave my students an opportunity to explain that they were more familiar with some of the techniques than students who simply loaded gels. They got to add information about things like running agarose gels in class on a weekly basis over a period of 10 weeks and making all the buffers and gels themselves. Geospiza, Inc. (#1604)
- My advice is always the opposite of your counselors and the same as yours. It is my experience that many of the biotech companies (in California anyway) scan in resumes (or ask solely for an electronic submission) and then search the resumes' for key words. Genentech reports that they receive 20,000 - 30,000 resumes per month. That's one thousand a day! To handle that volume, I'm pretty sure that they must search for key words. I believe, although they have not explicitly said this that their system ranks them based on the number of "hits" on words that we don't know. I'm always guessing that cGMP or GMP is one. I guess that bioreactor or cell culture or chromatography might be others. And I always hope (:::he grins:::) that Solano College is another. Often the students that we graduate have the skills that they acquired as their main selling points. They do not have a chemical engineering degree from MIT on their resume, but they are good in these specific laboratory skills. I have them put these skills at the top of their resume. I always have them cross out the vague terms like "goal oriented" or "driven" or ... the only one that I counsel is something about "team oriented". I have them write a cover letter that tries to bridge the gap between their past experience and the job that they want: "As a manager at In-N-Out Burger I was responsible for the accounting of monies; I believe that the strict record keeping procedures were not much difference than the strict record keeping required by GMP in biopharmaceutical manufacturing. Solano College (#1605)
- Yes, it is important to tailor your job CV to a particular job description - something we tell our students to do. Red River College (#1606)
- In response to the consensus that counselors do not counsel effectively on tech type resumes, did anyone attend the Biotech Workshop for counselors on March 8 somewhere in the SF Bay Area? I just ran across a program description and it looked like something that should be replicated. The keynote was given by Cathleen Davies, Pres. of BioTech Primer Inc. The title of her talk was "What the 'Heck' is Biotech. This sounds like something all career counselors need to be briefed on. (#1607)
- How about we all forward this email discussion to the career counselors at your college? (#1608)

Biotechnology and ethical issues (April 2006)

I am to be part of a panel discussion on ethics in Biotechnology and would like to create a handout for the audience on the "top 10 topics in biotech ethics" and the "top 20 website sources for ethical info in biotech". I have indicated to the panel that I would poll biotech faculty, etc via the Bio-link listserv for that info. So guys what do you consider to be the top 10 topics and what website sources do you recommend? Austin Community College (#1610)

- the topics that our school usually discusses in our biotech ethics class includes: animal research; stem cell research; euthanasia; genetically-engineered foods; cloning. Since our program is very new (beginning Aug '06), we have not been on the websites yet for these topics. (#1611)
- There is a professor at the University of Florida whose main focus in agricultural ethics. He spends a good deal of time in his ethics class talking about biotech issues, and has Moderated debates on the topics in the past. I don't have his email, but he can be looked up on the Food and Resource Economics Department Website: <http://fred.ifas.ufl.edu>. *John A. Ferguson Sr. High School* (#1612)
- Brian Shmaefsky, Bernice Schacter, Ann Batiza and I just published a series titled "Biotechnology in the 21st Century." It is a series of 4 books aimed at high school students as well as older general readers. The book I wrote is "The Ethics of Biotechnology." You will find useful up-to-date information in all of these books including the most common ethical issues discussed in biotechnology. These books also include many useful web resources in the appendixes. You can find these books described at <http://www.chelseahouse.com/ResDetail.aspx?BrowseVar=&ISBN=0791085201&ParentSource=Science>. *Manchester Community College* (#1613)
- Oh this is a good topic! Nature Biotechnology had a good story on this topic in the March issue. I posted the top 13 ethical issues in biotech companies at: <http://tinyurl.com/puasf>. *Geospiza, Inc.* (#1616)

Immunology lab exercises (April 2006)

I'm designing a new immunology lab course and would be ever so grateful for your expertise, protocols, and ideas for immunology labs. We do not have an animal facility and I would like to avoid using live animals if possible. We are a small private school with limited budget. We do have a cell sorter, fluorescent microscope, and sterile hood. Is there a general antigen / antibody pair that is inexpensive and works well (strong, clean signal?) What is a good company to buy antibodies from? What kinds of cell lines would be good to use? Do you know of protocols for: tissue staining with antibodies; immunoprecipitation; and use of fluorescent-labeled antibodies (basically, how do you permeabilize the cell to look at intracellular antigens?). *University of the Cumberlands* (#1619)

- We offer many basic reagents in large fill sizes (50 mg) at affordable prices. The effective unit costs should make the per experiment cost acceptable to your budget. You could look at albumin/anti-albumin, catalase, PFK, LDH etc. See web site for complete listing. (#1620)
- You can go to the following link and get a protocol that I wrote a few years ago. It works well. Even though it is for high school it certainly would work for college. My high school students were exceptional. The title is *Western Blot for the High School Classroom*. I would be very glad to hear how it goes if any of you try it. <http://www.aai.org/committees/education/high.htm>. (#1621)