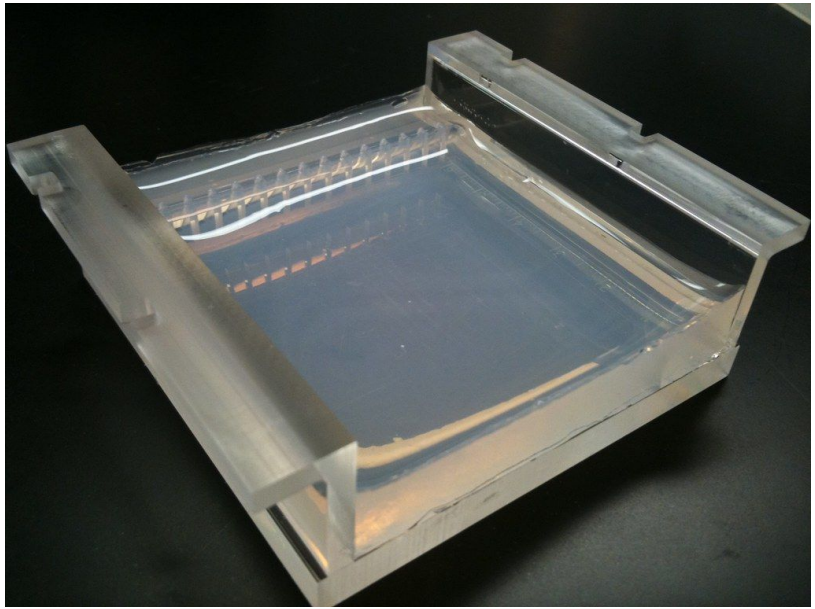
Mini One Learning

Loi Lutes - Sprague High School
Courtesy of Northeast Washington Education Council

Some background

Gel electrophoresis works by sending an electric current through the proteins causing it to move through the gel. The enzyme mixed with the DNA is looking for specific sequences of DNA, and when it find those sequences, it cuts them into fragments. The longer the fragments, sooner they stop moving through the gel. The shorter fragments continue to move. This separates out the DNA into a specific pattern.

This picture is not from our students. I've included it because it gives you a general idea of what the gels look like. At the far side of the gel, you can see different spots. Those are small wells that the dye / DNA is loaded into.



Practicing Gel Loading

The micropipettes load very small amounts. In this picture, students are practicing loading dyed water into gels.

The gel is basically a clear jello with wells molded in.

In the blue holder, there is a small plastic vial of dye.

The student steadies his elbow on the table and load the dye into the micropipette, then transfers it into the gel.

This activity allows the students to practice how far down they need to place the micropipette to load it correctly into the well.

The grant purchased the micropipette, gel practicing cups, dye and tips. Students were split into groups of 3.

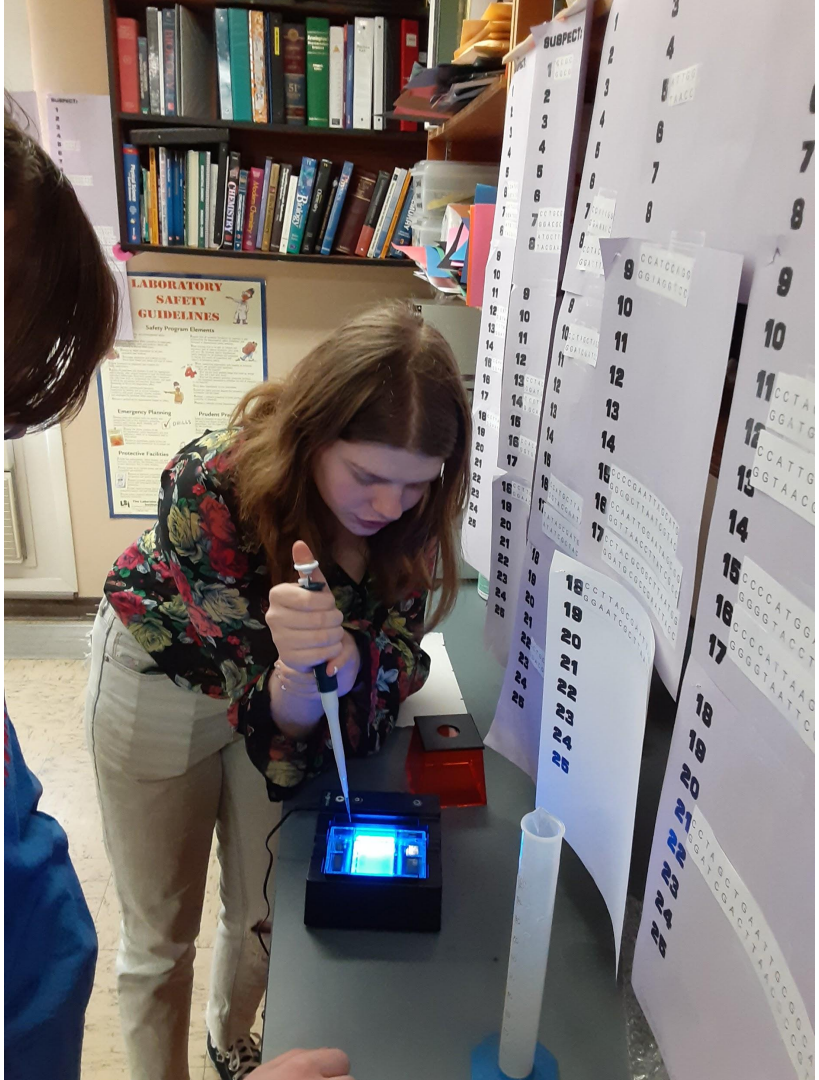
Using the Mini-One Machine

After practicing, we then were able to cast our own gels utilizing equipment the grant purchased.

This picture shows a student loading DNA samples into the gel plates in the mini-one system. The light makes it easy to see the wells.

Also notice the lab taped to the shelves. This is a paper version of gel electrophoresis. The students receive a VERY long piece of DNA, search for a specific sequence, and then splice it. They then tape their fragments next to the number that matches how many DNA proteins are in the fragment.

It simulates what the mini-one machine will be doing once the DNA is loaded and the current is turned on.



Running the Gels

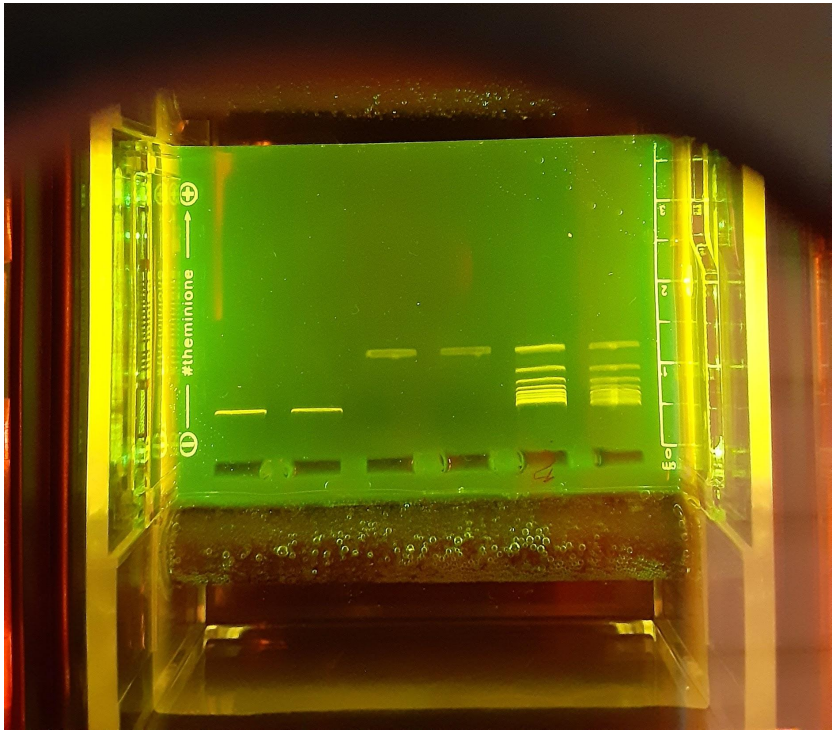
Going L-R...

In wells 1 & 2 one DNA sample was loaded.

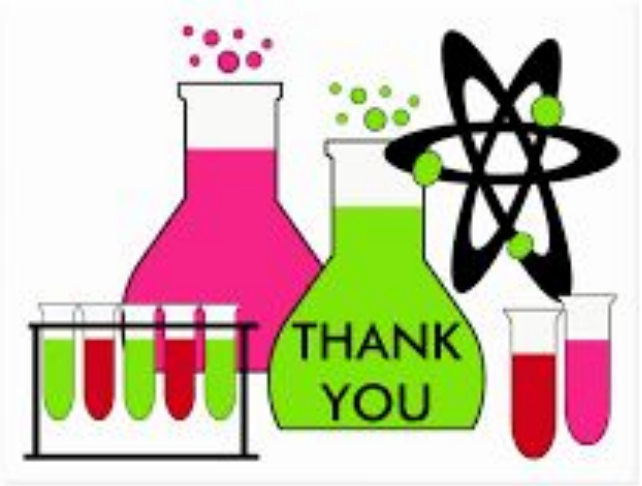
In wells 3 & 4 another DNA sample was loaded.

Wells 5 & 6 represent the markers so you can compare the unknown DNA, with known DNA.

**The mistake I made.... I failed to order the DNA splicing enzyme, so our samples in wells 1-4 were never cut into fragments. Whoopsie.... The bad news, we don't know who our "criminal" is. The good news: students practiced all of the same skills and learned so much.



I am sincerely thankful for the NEWEC for making this possible for our small schools. These supplies were not cheap, but made for an incredible DNA unit. I'm also very thankful I was able to complete the unit before we shut down in the Spring (I finished a few weeks before). I was lucky enough to receive another grant and will be purchasing 2 more MiniOne machines. This will allow fewer people per groups and increase the amount of involvement per student.



Currently we are face to face as well as offering remote learning. This year we will utilize document cameras to partner up remote learners with a in person learner. It won't completely make up for actually doing the skills, but at least it will let them see the process up close.

Any of you are welcome at any time to come see the advantages of a small school. Thank you for contributing to those advantages.