

ENHANCING PROCEDURES IN TECHNOLOGY

THE SOUTHERN CALIFORNIA BIOTECHNOLOGY CENTER



Jordan Lin, Bioengineering major at San Diego City College, jordan780814@hotmail.com

City College: NSF Grant # DUE0653277
SDSU: NSF Grant # DUE0653277

Christina Newell, Chemistry major at SDSU, x-tinanewell@hotmail.com

Introduction

In the field of science, improvements are constantly applied to existing procedures and technologies. The gel electrophoresis procedure, for example, that the Southern California Biotechnology Center implements in their crime scene simulations, currently uses three color bands to identify and compare simulated DNA samples. In order to create a more realistic lab scenario, Jordan Lin works to improve this simulation by increasing the number of color markers from three to five!

Enhancements naturally find their way out of simulations and into local industry applications. In the area of detecting toxicity in water, Assure Controls, Inc. uses the dinoflagellate, *Pyrocystis Lunula*'s, bioluminescence in the technology they developed called QwikLite®. This technology is not only cheaper than the older toxicity detectors, but also expedites the result time from weeks to days!

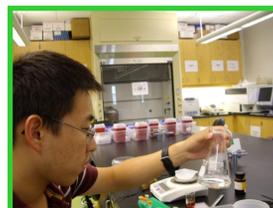
Together, companies like the Southern California Biotechnology Center and Assure Controls, Inc. significantly improves the technology used both in education and in everyday life. Through their efforts to race towards efficiency they also improve standards of life, education, and progress.

Intern's Goals

- To improve and upgrade the current procedures
- To prepare for related coursework and future employment
- To gain knowledge of the general workings of a laboratory
- To polish laboratory and networking skills
- To become more familiar with the properties of chemicals and equipment used in each process

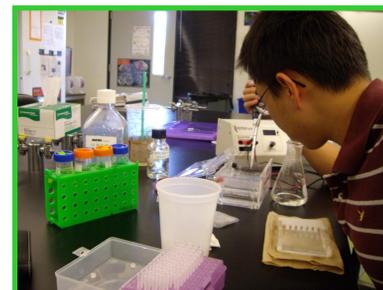


(Left) Christina Newell is reading instructions for using the chemical in the table on the bottle. (Below) Jordan Lin is observing the amount of Sodium Borate buffer solution with agarose.



Method

- Identify any problems with current procedures.
- Work to apply the same technology used in previous procedures but implementing a different approach.
- Utilize skills such as using micro-pipettes, calculating ratios for chemical solutions, and complying with standard cleaning procedures after the experiment is performed.
- Test. Re-test. Record. Perfect.

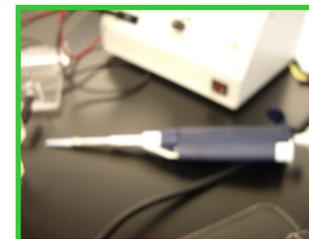


(Left and below) On a typical day in the lab, Jordan Lin and Christina Newell are pipetting samples into containers.

(Below) QL200 QwikLite® 200 Biosensor System used by Christina Newell in order to increase efficiency.



(Above) In order to reflect the distance travelled by the dye, Jordan Lin uses a black and white camera to observe dark spots left by dyes in the gel electrophoresis procedure.



(Right) Equipment such as a micropipette is very important in experiments involving very small amounts of solution.



(Right) Christina Newell is analyzing the results from her toxic detection experiment using a computer.

Results

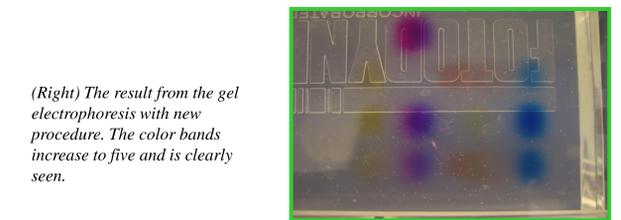
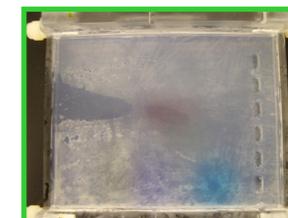
Although spanning different fields, Jordan and Christina both worked to increase productivity and efficiency, successfully enhance the proficiency of both their procedures and technologies, and improve their own lab skills.

Using Glycerol to condense the dyes, Jordan is able to increase the clarity and definition in the phenol red. Improvements such as these for the gel electrophoresis procedure successfully incorporate two more dyes into the original three-dye solution, resulting in five-color identification bands. Using the five-color dye, primary suspects are more easily defined than when the three-dye was used previously.

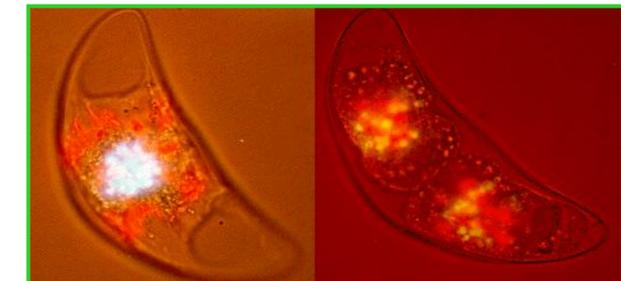
In Christina's work the use of QwikLite® has proven to be effective in detecting toxic levels in water samples. Using a control sample of healthy cells, the light output was measured successfully and the intended light spectra for healthy cells was achieved in every experiment that was performed.

In addition to being effective, this new technology is more cost and time efficient.

(Right) The result from electrophoresis with the original procedure in dyes loading and their amount.



(Right) The result from the gel electrophoresis with new procedure. The color bands increase to five and is clearly seen.



(Above) The microorganism *Pyrocystis Lunula* Christina Newell used for the toxic detection experiment.

Conclusion

The results show that both Jordan Lin's and Christina Newell's efforts in upgrading the gel electrophoresis and the water toxicity detection procedures are successful. Both have achieved better results with more time and cost efficient procedures. With the more realistic procedure, gel electrophoresis successfully include 5-color matched bands into the solution, helping students prepare better for work comparing DNA. Similarly, the use of dinoflagellate *Pyrocystis Lunula* in the toxic detection greatly reduced the time and cost involving water toxicity testing. The results from both experiments provided promising future implementation.

Acknowledgements

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