University of
Massachusetts
Medical School

Regional Science Resource Center
SUPPORTING MATHEMATICS, SCIENCE AND TECHNOLOGY EDUCATION

222 Maple Avenue, Stoddard Building
Shrewsbury, MA 01545-2732
508.856.5097 (office)
508.856.5360 (fax)
www.umassmed.edu/rsrc

Sandra Mayrand, Director

Isolating DNA from an Onion

Deoxyribonucleic acid, the substance of genes, is undoubtedly the most celebrated chemical of our time. Better known as DNA, this substance was largely ignored by biologist for nearly a century after its discovery… Today we know that this macromolecule is the genetic material. Chemically speaking, your genetic endowment consist of the DNA inherited from your mother and father… genetic programs encoded in the chemical language of DNA and reproduced in all cells of the body. It is these DNA programs that direct the development of your… biochemical, anatomical, physiological, and, to some extent, behavioral traits.

-N. Campbell, Biology, 2nd ed., 1990

Background

You have read about Deoxyribonucleic Acid (DNA). It is arguably the most important molecule in living things. It is a long, thin fiber that has the information necessary to control the chemistry of life. What does DNA look like? What are some of its many unique properties?

Purpose

In this investigation, you will have the opportunity to isolate DNA from an onion, precipitate and spool it onto a glass rod.

Materials

Part 1

- **50 ml of chopped onion**
- **50 ml graduated cylinder**
- **2 100 ml beakers**
- **50 ml of lysing buffer**
- **Cheesecloth**
- **Blender**

Part 2

- **50 ml test tube**
- **10 ml pipet and pipettor**
- **1 ml pipet and pipettor**

1 ml 10% SDS (a detergent called sodium dodecyl sulfate)
20 ml Ice-cold ethanol
Glass rod

Method

1. **For steps 1-6, you will work in pairs. Measure 50 ml of lysing buffer into a graduated cylinder. Add the buffer to 50 ml of chopped onion in a 100 ml beaker.**

2. **Pour onion and buffer into blender.**

3. **Blend mixture for 45 sec, low speed; then 30 sec high speed.**

4. **Pour back into beaker.**

5. **Filter the onion-buffer mixture through 4 layers of cheesecloth into a clean beaker.**

6. **Pipet 10 ml of onion extract into a clean 50 ml plastic test tube. (See instructor for directions on how to use a pipet)**

7. **You will now work independently. To the 10 ml onion extract in the 50 ml test tube, add 1 ml of 10% SDS with a 1 ml pipet. Replace cap and mix gently.**

8. **Measure 10 ml of ice-cold ethanol with a 10 ml pipet with pipettor attached to top.**

9. **Carefully release the 10 ml of ice-cold ethanol into your onion extract so the ethanol gently flows down the side of the tube. You should see two layers of liquid. Why does this happen? Add a second 10 ml of ice-cold ethanol the same way for a total of 20 ml added.**

10. **Wait 5 minutes without disturbing the tube. Observe what is happening and record.**

11. **Look for DNA coming out of solution at the line where the ethanol meets the onion extract. It may be possible to spool the DNA onto a glass rod and pull it out of the test tube. What does it look like? What does DNA do for an onion? What does DNA do for you?**