Strawberry DNA

A simple extraction

raft resource area for teaching
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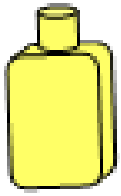
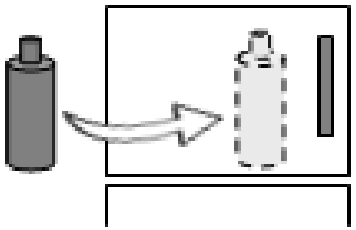
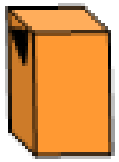
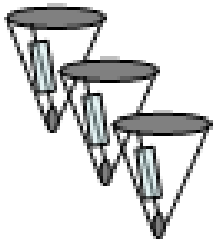
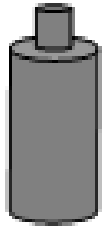
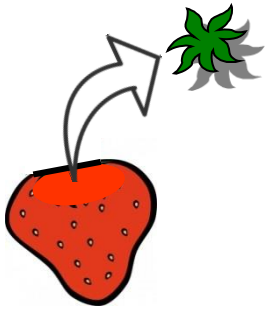
What do I need?

Purchase:	Prepare:
 Strawberries	 Fill container with water
 Dish soap	 Put alcohol in freezer
 Salt	 Tape funnels
 Isopropyl alcohol	

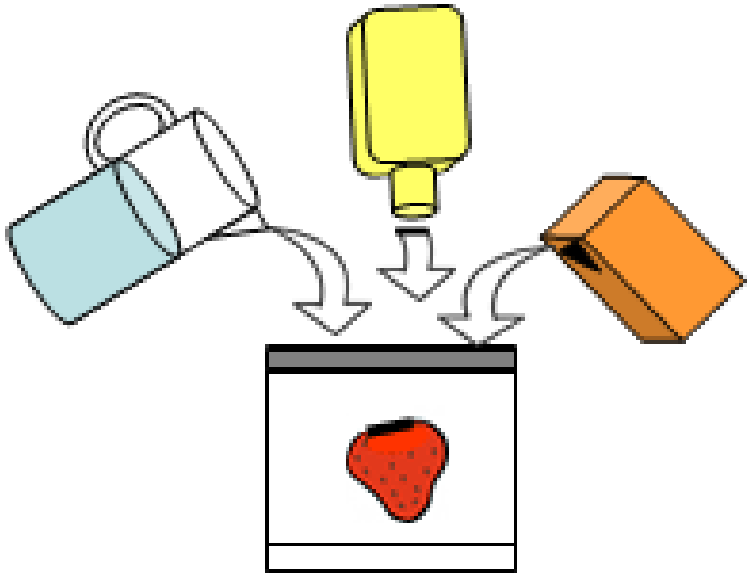
How to do it

- Remove sepal



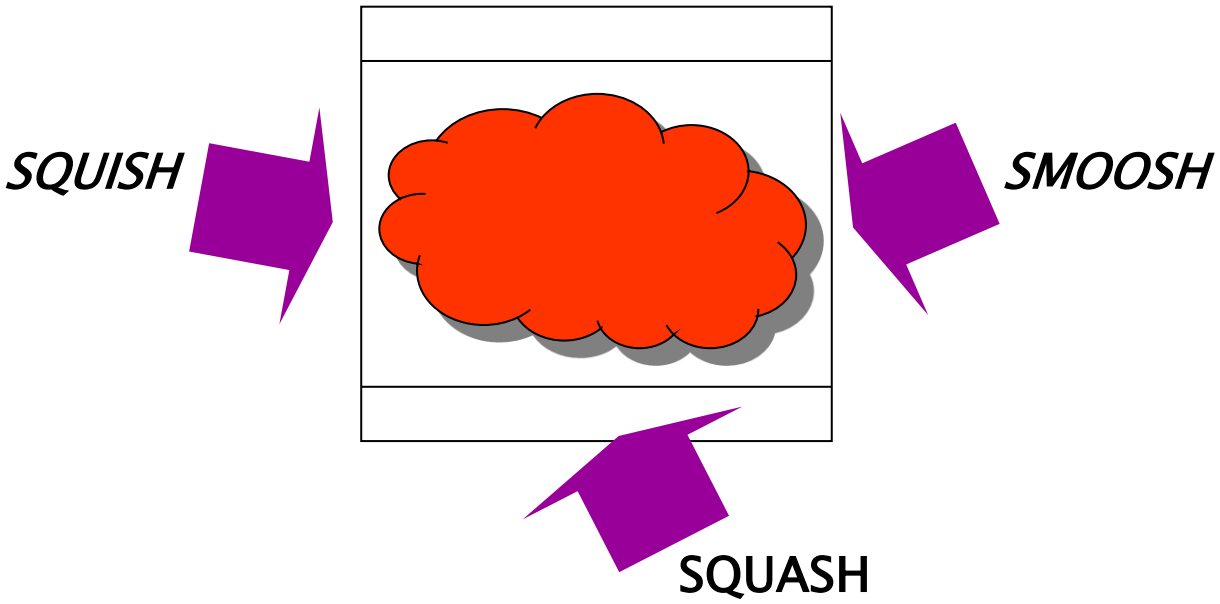
- In the bag:

1. Strawberry
2. Salt, pinch (~ 1/4 tsp)
3. Soap, 2 ml (1/2 tsp)
4. Water, 20 ml (4 tsp)



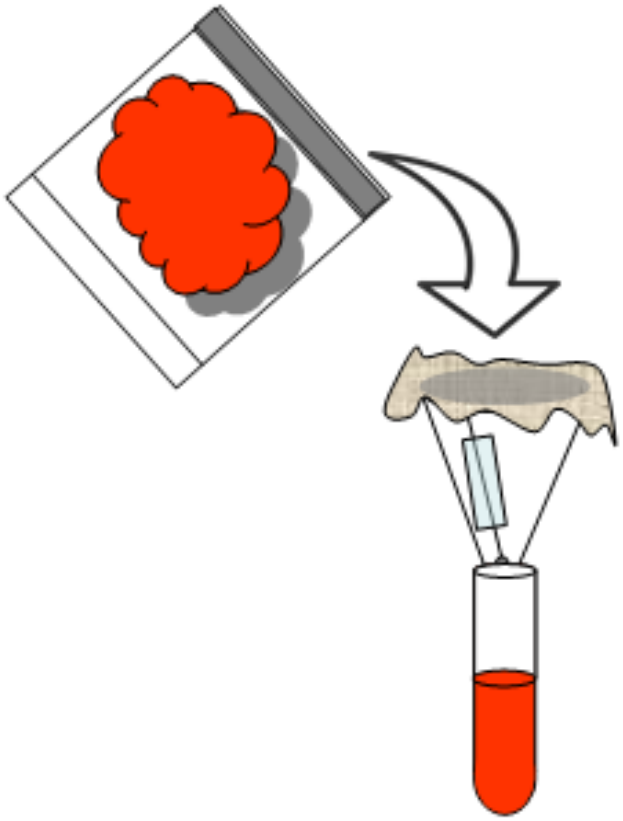
Ready, set, squish!

- Mash the ingredients for 2 minutes



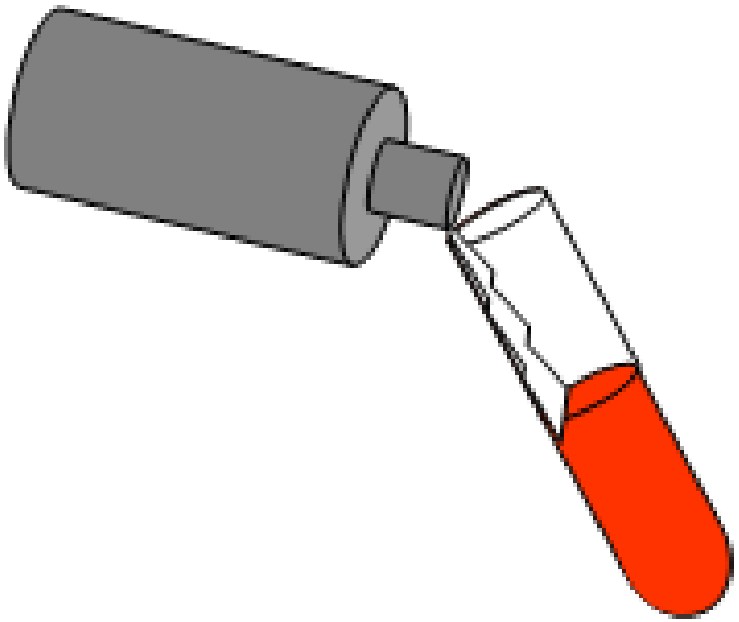
Collecting the “good stuff”

- Pour liquid from bag
- Fill tube about ¾ full



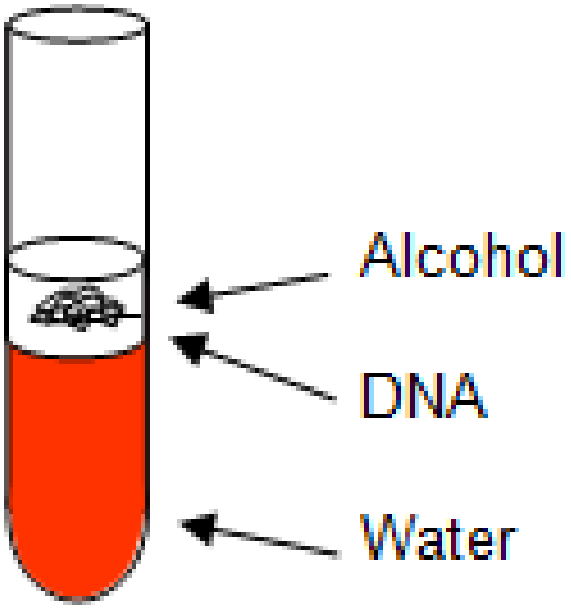
Adding the chilled alcohol

- Tilt the tube
- Let alcohol run down side of tube



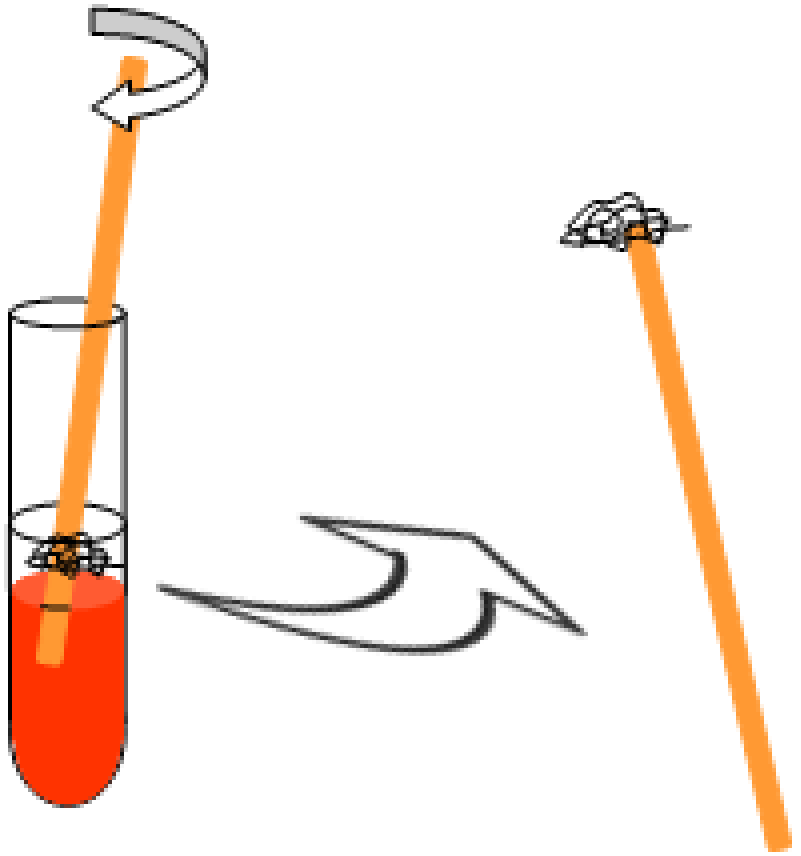
There's a good chance of clouds today!

- Notice the cloudy white DNA clump starting to form



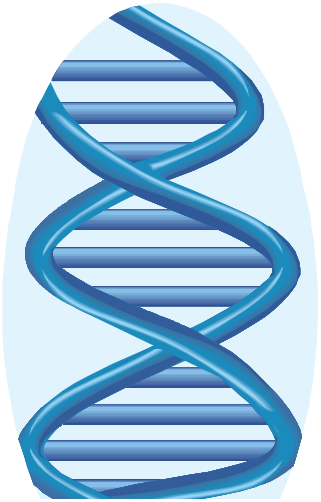
DNA on a stick!

- Gently wind the DNA material around stir stick



To do and notice

- Describe the clumps of DNA
- Notice how the DNA sticks to itself
- Discuss with a partner how this might be due to its spring-like structure

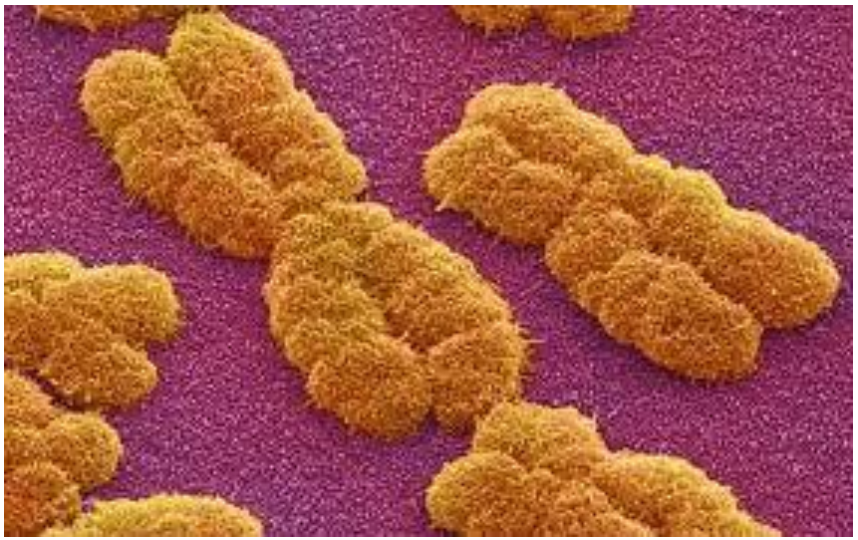


To do and notice (cont'd)

- Compare and share your observations
- Formulate a hypothesis explaining differences in extracted amounts of DNA

The science

- All living things contain DNA
- Strawberry cells have 8 copies of each chromosome (octoploid)
- By comparison, human cells have 2 copies of each chromosome (diploid)



The science (cont'd)

- Each ingredient affects the strawberry cells:

Dish soap breaks down the cell membrane so the DNA can escape. The soap molecules do this by breaking the bonds between the phosphates and fatty acids in the cell membrane.

Salt helps to purify the DNA by breaking up the protein chains and keeping them from binding around the DNA molecule. The proteins stay in the **water**.

DNA does not dissolve in **water** or **alcohol** because it is non-polar. Instead it forms "clumps" at the boundary between the two liquids.

Extract DNA from these!

- Cabbage (2n, diploid)
- Seedless watermelon or bananas (3n, triploid)
- Wheat, kiwi fruit, oatmeal (6n, hexaploid)




DNA Extraction and NGSS

Asking questions about the world that can be tested (K-2, 6-8)

- What is DNA? What does it look like? How can we get it out of an organism?

Using models to represent systems and/or describe natural processes (3-5)

- What role does each ingredient play in the extraction? What does this tell us about the nature of DNA?

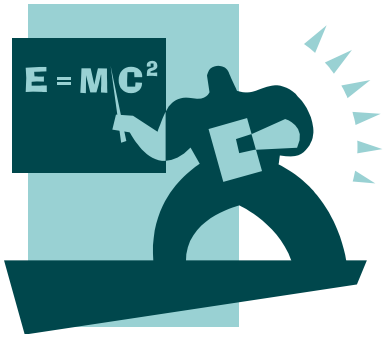
DNA Extraction and NGSS (cont'd)

Conduct investigations to test theories (K-2, 6-8)

- Students make observations of DNA in tube
- Compare their results to those of others

Collect data to support claims (K-2, 3-5)

- Students use observations to answer questions
- Use logic to make sense of observations, e.g. comparing relative quantities of DNA in tubes



DNA Extraction and NGSS (cont'd)

Scientists answer questions about the world (3-8)

- Students use science to describe what they observed in the tubes

Scientists use evidence to support their explanations (K-8)

- Students develop hypotheses about what they observed and then refine them based on evidence

DNA Extraction and NGSS (cont'd)

Scientists share theories and knowledge (K-8)

- Students can record, draw, list observations & hypotheses, etc.
- Opportunity for research on DNA-related topics outside of class and then presenting ideas