Isolating DNA from bananas using soap, salt and isopropanol.

Based on this protocol: http://www.gs.washington.edu/outreach/dhillon\_dnaprocedure.pdf

Preparation. Make lysis buffer: a solution of ~100 mL soap (we used hand soap; would work better with laundry detergent), 2 tsp NaCl, water to 1 liter.

Put bananas and isopropanol in freezer overnight.

Protocol: crush half a frozen banana in a ziplock bag. Add 20 mL lysis buffer, mix very well, and filter using a coffee filter and a funnel (we tried adding 10 mL, but the solution was too thick to go through the filter). Collect 3 mL of the flowthrough and add 6 mL cold isopropanol (from the freezer). DNA should precipitate.

We divided the monks into groups of ~10 each (we were limited by having only 9 filters). Every group was able to see precipitated DNA – they seemed very excited by the result.

Isolate your own DNA from saliva.

This works better than isolating DNA from bananas because there isn’t plant debris after you lyse the cells.

Preparation: lysis buffer as described above (this time we used laundry detergent)

Protocol: each monk spit 3 mL into a cup. Add 10 mL lysis buffer, mix. Pour contents of cup through filter paper (we used a napkin for the filter paper this time) and collect 3 mL of flowthrough in a ziplock bag. Add 6 mL of cold isopropanol (isopropanol should be stored in the freezer before the experiment). We tried adding methylene blue to the isopropanol to dye the DNA – didn’t seem to work. The monks were allowed to keep the baggie with DNA. Some said they wanted to look at it under a microscope.

This worked to precipitate DNA for all ~100 monks. Some monks didn’t get a lot of DNA, however. In those cases, I think they collected more than 3 mL of flowthrough (they probably collected all 13 mL of saliva plus lysis buffer), so 6 mL of isopropanol wasn’t enough to precipitate much DNA.

Later modified the protocol to have them collect only 1.5 mL of saliva, then add ~4 mL of lysis buffer, collect all ~6 mL of flowthrough, and then use 10 mL of isopropanol.

Protocol for Year 3 monks also worked. The second section of third year monks, however, questioned whether what what they isolated was really DNA. They suggested that it might be pieces of paper towel. We ruled this out by repeating the procedure starting with 1.5 mL of water instead of saliva. Then they asked how we knew that the thread-like things in the isopropanol was DNA – one monk said it looked more like protein (from an egg) or maybe it was something from his lunch. No way to prove to them that the isopropanol fraction corresponds to DNA without a spectrophotometer or running a gel. So the next time this is done, the teacher should do the experiment with three different starting materials: water, protein (could use egg whites), and membranes (could either bring phospholipids from home lab or else use oil) and then go through the isolation procedure while the monks are isolating DNA. It was great that they were questioning their results rather than taking their teachers’ word for what was going on. So it would be good to do the experiment with controls the next time.