

Teacher's Guide for:

Disease Spreading

Note: All activities in this document should be performed with adult supervision. Likewise, common sense and care are essential to the conduct of any and all activities, whether described in this document or otherwise. Parents or guardians should supervise children. Rock-it Science assumes no responsibility for any injuries or damages arising from any activities.

NOTE: This is the transcript of a lesson that was videotaped during an actual Rock-it Science class with real students, not actors. The students' brainstorming comments are included on the video but are not transcribed here because they're not part of the lesson presentation.

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Disease Spreading A Rock-it Science Lesson Filmed October, 2009

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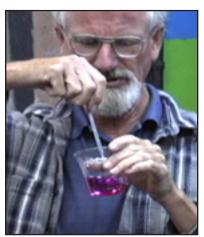
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Intro Quick Recap:

- [There are no drawings or materials used in this intro.]
- In olden times, people had no toilets.
- They also had no toilet paper. People usually wiped themselves with leaves or grass, and they usually used their left hand. They didn't have soap, so the left hand was considered dirty.
- If you slapped someone with your right hand, that was a challenge. But if you slapped someone with your left hand, that was a huge insult.

Experiment Quick Recap: "Disease Spreading"

- Instructor writes names on two plastic cups and fills them halffull of water.
- Instructor puts a squirt of phenolphthalein in one of the cups and stirs it with his finger. Both cups still look the same.
- Instructor explains how magicians use rubber fingertips to hide chemicals like phenolphthalein so they can make water change color.
- Instructor adds a squirt of ammonia to the cup containing the phenolphthalein, and the water turns bright pink.
- Instructor adds a squirt of vinegar to the pink water, stirs it with his finger, and it becomes clear again.
- Before starting the experiment, the Instructor explains the procedure to the students:



Water with phenolphthalein turns pink when you add ammonia.

- First, he's going to give them each two cups (their "pets"), and the students will write a name on each one (no two cups in the room can have the same name).
- The Instructor will send them outside and then add phenolphthalein to only one cup in the room. The phenolphthalein will help them detect the disease later on.
- He shows them how to mix the contents of one of their cups with another person's cup by pouring the liquid back and forth between them a few times.
 The disease will spread, but no one will be able to tell because both cups will still look clear.
- After mixing the first time, students will write the names of the two cups that were mixed on a sticky note and place it on the whiteboard in the column labeled "1 & 2". Then they'll take their second cup and mix it with someone else's second cup and put another set of sticky notes in column "1 & 2".



Pour water back and forth to mix well.

• Students repeat this entire process two more times, mixing with a different person each time, for a total of six mixes.

- Then the Instructor will squirt ammonia into each cup, and the ones containing phenolphthalein will turn pink. These are the ones with the disease.
- Students with pink cups are not allowed to talk. They leave the room and may discuss the solution among themselves. All of the cups are left in the classroom.
- The other students remain in the classroom and discuss as a group, using the sticky notes and the cups to figure out which cup was the first one to have the disease.
- During the experiment, the Instructor carefully checks the sticky notes on the board after each mix to make sure each cup is accounted for before mixing again.
- The rest of the students re-join the class and the Instructor asks for nominations for the first cup with the disease. The names are written on the board, and the students vote.
- Before revealing the answer, the Instructor uses the sticky notes to trace the mixing history of each of the nominations to confirm whether or not each one could have been the original one. It always comes down to two possible cups. Then the Instructor reveals which one was the first cup.
- This kind of detection work with diseases is called epidemiology.



Sticky notes in three columns labeled "1 & 2", "3 & 4" and "5 & 6".



Adding ammonia reveals the "diseased" cups.

Equipment List: "Disease Spreading" Items needed for Instructor:

- Phenolphthalein powder, 1 gram
- Rubbing alcohol, 91%, 100 ml
- Vinegar, white (a squirt)
- Alcohol, 70% isopropyl (a few ounces)
- Ammonia (a few ounces)
- Cups, clear plastic, 8 oz., 2 each
- Pipettes, 3

Items needed for Students:

Consumables (per student):

- Cups, clear plastic, 8 oz., 2 each
- Water, about 8 oz. per student
- Sticky Notes, 3" x 3", 3 per student

Other:

• Markers, permanent, colored



Clear plastic cups, 2 per student.

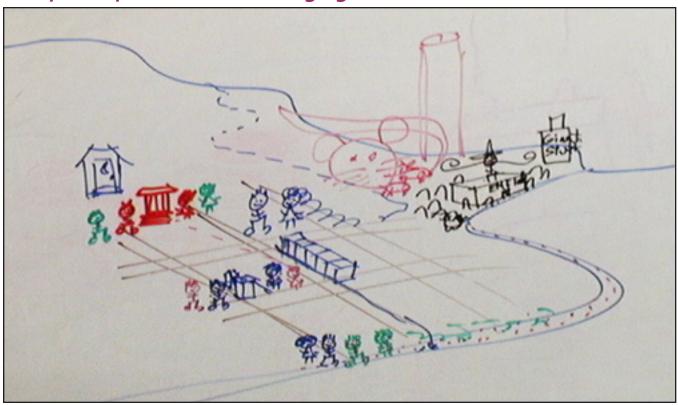
Prep Work:

- Prepare phenolphthalein solution at least a day in advance as follows:
- Add 1 gram of phenolphthalein powder to 100 ml of 91% rubbing alcohol (this is NOT the same as the alcohol used in the experiment to disguise the smell.)
- The solution will start out cloudy and needs to sit overnight to become clear again so the students won't be able to detect it in the water.



Phenolphthalein powder. Solution must be mixed a day in advance. (see Prep Work for instructions)

Story Recap: "The Color-Changing Disease"



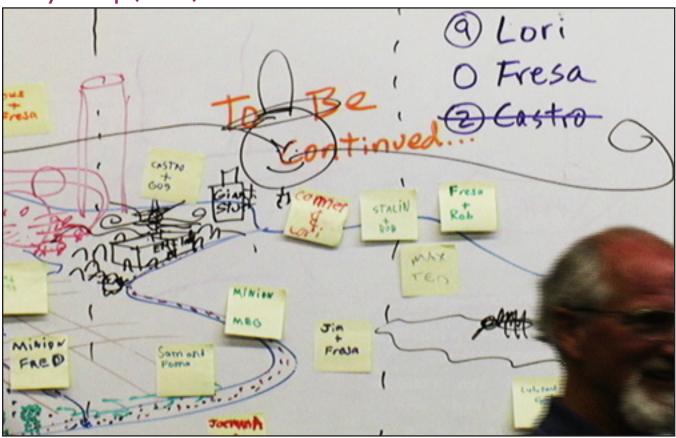
Part 1:

- There was a town next to a river. The poor people lived next to the river, and they were green.
- The people in the middle of the town were middle-class, and they were blue.
- The people farthest from the river were rich, and they were red.
- The rich people had chamber pots for their poop, and they emptied their chamber pots into an outhouse in the back yard.
- The middle-class people lived in houses that were very close together, and they didn't have back yards. So every morning they would empty their chamber pots out their windows into the street. The poop would flow down the gutter into the river.
- The poor kids played in the river, but they knew to avoid it during the early morning when the poop was coming down from the town.
- Evil Mister Fred built a large warehouse upriver from the town. He wanted to make his minions larger and stronger so they'd be a formidable army.
- He called the Acme Store of Everything, ordered steroids, and gave them to his minions. They developed really muscular mustaches, but they didn't get any taller.
- He called the Acme Store of Everything again and ordered stuff to modify their DNA so he could make them giants. But the Acme Store of Everything told Evil Mister Fred he'd have to figure out how to get it into the minions' cells.

Part 1 (cont.):

- Evil Mister Fred figured the DNA stuff was like a virus, so he went to the swamp to find some mosquitos.
- He asked a mosquito if it could infect somebody with a virus, and the mosquito said it could. It stuck its nose into Evil Mister Fred, but he said, "Get away!" He only wanted it for his minions.
- He took a bunch of mosquitos back to his warehouse so they could bite his minions, but then he decided to test it on rats instead.
- He called the Acme Store of Everything again and ordered some rats. Then he had the mosquitos bite them.
- When the first batch of rats was bitten, their tails got really big, but the rest of them stayed small. Then they died.
- The next batch got big heads and tiny bodies, and then they died. Other batches got really long legs and tiny bodies, or big bodies and tiny legs, and then they died.
- Eventually he got it right, and threw the dead rats into the river. The rats disintegrated in the water and flowed down past the town.
- When the poor kids saw the rat pieces in the river, they started playing with them.
- Soon the poor kids got sick, developed spots all over, and a high fever. And when they got well again, they had changed color. They were now blue.
- Their parents were happy about this, because now their kids could go up to the town and play with the middle-class kids, attend their parties, and bring back all kinds of good stuff.
- But after being visited by the poor kids, the middle-class kids got sick, too, with spots and high fever. And when they got well, they also changed color. But they became red.
- Their parents were happy about this, because now their kids could go and play with the rich kids, attend their parties, and bring back all kinds of good stuff.
- But after being visited by the middle-class kids, the rich kids got sick, too, with spots and high fever. And when they got well, they turned green.
- Their parents were not at all happy about this, so they told the mayor to find out what was going on.
- The mayor called Jack and Jill, and they went down to the river to talk to the poor kids and found out they had played with the rat pieces. They also found out that the city kids didn't play with the rat pieces, but they had played with the poor kids, and the rich kids had played with the city kids.
- Jack and Jill followed the rat pieces upstream to Evil Mister Fred's warehouse.
- Jack and Jill accused Evil Mister Fred of making this mess, and he was proud to take credit for it. But he wouldn't stop.

Story Recap (cont.):



Ending:

- At Evil Mister Fred's warehouse, Jack and Jill saw some of the experimental rats running around with enlarged body parts. When they asked Evil Mister Fred what he was doing, he said, "Nothing."
- The minions were begging Evil Mister Fred not to make them weird like the rats.
- Jack and Jill asked the minions what was going on, and they said they didn't know anything about mosquitos or weird chemicals.
- Jack and Jill went inside and found the cage full of mosquitos. They took it outside and asked Evil Mister Fred what it was. He said, "Nothing!"
- One of the minions said he hated mosquitos, and he hit the cage with his baseball bat.
- The cage broke and the mosquitos escaped, and they went after Evil Mister Fred to drink his blood. They all started stinging Evil Mister Fred.
- Evil Mister Fred's head got really big, but his body stayed tiny.

Transcript: Intro

[There are no drawings or demonstrations used in this Intro.] If you go back four hundred years or more, there was a problem. In those days, they had no toilets. So if you had to go . . . There was a poem about it, I think: "In days of old when knights were bold and toilets weren't invented, they laid a load beside the road and walked away contented." What else are you going to do? You know, you go out into the woods, dig a hole, poop in the hole, cover it up. And they also had no toilet paper. What do you do? [Student: Leaves.] Leaves, grass, whatever you could find.

Well, in those days, whatever you used, you used your left hand to apply it. And sometimes it didn't work so good. And they didn't have soap and water. Well, they had water, but they didn't have soap. So people's left hands were not cleaned. And if you were left-handed, the problem was, you wanted to use the hand that wasn't clean. If you were to slap somebody as an insult with your right hand -- whack! -- they'd say, "Arrgh, that's an insult! Arrgh, you rotten guy." But if you slapped him with your left hand -- whack! -- ohhh, now you're in for a deadly battle, because they slapped with the hand that they wiped themselves with.

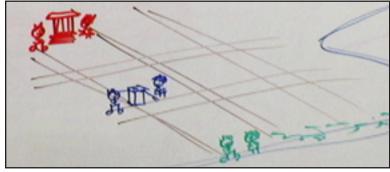
Cities didn't smell all that great, and they had to find ways to deal with it. So we'll just go right into the story part.

Story: "The Color-Changing Disease"

There's some countryside and a river coming by, and we'll put a city on the hill. And the city's got some streets that go that way. And it's got some streets that go that way. And the poorest people in the city lived down by the river in crummy little wooden houses. And they have green kids. And they let their kids play in the river. They swim in the river. They drink the river water. Hmmm.

Further up, the middle class people live. And they live in nicer houses on the city streets. And they have some yards around their houses. And all their kids are blue.

And then the rich people live way at the top of the town. They live in mansions with big stairs and columns in front. And their kids are all red.



Poor kids (green) live by the river; middle-class kids (blue) live in the city; rich kids (red) live at the top of the town.

Now, the people that live way up here,

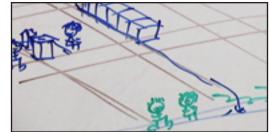
when they want to go to the bathroom they don't have a bathroom. They have a chamber pot. And the chamber pot is just a metal or porcelain pot that you poop in and cover it with a lid on it. And they had maids and servants who come and take the chamber pots away. And usually they had somewhere outside a hole in the ground with a shed over it. And there's a door on the shed with something that looks like a half-moon. And they go dump it in there. They call it an outhouse.



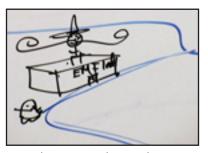
Rich kids' outhouse.

The people in the middle of the town, they have a similar thing. If they live where they have a back yard, they have an outhouse in the back yard. In the center of town, where the houses are really close together, and there are no yards, they've got a problem -- no holes to dump the poop. What do they do? Well, when morning comes along, they open the window and they pour it out onto the street. And it goes down the gutters into the river.

And so if you're a kid living down there, one of the poor kids living down by the river, you'd know when the poop was coming and when not to go play in the river. [Student: They could play upstream.] Yeah, they could play upstream, or they wait for all that stuff to go by, because they only get it in the morning. People wash their clothes in the river, and they got their drinking water from the river. So upstream was the way to go.



Middle-class houses are close together, and their gutter runs down to the river.



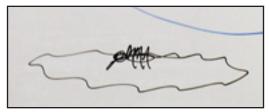
Evil Mister Fred's warehouse.

Well, in this particular story, there was somebody else upstream. That was the Evil Mister Fred. He built himself a big warehouse up there, Evil Mister Fred Industries, like that. And Evil Mister Fred was trying to make his minions into a real army. Minions are kind of short, and they aren't good with weapons. Evil Mister Fred wanted to make them big and tough. And he said, "You know, if I could genetically alter my minions to make them buff and really big, then they'd be a formidable army, and I could go take over places. As it is now, everybody just laughs at them."

So Evil Mister Fred called the Acme Store of Everything and said, "Hey, Acme Store of Everything, I need some steroids for my minions." And the Acme Store of Everything said, "Okay, right away, sir. On their way." And Evil Mister Fred gave his minions steroids. And they developed really big muscles on their mustaches. But they didn't get any taller. He said, "Well, we need something better than that. And Evil Mister Fred said, "We've got to make them taller, not just with stronger mustaches."

So he called the Acme Store of Everything and he said, "I want to genetically alter their DNA. I want to make them taller. I want to make them giants." And the Acme Store of Everything said, "Well, okay, we have this stuff, but you have to figure out how to get it into their cells." And they sent Evil Mister Fred a bottle of Giant stuff, DNA altering stuff.

And he thought, "Huh! Well, I can figure this out. There are all kinds of viruses out there, and this is kind of like a virus." So he went over to a swamp and he found some mosquitos there. And he said, "Hey, mosquitos! Can you put viruses inside people?" And one of the mosquitoes said, "Yeah, I think so." He jumped on Evil Mister Fred, stuck his nose in there, and blew his nose inside Evil Mister Fred. And Evil Mister Fred said,



Mosquito in the swamp.

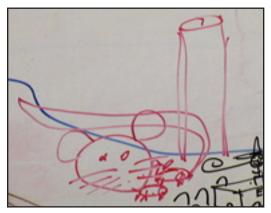
"Not me! Leave me alone! Get off! Oh man, I hate mosquito bites." And he says, "I got some friends here. We want you to alter them." And the mosquitos said, "Great! We're always happy to suck blood."

So Evil Mister Fred took some mosquitos back. And he wanted the mosquitos to bite the minions and inject into them some of this Giant stuff. And then, in a moment of clarity, he said, "Wait a minute. Maybe I'd better try it first on a mouse." So he called the Acme Store of Everything and he ordered some mice.

Some red rats. Big rats. And he had the mosquitos bite them. And the first of rats that he had the mosquitos bite, their tails got to be really big, like that, but the rest of the body stayed small. He said, "Oops!" And the rats died.

And next thing he tried, the rats got really big heads and little tiny bodies. And then they died. He said, "Boy, it's a good thing I tested this out."

And then he tried it with another set of rats, and he ended up with rats with really long legs and little tiny bodies. And of course, sooner or later, he got rats with a really big body but really tiny legs. And eventually, he got it right.



Mutated rats.

He says, "Okay, now I should try it on the minions." Meantime, all these dead rats -- what are you going to do with them? So he threw them into the river. And all these rat parts just kind of disentegrated in the water and came floating down. And the poor kids down at the bottom said, "Ohhh, dead rats! Look at that! That one had really big ears." And they were playing with the rat pieces, throwing them in the air, and flinging them like frisbees, and using the tails as whips, having a good time.

Well, pretty soon the poor kids got sick, and they got spots all over themselves and developed a high fever, like that. And when they eventually got well again, they weren't green any more. They changed into

at the rich people's

houses." So they

blue kids, like that. Their parents said, "Hey, what happened to you? You used to be green." And they said, "I don't know. We're blue now." And the parents said, "Well, hey, that's not so bad. You guys can go uphill and play with middle class kids, go to their parties, have ice cream and cake and cookies, and bring some back to us." And the kids said, "Yeah, I like this! This is cool!"

Well, then pretty soon the blue kids up there are being visited by the green kids, and they got sick. But when they got all well, they became red. And their parents, of course, said, "Well, this is great. You can go play with rich kids, and then you can come back with all the sorts of things that they have



Red rich kids got spots, then turned green.



Green poor kids got spots, then turned blue.



Blue city kids got spots, then turned red.

said, "Whoo-hoo! and ran up there to the rich kids.

Well, then the rich kids got sick. And they turned green. And their parents were not happy at all. They said, "Oh, no, you're green, just like those poor kids. Ohh, that's terrible!" And they

went to the mayor of the city and said, "Mister Mayor, we have a huge problem here. Our kids are getting sick, and they're changing colors. You've got to do something about it or we'll fire you."

So the mayor called Jack and Jill in, because they're good at bizarre things. He said, "Hey, Jack and Jill, we've got to solve this problem. Where is this disease coming from? Why are they changing colors? What are we going to do to stop it?"

So Jack and Jill went down to the river, they looked around, and they interviewed the kids about all the dead rats. And they walked up the river and found rat pieces tangled in the weeds and stuff. And there was Evil Mister Fred, playing around,



The mayor called in Jack and Jill.

throwing stuff in the water, making a big mess. And Jack and Jill said, "Evil Mister Fred, I bet you're the cause of this." And he said, "Well, I should hope so! That's my job. I take pride in doing a good job." And Jack and Jill said, "Well, you've got to stop."

Now, if you were Jack and Jill, what would you do?

Imagination and Brainstorming Time

[Students make suggestions] (THERE ARE NO WRONG ANSWERS! Whatever they say, you should reply: "That's a good idea," "They might do that," etc. After brainstorming, proceed with the experiments, then finish the story.)

We'll leave this To Be Continued . . .

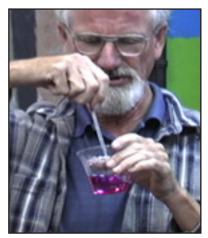
Experiment: "Disease Spreading"

And we're going to do an experiment. For our experiment, you're each going to get two cups. And these cups are going to be your pets. You have to name your pets. So you'll get a permanent marker, and you can write the name of your pet on it. You don't want the name to be too long because you're going to be writing it a bunch of times. So I'm going to name one "Gilda." And the other's going to be "MacGillicuddy." [Writes names on cups.]

Now, once you have some names on your pets, you're going to have to make them alive. They're dead right now. And you put some water in them so that they're about half full [fills the glasses half-full]. Now you've got two alive pets. After everybody has pets with names on them, and hopefully all different names, we're going to put a chemical in one of them. The chemical we'll be using is called phenolphthalein, in this bottle. Phenolphthalein is called an acid-base indicator. If you put something that has a lot of "OH"s in it, it will do something. Acid has a lot of plain old "H"s in it. [Squirts some phenolphthalein]

lein in one of his cups and stirs it with his finger.] There. Now they look pretty much the same, and this has got the invisible stuff in it [holds up one cup].

Magicians who aren't very good use this as a trick. Magicians have fake fingertips. They're just a rubber cover that goes on the fingertip, and it's painted to look like there's a fingernail on it and everything. So if they hold up their hand and do like this [waves hand around], you can't tell there's this rubber fingertip. There's a gap underneath it that they can put chemicals into. And there's a little hole in it, so if they squeeze their fingertip in something, the chemicals will squirt out. So if I was a bad magician like that, with some ammonia in one fingertip, I could put my finger in there and squeeze it, and ta-daa! Turn water into wine. [Squirts some ammonia into the cup with the phenolphthalein in it, and the water turns bright pink.] And everybody goes, "Oooooh! Aaaaaah!"



Adding ammonia to the water that has phenolphthalein in it makes it turn pink.

And then on the other hand I've got another rubber fingertip, and I've got something in that one. That's just vinegar. I'll stick that in there and squirt vinegar in and stir that [squirts some vinegar into the pink water, stirs it with his finger, and it turns clear again]. Back to water again. Ooooh, aaaaah.

So we're going to use that chemical to detect the disease. You're going to have all your pets sitting on the table. You're going to go outside. I'm going to close the door. And then I'm going to put the chemical in only one cup. You've each got two, so there's a bunch of cups there. Only one is going to have the disease. Then, when you come back, I'll say, "Okay, find someone else and mix yours with theirs." So you go find somebody else and mix yours with theirs. [Pours the liquid back and forth between his two cups a few times.] Now two people have the disease. But you don't know who's got it because all the cups are clear. And then you're going to write the names that are on the two cups on a sticky pad. And we'll stick the sticky pads for the first mix (1 + 2), they'll all be stuck up here on the board [draws a column on the whiteboard with "1 + 2" at the top]. So you go with your first pet, find someone else, -- mixy, mixy, mixy -- write the two names on the sticky pad, and stick it up here. And there should be maybe seven pads by the time you're done [this class had about 15 students in it].

And then you take your other pet, find someone different, and go mixy, mixy, mixy, mixy with them, and write those two names on another sticky pad, and put them up on the same spot [in the same column].

When you're done with that and we count them all and make sure everybody's done, then we're going to repeat the process with different people for 3 and 4. And then when we're done with that, we're going to repeat one more time [draws two more columns on the board, one with "3 + 4" and the other with "5 + 6" at the top]. And at the very end, there's going to be all those pets sitting on the table, and the disease will have spread by mixing from one to another. Will there be a whole bunch of them? We'll find out.

At the very end, I'll add ammonia to all of them, and wherever the red stuff is, that's where the disease is. If you have the disease in any of your pets, you become mute. You cannot speak. You become deaf. You cannot hear. Everybody else, who's got clear cups, both cups clear, it's their job to find out who had the disease first.

[Instructors pass out two cups to each student, and colored permanent markers. Students write names on the cups.] Once you've got your names on them, you can come over here to the orange bucket and put some water in them. [Students get water.] Make sure there are no duplicates. [Instructor goes around the table and reads off all the names on the cups to make sure they're all different. Students rename their cup if necessary.]

So everybody's got a name on there. We're going to add to it some alcohol to disguise the smell [assistant squirts some alcohol in each cup]. While he's squirting alcohol, you're going to go out here, and I'm going to put in some phenolphthalein in one of them. [Students exit classroom. Then Instructor squirts some phenolphthalein into one of the cups. (In this case, the cup is named "Freesa.") Then students are brought back in.]



Add alcohol to disguise the smell.



Add phenolphthalein to ONLY ONE cup while students are out.

Okay, now choose one of your pets --only one for right now. Go find someone else, and mix yours with theirs. [Students mix. If there's an odd number of students, the Instructor makes an extra cup, writes a name on it, and mixes with a different student each time.] After you mix, go get a blank sticky and write both names on it. [Students write names on sticky notes and put them up in the "1 + 2" column. Instructor counts them to

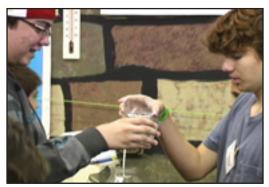
make sure everyone is accounted for. There should be one sticky note for every two students.]

Now you're going to take your other pet and go mix with someone else and do the same thing. [Students repeat the process and put their second sticky notes in the "1 + 2" column. Then they repeat the process twice for the "3 + 4" column. For the third mix, students on one side of the room mix with students seated on the opposite side of the room. For the fourth mix, students in front mix



Names on stickies.





Pour water back and forth several times.

Sticky notes in three columns. Each has the names of two cups on it.

with students in the back. Then they repeat twice more for the "5 + 6" column, mixing with anyone they like, as long it's someone they haven't mixed with before.

After each mix, Instructor counts the sticky notes to make sure every pair of students has filled one out and placed it in the correct column, before proceeding with the next mix.]

[After all mixing is completed and all stickies are on the board, the Instructor walks around the table squirting ammonia into each cup.] If any of yours change color, you become mute and deaf. [Several cups turn pink.] If you have pink in any of your cups, you are now mute and deaf. If your cups are clear, your job is to find out who had it first. You can look at their cups, you can look at the stickies that are on the board. Try to find out who had it first. I'll give you about three minutes. All the people that have pink in their cups go outside. Leave your cups inside. You can discuss among yourselves outside who you think had it first, but you have to keep your information outside. [Students who had pink cups go outside.] Okay, people who are left, try to figure out who had



Adding ammonia to each cup reveals the "diseased" ones.

it first. [Students discuss among themselves, look at the colors of the cups, read the stickies, figure out who mixed with whom, and try to trace the disease back to its source. Most of them come up with either "Fresa" or a cup that was right next to it.] Okay, you guys all sit down. [Outside students return.]

Now, some people have come to a decision. We're going to go by the non-scientific method of voting on the cup that they think had it first. So we now are open for nominees. Who would like to nominate a cup that they think had it first? [Students nominate three cups, "Lori," "Fresa," and "Castro." Instructor writes the names on the board.] Do we have any other nominations? Going once, going twice, sold! Now we're going to vote on it. You only get to vote once. [Instructor reads off each name and asks for a show of hands. In this case, the most votes went to "Lori."]



Figuring out which cup was the first.

Well, let's look at Castro. On the very first mix, Castro mixed with Zoova. Does Zoova have it? [Students: No.] No, so it can't be Castro. Fresa, let's see. Fresa mixed with Lori. Does Lori have it? [Students: Yes.] Okay, let's follow those two then. Then over here [in column "3 + 4"], Fresa mixed with Gus, and Gus has it. And Lori mixed with Stalin. Did Stalin get it? [Students: Yes.] Okay, so then we just follow those through [reading from column "5 + 6"]. Gus mixed with Castro, Lori mixed with Connor, Stalin mixed with Bob, and Fresa mixed with Rob.

So you guys were right. It was either Fresa or Lori who had it first. And Fresa was there, and Lori was there [right next to Fresa]. Which one had it first? Now, some people looked at Fresa's cup and said, "Oh, it's lighter!" [Instructor adds some more ammonia to Fresa and it turns darker pink.] Does more ammonia make it darker? If she mixed incompletely, would that make a difference? [Student: Yes.] Well, I know who had it first. What's it worth to you? Do I hear five dollars? Well, actually, Fresa had it first.

Now, if you enjoy solving problems like this, this is called epidemiology, where a disease starts to spread and people try to find out where it came from so that they can hopefully stop it from spreading any further.

Now, everybody take your cups of stuff and put your cups and their contents in the orange bucket. All the disease goes in there. [Students put their cups and contents in the bucket.]

End of Story

* DO NOT * present this part of the lesson until after the experiments!

When we left them, Jack and Jill were given the task of trying to find out where the disease came from. So they hike down to the river and they talk to all the poor kids. And they discovered that the poor kids were playing with dead rats and stuff. They got sick right after playing with dead rat pieces. So then they

went up to the middle, and they asked those guys, "Hey, did you guys play with dead rat pieces?" And they said, "No! We don't play with dead rat pieces. But we did play with the poor kids when they came up here. There were tricking us by changing color." And they discovered that the changing-color kids were the ones that brought the disease from the river all the way up to the rich folks.

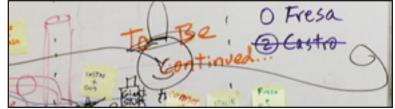
So they said, "All right, let's go down to the river again and follow it." And they found pieces of rat stuck in the weeds and stuff and against the rocks, all the way up to Evil Mister Fred's place where they were before. And they said, "Evil Mister Fred, you're the cause of all this trouble!" And he said, "Why, thank you. That's very nice of you to say that." And Jack and Jill said, "You've got to stop this. This is a terrible thing you've done." And Evil Mister Fred said, "Why, more compliments. I like this."



Jack and Jill followed the rat pieces up the river to Evil Mister Fred's warehouse.

And they saw some giant rats running around with weird-looking bodies, and they said, "What are you doing??" And Evil Mister Fred said, "Me? Nothing." And the minions were all going around saying, "Boss, please don't do it to us. Please, no, boss, I don't want to be weird like that. I'll die!" And Jack and Jill said, "Huh." And they asked one of the minions, "What's going on here?" The minion said, "I don't know anything. I've never seen giant mosquitos, never seen any weird chemicals, none of that is happening here."

And Jack and Jill said, "Oh, mosquitos? Chemicals?" And they ran into the building, and they found the cage full of mosquitos. And Jack picked it up, ran outside, and said, "Evil Mister Fred, what is this?" And Evil Mister Fred said, "Nothing."



Evil Mister Fred with a giant head and a tiny body.

And one of the minions said, "I hate mosquitos!" Bam! He hit it with his baseball bat. And the mosquito cage broke open, and all the mosquitos came out. Bzzzzzzzzzzz! They didn't like Evil Mister Fred as a person, but they did like the taste of his blood. So the mosquitos all zoomed over and started stinging Evil Mister Fred. And he went, "No! Stop! No! Please!" And the next thing they saw was Evil Mister Fred running away with a giant head, little tiny legs, and an enormous mustache. And everybody lived happily ever after, except Evil Mister Fred and a few assorted minions and rats.

End of Lesson

If you have questions about this lesson, please ask them through the online <u>Teacher</u> <u>Support Forum</u> on our web site.