



**UNIT 2: FOOD AND
THE ENVIRONMENT**

L.22

SOIL HEALTH AND HUMAN HEALTH

Note to Teachers

Human bodies are a lot like farms. They need to be nourished, exercised, and rested. Increasingly doctors, particularly those who study cancer, use the analogy of soil to talk about the body.

Many Americans have treated our bodies a lot like industrial agriculture treats the land. We feed it with chemical inputs, often focusing on calorie counts or units of macro- and micro-nutrients. The lesson for today asks us to think about the restoration of the health of human bodies like resilient farmers restore the health of soil: by fostering the diversity and vitality of the microbiome, the complex universe of microbes that make up as much of us as our own cells do.

Goals *In this lesson, students will*

- understand the analogy of the human body as soil.
- appreciate that resilient farming practices model a healthy lifestyle.

Objectives

- Two word clouds will assess students' understanding of health before and after this lesson.
- Students will use a short reading to study and evaluate a holistic model of healthy eating and behavior.
- Students will practice the skill of presenting their knowledge in a clear and systematic way to their peers.



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Please use this margin to notate how to best adapt this curriculum to your students.

Instructions

Part I: Introduction: Polling our assumptions about health

1. (Five minutes) Give students an index card or piece of scratch paper. Ask them to write down the words they associate with health.
2. Ask students to turn in those lists.

Part II: Soil Health and Human Health—the Reading

1. Divide the students into five groups and distribute the reading handout, excerpts from Dr. Daphne Miller's *Farmacology*.
Assign each group one of the excerpts from this reading. Some of the excerpts are significantly longer than the others, so they can be distributed on the basis of reading ability.
2. Explain to students that Dr. Miller has developed a way of understanding human illness that uses food as a means to restore and maintain health. Feel free to remind students that traditional “food rules” such as the humoral system relied on the same philosophy that food was key to create and maintain health.
3. Introduce students to Allie, the patient who is the subject of this chapter and of Dr. Miller's advice on illness and health by reading the headnote together.
4. (10 to 20 minutes) Assign one section to each group of students and set them to work, reading and annotating, highlighting, or taking notes on the text.

While the students are reading,

5. Enter their list of the terms they associate with health into wordclouds.com, an online word cloud maker. Enter them exactly as they are written, and including all terms as many times as they appear on the student lists.

Part III: Soil Health and Human Health—the Discussion

1. When students have completed the reading, set each group to the task of discussing their excerpt.
Their first job is to query their comprehension of what they have just read:
Do they understand the advice in the excerpt? Do they have questions about the logic behind the advice? What question would they ask Dr. Miller, if they were Allie?
2. Then, once they feel as though they have a strong command of the text, they need to consider how to communicate this step in the path to health as recommended by Dr. Miller to their peers.
How can they communicate the advice Dr. Miller offers here clearly and effectively?
3. Beginning with “Step 1” in the Reading, ask students to teach the step to their classmates. Ask follow up questions where appropriate—encouraging their peers to do so as well—and emphasize key ideas the students raise.
4. Once students are comfortable with what Dr. Miller is saying, write or project these questions on the board:
 - Do these ideas echo the topics we have discussed in this class and the recipes we have prepared?
 - How can you incorporate Miller's advice into your life?



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- What are obstacles that might prevent you from doing so?
- After reading your section, what is one question you still have?

5. Facilitate a full class discussion.
6. (5 minutes) Distribute an index card or piece of scratch paper. Ask students to list all of the words that they associate with health. Collect the paper.
[When you can, enter the second round of terms into the word cloud website. Begin the next class meeting by considering differences in the two word clouds.]

Part IV: Cooking Lab

Set the lab context in the following way: How would Daphne Miller select a dish for cooking lab?

- Her answer would be to use seasonal ingredients and to incorporate, where possible, produce that has not been part of recipes to date. She would want us to broaden the variety of ingredients to which students are exposed. (Remember Allie's wonderfully long list of her new favorite foods?)
- If possible, she would also choose a dish based on an ingredient that students have never tried before to encourage them to continue to sample new foods.
- Finally, Dr. Miller might also choose an ingredient that has some accepted medical benefit, where possible.

Home cooks have increasing access to foods that not only meet the first two criteria but also a rhizome that meets the last: fresh turmeric.

Turmeric has now been the focus of more than 700 medical studies and is seen as beneficial in the treatment of many chronic and debilitating diseases. (Note possible extension: ask students to research the potential benefits of foods like turmeric. Who does these studies, what do they find, and how commonly accepted are they in a world where allopathic medical professionals (the most common approach in Western health systems) turn to drugs and surgery to treat patients?)

See attached recipe for fresh turmeric curry with sweet potatoes, chickpeas and spinach.



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FRESH TURMERIC CURRY with sweet potatoes, chickpeas and spinach

16 students

This recipe made once will be enough for everyone to get a small bowl of curry over rice.

Equipment List

- Medium pot
- Burner
- Wooden mixing spoon
- 4 Tbsp
- 12 knives
- 12 cutting boards
- 2 microplanes
- 4 peelers
- Can opener
- Colander
- 2 medium bowls
- 1 small bowl for lime wedges

Food Items

- 2 tablespoons coconut oil
- 1 tablespoon mustard seeds
- 1 birds eye chili or other hot chili
- 3 cloves garlic
- A thumb-sized piece of fresh turmeric
- A thumb-sized piece of fresh ginger
- 1 large onion
- 1 tablespoon ground cumin
- 1 tablespoon ground coriander
- 4 medium sweet potatoes and/or potatoes
- 1, 14-ounce can of chickpeas
- 1, 8-ounce package of baby spinach
- 2, 14-ounce cans coconut milk
- 1 bunch cilantro
- 1 lime



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businesspeople who rarely set foot on their land acreage.) I also suggested that Allie take the time to visit her CSA farm since it offered quarterly farm tours for members. Who knows, she might make a friend or two in the process.

Step 2: Eat for Biodiversity

Impressed by the story of Boulpon, Allie set out to save her vegetable-loving microbiota from extinction. She realized that a diverse diet meant a diverse microbiota, so she exchanged her energy bars for a variety of primitive grains, including millet, sorghum, barley, farro, spelt, maize, and bulgur. She also began to let the seasonal herbs, fruits, and vegetables from the farm dictate what she put on the table.

Here is a list of some of her favorite farm foods: onions, leeks, garlic, basil, parsley, thyme, Jerusalem artichokes (sunchokes), honey, goat milk, kale, dandelion greens, spinach, broccoli, Brussel sprouts, purslane, squash, asparagus, carrots, tomatoes, blueberries, kiwis, cantaloupe, cherries, plums, apricots, apples, and oranges.

All of a sudden her diet got less monotonous, as it changed throughout the year.

It turns out that some of the foods that Allie had been told to avoid because they were “gas-producing”—including Brussels sprouts, broccoli, asparagus, leeks, and peas—happened to be the best prebiotics, meaning that they are the preferred diet for those beneficial Bacteroidetes and Actinobacteria phyla. These same foods also offer a rich supply of antioxidants and vitamins in a form that is safer and more easily processed than supplement formulations. As Allie began to eat these foods, she did notice that they made her a little gassy. But if she avoided eating too many of these foods at once, they were easy enough to digest. Allie also swapped out conventionally raised chicken and other animal products for those that had been sustainably raised. Research shows that meat from these animals has a better nutritional makeup and fewer antibiotics and hormones.

Step 3: Eat Dirt and Bugs

Well not literally. . . but I encouraged Allie to not be too compulsive about scrubbing her farm-fresh produce. I reassured her that getting a little bit of soil in her system from food grown in a healthy soil would be just fine. Who knew what beneficial bacterial and minerals might be coming along for the ride? I don’t mean to suggest that food-borne illness is not a real concern, even in the United States and other Westernized countries. In fact, one in six Americans get sick from contaminated food every year, generating billions of dollars in health care costs. On average, however, fewer than three thousand people per year die from these infections, and if you comb through the reports of the Centers for Disease Control (CDC) on these deadly outbreaks of E.coli, shigella and salmonella, listeria and botulism – as I have – you realize that well over 95 percent of the food involved is grown, processed, and packaged by large commercial manufacturers. Of course, the denominator is larger for processed food, since national brands still make up the lion’s share of the American diet. But even on a per-serving basis, the risk of infection from eating industrially produced food is so much greater that during the 2006 E. coli-tainted spinach scare, Dr. David Acheson, who was in charge of food safety at the Food and Drug Administration (FDA), counseled Americans to avoid the illness by sticking to local produce. He told the



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New York Times: “Clearly the risk is significantly reduced if you know the farmer and know his farm.”

Along these same lines, I encouraged Allie to eat the outer leaves and the peels of her carrots, cabbage, Brussels sprouts, artichokes, apples, and other produce. In general, this tougher, pest-nibbled, sun-exposed covering is precisely the part of the food that has the highest concentration of nutrients and is best suited for feeding those good Bacteroidetes and Actinobacteria in the intestine.

I also mentioned to Allie that while her stomach pains and other digestive issues might improve by taking probiotics or bacteria in pill form, emerging data show that some bacterial supplements offer little benefit and can sometimes pass on antibiotic-resistant genes to other intestine-resident microbes. Fermented foods, on the other hand, can offer an excellent alternative as this source of bacteria is often more diverse and more aligned with our health needs. As Justin Sonnenburg explained to me, our ancestors, who for millennia had no access to preservatives, pasteurization, or refrigeration, evolved to tolerate the bugs found in their rotten food and possibly to reap health benefits from them. In our modern lives, our daily brush with putrefying bacteria is minimal to nonexistent; foods produced by controlled fermentation come the closest to offering us a collection of bacteria and yeast that matches that found in our predecessors’ diets.

I’m especially impressed with the non-dairy fermented foods, since these grow more bacteria that belong in the Bacteroidetes and Actinobacteric Phyla. These foods include fermented pickles and cabbage (sauerkraut and kimchi), barrel-aged vinegar, and fermented whole soy products such as miso and tempeh.

Step 4: Don’t Kill Your Good Bacteria

Allie also came to realize that the preservatives and chemicals in her food, as well as her high-dose supplements and acid blockers, might be obliterating beneficial bacterial species. She had also taken many rounds of steroids and antibiotics in the past, two classes of medication that have been shown to foster less beneficial intestinal microbiota. (Several studies by David Relman at Stanford have shown that recurrent antibiotic use may result in a permanently altered gut ecosystem for some individuals.) Of course, there are times when a drug is necessary, but Allie now realized that some of her doctors had been way too cavalier about prescribing these powerful medications, especially for long-term use.

Step 5: Engage in Farm Love

The close community at Jubilee made me a little envious. Sure, there was bickering, but I’ve rarely spent time in a place where I felt more warmth and interconnection. I brainstormed with Allie about how she could find this kind of community in San Francisco. She looked into volunteering in a local park and a community garden, but eventually decided to spend a couple hours each week in an elementary school’s garden. During a recent office visit, she told me how much she enjoyed the students, teachers, and volunteers. Months later, after spending time farming in the Bronx, I would come to understand how farming, in addition to building community, can act as an antidepressant. Here are some explanations for this mood-elevating effect:

- Gardening increases the chance for interpersonal connection and boosts one’s sense of purpose.



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FRESH TURMERIC CURRY with sweet potatoes, chickpeas and spinach

YIELD: 4 – 8 servings

Ingredients

- 2 tablespoons coconut oil
- 1 tablespoon mustard seeds
- 1 birds eye chili or other hot chili, seeds removed and minced
- 3 cloves garlic, peeled and minced
- A thumb-sized piece of fresh turmeric, skin scraped and grated finely
- A thumb-sized piece of fresh ginger, skin scraped and grated finely
- 1 large onion, roughly chopped
- 1 tablespoon ground cumin
- 1 tablespoon ground coriander
- 4 medium sweet potatoes and/or potatoes, peeled and cut into a small dice (about 1 pound)
- 1, 14-ounce can of chickpeas, drained and rinsed
- 1, 8-ounce package of baby spinach
- 2, 14-ounce cans coconut milk
- 1 bunch cilantro, coarsely chopped
- 1 lime, cut into small wedges

Directions

1. Heat a large, heavy bottomed pot over medium heat. When hot, add the mustard seeds and cover while the seeds pop.
2. When the popping ends, add the chili, garlic, turmeric, ginger and onion. Fry on medium until the onion is golden and translucent.
3. Add the dried spices and fry for a minute or two, scraping them off the bottom of the pot.
4. Add the sweet potatoes, chickpeas and coconut milk. Stir to combine and simmer over medium heat for 20-30 minutes until the sweet potatoes are tender. You may want to mash about 1/3 of the potatoes to thicken the sauce.
5. Stir in the spinach and cook until wilted. Season with salt and pepper to taste.
6. Serve on long-grain basmati rice and garnish with chopped cilantro and a wedge of lime.

