

Longwood Gardens Community Read

Book Discussion Questions and Quotations for

Lab Girl

By Hope Jahren

Meets the following standards of the
Pennsylvania Department of Education (grades 9-12):

Reading and Writing in Science and Technical Subjects

- CC.3.5 Reading Informational Text: Students read, understand, and respond to informational text – with emphasis on comprehension, making connections among ideas and between texts with focus on textual evidence

Career Education & Work

- 13.1 Career Awareness and Preparation



2018 Community Read Toolkit

Lab Girl by Hope Jahren

SUMMARY

Hope Jahren's Minnesota childhood was filled with the comfort and promise of her father's community college laboratory, where he taught physics and earth science; and the emotional distance of her mother, with whom she gardened and read and studied literature. Hope pursued the college education her mother had yearned for, learning early on that science was her "home."

Jahren's greatest discovery was her long-time lab partner Bill, with whom she traveled from graduate school in California to an assistant professorship in Georgia, where they built their first lab and dared to study the science of "what it's like to be a plant." Through tales that span twenty years, the author skillfully connects the passions and risks of life as a scientist with the wonders and challenges of the plant lives that share our world.

Through engaging facts and expert storytelling, Jahren speaks to us as fellow scientists, inviting us into her lab and into her life in a voice that circumvents hardship with ever-present hope and humor.

GENERAL DISCUSSION QUESTIONS

Opening Discussion and Prologue

1. What does *Lab Girl* tell us about what it means to be a scientist? Do you think Hope Jahren's path to a career in science was typical? How did elements of her background either draw her toward science or serve as obstacles in her path?
2. Did Jahren's narrative change your opinion of science and scientists? How comfortable do you feel with the language and methods of science? Did *Lab Girl* help to deepen your understanding?
3. What is the overall tone of the author's language, mood, and message? Compare and contrast her use of humor and tragedy, scientific description and storytelling.



4. Two of our past Community Read authors are notable scientists: Aldo Leopold (*A Sand County Almanac*) worked in forestry and land management; Robin Wall Kimmerer (*Braiding Sweetgrass*) studies botany with the holistic sensitivity of a Native American. In what ways does Hope Jahren’s voice and message differ from theirs? In what ways does her work resonate with theirs?
5. Jahren packs her two-page prologue with wondrous facts about trees, as a way to explain why she studies them (pp. 3-4). Then she invites us to pick up a leaf and ask a question. Thus, in the simplest of terms, she describes what it’s like to be a scientist. Throughout the book, does the author keep the pact she makes with us from the start—to treat us as fellow scientists who speak a shared and comprehensible language?

Part One: Roots and Leaves

1. Jahren invites us into her story and into her childhood with the perfect first line for a yearning young scientist: “There is nothing in the world more perfect than a slide rule” (p. 7). What do you think the slide rule symbolizes? Why does it stir such powerful memories and emotions? Why were the tools and trappings of science so important to her? Are there objects in your own life that possess the power of Jahren’s slide rule, imbued with meaning far beyond face value?
2. Throughout her narrative, the author describes science both as a haven and a world full of risk. “I chose science because science gave me what I needed—a home as defined in the most literal sense: a safe place to be” (p. 18). Later, she speaks through the metaphor of plants: “No risk is more terrifying than that taken by the first root” (p.52). For Jahren, what is safe and comfortable about science? What is terrifying?
3. Jahren asserts that “the scientific rights to naming a new species, a new mineral, a new atomic particle, a new compound, or a new galaxy are considered the highest honor and grandest task to which any scientist may aspire” (p. 25). Why do you think the act of naming something is so important? What power and significance lie in a name?
4. In reminiscing about a tree from her childhood, the author says, “I fully appreciated that my tree was alive only just in time to hear that it had died. ... [Science] has convinced me that carefully writing everything down is the only real defense we have against forgetting something important that once was and is no more, including the spruce tree that should have outlived me but did not” (p 29). What do you think the author is saying about science, about writing, about memory, about the world we live in?



5. Jahren defines a “true scientist” as one who “doesn’t perform prescribed experiments; she develops her own and thus generates wholly new knowledge” (p. 66)—knowledge so new that “what we now take for granted was once a dangerous idea.” (p189). What dangerous ideas do we now take for granted? What are the dangerous ideas being proposed by scientists today?

Part Two: Wood and Knots

1. In “Wood and Knots,” Jahren describes moving from California to Georgia to transition between life as a grad student and life as an assistant professor and research scientist with a lab of her own. How does the opening line of this section —“The American South is a plant’s idea of Eden” (p. 95)—reflect the author’s hopes for (versus the reality of) her new life?
2. Jahren describes a field trip with her Soils class, where the students dig holes to create soil profiles. She characterizes scientists as “lumpers” or “splitters” according to the way they choose to map the layers of soil. She tells us that “the only way to do good soil science is to put a splitter and a lumper together in the soil pit and let them fight it out until they achieve something that they both know must be correct because neither of them feels satisfied” (p. 110). In this passage, what is Jahren saying about subjectivity and collaboration in scientific communities in particular, and in human society in general?
3. Continuing with her soil study field trip, the author states: “By dragging students through dirt for five days I can do something far more important and significant than I can do for them during an entire semester behind a desk” (pp. 110-111). Compare this author’s teaching style with that of Robin Wall Kimmerer, or of teachers you yourself have had. What are the possibilities for public gardens as living laboratories and as centers for hands-on learning?
4. The author describes her role in science as “being paid to wonder” (p. 236), and calls the type of science she does “curiosity-driven.” She explains that “one side effect of curiosity-driven research is the inspiring of young people” (p. 123). Do you feel that this is a worthwhile “side effect” of such research? Who should pay for “curiosity-driven” science?
5. Halfway through *Lab Girl*, Hope Jahren describes—in a chapter as powerful and succinct as her interspersed essays on plants—the experience of “full-blown mania” (pp. 144-147). What effect did this passage have on you as a reader? What are the connections between this chapter and the one that precedes it about cactuses and “resurrection plants” (pp. 142-143)?



Part Three: Flowers and Fruit

1. Throughout her memoir, Jahren reflects not only upon scientific achievements, but also upon personal victories. Take the example of her lab partner, Bill, dancing, for the very first time, in the wilderness of Alaska: “Today was for watching a great man dance in the snow” (pp. 199-201). Or her description of meeting her future husband: “When I was thirty-two I learned that life can change in one day” (p. 205). Or the birth of her son: “Perhaps this has been a million-plus-year-old experiment that even I couldn’t screw up” (p. 229). Were there moments that especially touched you or that you identified with?
2. Jahren talks about studying “tree memory” as a Fulbright scholar in Norway. The process spans not months or years but decades: “All our special attention renders it probable that one out of every one thousand embryos that we process will give rise to an adult tree. ... In thirty years, perhaps one of the plants before me will bear seed and help give answers to the questions that we ask today” (pp. 232-236). How difficult would it be to work on projects that you couldn’t personally see through to completion?
3. The author describes a field trip to Ireland, hastily planned to help Bill heal after the death of his father (pp. 238-253). While there, she and Bill spend 60 hours collecting over a thousand samples of moss that they forfeit at the airport because they lack the necessary permit. One of the insights that emerges from this deeply layered story deals with resilience. “There are two ways to deal with a major setback: one is to pause, take a deep breath, clear your mind and go home, distract yourself for the evening, and come back fresh the next day to start over. The other is to immediately resubmerge, put your head under and dive to the bottom, work an hour longer than you did last night, and stay in the moment of what went wrong. While the first way is a good path toward adequacy, it is the second way that leads to important discoveries” (p. 252). Can you think of other passages in *Lab Girl* that speak about resilience: In science? In nature? In individual lives?
4. Jahren discusses an experiment “growing sweet potatoes under the greenhouse gas levels predicted for the next several hundred years ... The potatoes grew bigger as carbon dioxide increased ... [but] were less nutritious, much lower in protein content ... It looks as if the bigger potatoes of the future might feed more people while nourishing them less” (p. 271). How important is the study of science for our future? What are some of the limitations of science? What are the problems and possibilities of turning scientific findings into action?



Epilogue (pp. 279-282)

After years of study, Hope Jahren acknowledges the “deep otherness” of plants, admitting that “they are beings we can never truly understand.” She laments that “human civilization has reduced the plant, a four-hundred-million-year-old life form, into three things: food, medicine and wood.” She reminds us that “every single year, at least one tree is cut down in your name.” Her request of each reader is to plant a tree, care for it, tell its story—and carve Bill’s name into the trunk. Has *Lab Girl* moved you to action?

PLANT SCIENCE DISCUSSION QUESTIONS

Throughout *Lab Girl*, Jahren opens our eyes to the world of plants, through short evocative chapters that not only highlight aspects of her work and her life, but that also illustrate the connections among all living things.

Prologue

1. “People live among plants but they don’t really see them” (p. 3). What are the consequences of being blind to plants? What steps can we take to awaken our senses to the natural world? Can you describe a memory or experience in which a plant stirs your senses even now?
2. Using facts and calculations to grab our attention, Jahren establishes a direct connection between trees and readers, and reminds us of our impact on the natural world: “There are about as many leaves on one tree as there are hairs on your head. ... In the last ten years, we’ve cut down more than fifty billion trees” (p.4). Do these simple objective statements convey an emotional impact? How effective are they at helping you understand the problems she presents?

Part One: Roots and Leaves

1. Jahren draws many connections between the lives of trees and her own life. She remembers a blue-tinged spruce from her childhood, which she comes to appreciate more with the passage of time. “I fully appreciated that my tree was alive just in time to hear that it had died ... my spruce tree was not only alive; it had a *life*, similar to but different from my own” (p. 29). What does the author’s statement mean to you? Do you have a childhood tree you remember? Or a tree that is special to you now?



2. The author describes seeds as living embryos—“a working blueprint”—waiting to be, including a lotus seed that was coddled into growth after two thousand years. “When you are in the forest, for every tree that you see, there are at least a hundred more trees waiting in the soil, alive and fervently wishing to be” (pp. 30-31). What can seeds teach us about tenacity, hope, and the ability of life to endure?
3. In one short chapter (pp. 63-65), the author describes the anatomy, life cycle, and function of a leaf, marveling at this “simple machine designed for one job only—a job upon which hinges humankind. Leaves make sugar.” How does her description compare to your previous knowledge of what a leaf is and what a leaf does? What did you learn that impressed you? Did her description affect the way you feel about plants?
4. Jahren says, “Light equals life for a plant” (p. 91). Do you feel this is true for people as well? In what ways?

Part Two: Wood and Knots

1. How does the author’s language compare with other books about plants you might have read? Consider this passage about the relationship between trees and fungi: “The fungus could certainly live very well alone almost anywhere, but it chooses to entwine itself with the tree over an easier and more independent life. ... Perhaps the fungus can somehow sense that when it is part of a symbiosis, it is also not alone” (p. 105). Compare the power and meaning of Jahren’s poetic language with her scientific voice.
2. How does the author’s discussion of vines relate to her own life, and to society? How effective is the author’s use of plant metaphors at expressing deeply layered ideas? “Vines are not sinister; they are just hopelessly ambitious” (p. 126). “The vine that we know by the name ‘kudzu’ arrived in Philadelphia as a gift from Japan to honor the 1876 centennial. ... While the dogwood tree blooms, stationary and secure ..., the kudzu resolutely continues to grow one inch each hour, searching for its next temporary home” (pp.127-128).
3. Jahren discusses the concept of plant communication via “volatile organic compounds,” wherein trees attacked by tent caterpillars use aboveground chemical signaling to “warn” other trees, a full mile away, to begin producing “caterpillar poison.” Do you know of other instances of communication in the plant world? Discuss the author’s remark that, although this was “a beautiful, brilliant piece of work ... it took more than twenty years for anyone to believe it” (pp. 165-167). Compare the author’s own struggle to gain credibility in her field, which she describes as “repeatedly smashing against a brick wall of scholarly skepticism” (p. 169).



Part Three: Flowers and Fruit

1. The author describes the hardening of trees for winter, a process that is triggered not by temperature, but by seasonal changes in light levels (pp. 191-193). Consider her ending statement: “Hardening has worked for eons because a tree can trust the sun to tell it when winter is coming, even during years when the weather is capricious. These plants know that when your world is changing rapidly, it is important to have identified the one thing that you can always count on.” What philosophical leap does the author make in her final sentence? What can these plants teach us about our changing world?
2. Jahren marvels at the “unprecedented possibilities” of evolution that result from the mixing of genes: “One grain of pollen is all that is necessary to fertilize an ovum and then develop into a seed. One seed may grow into a tree. One tree can produce one hundred thousand flowers each year. Each flower can produce one hundred thousand grains of pollen” (pp. 202-204). In her endnote, Jahren explains how she carefully gleans facts and statistics to arrive at such calculations, which are “set up to ‘err’ on the side of understatement” (p. 287-289). Were there particular plant facts in *Lab Girl* that surprised or amazed you? As an activity, what interesting facts or calculations can you combine to make scientific concepts more accessible or memorable
3. The author discusses the economy of trees (pp. 268-269): “In the end, trees die because being alive has simply become too expensive for them. ... replacing old leaves, making medicine against infection, pumping out flowers and seeds—these use the same raw materials, there are never enough to spare, and there is only so far out or down the tree can go in order to search for them. ... Once it exceeds the limitations of its environment, it loses all.” Think about this passage in relation to the “economy” of other natural “resources,” in relation to human economies, and in relation to nature or Earth as a whole.



QUOTES FOR CURIOSITY AND DISCUSSION

1. “[My father] taught me that there is no shame in breaking something, only in not being able to fix it.” (p. 8)
2. “My strongest memory of our garden is not how it smelled, or even looked, but how it sounded.” (p. 14)
3. “Science has taught me that everything is more complicated than we first assume, and that being able to derive happiness from discovery is a recipe for a beautiful life.” (p. 29)
4. “Each beginning is the end of a waiting. We are each given exactly one chance to be. Each of us is both impossible and inevitable. Every replete tree was first a seed that waited.” (p. 31)
5. “The most important thing I know about science [is] that experiments are not about getting the world to do what you want it to do.” (p. 75)
6. “From dandelions to daffodils, from ferns to figs, from potatoes to pine trees—every plant growing on land is striving toward two prizes: light, which comes from above, and water, which comes from below.” (p. 77)
7. “A tree’s wood is also its memoir ... If you know how to listen, each ring describes how the rain fell and the wind blew and the sun appeared every day at dawn.” (pp. 78-79)
8. “Discovery and mischief are two sides of the very same coin.” (p. 100)
9. “It was kind of tragic, I reflected, that we all spent our lives working but never really got good at our work, or even finished it. The purpose instead was for me to stand on the rock that he had thrown into the rushing river, bend and claw another rock from the bottom, and then cast it down a bit further and hope it would be a useful next step for some person with whom Providence might allow me to cross paths.” (pp. 189-190)



10. “One of the strangest things about being thousands of miles from anywhere is how incredibly safe you feel.” (p. 194)
11. “A scientist is supposed to feel overwhelmed at the beginning of her career, not the end. But the more I know, the more my legs buckle underneath me with the weight of all this information.” (p. 270)
12. “Each morning, I pick up something green and look at it, and then I plant some more seeds. I do it because it is what I know how to do.” (p. 270)
13. “I’ll never concede that any tool is useless and I’ll never admit that there is one that I don’t need. I will never stop being ravenously hungry for science, no matter how well it feeds me.” (pp. 275-276)
14. “Because I am a female scientist, nobody knows *what* the hell I am, and it has given me the delicious freedom to make it up as I go along. I don’t take advice from my colleagues, and I try not to give it. When I am pressed, I resort to these two sentences: You shouldn’t take this job too seriously. Except for when you should.” (p. 277)
15. “I can feel the warmth of the same brilliant sun that shines above the forest and onto the green world, but in my heart I know that I am not a plant. I am more like an ant, driven to find and carry single dead needles, one after the other, all the way across the forest and then add them one by one to a pile so massive that I can only fully imagine one small corner of it.” (p. 277)
16. “In languages across the globe, the adjective ‘green’ is etymologically rooted in the verb ‘to grow.’ In free-association studies, participants linked the word ‘green’ to concepts of nature, restfulness, peace, and positivity. Research has shown how a brief glimpse of green significantly improved the creativity that people brought to bear on simple tasks.” (p. 280)

SOURCE

Jahren, Hope. *Lab Girl*. New York: First Vintage Books Edition (paperback), a division of Penguin Random House LLC, March 2017.

