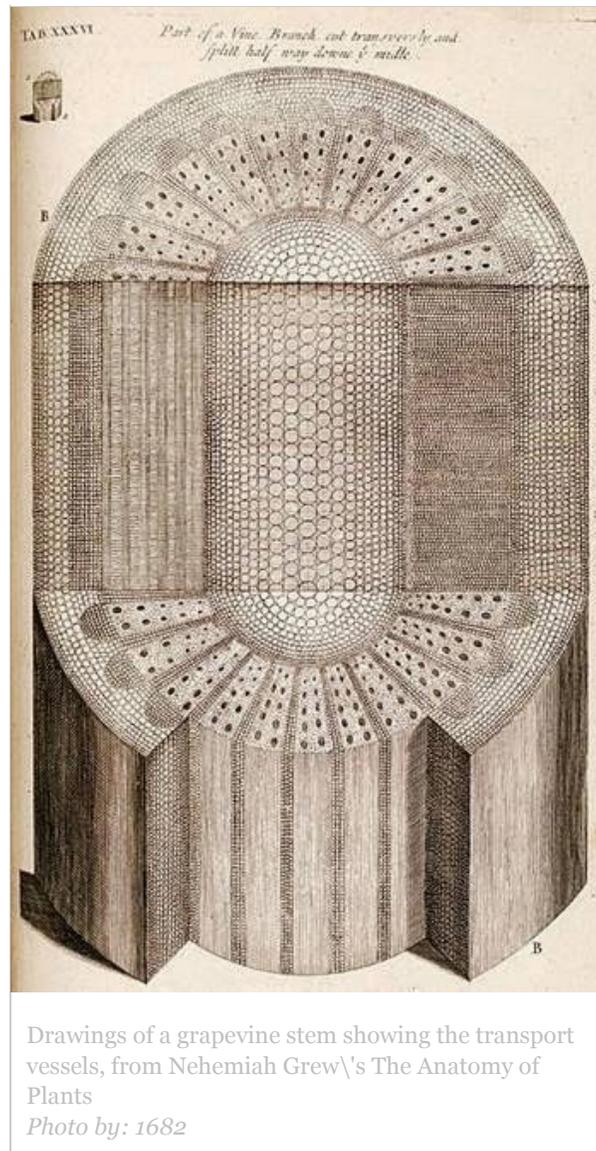


Exploring the Rich History of Plant Science

by Stephen Hales, blog.biodiversitylibrary.org

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In 1682, the first known microscopic depiction of pollen appeared in Nehemiah Grew's *Anatomy of Plants*. Grew, now known as the “Father of Plant Anatomy,” revolutionized botanical science with his studies of plant structure. Exploiting the power of the microscope,

he outlined key morphological differences in plant stems and roots and proposed the hypothesis that stamens are a plant's male reproductive organs.

Science has progressed significantly since the 17th century. Microscopes are no longer novel but commonplace, and scientists occupy their minds with theories about dark matter and quarks. Yet despite the centuries that have elapsed, today's advances are founded squarely on the discoveries of these bygone eras. Likewise, modern theories often cause us to re-examine assumptions from the past.

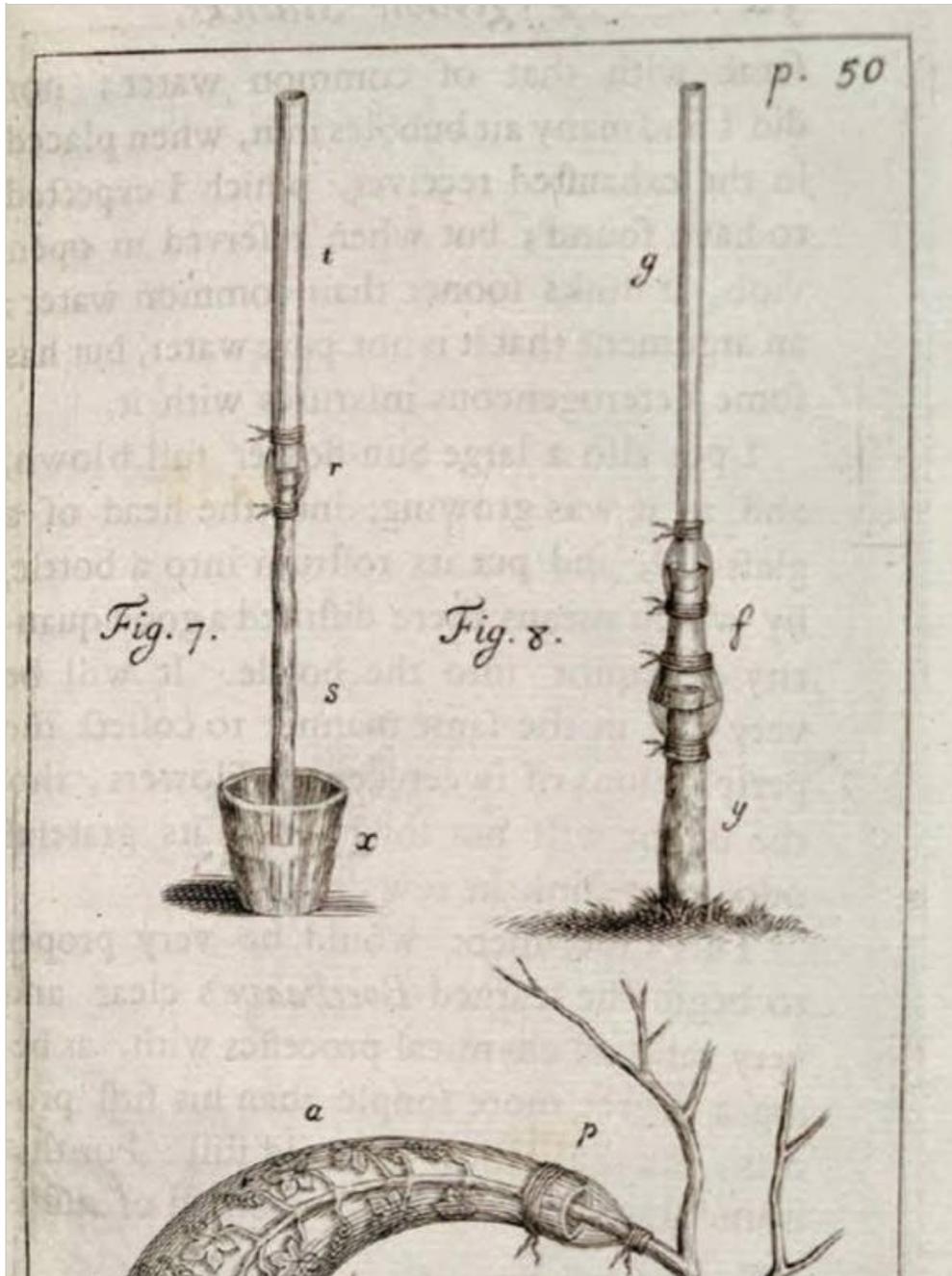
Dr. Mary Williams is particularly drawn to this interplay between historic and modern scientific study, specifically in the field of botany. Dr. Williams has been studying and educating people about plants since she began her PhD in Plant Molecular Biology 30 years ago. Serving as a professor at Harvey Mudd College from 1995-2009, Dr. Williams is now a Features Editor for the [American Society of Plant Biologists](#), writing a series of educational articles about plant biology called "[Teaching Tools in Plant Biology](#)." The series connects advanced undergraduate students to current research in plant sciences through textbook-style review articles, diagrams and images.



Mary Williams demonstrating the size of giant hogweed
Photo by: Heracleum mantegazzianum

A comprehensive biological education is not just about current research, however.
“Educating students about science involves more than teaching them our current models,”

explains Dr. Williams. “We also have to help them learn to synthesize information and develop their own models. One way to do this is by asking them to examine how our ideas and understanding have changed with time. As an example, students can read *Vegetable Staticks* published in 1727 by Stephen Hales, who is considered one of the pioneers of plant physiology. This book is an account of his studies of water transport in plants. In spite of having only simple tools he made key discoveries and developed models that are still useful.”





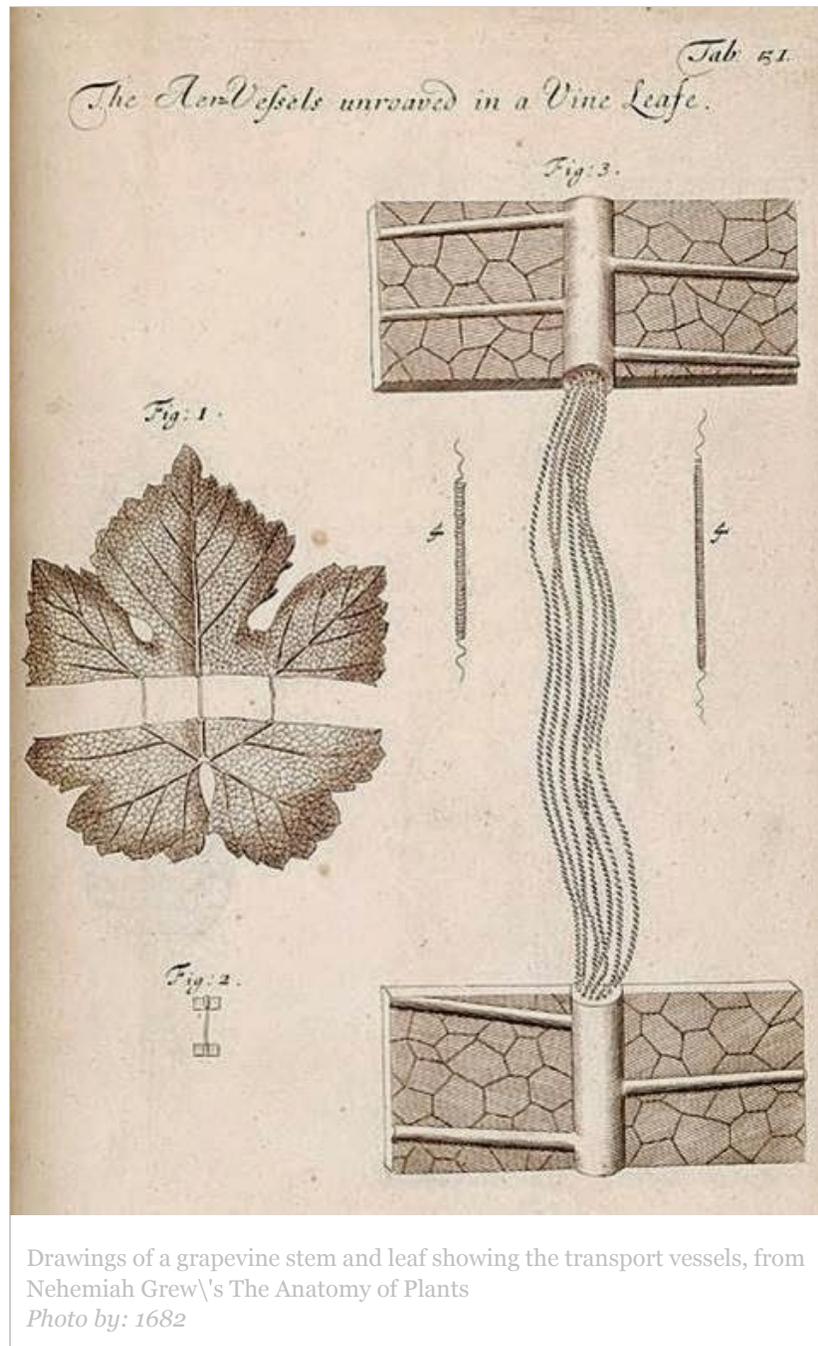
BHL has become an important resource for satisfying Dr. Williams' need for historic botanical literature. Some serendipitous Google searching in 2012 brought her to several digitized classics in the BHL collection, which has since transformed into monthly searches for materials. [BHL's Twitter account, @BioDivLibrary](#), has also proven helpful for uncovering hidden gems in the collection. Dr. Williams includes links to relevant material and images in her teaching articles.

"BHL makes great scientific works available for students to explore," lauds Williams. "It can be both fascinating and challenging to see how early scientists conducted experiments and described their results. I particularly like to direct students to "[The Power of Movement in Plants](#)", written by Charles Darwin and his son Francis. Reading it reveals how these exceptional scientists first observe a phenomenon and then set out to understand it. Their investigations of phototropic movement of *Phalaris canariensis* are brilliant studies that set the stage for the discovery of the plant hormone auxin."

Providing access to historic literature isn't the only thing that makes BHL an important resource for Dr. Williams. The diversity and openness of the collection are equally important. "I wrote an article about medicinal plants and was able to draw on BHL for access to dozens of books from across the world and across the ages. Also, the fact that many of the resources are in the public domain makes them easier to share."

The ability to see the primary sources as they were originally published is another of Williams' favorite BHL qualities. "Although it would be possible to learn from a transcribed document, somehow seeing the original publications with the old type and especially the old drawings has so much more impact and makes me feel connected to the writers across the

centuries.”



Her one complaint? “It would be nice if it were easier to search within a book (although I do enjoy scrolling and browsing).” Improved search is a component of the [Mining Biodiversity, Digging Into Data project](#) that BHL is currently engaged in. Deliverables will include

enhanced search functionality incorporating text mining, semantic metadata, and result visualizations.

So, which books would a botanical educator choose as her favorite within a collection of more than 150,000 volumes? “It would have to be the two important plant anatomy books from the 17th century, Marcello Malpighi’s *Anatome Plantarum* (1675) and Nehemiah Grew’s *The Anatomy of Plants* (1682),” asserts Williams. “The detail and observational quality of the drawings is fantastic. Because of their simplicity in some ways these centuries-old line drawings are clearer and easier to comprehend than an image taken today using a powerful microscope. When I look at these books I am struck by the power of the giants whose shoulders we stand on.”

We couldn’t have said it better ourselves.

Thank you, Dr. Williams, for taking the time to tell us how BHL has impacted your work. Do you use BHL regularly? Tell us about it by writing to feedback@biodiversitylibrary.org.