



On the Importance of Scientific Collections A Series by Natural Science Collections Alliance

How Thoreau, *Walden*, and Herbarium Specimens Informed Research

Boston University biology professor Richard Primack, Ph.D., calls biocollections “an under-appreciated and essential resource for understanding the effects of climate change on plant life.” Dr. Primack’s work uses herbarium (plant) specimens and associated data from Harvard University’s Arnold Arboretum to demonstrate the effects of rising temperatures on the flowering times of plants.

Arnold Arboretum, founded in 1872 as a public-private partnership between Harvard and the City of Boston, is the oldest arboretum in America. The arboretum contains one of the world’s most comprehensive living collections of trees, shrubs, and woody vines, as well as an herbarium holding more than 1.3 million plant specimens and a 43,000 square foot research center.

Dr. Primack uses the arboretum collections to study how climate change influences when plants flower. In one study, he gathered data from 372 plant samples that were collected between 1885 and 2002. These samples included the date and location they were collected, as well as the name of the person who gathered them. The meticulous collections at Arnold have allowed Dr. Primack to determine that flowers today are blooming eight days earlier than in the late 1800’s, a finding consistent with the 1.5 degrees Celsius warming seen in Boston over that time.

Henry David Thoreau’s classic *Walden* has also inspired Dr. Primack’s research. Nearly 150 years after *Walden* was published, Dr. Primack learned that Thoreau had not only explored the woods, but had spent considerable time documenting what he saw. After his death, Thoreau’s eight years worth of detailed botanical charts were scattered among various libraries and collectors. It was not until an independent scholar, Bradley Dean, took an interest and gathered copies of all of Thoreau’s work in one place that it became easily accessible for scientists. Working with Thoreau’s data, Dr. Primack built on the evidence he had obtained from his study at Arnold Arboretum, and confirmed that “the flowering time and leafing time of plants are the most sensitive indicators of climate change.”



While staying in a cabin at Walden Pond, Thoreau kept detailed botanical records, which now help researchers answer important questions on ecology and climate change.

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