

Time's Arrow and the Things We Leave Behind:

What Harriet G. Barclay's Herbarium Collections can Teach us
about her life and the land she studied

I came to the mountains to do science,
But in the end I made art.
Even in a landscape as remote as this one,
I could not escape the implacable draw of creation

"A trip has no value if you come home and forget it" - Harriet George Barclay.

Introduction

While traveling across the great plains, after the train jostled me awake somewhere West of Omaha Nebraska, I remember rummaging around in my carry on to find one of the four separate blank notebooks I had decessed to bring with me for the three months I would be in Colorado. Looking through the observation car window at the rolling pastoral expanse that surrounded me, I started my first of three attempts to keep a journal chronicling my experience at the Rocky Mountain Biological Laboratory (or RMBL), a biological field station eight miles north of Crested Butte, where I would be spending my summer doing botanical research alongside some of the most prominent ecologists and natural scientists in the nation. As I neared Denver and the blue-gray outline of the Rockies slowly grew across the horizon, the penultimate leg of my journey west started coming to a close. Preoccupied with my surroundings, I set down my now partially filled notebook and promptly forgot

Commented [1]: I love how this opens. However, these first few sentences are really the only ones in the whole piece that I think need complete reconstruction. Maybe its because they are the first things you wrote and really got going or because the opening to a piece carries more weight. But here's a suggestion for a rewrite - "Somewhere west of Omaha, Nebraska, the train carrying me to Colorado jostled me awake. Compelled to I rummaged through my carry-on for one of the four blank notebooks I'd packed for the three month trip." Then onto "Looking through..."

about it. Unfortunately, this is the fate that ultimately befell all of my attempts at journaling during my time at RMBL.

Though I did not succeed at creating the thorough travelog I had hoped to, it did get me thinking about the importance of written records in the chronicling of a life. As a journalist and a historian, it is often my job to reconstruct the course of past events through the paper trail they leave behind, but over time these trails have a tendency to disperse or disappear altogether unless properly and conscientiously kept.

After a decidedly tumultuous start to my summer, I began work on a project looking into the over 2,000 herbarium plates collected by Dr. Harriot George Barclay. I knew vaguely of Dr. Barclay's from the two buildings around the field station named after her and from the signature present at the bottom of several impressionistic paintings of the local scenery that I had seen hanging in various offices around the campus. I also know from the portrait hanging in the small, but impressively stocked, natural history museum that housed her specimens, that she must have had some connection to the institution, but aside from that I knew very little about her.

Most people are familiar with the kinds of natural history museums filled with dinosaur fossils in life-like poses and ecosystems of antique taxidermied animals staged in vignettes of their natural habitats. However, in the basement or through a door, down a long fluorescent-lit hallway at these same institutions there are often vast rooms of carefully-cataloged, near-endless shelves containing biological specimens not viewable by the visiting public.

Specimens housed there can range in size and scope from an elephant skeleton to the preserved skin of an exotic bird to jars of squids suspended in alcohol to a vial of snail shells smaller than the tip of your pinky. These collections are used by taxonomists, scientists who study and classify species, and other researchers wishing to learn about the natural history or anatomy of a specific organism or region. Herbarea are a type of these biological collections focused specifically on preserving and archiving plant material. Plants are picked in the field, pressed flat, dried and then attached to a piece of archival-grade paper with relevant information, like its scientific name, when and where it was collected and who it was collected by, recorded on it. These specimens, or plates, are then placed in tremendous, climate-controlled cabinets where they are stored for posterity. This same process has been used continuously since the 16th century, when it was developed, with only slight alterations (Reiner-Drehwald et al., 2022).

Science has always been a male-dominated discipline (McDermott & Gee, 2022). The patriarchal and colonial roots of natural science are arguably on their fullest display through the classification of species and the study of biological specimens. What could appeal more to the masculine, European ethos than reducing the whole of the natural world into something you can own, hoard and organize into a rigid socially-constructed hierarchy? [Wonderful apt and snarky observation.] Though gendered discrepancies in the sciences have continued into the 21st century (McDermott & Gee, 2022), and many scientific institutions are still grappling with their historical and ongoing ties to oppressive systems, the worlds of botany and biological collections were some of the first to become open to women in the 19th and early 20th centuries (Bonta, 1991). It should be

acknowledged that all of these pioneering women were cisgender, almost unilaterally white and very often came from upper-class backgrounds. However the sentiment that even when women were granted some modicum of access into the scientific establishment they were “often viewed as amateurs, even though professional men in the same field who had achieved great renown often had the same amount or even less professional training” (p. 14), expressed by Marcia Bonta in her 1991 work Women in the field: America's pioneering women naturalists, still very much rings true.

Given this context, I wanted to see what information I could find out about Dr. Barclay in an attempt to better understand how she and the work she did here at RMBL fit into this broader legacy of early women scientists. So, like I do at the beginning of any historical or journalistic endeavor, I began pouring through online archives and digitized records databases to see what traces of her life I might be able to find. However, after a fairly exhaustive search, all I managed to find were about half a dozen proceedings from scientific conferences she spoke at during the latter half of her career, a listing for over 5,000 photographic slides she had taken that had yet to be digitized, housed at the University of Tulsa (*Collection: Harriet George Barclay Archive*, n.d.), census records indicating that she was born Harriot George in Minneapolis Minnesota during the summer of 1901, the daughter of a plumber (U.S. Census Bureau, 1910), and a 1923 newspaper article published in the Elk Mountain Pilot, just down the road in Crested Butte Colorado, that upon further examination turned out not to be about Dr. Barclay, but a local resident's mother-in-law who just so happened to share the same name (“Gunnison Items,” 1923). By all accounts she did not publish a single scientific paper during her entire 50+ year career

(Dobbin, 2015, p. 76). Given this relatively small pittance of available information, I thought I might have hit a dead end in my quest to uncover the thread of her life and career here at RMBL. That was until one day, while sitting in the herbarium, I realized I actually had a trove of information about her right at my fingertips.

Methods

Thumbing through her old herbarium plates, I can't couldn't help but wonder if she was as caught up in the turbulent times in which she was living when she collected this specific sedge as I am preoccupied with mine looking at it all these years later. Granted, she seemed a lot more interested in Poales (the botanic order containing grasses and sedges) than I am, based on the sheer number of them that she collected over her career. They make up almost 28% of the specimens I have seen of hers, though there is a general lack of Poales in biological collections, mostly on account of how un-charismatic of plants they are, and from what I have gathered this is a bias that is still reflected in Barclay's collecting.

So it isn't out of the question that she was more grounded than I am, and spent more time thinking about grasses and grass allies than the forces of history and her relationship to them when she first came to RMBL in the summer of 1929. The rising threat of fascism was in Europe, an ocean away, she was a year out of her doctoral program at the University of Chicago, a newlywed, having just married her husband, Burtrum Barclay, a fellow graduate of the U of C ecology department, and was five years older than I am now, at 27. But the looming great depression was right around the corner and from the writings of hers I've come across so far, it seems like she was much less involved in leftist spaces than I am,

so she might not have even been aware of the coming catastrophe until it hit a few months after she returned home from her first, incredibly prolific stint at the field station, with her 200+ freshly collected plant specimens in tow. By the time she returned in the summer of 1933, the effects of the economic downturn would have been in full effect.

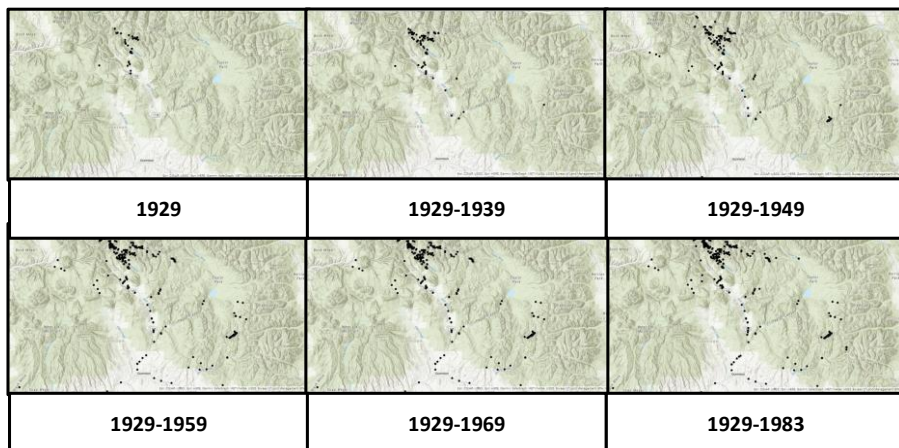
One of the strange things about studying the life and work of someone from so long ago is that you know so clearly all of the generation-defining events they will be experiencing in real time five, ten, twenty years after they press the flower you are looking at or publish the paper you just read. Something they could only just guess at. There is really no way of knowing how World War II affected Harriot, her work and her perception of the place she held in the scientific community, aside from the conspicuous gap in collecting between 1940 and 1946.

To glean what information I could about Dr. Barclay's life from her extensive collections, I combed through the online database of the Consortium of Southern Rocky Mountain Herbaria (SoRo Herbaria), identified every specimen collected by Dr. Barclay and separated them onto a separate spreadsheet. She collected specimens from places as far flung as Alberta Canada and the Andes of Colombia, Venezuela and Ecuador, where she studied extensively later in her career, discovering 19 high elevation species in the process (Paustenbaugh, 2005). However, since I wanted to focus specifically on her time here at RMBL, I winnowed the list of total observations in the SoRo Herbaria database down to just the 1,900 observations she made in the state of Colorado. Species name, taxonomic family, collection date, location name, latitude and longitude were all recorded on the sheet.

Each specimen was then manually grouped into a collection trip. This was accomplished by assigning a unique numeric code to all specimens collected on the same date and in a similar location. There were some instances where the same location was sampled during two concurrent days that were deemed to be overnight trips and were recorded with the same numeric code. A separate spreadsheet was also created from this data listing the number of individual observations and the number of collection trips for each year.

Results

With this data set in tow, I was able to create an interactive map showcasing every collection made by Dr. Barclay. To differentiate collections made in different years, data points were indicated with distinct symbols, the color of which was changed each year, and the shape was changed each decade. Additionally, as latitude and longitude was not recorded at the time of collection for many of the earlier specimens and the program GEOLocate was used to approximate coordinates, it was not uncommon for several observations to occupy the same exact spot on the map. To visibly indicate this, points representing multiple specimens were made to appear proportionately larger depending on the number of representatives. Using this map I was also able to create these less detailed maps showing the gradual expansion of her collections in central Gunnison County in 10 year increments starting in 1929.

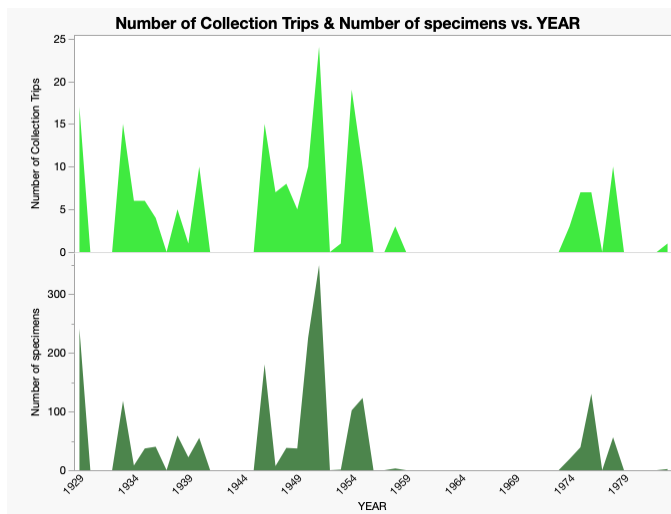


Additionally, with the data on the number of specimens and collection events for each year, I was able to create a graph illustrating Dr. Barelay's prolificacy of collecting for each year she was at RMBL based on the collections held in the natural history museum. Notice

the gaps in collecting between 1929 and 1933, 1940 and 1946, 1951 and 1954, and between 1958 and 1974.

Discussion

Barclay arrived at RMBL for the first on or around the first of July 1929, as this



was the date of her first observation recorded at the station. I was able to determine that on her inaugural trip she passed through Weld County Colorado, Between Fort Morgan and Greeley, as there was a lone collection of *Rydbergia grandiflora* from that location dated four days before her arrival. I was not, however, able to determine if she came to Colorado alone or with Bertram, her husband, this first year from looking just at the specimen data. This is the case as well for every or subsequent year for with the exception of 1946, when there was one herbarium plate attributed to him in the county where the lab is located.

Harriet and Bertram met while studying ecology at the University of Chicago under Dr. Henry Cowles (*Harriet g. Barclay Botany Award*, n.d.), an early expert in the field who conducted pioneering research into succession, or the process through which ecosystems rebuild after a disaster. They both graduated with their doctorates in 1928 and got married soon after. Bertram was then offered a position heading the newly established botany department at the University of Tulsa, so the young couple relocated to Oklahoma. Though they possessed identical educational backgrounds, Harriet was initially only offered a position as a part-time lecturer in the same botany department. An interesting note on their marriage however, is that after the ceremony, Harriet began recording George, her maiden name, as her middle name. This would have been a fairly revolutionary thing to do at the time and is a poignant indication of her strength and resilience in face of the restrictive gendered expectations placed on her as a woman in science.

The summer after their first school year in Tulsa, and the second year of RMBL's formal operations, Bertram was invited to come to RMBL to teach the field biology class offered that season, as the professor slated to teach the class had taken ill. Though the couple had already traveled to Minnesota for the break, he accepted and the couple headed westward into Colorado. This is consistent with the Weld County observation previously mentioned, as they easily could have passed through that locality in the Northeastern part of the state on their trip from Minnesota where they were likely visiting Harriet's family.

Though the discrepancy between similarly educated men and women during the era, illustrated by the gap in prestige between the positions offered to Harriet and her husband, was industry wide, RMBL offered the relatively rare opportunity for cisgender white

women to participate in field research. Likely due in part to this progressive culture, Harriot became the first person to collect herbarium specimens at the station, ultimately leading to the creation of the natural history museum where I was able to do my research. Many of the 241 specimens Harriet collected in 1929 were in riparian areas or wetlands, indicating an interest in succession in these ecosystems, a continuation of the academic interests of her mentor. On their way back to Tulsa, at the end of the season, they passed through the Mesa Verde area as evidenced by another lone observation recorded about a week after her last specimen in the area around the lab.

There is not any evidence of either Barclay at RMBL again until 1933. This is not too surprising given that they were still establishing themselves at the University of Tulsa and they were raising their two sons, Bertram Barclay Jr. and Arthur Barclay. Arthur later went on to become a botanist in his own right, collecting over 700 herbarium specimens that would ultimately come to be housed in the RMBL natural history collection. Additionally herbarium records indicate him staying at the station during the summer of 1960. In spite of her personal and professional obligations, Harriot still managed to collect 606 specimens by the end of the 1940 field season.

Due to the massive disruption to society caused by the second world war, RMBL entirely ceased operations from 1941 until 1945 (Langenheim, 2010). This as a practice was not terribly uncommon. My home institution, Antioch College in Yellow Springs Ohio, also closed down during the war years, as did many other smaller universities across the nation due to the high proportion of college age men who were out of the country fighting. Harriot, however, took this disturbance in stride and spent the period focusing on honing

her skills as an artist. In 1945, she graduated with a BA in fine art from the University of Tulsa (Paustenbaugh et al., n.d.).

It is said that Harriet used her paintings to masterful effect as teaching tools, by showcasing her bright vibrant watercolors alongside herbarium plates of the same plants, many of which she created at and around RMBL (Dobbin, 2015, p. 75). After the advent of commercially available color photography, she taught herself the process and began using the new technology to showcase a similar principle. She also produced quite a few larger landscapes at RMBL during the post-war period. Several of which still hang in various offices around campus and served as one of my first introductions to Dr. Barclay.

In 1946, both Dr. Barclays returned to RMBL. By this time, Harriet had taken over the teaching of the field biology class (Langenheim, 2010), and through some oblique references it can be assumed that she had been promoted to a position as an associate professor at the University of Tulsa. 1946 is the year of Harriet's career at RMBL that I was able to find the most information about. In addition to the 180 specimens she collected, her fourth most productive year on record, and two of her landscapes, Barclay was also able to encourage one of her students from Oklahoma, Jean Langenheim, to attend the summer program offered at the lab. Langenheim would later go on to become a quite accomplished ecologist and mentioned this time with Harriet in her 2010 autobiography.

The five years immediately following the war were far and away the period in which Harriet collected the most prolifically, with 1951 being the best cataloged year of her career at RMBL both in terms of individual collections and collection trips, with 349 and 24 respectively. It also became more common for her to travel further from the laboratory

property on her trips during this era of collections. It was remarked by many who knew her that she would ride on horseback to some of her more remote field sites, however, this increased distance indicates that she may have started more frequently driving to further flung locations.

However, this period was cut short in 1953, with the sudden death of her husband in an automobile accident (Dobbin, 2015, p. 75). I was unable to find a date for the accident, but she made two herbarium observations that summer, both in July, two days apart from each other. The first at the Barclay Farm in Oklahoma and the second at RMBL. This is the only collection housed at RMBL that originated at the Barclay Farm, so I think it is a reasonable conjecture that this was a property belonging to Burtam's family as opposed to being the Dr. Barclay's home residence, even though it is only one county away from Tulsa, so this possibility can not be ruled out entirely. I can only really speculate at her timeline of events during this assuredly tumultuous season based on the scant information I have, but it is not too much of a stretch to assume that she spent some time visiting or living with her husband's family before traveling to RMBL for an abridged summer stay.

Additionally, after her husband's death, she was promoted to head of the Tulsa botany department and awarded a full professorship (*Bertram Donald Barclay, Sr.*, n.d.). She still continued to come to, and collect at, RMBL for a few years after stepping into this new role. The first two years of which, 1954 and 1955, she was quite active, collecting over 100 specimens each year. Her eighth and sixth most productive years respectively.

Inspired by the work looking into alpine plants that she did at RMBL (Dobbin, 2015, p. 75) she applied for and was awarded a National Science Foundation grant in 1958 that

allowed her to travel to South America to study plants at similarly high elevations in the Andes. After spending an entire summer season at RMBL, she left for Colombia, arriving in October of that year. She would spend the next 15 months collecting in Ecuador, Peru and Venezuela and working with an individual by the name of Pedro Juajibioy, whose name appears on many of the specimens collected during this period. She would spend the next few decades, and most of the rest of her life going on expeditions around the globe, traveling to every continent except Antarctica (Dobbin, 2015, p. 75). On these travels (Paustenbaugh et al., n.d.), she identified 19 plants that were new to science, ten of which bear her name. She would not return to RMBL until 1974.

After retiring from the University of Tulsa in 1971 (*Bertram Donald Barclay, Sr.*, n.d.), she was able to devote more time to RMBL once again where she would continue to facilitate the management and running of the herbarium and natural history collection that she had been instrumental in establishing almost 50 years before. Dr. Barclay is most remembered as a world traveler and for being an inspiring educator to the many that she taught in Colorado, Oklahoma and in Arkansas and North Carolina where she spent some time as an instructor at other university-affiliated field stations (White , 2018). However, her legacy is not just limited to those that she taught. The scientific contribution that she left behind through her extensive herbarium sampling can not be underestimated.

It is a commonly known fact in environmental science that it can be incredibly difficult to find accurate historical data on climate and ecology. And in a world where global average temperatures continue to rise due to anthropogenic climate change, this sort of data is in higher demand than ever. This is where herbaria are able to step in. Given that

individual specimens are made of preserved plant material, they offer the very rare opportunity to analyze genetic information from plants that grew decades before such technology had been invented. Additionally, though they are not very accurate reflections of all of the flora that was present in an area at a particular point in time, large collections of herbarium plates, like the one accrued by Dr. Barclay, can be incredibly useful tool in uncovering the historic distribution of specific species and can be used to study phenology, or the timing of a plants lifecycle.

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