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*MID-NINETEENTH-CENTURY
BOTANICAL EXPLORATION IN NEW MEXICO*

CAROLYN DICKERMAN

IN THE NINETEENTH CENTURY a varied people came west and in doing so, braved hardship, danger, and isolation. Initially, explorers and adventurers were drawn to the inhospitable country "because it was there." In addition, settlers, dissatisfied with their lives in more civilized areas, looked to the West as a place to realize their dreams. Another group, merchants, discovered an untapped clientele developing west of the Mississippi.

The irresistible West drew still another breed of man to its harsh terrain: scientific explorers. Although the early naturalists are not discussed in many historical treatments of western development, they carried out their work on the very edge of the frontier. A glimpse of the earliest botanical collectors in New Mexico reveals what kind of people they were and why and how they came to the territory. In addition, a study of their opportunities for collecting in New Mexico indicates that the political and social history of that region in the 1840s helped determine their successes and failures on the frontier.

While some of the West remained unexplored in the first half of the nineteenth century, eminent American botanists Asa Gray of Harvard and John Torrey of Columbia were preparing a compilation of the plants of the North American continent. Also helping with this ambitious project were Thomas Nuttall, a prominent Philadelphia botanist who had traveled extensively on the frontier, and George Engelmann, a St. Louis physician and expert on cacti.

To obtain material from previously unstudied areas, Gray sponsored collecting expeditions, funded by sales of subscriptions to

sets of plant specimens brought back from these trips. Announcements for these subscriptions were published in scientific journals and specified the geographical area in which a collection would be made. The advertisements stated who the collectors would be, how they were qualified, and which scientist would identify the specimens.¹

Gray was particularly interested in obtaining plant information from the largest area of the continental United States still unexplored scientifically, the land between Texas and California. Botanical specimens were first taken from the coast of California in 1791,² and by 1820, Dr. Edwin James, who accompanied Maj. S. H. Long on his first expedition to the Rocky Mountains, was gathering plants in Texas.³ Although these areas of the Southwest and other sections of the continent had experienced botanical expeditions in the 1840s, no one had yet ventured into New Mexico.

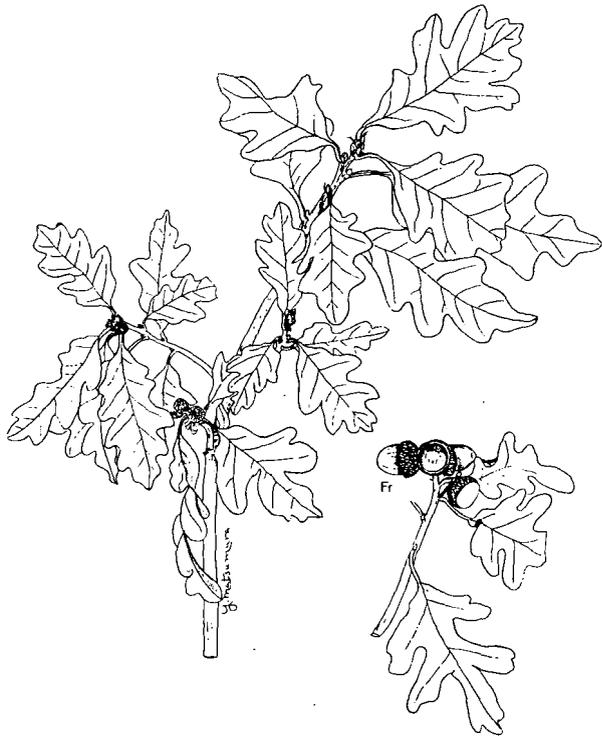
Of course, people had lived in the Southwest for millenia and were acquainted with the plant life of the region. Indeed, successive indigenous populations, Spanish missionaries and soldiers, and hunters and trappers from the United States knew the plants of the area, named them, and were aware of their uses and distribution. Trained European botanists, who were building a systematic body of knowledge of the relationships and distributions of all plants of the world, would not base their scientific work on laymen's descriptions, however. They needed actual specimens, prepared by professionals who had the training to recognize interesting and useful species. The reasons New Mexico remained unknown botanically are not attributable primarily to the rough, inhospitable nature of the land or the arduousness of travel, difficult as these were, or to the unwillingness of people to undergo the tribulations of frontier life. Instead, international politics determined the course of botanical knowledge in these early years.

New Mexico in the early nineteenth century was an integral part of Mexico, itself under Spanish administration. Generally, the weak Spanish government viewed frontier New Mexico as a buffer to protect remaining Spanish possessions from hostile Indians; it also prohibited foreigners from entering Spanish lands.⁴ Fear of encroachment by the United States, especially after the Louisiana Purchase in 1803, as well as protecting the monopoly on trade from

Chihuahua to New Mexico, motivated the Spanish to keep New Mexico isolated. A result of this isolation policy was that New Mexico received no funds for colleges or public schools; nor were there any printing presses, lawyers, or medical doctors in the province, with the exception of a surgeon supported by soldiers in Santa Fe. Spain prohibited manufacture of goods, and all trade was with the south. Annual caravans laden with wool, wine, and furs made the perilous journey to Chihuahua and returned with manufactured items of European origin. Traders who broke the rules of the foreign embargo, especially Americans, could expect heavy jail sentences.⁵

During the three hundred years of Spanish rule in the New World, Spain sent scientific explorers to Mexico on only one occasion: the Royal Scientific Expedition to New Spain, authorized in 1786 and headed by two prominent Spanish botanists. For fifteen years, this expedition of botanists, zoologists, and artists collected, described, and painted the flora and fauna of New Spain from Central America to Veracruz (where they were joined by the Malaspina expedition) to Baja California, including some Caribbean islands, but not northern Mexico. When the principals returned to Spain in 1803, however, the chaotic political climate thwarted further scientific activities. As a result, materials from the collection were not made available to the European scientific community, and Spain discontinued botanical work in Mexico.⁶

When Mexico broke from Spain in 1821, it abandoned the Spanish policy of excluding foreign traders. In fact, the first American to trade with the Mexican people was William Becknell, a Missouri merchant who gambled that Mexican independence would lead to repeal of the restrictive trade laws. He started out for Santa Fe before the war of independence was won. When he arrived in New Mexico friendly troops met his party and escorted them to Santa Fe where they exchanged their manufactured goods for bags of silver pesos. Upon his return to Franklin, Missouri, he advertised his good fortune by riding down the main street, pulling out one of his leather bags of silver, and, cutting it with a knife, spilling the coins out on the street. Six months later, Becknell headed back to Santa Fe with more goods. Knowing that his three, heavily loaded wagons would not be able to negotiate the steep Raton Pass through which he had earlier entered Santa Fe, he crossed the



Gambel oak, *Quercus gambeli*.



Rio Grande cottonwood, *Populus fremontii* var. *wislizenii*.

Cimarron desert and inaugurated another branch of the Santa Fe Trail.⁷

The opening of the Santa Fe Trail and the commercial activity it spawned provided a means of sending botanical collectors into the new area. The first botanical explorer in New Mexico was William Gambel, a protégé of Nuttall who had traveled with his mentor in the Southeast and New England and had learned the technique of collecting and preserving plants for scientific purposes. An adventurous young man of eighteen when Nuttall sent him west, Gambel followed the usual route to the frontier through Pittsburgh, down the Ohio by steamboat, up the Mississippi to St. Louis, and then up the Missouri to Independence, Missouri. In May 1841, Gambel left Independence with a mule caravan of ninety trappers and traders along with forty wagons laden with merchandise.

The three-month trip to Santa Fe was not without considerable trouble. In western Kansas, combat with a band of five hundred Arapaho Indians was avoided only by handing out gifts. This incident took place within sight of the remains of Pawnee Indians whom the Arapaho had killed earlier. Farther along, four hundred Utes attacked and shot at the caravan for an entire morning. (We know of these events through extant letters Gambel wrote to his mother.) In describing travel along the Santa Fe Trail, Gambel reported: "We also suffered much for want of water sometimes having to do without for two days. However, I have got through it with safety not even with a cold from laying [*sic*] on the ground with nothing on but the sky above the earth below and perhaps Indians around us for nearly three months."⁸

Despite these and other problems, the mule train arrived in Santa Fe in record time. For the next two months, Gambel remained in New Mexico, collecting botanical and zoological specimens in the Sangre de Cristo range and the nearby Rio Grande valley.

Since traveling over the deserts and mountains of New Mexico by mule was arduous, amassing a useful collection of plants while on such trips was particularly difficult. As samples were collected in the field, care had to be taken to save all parts of the plant (for

example, flower, fruit, root) to retain useful specimens. These specimens were transferred back to camp in metal containers (vascula) or leather portfolios. Moisture was then removed from the plants by pressing them between absorbent papers that were changed daily until the specimens had dried. In rainy seasons, papers had to be changed over a long period of time. At the end of each day, a detailed list of the collected plants had to be made, including information on exact location, habitat, density of population, and associated flora. Freshly collected plants had to be pressed, all other specimens collected on the trip had to be examined for dryness, and those that were still moist had to be replaced in dry papers. In addition, collectors had the more mundane daily chores of cooking, washing, and guard duty.

By September, the flowering season was coming to a close, and Gambel resumed his trip to California by joining the Workman party in Abiquiú. The route this group of twenty-five people (most of whom planned to settle in California) took went as far north as Utah, then across the Mojave desert to Los Angeles without major problems, although toward the end of the trip their flock of sheep had been eaten, and they suffered from a serious lack of water.

When Gambel's extensive collections finally reached Philadelphia, Nuttall published the descriptions.⁹ Nuttall permanently honored Gambel by naming the common scrub oak of New Mexico *Quercus gambellii* (Gambel's oak) and the top-knotted bird commonly seen scurrying through the desert *Lophortyx gambellii* (Gambel's quail).

Nearly five years passed before another botanist visited New Mexico. In the meantime, relations between the United States and Mexico deteriorated as the United States perceived the disorganized young state of Mexico as uncooperative, while Mexico feared their powerful neighbor's greed for additional territory. As a result, Mexico broke off diplomatic relations with the United States in March of 1845 following the annexation of Texas.

The next year, despite clouds of war on the horizon that a series of border incidents had initiated, Frederick A. Wislizenus, an emigré physician and partner in practice with George Engelmann, was persuaded by the latter to undertake a scientific tour of northern Mexico. Engelmann had developed Wislizenus' interest in botany

and had instructed him in the technique of collecting and preserving specimens. The tour began on 5 May 1846, when Wislizenus left St. Louis for Missouri where he sought a company destined for Santa Fe. Although word of skirmishes on the frontier reached Wislizenus before he left Missouri, he continued on his trip, believing that if war came, it would be short-lived. He headed west within the month with the thirty-five-man caravan of Albert Speyer, a Santa Fe trader carrying two wagon loads of arms and ammunition to sell to the governor of Chihuahua.

On 17 July, Wislizenus crossed the New Mexico border. Among the botanical observations of New Mexico he recorded in his detailed journal was the first cane cholla, *Opuntia arborescens*. He noted that this plant, common throughout Mexico, has porous stems that are used as torches. At Las Vegas, he went into the mountains where he recorded then undescribed pines: ponderosa and piñon.

In Santa Fe, word reached the American party of the battle of Palo Alto that took place in Texas when the Mexican army crossed the Rio Grande and killed American patrols. Still, the situation seemed normal in Santa Fe, so the Mexican general granted Wislizenus a passport for travel to the interior. The caravan started on its way to Mexico along the Rio Grande on 9 July, and Wislizenus made the first collection of plant specimens south of Santa Fe. At the Sandia Mountains, Wislizenus left the party to obtain gold ore, then rejoined the group at Albuquerque. A few days later along the Rio Grande, Wislizenus encountered mesquite. At first he was pleased to see specimens of the plant he had known only by description, but he soon found them monotonous. He was also interested in the various species of *Yucca* and *Opuntia*. At Socorro, while examining the minerology of old mines, Wislizenus found an undescribed species of *Yucca* in fruit.

From Socorro the party left the Rio Grande, which at this point begins a circuitous bend that, because of the mountainous terrain, was difficult to follow and entered the ninety-mile Jornada del Muerto, a nearly waterless valley, the name of which reveals its dangers. There, Wislizenus discovered a new *Echinocactus* of impressive size. He collected its flowers and seeds, but its four-foot height prevented him from making a whole-plant specimen. On 8 August 1846, Wislizenus crossed into Mexico where during the

next ten months he succeeded in amassing an important botanical collection despite being caught up in the war. For six months he was confined to a remote village in the state of Chihuahua.¹⁰

Wislizenus' collection included five new species from New Mexico. Engelmann described these and other new species in the "Botanical Appendix" of Wislizenus' "Memoir," thereby stamping Wislizenus' unwieldy name on American botany.¹¹ At the generic level, Engelmann described *Wislizenia*, of the family Capparidaceae, in honor of its discoverer. In addition to *Ferocactus wislizenii*, a cottonwood, *Populus fremontii* var. *wislizenii*, collected in Texas, was also named for the German physician, as were *Dithryea wislizenii*, *Geranium wislizenii* and a California oak, *Quercus wislizenii*. Engelmann wrote that "the collection of Dr. Wislizenus cannot but impress the botanist with the richness and novelty of the flora of these countries and invite the arduous explorer to further exertion."¹²

In the spring of 1846, while Wislizenus was on the Santa Fe Trail, worsening relations between Mexico and the United States culminated in full-fledged war along the lower Rio Grande. President Polk signed an act of war on 13 May that authorized him to use military force to take Chihuahua, Tamaulipas, New Mexico east of the Rio Grande, and the California ports.

In response to the declaration of war, the 2,700-member Army of the West assembled at Fort Leavenworth, Missouri. Attached to the army were five members of the Corps of Topological Engineers, a branch of the army charged with gathering scientific information about the West while serving as part of the fighting force. The engineers were educated at West Point where they were given courses in engineering, drawing, and natural science. In fact, prominent botanist John Torrey gave them basic instruction in botany and taught them how to document the flora of areas through which they would travel. By means of their association with foremost American scientists, these West Point graduates came into contact with leading scientists of the United States and Europe, and some of them became highly respected scientists in their own right.¹³ When President Polk ordered General Kearny to extend his conquest of New Mexico onward to California, the topological bureau was provided with an opportunity for original exploration

in unmapped lands that until then only Indians, Spaniards, and mountain men had crossed.

On 5 June 1846, Lt. William H. Emory, a thirty-five-year-old career soldier, received orders to repair to Fort Leavenworth and report to Colonel Kearny as head of a party of topological engineers. These orders stipulated that Emory would perform any military duties that Kearny assigned to him. Anticipating that this tour of duty would take him to unexplored areas of the continent, Emory prepared to use his free time to collect scientific data.

Indeed, before leaving Washington, D.C., Emory procured box chronometers and sextants for determining longitudes and latitudes. So jarring was the trip, however, particularly the overturning of the stagecoach in the Alleghenies, that the settings of these delicate instruments changed and had to be recalibrated in Fort Leavenworth. On the other hand, Emory managed to keep the settings in working order throughout the remainder of the trip, and during a stopover in St. Louis, he consulted with Engelmann on preparations for plant collecting.

Emory's official report reveals that the Army of the West set out from Fort Leavenworth on 26 June following the Santa Fe Trail. Throughout the trip, Emory recorded military events and botanical findings.¹⁴ Although the march was hard, food in short supply, water scarce, and there was a constant threat of combat, Emory took valuable time each day to detail the floral characteristics of the country. The army traveled across New Mexico from Raton Pass to Santa Fe, announcing at each village that the United States was taking possession of the country. The armed Mexican forces, rumored to be ready, never materialized.

In August and September, while Kearny's men remained in Santa Fe, Emory selected and surveyed the site of Fort Marcy. In addition, he took the opportunity to collect plants in the environs as well as to travel south along the Rio Grande as far as the village of Tomé.

Toward the end of September, the company set out on the march for California, moving south along the Rio Grande. At Socorro, they left the road that continued down to Chihuahua through the Jornada del Muerto and instead followed the Rio Grande. From this point on, Emory was collecting in botanically virgin territory.

At the level of the present Elephant Butte Dam, Kearny and his party headed west toward the Mimbres Mountains and the Santa Rita copper mines, and then to the Gila River, which they followed out of New Mexico. The month's passage across present-day Arizona along the Gila was without military incident, so Emory was able to continue his botanizing along the Gila, adding new species to his collection. His most notable botanical discovery was the saguaro cactus. Although Emory was on a military mission, his descriptions were enthusiastic, at times almost poetic: "The view from our camp is inexpressibly beautiful";¹⁵ "for two days our way was strewn with flowers."¹⁶

His collection of plants was excellent, although he apologized in a letter to John Torrey that it was made "at intervals snatched from military duty, and necessarily done hastily and without that order of regularity which you would expect had I been sent on a scientific expedition. . . . I went out on a notice of only a few hours and what was done was beyond military duties."¹⁷ Torrey was asked to write a catalogue of the plants collected. This analysis of Emory's specimens in the appendix of the "Notes" includes a new genus, *Baileya*, of the Composite family, a common plant along the Rio Grande, as well as nine new species.¹⁸ *Prosopis strombocarpa emoryi* and *Quercus emoryi* (Emory oak) were species named after Emory, who collected them while on his military mission.

Meanwhile, Asa Gray of Columbia recognized the opportunity to place plant collectors in remote places in the flood of military people headed west. He wrote Engelmann on 30 May 1846 that he "must have a collector for plants living and dry to go to Santa Fe, with the Government Expedition."¹⁹ Engelmann responded a few weeks later, "I believe I have found a young man."²⁰ Engelmann's candidate was Augustus Fendler, a Prussian who had traveled extensively in frontier America collecting plant specimens. At the outbreak of the Mexican war, Gray had obtained a letter of recommendation from the secretary of war granting Fendler free transportation to Santa Fe with the troops. Arriving there in the fall of 1846, Fendler was obliged to wait until the plants were in a collectible stage in the spring. Then from April through August, he botanized along the Santa Fe River and on the surrounding plains west to the Rio Grande Valley, gathering 1,026 specimens.

Clearly, the correspondence of Engelmann and Gray indicates they were well pleased with Fendler's method of collecting. Fendler's contribution to the botany of the newly acquired areas of the United States was considerable, and he showed further promise of scientific contribution. His dedication to plant collecting is evident in a letter he wrote to Gray: "Not the dangers nor the risk of life, health, and property; not the many hardships and privations which are insuperably connected with such an undertaking are deterring me from entering upon it again—on the contrary, these botanical excursions were enough to make me passionately fond of herbalizing."²¹

So pleased was Gray with Fendler's efforts that his letters to Engelmann indicated that the Harvard scientist wanted Fendler to remain in the Santa Fe area for two years to collect material in the nearby mountains. However, when Fendler requested funds from Gray (pleading that lack of money had compelled him to sell his belongings, borrow money, and forced his younger brother to join the army to keep from starving), he was not granted sufficient funds to permit him to remain in the field. He left for St. Louis in the fall of 1847, never to return to New Mexico.²²

In recognition of his contribution to western botany, two genera commemorate Fendler's name: *Fendlera* (fendlerbush) and *Fendlerella*, both in the Saxifrage family. Fendler's next botanical expedition was spectacularly disastrous. In the spring of 1849, en route to the Great Salt Lake region, he was caught in a sudden flood and lost all of his collecting materials as well as his transportation. When he finally was able to make his way back to St. Louis, he found that a fire had destroyed all of his worldly goods.²³

The departure of Fendler from New Mexico marked the end of this initial period of individual collectors, but other events soon transpired that encouraged further botanical exploration of New Mexico. The Mexican-American War resulted in the establishment of a boundary commission to run and mark the boundary line between the two countries. Topological engineers were assigned to this survey, as well as geologists, zoologists, and botanists. According to noted historian of science, A. Hunter Dupree, the survey had "too many botanists, certainly for their own or the government's good. But their very numbers turned the Mexican boundary survey

into a kind of graduate school for collectors."²⁴ Indeed the botanical collectors sent back 2,648 species, which Torrey described in the botanical report of the boundary commission.²⁵ Gray considered this report, including all species known from the Southwest at that time, to be ranked "as the most important publication of the kind that had ever appeared."²⁶ This report indicated that improved transportation, removal of political barriers, and—most important—government support of natural history expeditions to the West would encourage trained, well-equipped botanists to carry out surveys in New Mexico, which would expand the botanical knowledge of the area.

Here, then, is the story of the beginning of scientific botanical work in New Mexico. Only after Mexico became independent in 1821 were outsiders officially permitted to enter, and the only means of travel was by mule or wagon along the Santa Fe Trail. In the first half of the 1840s, Gambel and Wislizenus, despite the rigors of working from a mule or oxen train, sent east the first examples of New Mexican flora from Santa Fe and along the Rio Grande. But the Mexican-American War opened up new opportunities for travel in the mid-1840s, and as a result, Lieutenant Emory's military duties took him to previously unexplored parts of the Southwest. Moreover, Fendler, while he traveled to Santa Fe with the army, was free to devote his full time to plant collecting. Although these deeply committed men received a minimum of compensation for the hardships they incurred, aside from having their names permanently attached to the nomenclature of novel plants, they laid the groundwork for the botanical study of New Mexico.

NOTES

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20. Dupree, *Asa Gray*, p. 162.
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22. McKelvey, *Botanical Exploration*, pp. 1024–27.
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