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Article Summary: Long's 1819 and 1820 expeditions included the most significant explorations of the period after the War of 1812. Long and the scientists who accompanied him provided important botanical knowledge and produced more accurate maps.

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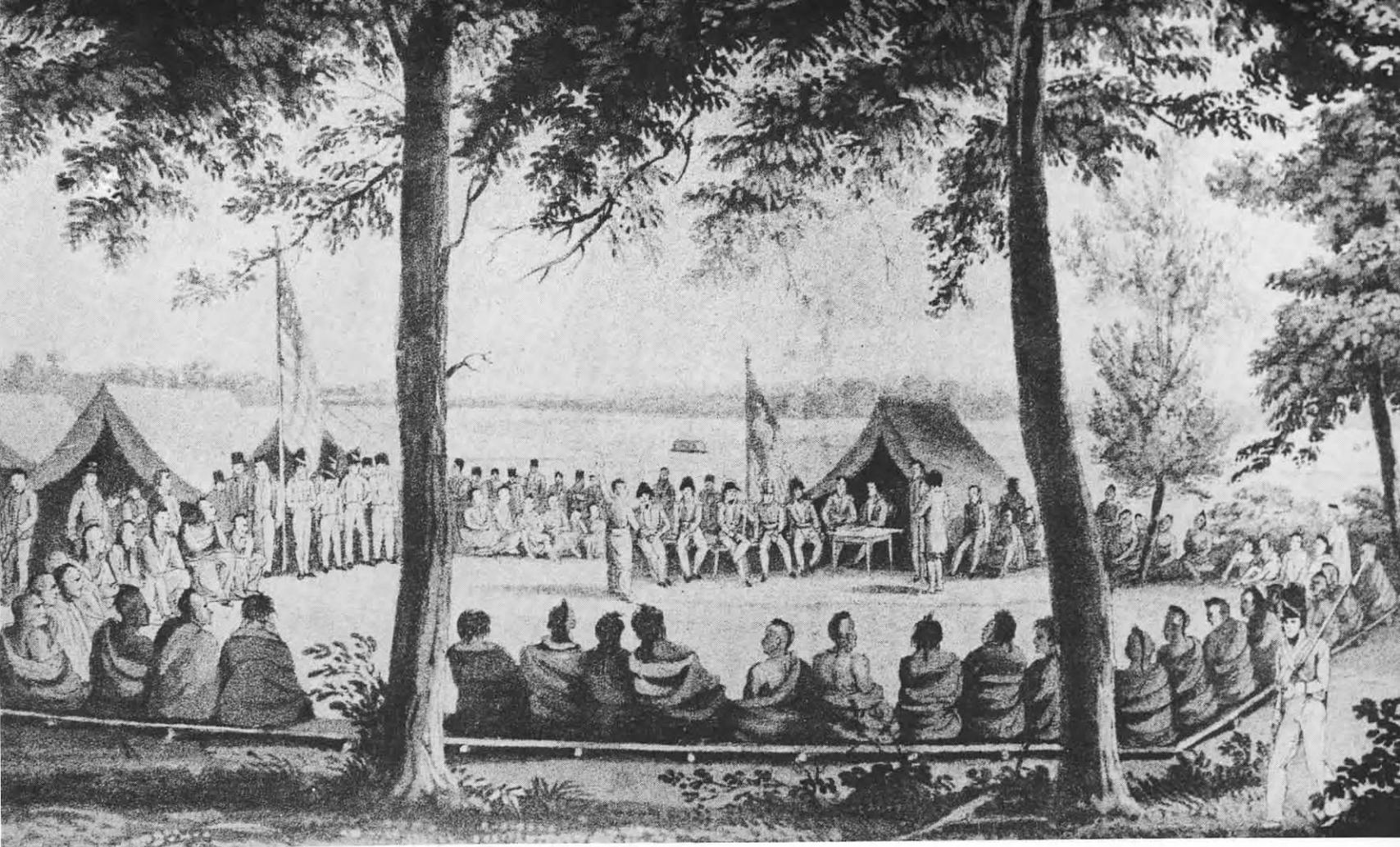
Names: Stephen Long, John C Calhoun, John Torrey

Members of Long's Expeditions: Titian Peale, Edward Jessup, William Baldwin, Edwin James, Thomas Say, Samuel Seymour, John Bell

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Photographs / Images: Long's council with the Pawnee in eastern Nebraska, painted by Samuel Seymour; Major Long; map of the 1820 Long Expedition



*Major Stephen Long's council with the Pawnee in eastern Nebraska was painted by Samuel Seymour.*

# STEPHEN LONG AND SCIENTIFIC EXPLORATION ON THE PLAINS

By ROGER L. NICHOLS

WHEN MAJOR STEPHEN LONG ordered the steamboat *Western Engineer* from the dock near Pittsburgh in early May, 1819, he set into motion the first American effort to explore the Great Plains in a scientific manner. Between 1816 and 1823, Long led numerous expeditions into frontier regions. These assignments took him from British Canada in the north to Spanish territory in the south, and from Indiana in the east to the Rocky Mountains in the west. He led more expeditions, traveled more miles, and helped accumulate more scientific information about the American West than did any other explorer of that era. In fact, Long's expeditions comprised the only significant army explorations between the War of 1812 and the 1840's. Nonetheless, his contributions have received little attention and less understanding.<sup>1</sup>

Long's work resulted from the gradual acceptance by federal officials of the idea that the army was the governmental institution best suited for discovery and exploration. There were several reasons for using the army to explore the West. Army posts existed near the frontier and could be used as staging points for expeditions. By using engineers as explorers, government leaders could show tax-payers some positive return for the expense of a peacetime army. Also, frontier exploration enlarged the geographic knowledge of the West, located its natural

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resources, and secured additional knowledge about the Indians. All of this information was essential for future military operations, and for successful frontier settlement. Finally, the army seems to have been the only federal agency which could have been used readily for such activities.

Within the army the Topographical Engineers carried out this work because their assigned duties included survey and map work as well as locating sites for frontier military posts. As a member of this bureau, Major Stephen Long received several such assignments. The son of a New Hampshire farmer, he graduated from Dartmouth College, taught school, and worked as a surveyor until early 1815, when he entered the army. He served as an instructor of mathematics at the military academy in West Point for a year, then received a transfer to the Topographical Engineers. Within a few months, Long journeyed west to St. Louis, the staging point for most frontier activity beyond the Mississippi, and for the next two years traveled and mapped portions of the upper Mississippi Valley. <sup>2</sup>

In early 1817, Long showed his interest in frontier exploration when he recommended to President-elect James Monroe that the upper Mississippi Valley and the Great Lakes be explored by steamboat. Long wanted to navigate the tributaries of the Mississippi, "meander their courses, and take the Latitude and Longitude of their mouths and heades [*sic*] of navigations." <sup>3</sup> In this first proposal he assumed that the party would work as army engineers and topographers. Obviously, this was a far cry from thorough scientific investigation, yet it was a first step toward competent exploration. Unfortunately for Long, Monroe had more pressing concerns than frontier exploration in early 1817, and he did not reply. Lack of response failed to dampen Long's enthusiasm, and during the next year he repeated his proposal to others within the army.

By the summer of 1818, the new Secretary of War, John C. Calhoun, had become interested in expanding American control over the West. Continuing difficulties with the Indians in that region, coupled with an almost paranoid fear of British influence among the northern tribes, convinced Calhoun and the President that steps for American military occupation of the upper Mississippi and Missouri rivers were essential. Therefore the War Department organized the Missouri Expedition, which set troops in motion up that stream in 1818, and the Mississippi Expedition, which took a year longer to get started. <sup>4</sup> While administra-

tive officials planned these expeditions, Long traveled to Washington to report directly to his superiors, and in August, 1818, he submitted a broadened plan for frontier exploration to Calhoun. Again he requested a steamboat, but now he asked for a group of scientists to accompany him into the West.<sup>5</sup>

Long never made clear why he added a group of scientists to his plan. He may have considered this earlier, but probably had begun to think of his efforts as an extension of the earlier work of Lewis and Clark with expanded facilities and personnel. Certainly he hoped to gain Calhoun's attention and support by making his plan more dramatic than it had been. Whatever the personal reasons for his request to include trained observers, he cited the lack of geographic and scientific knowledge as the basis for the suggestion.<sup>6</sup>

Both Long and Calhoun realized that this was not entirely true. Lewis and Clark had explored the Missouri Valley and the northern Rockies, Zebulon Pike had at least crossed the southern plains, while William Dunbar, George Hunter, Thomas Freeman, Thomas Nuttall, and John Bradbury had explored parts of Louisiana, Arkansas, and Missouri. These men, however, had examined only limited portions of the West, frequently without the knowledge or training that accomplished scientists might bring to the task.<sup>7</sup> Therefore, Long's contention that a scientific expedition would contribute much to the knowledge of the West was, in fact, true.

A few days after receiving Long's plan, Calhoun approved it. By December, 1818, he assured Long that he wanted the expedition to gather scientific information and instructed him to recruit competent men for the task.<sup>8</sup> This proved both time-consuming and frustrating. For example, Long hoped that John Torrey, a prominent New York scientist, would join his party as the geologist. Torrey refused, however, because the pay was insufficient and because he preferred to serve as botanist, a position already given to Dr. William Baldwin.<sup>9</sup> In this instance the more widely-known man failed to participate, although Torrey did classify and publish some of the expedition findings a few years later. By the end of the winter of 1818-1819, Long had gathered a staff which included Titian Peale, assistant naturalist; Edward Jessup, geologist; William Baldwin, surgeon and botanist; Thomas Say, zoologist; and Samuel Seymour, artist. These five men comprised the largest and best-trained group of civilian scientists and investigators to accompany any government-sponsored expedition up to that time, and their

presence in Long's party was a major step forward in the process of studying the environment in the American West.

To direct the scientists' efforts, Calhoun asked the American Philosophical Society for advice, topics to study, and questions for the explorers to answer. The Society responded with a list including the origins, languages, and customs of the Indians, nature of the soil, types of plant and animal life, and careful astronomical observations.<sup>10</sup> Clearly the party had plenty of subjects for study.

By the spring of 1819, Long's hoped-for expedition had materialized. The only significant change of his proposal to explore the upper Mississippi Valley and the Great Lakes region came from Calhoun's decision to integrate Long's activity with the Missouri and Mississippi expeditions on the so-called northwestern frontier. Therefore, he directed Long to explore a more western area than originally proposed. Rather than examining the Great Lakes, the expedition was to investigate above the mouth of the Missouri.<sup>11</sup>

To transport the party, Calhoun allowed Long to design and build a special steamboat, the *Western Engineer*. This shallow-draft vessel was supposed to carry the scientists up the turbulent western rivers, but the silt-laden Missouri clogged its boiler, and the rapid current slowed movement upstream to a few miles each day. Consequently, the scientists had to limit their investigations to the immediate river bank much of the time. The demonstrated inadequacy of the *Western Engineer* and mounting criticism by the newspapers and in Congress of the two related military expeditions caused the President to order the scientific expedition to halt when the explorers reached Council Bluffs north of present-day Omaha on the western bank of the Missouri River in October, 1819.<sup>12</sup>

While most of his party remained at their temporary post called Engineers Cantonment, Long and Edward Jessup returned east—the major to spend some time with his bride, and the geologist because he had tired of exploring. When Long arrived in Washington, he found Secretary Calhoun still interested in exploration but harried because of fiscal and political difficulties with Congress. As a result Calhoun remained wary of committing his department to any further large-scale spending for the coming year. After nearly a month and in response to Long's urgings, he authorized a small and less expensive party to continue exploring the next summer. This group was to travel overland, west from Council Bluffs along the Platte River to its source, then south



*"The Great American Desert"  
concept of the Great Plains  
was concurred in  
by Major Stephen H. Long.*

to the headwaters of the Arkansas and Red rivers, and finally east to Fort Smith, Arkansas. This expedition, which Long estimated would take about four months and cost some \$6,500, would take him and his party out onto the central and southern plains, far beyond existing outposts.<sup>13</sup> In fact, their starting point near the Council Bluffs in eastern Nebraska was then the westernmost post occupied by the army.

Long's expedition of 1820 consisted of twenty-two men—ten soldiers and twelve civilians. The latter included most of the men who had accompanied him in 1819, as well as a new botanist, Dr. Edwin James, to replace Dr. Baldwin who had died. Prior to joining Long, James, a twenty-eight-year-old physician, had studied botany, geology, and medicine, had some post-graduate botanical study with John Torrey of New York, and had practiced medicine. Because Edward Jessup, expedition geologist in 1819, had resigned, Long decided that James could serve in that capacity also. Thus James became the surgeon, botanist, and geologist for the 1820 party.<sup>14</sup> Thomas Say continued to act as zoologist and received the additional assignment as ethnologist. Samuel Seymour, the artist, and Titian Peale, the assistant naturalist, continued their previous assignments. Thus, in 1820 the party included one less scientist than it had a year earlier, but the men continued to be responsible for the same number of fields of investigation.

Although possibly lacking adequate training by twentieth century standards, these investigators possessed a high degree of competence as measured by those of their day. They had either college training or experience in their fields of investigation or both. They had the enthusiasm and curiosity to venture beyond the library and laboratory into the uncharted West. These latter characteristics proved indispensable because the study of the natural and physical sciences in early nineteenth century America consisted chiefly of gathering, identifying, and classifying material. Their presence as members of Long's 1820 expedition represented the first conscious effort by the federal government to employ a significant number of trained men for overland exploration beyond the Missouri River.

On the other hand, several factors tended to limit or to reduce the explorers' scientific contributions. One was that each man had responsibility for more than a single area of observation. As noted earlier, Edwin James had three assigned tasks, and Thomas Say had two. Titian Peale, as assistant naturalist, helped both men gather and prepare specimens, sketched, and even hunted on occasion as well. Therefore, none of the investigators ever had enough time to concentrate fully on his area of particular skill or interest, or even to do an adequate job with all of the assigned tasks.

A second factor limiting the explorers' degree of success was an absence of thorough planning and a subsequent shortage of supplies. This resulted from the last-minute nature of the expedition itself and from the decision to travel overland rather than by steamboat. The new plan meant that Long lacked some equipment and supplies, and had to gather these needed materials while enroute west from Philadelphia during early 1820. A related problem, the failure of the appropriated funds to arrive and the hurried planning and purchasing, limited the variety and quality of goods he bought. For example, the expedition had only twenty-seven horses and mules when it left Council Bluffs in 1820. These beasts not only had to carry the twenty-two men, but also their clothing, food, ammunition, scientific equipment, and any specimens they gathered enroute — obviously an impossible task. Because they lacked horses and money, the explorers carried enough food for only a single month, even though they expected to be on the plains four times that long.<sup>15</sup>

The party started late because Long had to travel west from Philadelphia after he learned that the overland expedition had been

approved. It took him, Dr. Edwin James, and Captain John Bell, official journalist for the party, from February until late May, 1820, to reach Council Bluffs. By then valuable weeks of moderate weather had passed, and the explorers had to carry out their tasks in the mid-summer heat. Also, because of the late start, they had to travel farther each day in order to complete their assignment before winter. As a result, they often rode all day and had little time for sketching, gathering specimens, or making other scientific observations. Clearly, Stephen Long's exploration of the plains faced severe obstacles in addition to an occasionally inhospitable environment or danger from hostile Indians.

The expedition began at 10:00 a.m. on June 6, 1820, but careless or unskilled loading of the mules caused some difficulty, and consequently the group traveled only nine miles the first day. That evening Major Long assigned a particular man to pack each animal to prevent future delays. He also prescribed the order of march. Captain Bell and the guide led, with two squads of soldiers, hunters, and workers riding single file behind them, and Long following at the rear. The scientists and artists rode anywhere in the column they chose. <sup>16</sup>

The first two weeks gave the explorers a preview of the difficulties they would encounter that summer. River crossings proved slow, difficult, and dangerous. A shortage of food soon made the men dependent upon the hunters, and when they failed, the party dined on water and biscuits. They visited the camps of several Pawnee Indian bands, but got little welcome and less food. On the other hand, they did become accustomed to riding twenty to thirty miles each day, to jerking meat, to gathering buffalo chips for fuel, and to enduring physical hardship. The sun and insects were particularly troublesome, and soon most of the party suffered from sunburn, peeling skin, and cracked, bleeding lips and ears.

From the Pawnee villages in eastern Nebraska, they rode west along the Platte into territory that was unmapped and unknown to them. All the Indians they met insisted that Long's party would fail, that danger and death awaited them, and that they should turn back. Long ignored these predictions because he assumed that the Indians wanted to keep his party out of their hunting grounds. Nonetheless, his men remained wary, and everyone had a rifle or a musket. Each officer and scientist also carried a pair of pistols, and most of the men had a knife, a tomahawk, or both.

Insufficient food and not enough time for the scientists to gather specimens remained constant irritants. To remedy these problems or

perhaps because of religious beliefs, Long usually halted the expedition on Sunday. It also became necessary to stop every few days to rest the horses, because the buffalo grass they ate apparently lacked sufficient nutrients for animals accustomed to having grain as a part of their diet.

Each day included hard work, discomfort, and danger, but frequent unexpected incidents varied this routine. For example, during the night of July 28, the sound of running horses roused the sleeping men. They feared an Indian attack, but soon learned that the noise was from their own stampeding animals, frightened by nearby buffalo. A few hours later the tired men scrambled from their beds a second time because one of the sentries had heard a shot. To their disgust, Long told them that he had ordered the guard to wake them to be sure that everyone knew his place and duties in case of an attack. Then, with the command already up and grumbling, Long decided that they might as well get an early start, so at 5:00 a.m. they broke camp and began their ride for the day.

The tasks assigned to the expedition included exploring the headwaters or sources of the Platte, Arkansas, and Red rivers. But when Long's party reached the Rockies, they first mistook Long's Peak for Pike's Peak farther to the south. Then, when they tried to follow the Platte into the mountains, rough terrain blocked their efforts, so they turned south and traveled along the front of the mountains. On July 12 they neared Pike's Peak, and the next morning Dr. James, accompanied by six men, started up the slope. It took them nearly two days to climb the mountain, but during the strenuous effort James gathered samples of alpine flowers and plants which he carried back to camp for later study. On July 16, Long led the party southeast along the Arkansas River. Near its confluence with the Purgatoire, Long and a part of the command veered southward. Upon reaching the Canadian, they decided mistakenly that it was the Red and turned east along the wrong stream. Captain Bell led the rest of the command down the Arkansas Valley to Fort Smith.

Long's return to Fort Smith was the most difficult part of the expedition. For days they traveled under clear skies with the temperature often over one hundred degrees. They saw few trees and little game, and had to dig for water in the patches of mud lining the river-bottom. Scattered buffalo chips provided their only fuel, and often they ignored these because they had no food to cook. Several nights the explorers retired with neither food nor water. On others they existed on wild grapes and water, ate a dead badger they found, and even

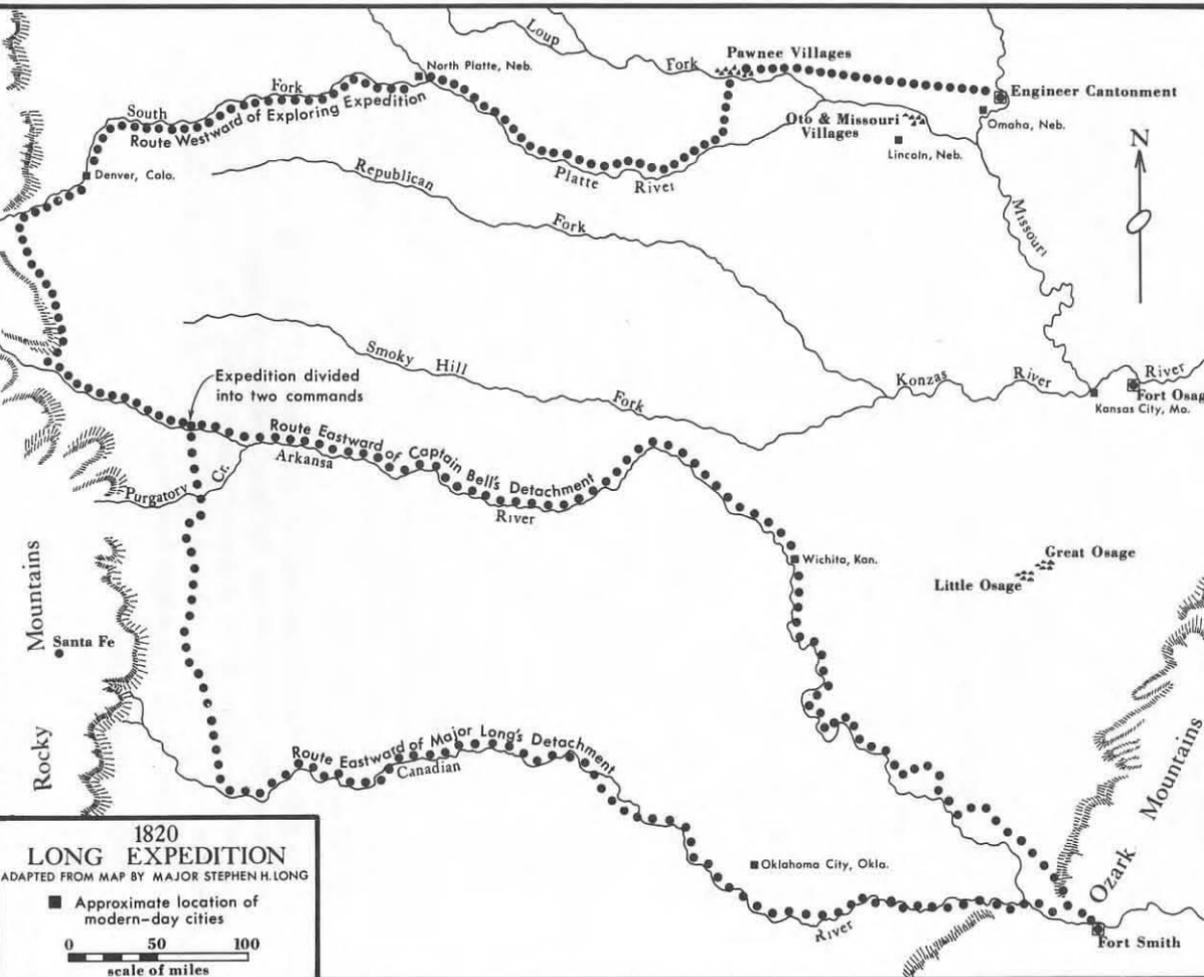
butchered a wild horse which had foolishly followed them. The dearth of forage killed several of their horses, and both of their large hunting dogs died from a lack of food and water. It is little wonder that as they rode across what they called "sterile and sandy wastes," they came to consider the plains as nothing but a vast desert. By mid-September, 1820, their ordeal ended, and Long's party rejoined the rest of the expedition at Fort Smith.

The performance of this expedition left much to be desired. Long and his men had been ordered to explore the headwaters of the Platte, Arkansas, and Red rivers, but had not done so. Their inability to find the Red was the most serious lapse. A second was the incomplete collection of scientific information they gathered because they had to hurry their work all summer. To make matters worse, two of the enlisted men from Captain Bell's party deserted, taking several scientific journals and some of the notes with them. This material has never been recovered, and its loss reduced the already limited amount of information about the plains which the party had been able to gather.

These negative aspects would have been difficult, if not impossible to avoid, given the belated efforts to organize and equip the expedition and Stephen Long's leadership. He thought of traveling vast distances in a short time, usually over estimating how much territory his men could explore, and under estimating the amount of food and equipment they needed. Apparently this stemmed from his fear that Congress would appropriate so little money for the War Department that there would be none available for exploring. Unfortunately, this meant that he burdened his expeditions with unrealistic goals and a shortage of goods needed for any competent exploration.

In spite of these limitations, the expedition of 1820 did accomplish several worthy things. It was the first government-sponsored effort to explore the plains in an organized and scientific manner—at least as educated men of that day understood those terms.<sup>17</sup> In this Long's companions proved surprisingly successful.

Artist Samuel Seymour and naturalist Titian Peale made the first American paintings and sketches of the Rocky Mountains and of some plant and animal life on the plains.<sup>18</sup> Edwin James collected much ethnological data about the Indian tribes which he incorporated into the material gathered by the 1819 expedition up the Missouri River. His most original contributions, however, came in botany. He was the first competent botanist to travel west across Nebraska, to climb the eastern



slopes of the Rockies, and to cross parts of New Mexico, Texas, and Oklahoma. While doing this, he gathered the first collection of alpine plants from the Rockies and collected many other plant specimens that summer.<sup>19</sup> Although James himself published some of his findings, the New York botanist John Torrey published much of the rest. Fifty years later the famous botanist Asa Gray described the James and Torrey contribution to science when he wrote, "This is the earliest treatise of this sort in this country . . . and with it begins the history of the botany of the Rocky Mountains, if we except a few plants collected early in the century by Lewis and Clark . . ." <sup>20</sup> In the field of geology, James's contribution to the existing body of geologic knowledge was modest. He published one article on this topic during the mid-1820's.<sup>21</sup> Thomas Say, the zoologist, collected or noted many new specimens which he included in volumes two and three of his classic study *American Entomology*.<sup>22</sup>

Long himself added two significant contributions. The first was a more complete and accurate map of the central and southern plains than those being used at the time. First published in 1823, it became the standard base map for cartographers and explorers during the next several decades.<sup>23</sup> Second, and in some ways more important, was his evaluation of the plains as an area best suited as buffalo pasture and the home of nomadic Indians. His oft-quoted statement, "I do not hesitate in giving the opinion, that it [the plains region] is almost wholly unfit for cultivation, and of course uninhabitable by a people depending upon agriculture for subsistence," left little to the imagination. He reinforced this by labeling the area extending from Nebraska to Oklahoma as the "Great Desert" and described the soil there as "deep sandy alluvion." These phrases on his map, when taken with his negative assessment of the plains, affected later maps and notions of western geography and have caused much criticism of Long's work.<sup>24</sup>

Most of his critics blamed him for creating the myth of the Great American Desert. The fact is that Zebulon Pike is the American originator of this idea and that Long merely helped to spread and popularize it. In spite of this, Long has been denounced for failing to find anything of significance during his 1820 expeditions, and for limiting the speed of American expansion onto the plains. The latter charge may be true if Long's map and report received widespread public notice and if potential settlers avoided the plains because of them. On the other hand, although most cartographers and many travelers accepted the Great American Desert idea, Long was only one of many who contributed to this concept.<sup>25</sup>

Actually, if Long's negative description discouraged settlement on the southern plains, he did most early nineteenth century farmers a favor. Given the extent of technological development and the lack of scientific knowledge about agriculture for several decades following 1820, few farmers could have succeeded on the plains. Vast buffalo herds endangered their crops, hostile Indians threatened their lives, drought and insects limited yields, and the lack of timber made building homes and fences difficult.<sup>26</sup> If the idea of the plains as desert deterred occupation of the region prior to the Civil War, then this was a positive rather than a negative achievement.

By spreading the desert idea, Long may have helped rather than hindered American expansion. True, for several decades the desert and the Indians dammed the flow of westering pioneers at the banks of the Missouri. But by the 1840's, when missionary stories of Oregon reached the East, many people appear to have been ready to believe that a New World Garden of Eden lay on the Pacific coast. There is no way to tie Stephen Long's work to the Oregon fever of the 1840's, but certainly the idea that the plains could not be settled easily was in part responsible for stimulating interest in regions farther west. Thus, Long's efforts helped to produce the climate of opinion which made Americans willing to by-pass both plains and mountains to reach the coast.

Stephen Long's expeditions of 1819 and 1820 should not be considered failures which harmed America, but rather expeditions which included the most significant explorations of the period after the War of 1812. Long and his colleagues deserve to be remembered more for their positive contributions to several fields of American knowledge than for their relatively limited additions to geographic knowledge and for Long's negative remarks on the nature of the plains.

Following the example of Lewis and Clark set earlier in the century, Long led soldiers west to explore rather than to fight. But in addition to soldiers, he also took trained civilian observers and scientists to examine the West. This remained an important part of later planning by federal authorities as may be seen in the work of John C. Fremont, John Wesley Powell, and the numerous other survey parties with which the army examined the West during the later decades of the nineteenth century.

## NOTES

1. Hiram M. Chittenden, *A History of the American Fur Trade of the Far West* (2 vols., New York, 1935), II, 570; Walter P. Webb, *The Great Plains* (New York, 1931), 147; and Ray A. Billington, *Westward Expansion* (New York, 1949), 469, are examples of this.

2. Richard G. Wood, *Stephen Harriman Long, 1784-1864* (Glendale, Cal., 1966), 24-39.

3. Long to Monroe, March 15, 1817, Office of the Secretary of War, Letters Received, Record Group 107, National Archives. Hereafter cited as SW, LR, RG 107.

4. Edgar B. Wesley, "A Still Larger View of the So-Called Yellowstone Expedition," *North Dakota Historical Quarterly*, V (July, 1931), 219-238.

5. Long to Calhoun, August 31, 1818, SW, LR, RG 107.

6. *Ibid.*

7. For a contrary view see Paul R. Cutright, *Lewis and Clark: Pioneering Naturalists* (Urbana, Ill., 1969), vii-x; William H. Goetzmann, *Exploration and Empire* (New York, 1966), 3-8.

8. Calhoun to Long, December 15, 1818, SW, Letters Sent, Vol. X, RG 107.

9. Wood, *Stephen Long*, 66.

10. *Ibid.*, 71-72.

11. Calhoun to Long, March 18, 1819, SW, LS, Vol. X, RG 107.

12. Edgar B. Wesley, *Guarding the Frontier: A Study of Frontier Defense from 1815 to 1825* (Minneapolis, 1935), 149-153; Calhoun to Henry Atkinson, April 10, 1820, Andrew Jackson Papers, Library of Congress.

13. Long to Calhoun, January 22, 1820, SW, LR, RG 107; Calhoun to Long, February 29, 1820, SW, LS, Vol. XI, RG 107; *American State Papers: Indian Affairs* (Washington, 1832-1834), II, 320.

14. Long Orders, June 1, 1820, in Edwin James, *Account of an Expedition from Pittsburgh to the Rocky Mountains . . .* (in Reuben G. Thwaites, ed., *Early Western Travels*, Cleveland, 1905), XV, 191-192. Hereafter cited as James, *Account*.

15. There is some confusion here. Long reported twenty-seven horses, James twenty-eight, and Bell only twenty-six. Long to Calhoun, June 2, 1820, SW, LR, RG 107; James, *Account*, XV, 191-192. Harlan Fuller, ed., *The Journal of Captain John R. Bell* (In LeRoy R. Hafen, ed., *The Far West and the Rockies Historical Series*, Glendale, Cal., 1957), VI, 103-105. Hereafter cited as Fuller, *Bell Journal*.

16. James, *Account*, XV, 193; Fuller, *Bell Journal*, 105. The events of the expedition discussed on the following three pages are from these sources and will not be otherwise noted.

17. Susan D. McKelvey, *Botanical Exploration of the Trans-Mississippi West, 1790-1850* (Jamaica Plain, Mass., 1955), 189.

18. John F. McDermott, "Samuel Seymour: Pioneer Artist of the Plains and Rockies," Smithsonian Institution, *Annual Report* (1950), No. 4043, 497-509; Jessie Poesch, *Titian Ramsay Peale, 1799-1885* (American Philosophical Society, *Memoirs*, Philadelphia, 1961), 22-34.

19. McKelvey, *Botanical Exploration*, 205, 245. His scholarly contributions include *Account of an Expedition from Pittsburgh to the Rocky Mountains*

*Performed in the Years 1819 and 1820 . . .* (2 vols., Philadelphia, 1823), and "Catalogue of Plants Collected during a Journey to and from the Rocky Mountains, during the Summer of 1820," American Philosophical Society, *Transactions*, II (Philadelphia, 1825), 172-190.

20. Quoted in McKelvey, *Botanical Exploration*, 205.

21. "Remarks on the Sandstone and Floetz Formation of the Western Part of the Valley of the Mississippi," American Philosophical Society, *Transactions*, II (Philadelphia, 1825), 191-215.

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23. H. S. Tanner, *A New American Atlas . . .* (Philadelphia, 1823), 6-7; Carl I. Wheat, "Mapping the American West, 1540-1857," American Antiquarian Society, *Proceedings*, LXIV, 72-74; Wheat, *Mapping the Trans-Mississippi West, 1540-1861* (6 vols., San Francisco, 1958), II, 77-81.

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25. Ralph C. Morris, "The Notion of a Great American Desert East of the Rockies," *Mississippi Valley Historical Review*, XIII (September, 1926), 190-200; Reigel and Athearn, *America Moves West*, 326; Goetzmann, *Exploration and Empire*, 62; Webb, *The Great Plains*, 147.

26. Goetzmann, *Exploration and Empire*, 62-64; Webb, *The Great Plains*, 48-67, 167-168, 184-204, 486-488; W. Eugene Hollon, *The Great American Desert, Then and Now* (New York, 1966), 3-8.