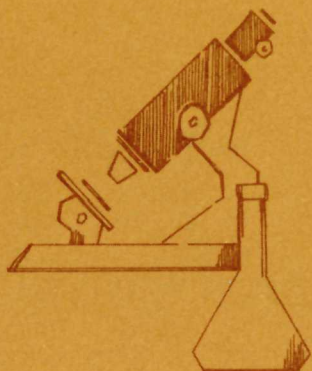
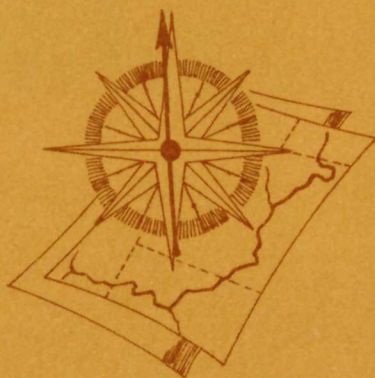
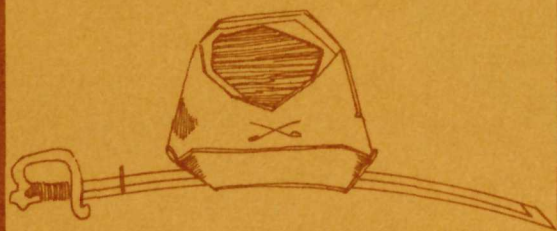




JOHN WESLEY *SOLDIER*
POWELL *EXPLORER*
SCIENTIST



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
USGS: INF-74-24

JOHN WESLEY POWELL

*SOLDIER
EXPLORER
SCIENTIST*



For sale by the Superintendent of Documents, U.S. Government Printing Office
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In 1869, John Wesley Powell and nine adventure-seeking companions completed the first exploration of the dangerous and almost uncharted canyons of the Green and Colorado Rivers. By this trip, Powell, a 35-year-old professor of natural history, apparently unhampered by the lack of his right forearm (amputated after the Battle of Shiloh), opened up the last unknown part of the continental United States and brought to a climax the era of western exploration.

Powell was not an adventurer, nor did he consider himself just an explorer. He was a scientist, motivated by a thirst for knowledge and a firm belief that science was meant to further the progress of mankind.

He endeavored at all times to put his beliefs into practice.

Powell's exploration of the Colorado River led to the formulation of some of the fundamental principles of land sculpture. He went on to develop an understanding of the natural conditions that control man and society in the arid lands of the Western States and to develop guidelines for the orderly develop-

ment of the region. He had a keen and sympathetic interest in the Indians who inhabited this western land and made fundamental contributions to the new sciences of anthropology and ethnology. His talent for organization has left its mark on agencies and programs for the development and conservation of the natural resources of the world.



John Wesley Powell . . . was one of the few who believed in evolution by endeavor and who fought for intelligent and scientific planning for the development of society. He believed that progress comes by increasing cooperation among men, and he dreamed of developing a science that would provide the knowledge whereby men could live together in peace and mutual cooperation.

William T. Pecora, Director
U.S. Geological Survey
August 1969

John Wesley Powell was born in 1834 in Mount Morris, New York, the son of Joseph Powell, a Methodist preacher who had emigrated from England 4 years earlier. A restless man, Joseph Powell gradually moved his family west across New York State and in 1838 settled in Jackson, Ohio. There the Powells became embroiled in one of the most controversial issues of the day—abolition. Reverend Powell's vigorous stand against slavery was met with hostility by many of the townspeople. Young Powell was frequently stoned by his classmates and had to be removed from public school and placed under the tutelage of a neighbor, George Crookham, a farmer and self-taught scientist. Crookham emphasized learning na-

ture firsthand, and Powell's interest in natural history grew during their numerous junkets to collect specimens of plants, animals, birds, and minerals.

When Powell was 12 years old the family moved to a farm in Wisconsin. With his father away much of the time, the boy assumed management of the farm, an experience that helped develop physical stamina and moral character.

Though he attended school irregularly, he was determined to pursue his studies in science over the objections of his father who wished him to become a minister. When he was 18, Powell began teaching in a one-room country school to earn money for college. The next 7 years were spent teaching school, attending college, and exploring the Mid-

west. At various times he attended Illinois College, Illinois Institute, and Oberlin College. In 1858, he joined the newly formed Illinois State Natural History Society, and as curator of conchology, made a fairly complete collection of the mollusks of Illinois. He began teaching at Hennepin, Illinois, in 1858 and in 1860 became superintendent of its schools.

While on a lecture tour in the summer of 1860, Powell realized that a civil war was inevitable. That winter, he studied military science and engineering. A strong abolitionist, John Wesley Powell was one of the first to volunteer when President Lincoln issued a call for troops.

On May 8, 1861, he enlisted at Hennepin, Illinois, as a private in

the 20th Illinois Infantry. He was described as "age 27, height 5' 6½" tall, light complected, gray eyes, auburn hair, occupation—teacher." He was elected sergeant-major of the regiment, and when the 20th Illinois was mustered into the Federal service a month later, Powell was commissioned a second lieutenant. The regiment was sent to Camp Girardeau near St. Louis. Because of his knowledge of engineering, Powell was directed to prepare and carry out a plan for the fortification of the camp and town. In November, General Grant authorized him to recruit and train a

A typical farm of the 1800's similar to that on which John Wesley Powell was born.



Emma Dean Powell (nee Harriet Emma Dean) wife of Major John Wesley Powell.



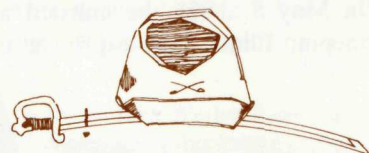
The Battle of Shiloh. A drawing from the Matthew Brady collection.

company to manage the siege guns.

That same month Grant allowed Powell a short leave for a hurried trip to Detroit to marry his cousin, Emma Dean, who accompanied him back to camp after the ceremony.

Powell was made captain of Battery F, 2d Illinois Artillery Volunteers at the end of the year. A few weeks later, he and his battery were ordered to Pittsburg Landing on the Tennessee River. During the Battle of Shiloh, on April 6, as Powell gave the signal to fire, a Minie ball struck his wrist and plowed into his arm. The wound was so severe that his arm had to be amputated below the elbow.

Despite his injury, Powell returned to active service within a few months. On General Grant's orders, Mrs. Powell was given a



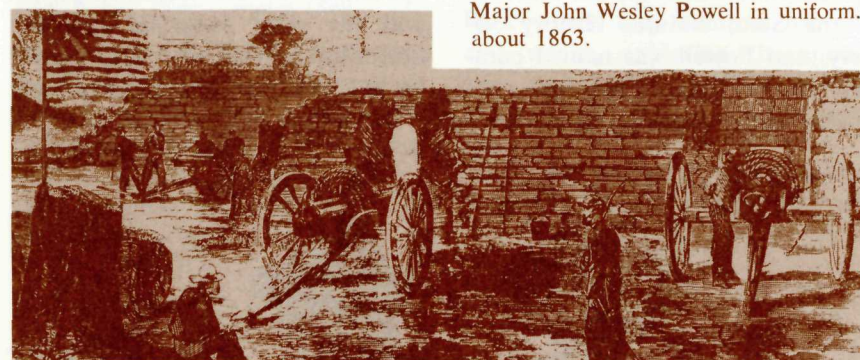
pass to be with her husband wherever he went, thus enabling him to remain in the service where his engineering and artillery knowledge were sorely needed. During May and June 1863, Captain Powell's battery participated in the Siege of Vicksburg, and while in the trenches he examined the rocks and made a collection of fossil shells that was later deposited in the Illinois State Museum. In late 1863, Powell was made an inspector of artillery for the Department of the Army of Tennessee. He served as commanding officer of the 17th Army Corps Artillery Brigade and took part in several operations after the fall of Atlanta, including the Battle of Nashville.

By January 1865, Powell had risen to the rank of brevet lieutenant colonel (although he preferred to be called major). With the end of the war at hand and his term of enlistment having expired, Powell asked to be mustered out of service.

Frederick S. Dellenbaugh, who was later with Powell on his second expedition down the Colorado River, wrote:



Major John Wesley Powell in uniform, about 1863.



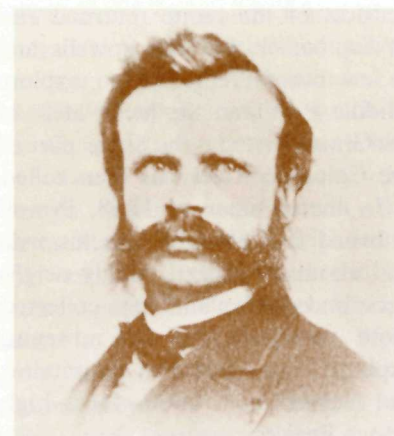
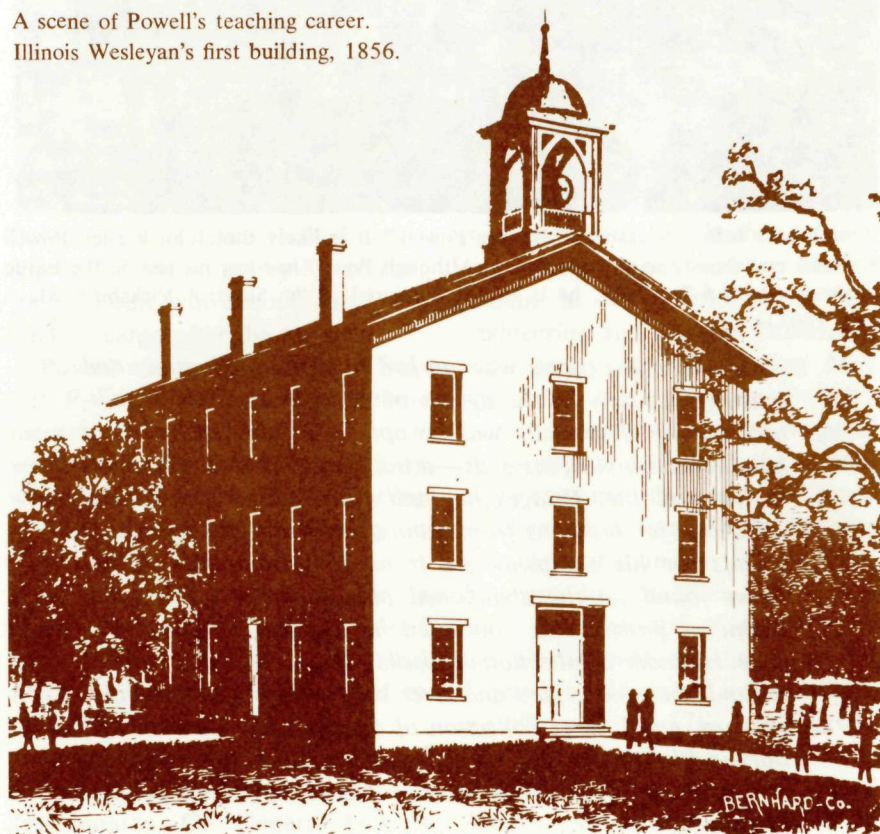
"Our Works before Vicksburg—Battery Powell." It is likely that John Wesley Powell is shown erroneously in this illustration. Although Powell had lost his arm in the Battle of Shiloh (April 6-7, 1862), he is shown uninjured at the Siege of Vicksburg (May-July 1863).

As a soldier his career was marked by a thorough study and mastery not only of the details of military life; but of military science. Especially was he apt in utilizing materials at hand to accomplish his ends—a trait that was also prominent in his civil life. Bridges he built from cotton gin houses, mantelets for his guns from gunny sacks and old rope, and shields for his sharpshooters from the moldboards of old plows found on the abandoned plantations. All this time, whenever possible, he continued his studies in natural science. He made a collection of fossils unearthed in the trenches around Vicksburg, land and river shells from the Mississippi swamps, and a large collection of mosses while on detached duty in Illinois. He also familiarized himself with the geology of regions through which armies passed to which he was attached.

After the war, Powell accepted a professorship in geology at Illinois Wesleyan University in Bloomington. His method of teaching reflected his training under George Crookham, and he often took his students into the field to collect fossils, minerals, and plants and to observe animals in their natural habitat. The following year he gave a course of lectures at Illinois State University in nearby Normal, Illinois. The State Legislature provided a small endowment for the museum of the State Natural History Society, and Powell was named curator.

Powell loved to travel; it had been one of his main interests before the war. In 1867, he led a party of students to the Rocky Mountains to collect specimens for the museum. Funds for the trip came from various sources, including the Museum of Natural History—\$500, the Illinois Industrial University (later the University of Illinois)—\$500, and the Chicago Academy of Science—\$100. In return he agreed to supply them with specimens of the animals, plants, and any other materials collected. Scientific instruments were loaned by the Smithsonian Institution, and

A scene of Powell's teaching career.
Illinois Wesleyan's first building, 1856.



John Wesley Powell, winter 1869.

Powell agreed to give the Institution the topographic measurements made by his party. He made arrangements to procure rations for the group

from Army posts at Government rates and to obtain free transportation from the railroads. Powell contributed his own salary to help finance the trip.

In May and June of 1867, the expedition, which included Mrs. Powell, traveled by train, wagon, and horseback across the plains to Denver and on to a valley known as Bergens Park on the west side of the Rampart Range north of Pikes Peak. After climbing Pikes Peak they traveled west to South Park where they camped for several weeks, exploring the mountains and hot springs and making a variety of natural history collections.

Student members of Powell's
1868 expedition.





Navajo boy



Ruins of an ancient Indian settlement on the rim of the Grand Canyon.

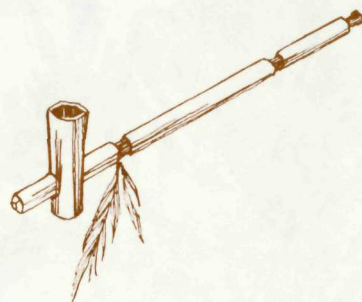
Most of the group returned east in September, but the Powells and a few others remained to explore Middle Park and the headwaters of the Grand River, as the upper part of the Colorado River was then called.

In the summer of 1868, Powell returned to Colorado with his wife and about 20 others, mainly neighbors and students. They collected more specimens for the museum, explored the Colorado mountains, and climbed 14,000-foot-high Longs Peak.

In October, the party reached a point on the White River about 120



Tau-gu, a chief of the Paiute Indian tribe and Major Powell in southern Utah.



miles above its mouth where they built cabins and established winter quarters. During the winter of 1868-69, Powell traveled south to the Grand River, down the White and Green Rivers, north to the Yampa River, and around the Uinta Mountains. He befriended a tribe of Ute Indians and studied their language and customs. His interest in the Indians of the West grew, and in 1873, as a special commissioner to the Indians in Utah and eastern Nevada, he pleaded for greater justice and more educational opportunities for the Indians.

By 1868, Powell was considering exploration of the Colorado River, undeterred by legends of earlier expeditions that had perished. Lieutenant Joseph C. Ives, who in 1857 explored the southern stretches of the river below the Grand Canyon, believed "that the Colorado, along the greater part of its lonely and majestic way, shall be forever un-

visited and undisturbed." But after studying the few reports, talking with Indians, hunters, and mountain men familiar with the area, and exploring tributary streams similar to the Colorado, Powell decided it was possible to explore the river by descending it in small boats. He obtained some funds from private sources and from the Illinois State Natural History Society, and he gained permission from the Government to requisition military stores. He had four boats built in Chicago to his own design and specifications and had them shipped to the proposed starting point at Green River Station, Wyoming Territory. He selected a crew of nine who, with the exception of his brother Walter, were mountain men experienced in living off the land. On May 24, 1869, Powell launched his boats on their historic journey.

Major Powell talking to a Paiute Indian during northern Arizona survey.





The Rescue



Running the Rapids



First Campsite, 2d Expedition



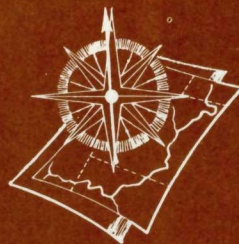
Powell and Colleagues, C. D. Walcott (left) and Sir Archibald Geikie (right)



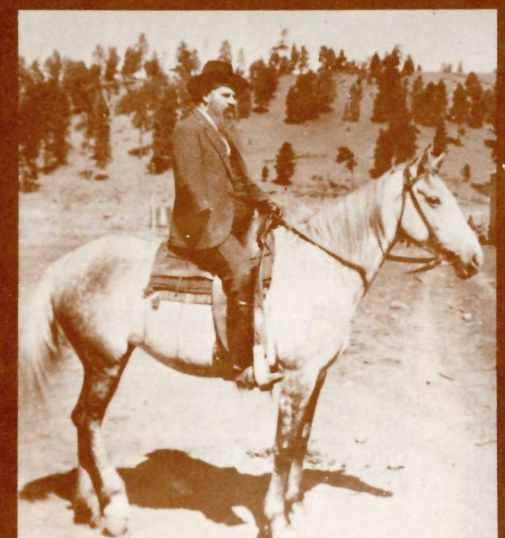
Powell's Farewell Dinner as Director of the U.S. Geological Survey



War Memorial at Vicksburg, Mississippi

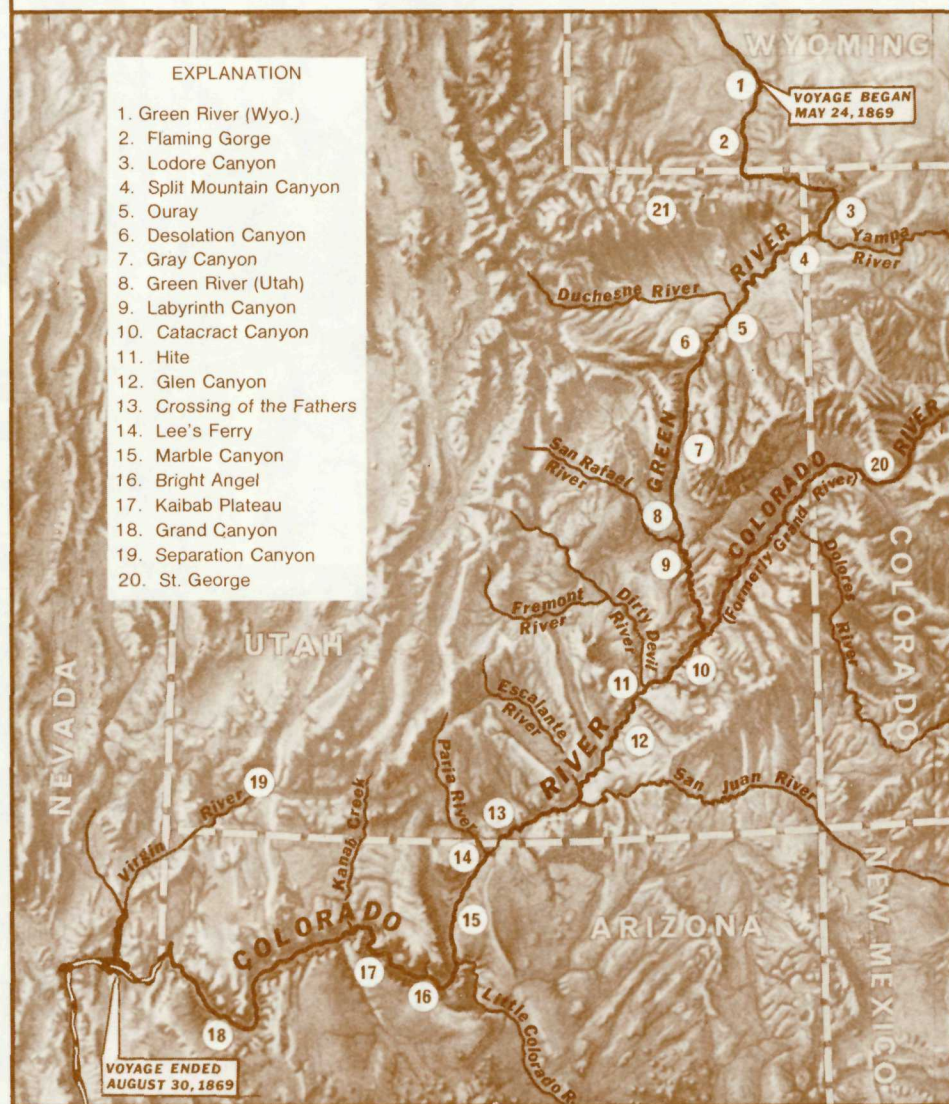


Indian Tribal Conference



At Riordan Ranch, Arizona

John Wesley Powell's Pioneer River Voyage-1869



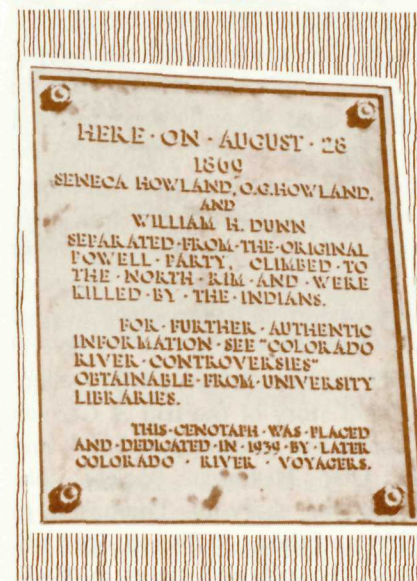
Relief map of Powell's pioneer river voyage—1869.

The party traveled more than 1,000 miles of river through winding canyons and over foaming rapids. One of the crew left the expedition after a month, having had enough adventure; three others, hoping to find a safer route overland, departed only 2 days before the voyage ended. Powell and five men in two boats emerged months later on August 30 at the mouth of the Virgin River, Arizona,

long after hope for their survival had been abandoned. Their emotional ordeal was well expressed in Powell's words—"What falls there are, we know not; what rocks beset the channel, we know not; what walls rise over the river, we know not."

Powell immediately set about making plans for a second expedition. He had planned and supplied the first trip for what he thought would be a leisurely 6- to 9-month scientific expedition. Because of the loss of food and equipment and the scarcity of game, the trip had been hurried. Powell's observations and notes on topography and geology were incomplete or unreliable because of badly damaged instru-

A plaque marking the place where the Howland brothers and William H. Dunn separated from the 1869 Powell expedition. The plaque is located near the northeast bank of the Colorado River on the eastern side of Separation Canyon.



ments. The few specimens collected had been cached along the river.

Having succeeded so dramatically in conquering the Green and Colorado Rivers, Powell had little difficulty in obtaining funds from Congress to continue his exploratory work. He decided that supplies should be cached along the river and spent most of the year 1870 in determining potential supply routes and in establishing friendly relationships with the Indians.

By the spring of 1871, preparations had been completed for the second survey of the canyon country. This time the party included a surveyor, Professor Almon H. Thompson, Powell's brother-in-law, and an experienced photographer, E. O. Beaman, who together with his successors James Fennemore and J. K. Hillers, dramatically documented the river voyage.

On May 22, the party pushed three boats of improved design into the stream. Major Powell rode in the lead, perched in a chair lashed amidships where he commanded an unrestricted view of the way ahead and could signal to the other boats. The expedition was planned to last about a year and a half. During the first 4½ months the expedition traveled from Green River Station to the mouth of the Paria River at the foot of Glen Canyon. Thompson was largely responsible for conducting the exploration of the river. Powell spent most of July and August traveling on horseback between the river and Salt Lake City, exploring the canyon lands, and studying the Indian tribes. During



The Powell expedition ready to start from a location just below the Union Pacific Railway bridge at Green River Station, Wyoming.

the winter and spring (1871-72) while Powell was in the East seeking new appropriations, Thompson set about mapping the area. In the spring, while seeking another route by which supplies could be brought to the river, the party discovered the last unknown river in the United States and named it the Escalante.

In August 1872, the expedition once more started downriver from Lee's Ferry. Because of torrential rains and heavy snowmelt in the mountains, the river was high, swift, and dangerous. Finding that controlling the boats was nearly impossible in the rushing current, Powell called a halt to the expedition when the party reached

Kanab Canyon.

The second expedition brought back considerable information. Professor Thompson completed a topographic map of the Grand Canyon region, and Powell's monumental account was published in 1875 by the Smithsonian Institution. Hundreds of photographs were taken, many of them stereoscopic views that brought the western canyons into eastern living rooms. Diaries and field notes were kept by several other members of the party. Dellenbaugh's story of the trip *A Canyon Voyage* was published in 1908, and the Utah Historical Society published the diary of Thompson in 1939 and those of Bishop, Steward, W. C. Powell, and Jones in 1947.



On the Colorado at the mouth of the Little Colorado River.



The Kanab Canyon, near its mouth. The cliffs in the distance are on the far side of the Colorado River.



Major Powell's boat, the *Emma Dean*, moored on a bank of the Colorado River in the Grand Canyon.

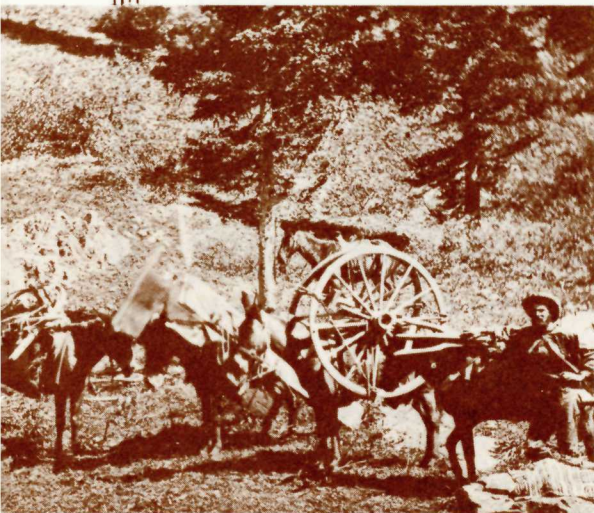
Powell continued to study the Colorado River region under Government auspices. He became impressed with the problems of settling the arid western lands and in 1878, encouraged by Secretary of the Interior Carl Schurz, he completed his *Report on the lands of the arid region of the United States*, which was published as a Congressional document. The

book was not only a report on the physical characteristics of the land and the rainfall but also discussed the need for a land classification system and contained drafts of proposed legislation providing for the organization of irrigation and pasturage districts. The book, since recognized as one of the most important ever written about the western lands, went unheeded at the time.

Four surveys—the Powell, Hayden, King, and Wheeler surveys—were mapping the West, and some conflicts of interest began to develop, especially between Army and civilian scientists.

In the spring of 1878, Congress investigated the rivalry among the western surveys but was unable to come to a satisfactory conclusion. They called on the National Academy of Sciences for advice, and the academy in turn called on Powell and others for suggestions. Legislation embodying the academy plan that contained many of Powell's ideas was introduced, but before it was finally enacted several provisions were eliminated, including one of special interest to Powell—a proposal to change the public land system. The bill that was passed on March 3, 1879, provided for the establishment of the U.S. Geological Survey, discontinuation of the western surveys, and appointment of a commission to codify the public land laws. Powell became a member of the commission, and Clarence King, who had been in charge of the Geologic Exploration of the 40th Parallel, the first of the national surveys authorized by Congress, became the first Director of the U.S. Geological Survey.

Members of the Hayden survey packing a wagon, on mules, across the San Juan Mountains.



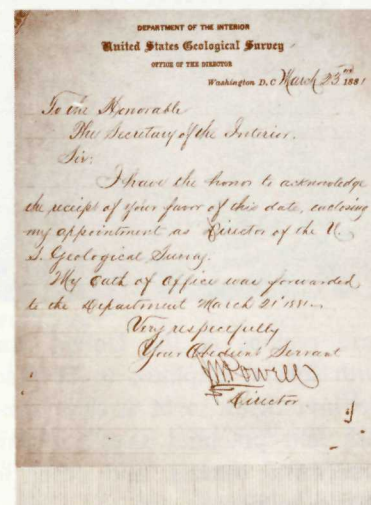
Campsite of Lieutenant G. M. Wheeler and survey party near Belmont, Nevada (Wheeler, seventh from left).



The bill that included the organic act of the Geological Survey also contained an appropriation for completing and publishing the results of Powell's research on the Indians and their cultures. This work ultimately led to the creation of the Bureau of Ethnology, which devoted its efforts to collecting information on the fast-disappearing Indian tribes of North America. Powell became its Director, a post he held for the rest of his life.

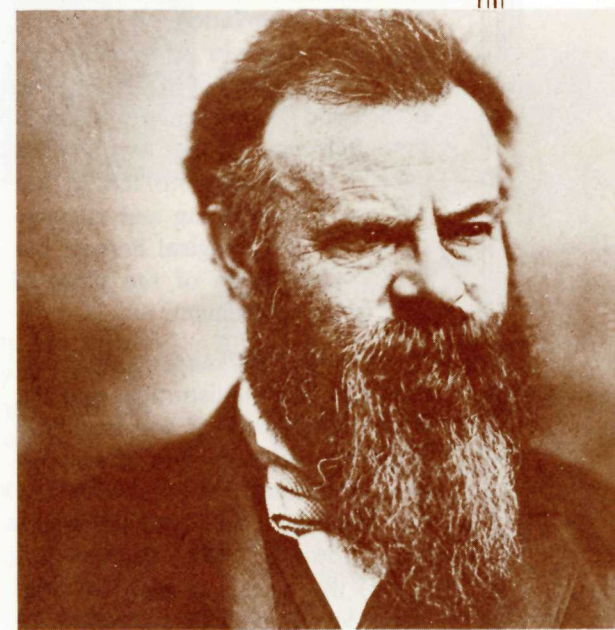
In 1881, following King's resignation, Major Powell was appointed Director of the U.S. Geological Survey. As Director from 1881 to 1894, Powell was the principal force in expanding geologic studies and topographic mapping throughout the country and in stimulating investigations of soil, ground water, rivers, flood control, and irrigation.

Acceptance of directorship of the U.S. Geological Survey.



Clarence King, first Director of the U. S. Geological Survey, 1879-81.

John Wesley Powell, second Director of the U. S. Geological Survey, 1881-94.



During the 13 years of Powell's directorate the growth of the Geological Survey was remarkable. Its field of operations, at first restricted to the Far West, became nationwide. The annual appropriation was gradually increased, and from time to time new functions were added, the most important being a program of topographic mapping and investigation of water resources and irrigation. New divisions of chemistry, physics, paleontology, and hydrography were also added.

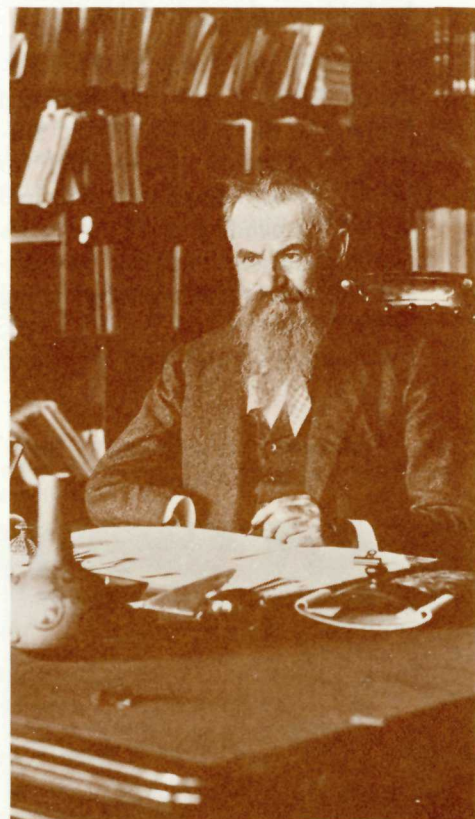
In 1884, Congress set up a joint commission to consider the organization of several of the scientific bureaus, including the Geological Survey, in order to "secure greater efficiency and economy." The National Academy of Sciences was again called on for advice, and its committee made some specific recommendations. Their chief goals were the formulation of a general plan for science in government and the establishment of a Department of Science. In the lengthy hearings that followed, Major Powell was called several times to testify, not only on the operation and management of the Geological Survey, but also on his views of the place of science in government.

Midway in the hearings there was a change of administration, and the search for efficiency and economy became an investigation of corruption. Powell and the Survey became the target of bitter attack. In the end, however, the Commission found the administration of the Geological Survey to be well con-

ducted, and they recognized the wisdom of a geological survey of the whole country. Geologic research was established as a proper function of the Government.

In 1888, following a series of dry years, Congress, on Powell's recommendation, authorized the Survey to undertake a study of the

John Wesley Powell in his Adams Building Office, Washington, D. C., 1896.



arid regions of the United States with special emphasis to be placed on investigations of stream capacities and potential sites for dams, reservoirs, ditches, and other irrigation facilities.

The House added an amendment requiring that all irrigable lands be withdrawn from entry. This effectively closed the land to the homesteader. After about 2 years the Irrigation Survey was discontinued, and Congress eliminated the power to reserve irrigable land. Powell's vision of an orderly settlement of the West was not to become a reality. Ultimately, the Irrigation Survey led to the establishment of the Reclamation Service and then the Bureau of Reclamation.

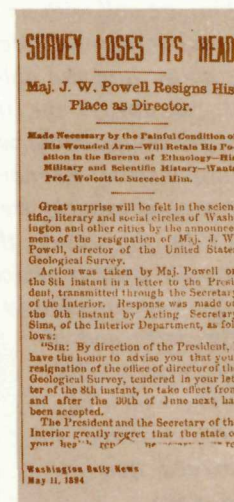
On June 30, 1894, Powell resigned as Director of the U.S. Geological Survey. He had been in poor health for a number of years, and surgery was once more required on his arm. Major Powell's health declined steadily after his resignation, and he died at his summer home in Haven, Maine, on September 23, 1902, in his 69th year. He was buried in Arlington Cemetery among other heroes of the Civil War.



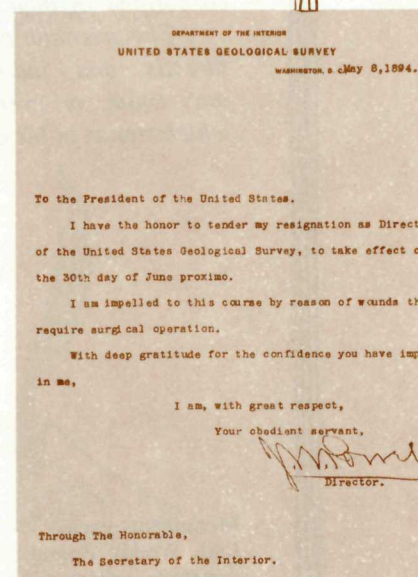
Major Powell and companions off the coast of Maine during retirement years.

Though honored and respected by the scientific community, Powell was for many years overlooked by historians. Only recently has the significance of his ideas been rediscovered.

Powell, however, was not without recognition in his own time. He was elected a member of the Philosophical Society of Washington in 1874 and its president in 1883 and a member of the National Academy of Sciences



Resignation of directorship of the U.S. Geological Survey.

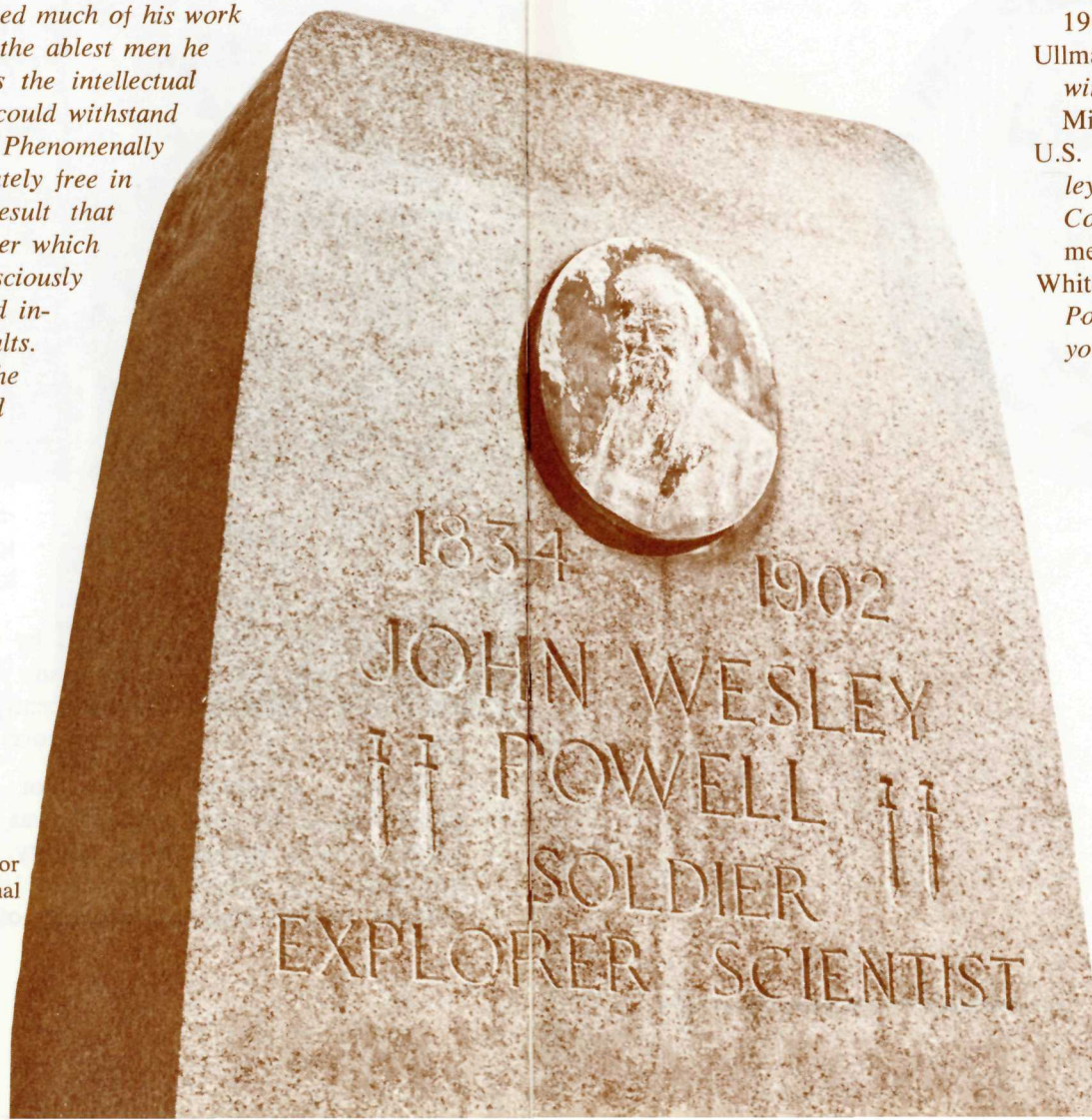


in 1880. He was a founder of the Cosmos Club and its president during 1878 and 1888, a founder and president of the Anthropological Society of Washington, one of the earliest members of the Biological Society of Washington, and an organizer of the Geological Society of Washington. He helped establish the National Geographic Society and the Geological Society of America. In 1888, he was elected president of the American Association for the Advancement of Science, then considered the highest honor for an American scientist, and he received honorary degrees from several universities at home and abroad.

His place among his contemporaries was fittingly expressed by G. K. Gilbert, the eminent geologist and his long-time associate, at a meeting commemorating Powell's achievements. Speaking of Powell before the Washington Academy of Sciences on February 16, 1903, Gilbert said:

The glow of his enthusiasm, the illumination of his broad philosophy, the warmth of his friendship, are still with us. . . . It was through this personality too that he accomplished much of his work for science. Gathering about him the ablest men he could secure, he was yet always the intellectual leader, and few of his colleagues could withstand the influence of his master mind. Phenomenally fertile in his ideas, he was absolutely free in their communication with the result that many of his suggestions—a number which can never be known—were unconsciously appropriated by his associates and incorporated in their published results. . . . The scientific produce which he directly and indirectly inspired may equal, or even exceed that which stands in his own name.

Monument erected about 1914 to honor John Wesley Powell. Arlington National Cemetery, Arlington, Virginia.



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As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.



Thomas S. Kleppe, Secretary
U. S. Department of the Interior

V. E. McKelvey, Director
Geological Survey

