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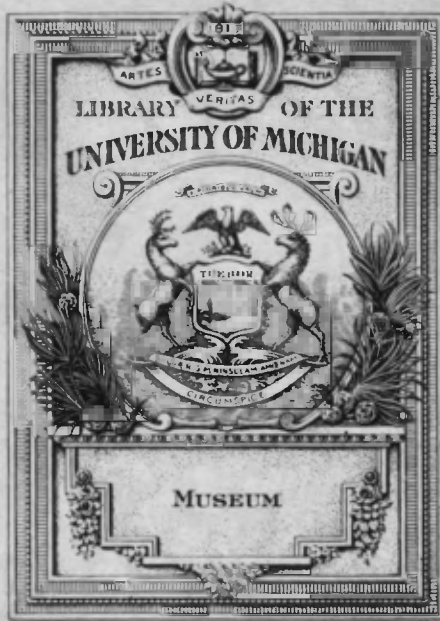
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*Exploration of the Colorado
River of the West and its ...*



REPORT

OF

J. W. POWELL.

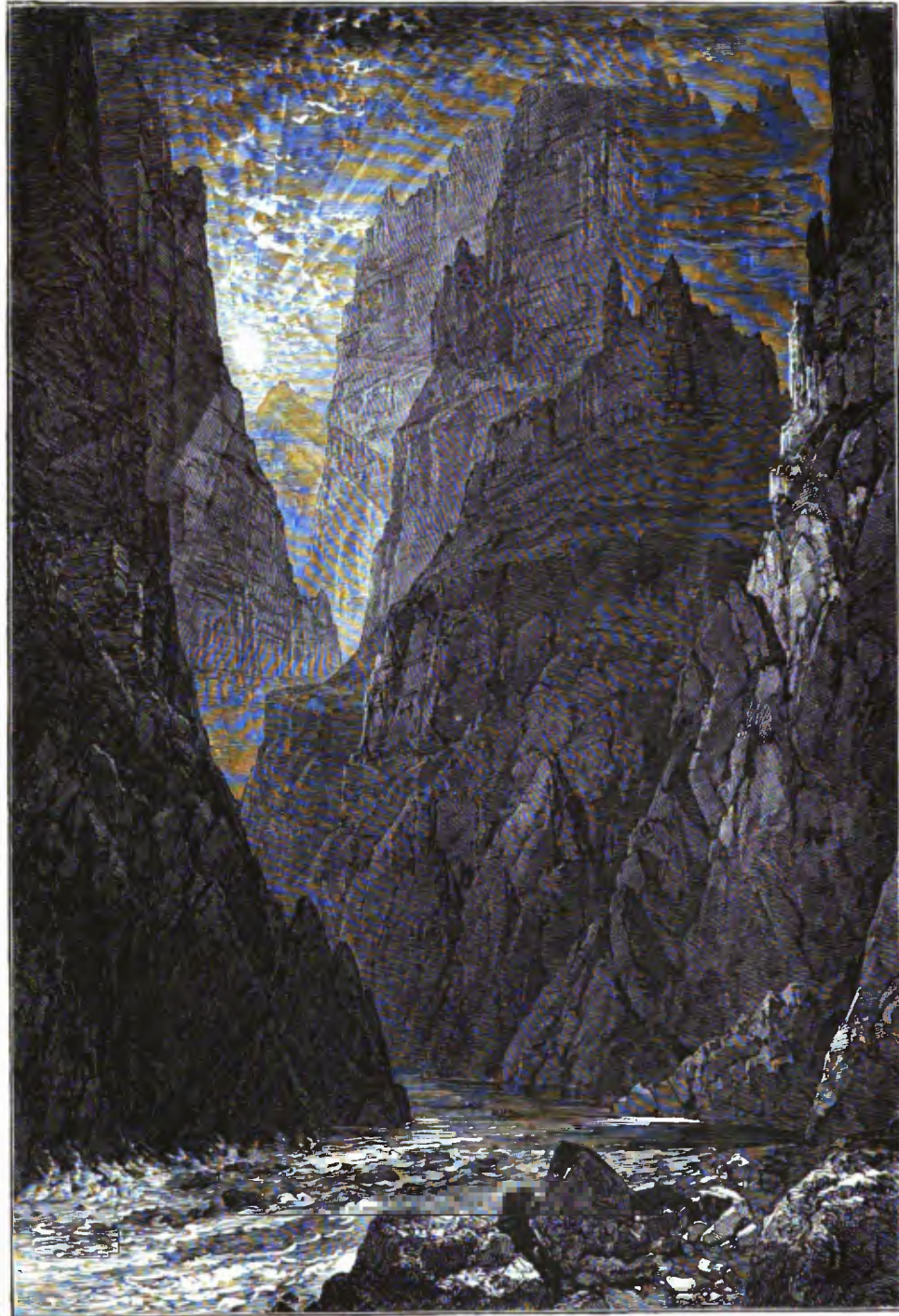


Figure 1.—Grand Cañon of the Colorado. (6,200 feet deep.)



Smithsonian Institution

EXPLORATION
OF THE
COLORADO RIVER OF THE WEST
AND
ITS TRIBUTARIES.

EXPLORED IN
1869, 1870, 1871, and 1872,

UNDER THE
DIRECTION OF THE SECRETARY OF THE SMITHSONIAN INSTITUTION.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1875.

Museum list
4-18-1933

SMITHSONIAN INSTITUTION,

Washington, D. C., June 18, 1874.

SIR: I have the honor to submit herewith the report of the exploration of the Colorado River of the West and its tributaries, by Prof. J. W. Powell.

This exploration was placed under the direction of the Smithsonian Institution by Congress.

Very respectfully, your obedient servant,

JOSEPH HENRY,

Secretary Smithsonian Institution.

Hon. J. G. BLAINE,

Speaker of the House of Representatives.

WASHINGTON, D. C., *June 16, 1874.*

SIR: I have the honor to submit herewith my report of the exploration of the Colorado River of the West and its tributaries, and respectfully request that the same may be forwarded to Congress.

I am, with great respect, your obedient servant,

J. W. POWELL.

Prof. JOSEPH HENRY,
Secretary Smithsonian Institution,
Washington, D. C.

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PREFACE.

In the summer of 1867, with a small party of naturalists, students, and amateurs like myself, I visited the mountain region of Colorado Territory. While in Middle Park, I explored a little cañon, through which the Grand River runs, immediately below the well-known watering-place, "Middle Park Hot Springs." Later in the fall I passed through Cedar Cañon, the gorge by which the Grand leaves the park. The result of the summer's study was to kindle a desire to explore the cañons of the Grand, Green, and Colorado Rivers, and the next summer I organized an expedition with the intention of penetrating still farther into that cañon country.

As soon as the snows were melted, so that the main range could be crossed, I went over into Middle Park, and proceeded thence down the Grand to the head of Cedar Cañon, then across the Park range by Gore's Pass, and in October found myself and party encamped on the White River, about a hundred and twenty miles above its mouth. At that point I built cabins, and established winter quarters, intending to occupy the cold season, as far as possible, in exploring the adjacent country. The winter of 1868-'69 proved favorable to my purposes, and several excursions were made, southward to the Grand, down the White to the Green River, northward to the Yampa, and around the Uinta Mountains.

During these several excursions, I seized every opportunity to study the cañons through which these upper streams run, and, while thus engaged, formed plans for the exploration of the cañons of the Colorado. Since that time I have been engaged in executing these plans, sometimes employed in the field, sometimes in the office. Begun originally as an exploration, the work has finally developed into a survey embracing the geography, geology, ethnography, and natural history of the country, and a number of gentlemen have, from time to time, assisted me in the work.

It is expected that the results of these labors will, as soon as practicable, be published by the General Government, in a series of volumes, and such publication commences with the present, which, in Part First, gives a history of the original exploration through a region practically unknown prior to the time it was made. It has not been thought best to give a history of all our travels, but only those portions which were original explorations.

Accompanying the volume will be found a map of the "Green River from the Union Pacific Railroad to the mouth of the White River," including the eastern portion of the Uinta Mountains, and a "Profile of the Green River and Colorado River of the West, from the crossing of the Union Pacific Railroad to the mouth of the Colorado, compared with the profile of the Ohio and Mississippi Rivers from Pittsburgh to Vicksburgh." It has been prepared from barometric data collected at different times during the exploration and survey. That portion below the mouth of the Rio Virgen has been taken from Lieutenant Ives's "Report upon the Colorado River of the West."

The altitude of the mouth of the Rio Virgen is represented on the profile with this volume as somewhat less than it appears on that made by Lieutenant Ives. Our own determinations fix it as we represent it. Lieutenant Ives's data for the upper portion of his line are indefinite, but can be interpreted to agree with the results which we have obtained; perhaps better than with his own profile.

As far as possible we have adopted the names of geographic features used by the settlers of the adjacent country, but many of the mountains, plateaus, valleys, cañons, and streams were unknown and unnamed. In such cases we have accepted the Indian names, whenever they could be determined with accuracy. I intend, finally, to publish a glossary of all these new names, giving their significance.

I am greatly indebted to many gentlemen living in Utah, Wyoming, and Colorado Territories for their assistance and co-operation in this enterprise. To mention them severally would inordinately swell this preface.

Professor A. H. Thompson has been my companion and collaborator during the greater part of the time, and has had entire charge of the geo-

graphic work; the final maps will exhibit the results of his learning and executive ability.

Professor Joseph Henry, the Secretary of the Smithsonian Institution, under whose direction the work was performed, prior to the 1st of July, 1874, has contributed greatly to any success which we may have had, by his instructions and advice, and by his most earnest sympathy; and I have taken the liberty to express my gratitude for his kindness, and reverence for his profound attainments, by attaching his name to a group of lofty mountains.

To the officers of the Union Pacific, the Chicago, Burlington and Quincy, the Utah Central, and other railroads, I am indebted for many valuable favors; but for their co-operation the work could not have been accomplished with the means at my command. Many thousands of dollars, in the aggregate, have been contributed by them to the enterprise in the form of free transportation. I earnestly hope that the final result of the work, as a contribution to American science, will not disappoint their expectations.

J. W. P.

WASHINGTON, D. C., 1875.

PART FIRST.

HISTORY

OF THE

EXPLORATION OF THE CAÑONS OF THE COLORADO.

1 COL

CHAPTER 1.

THE VALLEY OF THE COLORADO.

The Colorado River is formed by the junction of the Grand and Green.

The Grand River has its source in the Rocky Mountains, five or six miles west of Long's Peak, in latitude $40^{\circ} 17'$ and longitude $105^{\circ} 43'$ approximately. A group of little alpine lakes, that receive their waters directly from perpetual snow-banks, discharge into a common reservoir, known as Grand Lake, a beautiful sheet of water. Its quiet surface reflects towering cliffs and crags of granite on its eastern shore; and stately pines and firs stand on its western margin.

The Green River heads near Frémont's Peak, in the Wind River Mountains, in latitude $43^{\circ} 15'$ and longitude $109^{\circ} 45'$ approximately. This river, like the last, has its sources in alpine lakes, fed by everlasting snows. Thousands of these little lakes, with deep, cold, emerald waters, are embosomed among the crags of the Rocky Mountains. These streams, born in the cold, gloomy solitudes of the upper mountain-region, have a strange, eventful history as they pass down through gorges, tumbling in cascades and cataracts, until they reach the hot, arid plains of the Lower Colorado, where the waters that were so clear above empty as turbid floods into the Gulf of California.

The mouth of the Colorado is in latitude $31^{\circ} 53'$ and longitude 115° .

The Green River is larger than the Grand, and is the upper continuation of the Colorado. Including this river, the whole length of the stream is about two thousand miles. The region of country drained by the Colorado and its tributaries is about eight hundred miles in length, and varies from three hundred to five hundred in width, containing about three hundred thousand square miles, an area larger than all the New England and Middle States, with Maryland and Virginia added, or as large as Minnesota, Wisconsin, Iowa, Illinois, and Missouri.

There are two distinct portions of the basin of the Colorado. The

lower third is but little above the level of the sea, though here and there ranges of mountains rise to an altitude of from two to six thousand feet. This part of the valley is bounded on the north by a line of cliffs, which present a bold, often vertical step, hundreds or thousands of feet to the table-lands above.

The upper two-thirds of the basin rises from four to eight thousand feet above the level of the sea. This high region, on the east, north, and west, is set with ranges of snow-clad mountains, attaining an altitude above the sea varying from eight to fourteen thousand feet. All winter long, on its mountain-crested rim, snow falls, filling the gorges, half burying the forests, and covering the crags and peaks with a mantle woven by the winds from the waves of the sea—a mantle of snow. When the summer-sun comes, this snow melts, and tumbles down the mountain-sides in millions of cascades. Ten million cascade brooks unite to form ten thousand torrent creeks; ten thousand torrent creeks unite to form a hundred rivers beset with cataracts; a hundred roaring rivers unite to form the Colorado, which rolls, a mad, turbid stream, into the Gulf of California.

Consider the action of one of these streams: its source in the mountains, where the snows fall; its course through the arid plains. Now, if at the river's flood storms were falling on the plains, its channel would be cut but little faster than the adjacent country would be washed, and the general level would thus be preserved; but, under the conditions here mentioned, the river deepens its bed, as there is much through corrasion and but little lateral degradation.

So all the streams cut deeper and still deeper until their banks are towering cliffs of solid rock. These deep, narrow gorges are called cañons.

For more than a thousand miles along its course, the Colorado has cut for itself such a cañon; but at some few points, where lateral streams join it, the cañon is broken, and narrow, transverse valleys divide it properly into a series of cañons.

The Virgen, Kanab, Paria, Escalante, Dirty Devil, San Rafael, Price, and Uinta on the west, the Grand, Yampa, San Juan, and Colorado Chiquito on the east, have also cut for themselves such narrow, winding gorges, or deep cañons. Every river entering these has cut another cañon;



Figure 2.—Lower Cañon of the Kanab. (3,600 feet deep.)