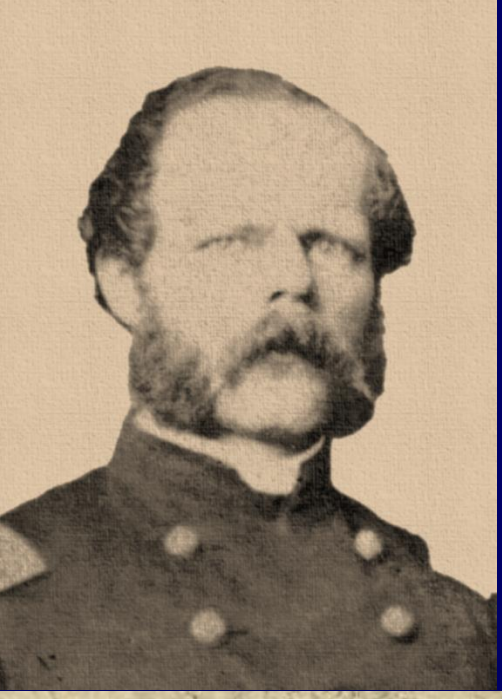

A BIG MISUNDERSTANDING

F. W. von Egloffstein's 1858 Map of the Grand Canyon and Its Influence

Earle E. Spamer

This PDF publication is best viewed in opposing-page format on wide screens or printed as color double-sided pages

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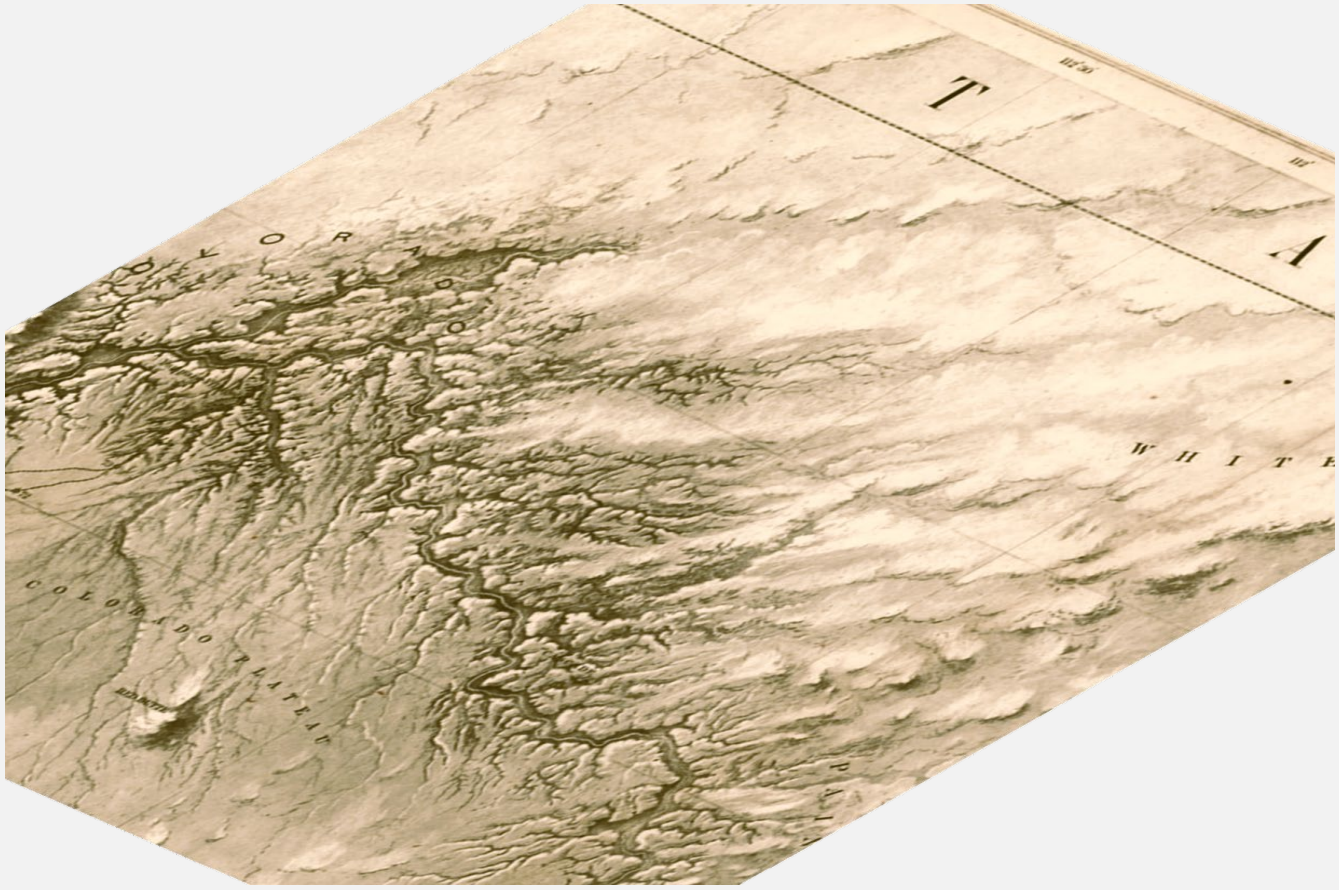
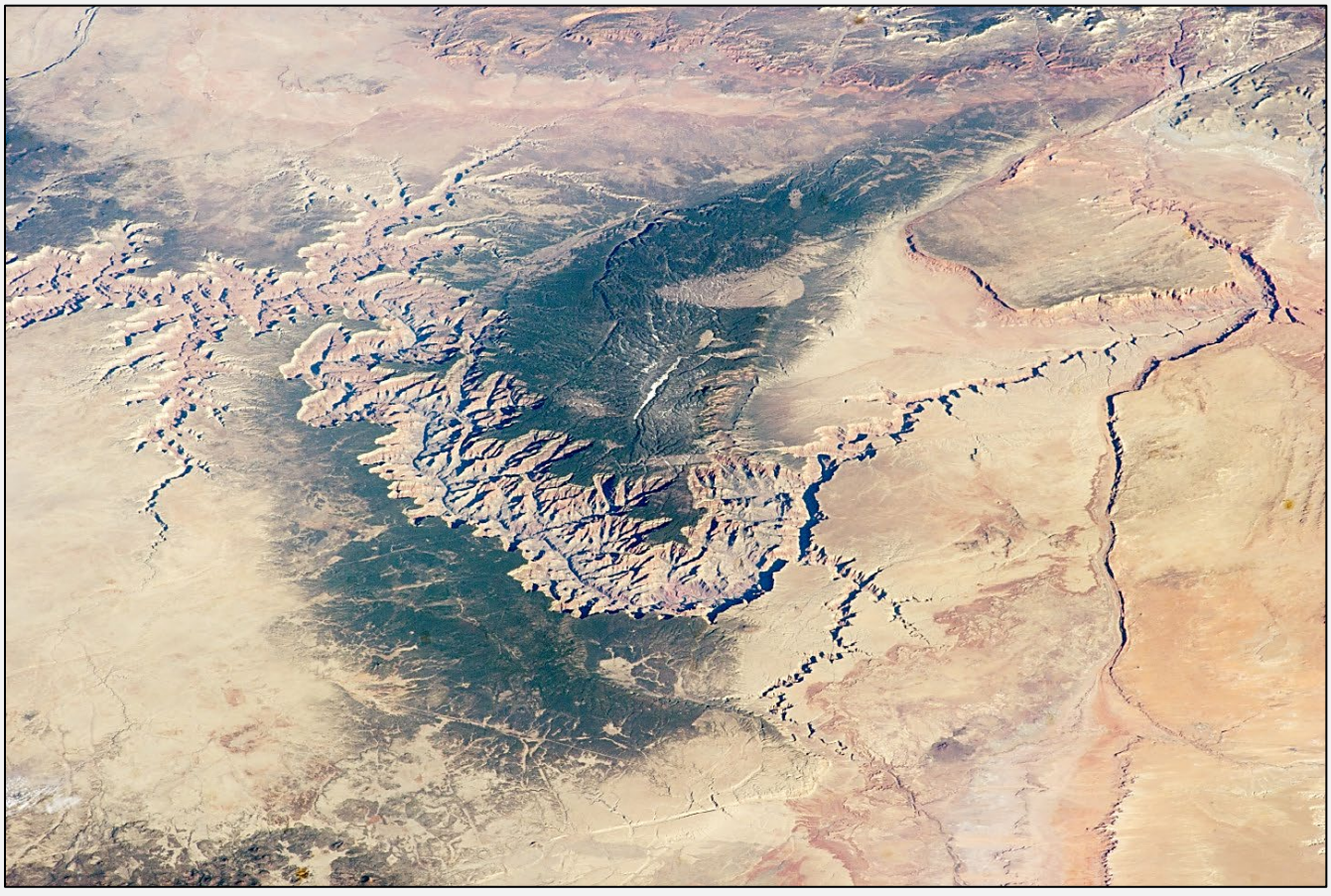
COVER ILLUSTRATIONS

PORTRAIT: F. W. Egloffstein in uniform as Colonel, 103rd New York Volunteer Infantry, 1861–1863 (detail) *(Library of Congress)*

MAP: Detail from "Map No. 2. Rio Colorado of the West, Explored by 1st. Lieut. Joseph C. Ives, Topl. Engrs. under the direction of the Office of Explorations and Surveys, A. A. Humphreys, Capt. Topl. Engrs. in charge, by order of Hon. John B. Floyd, Secretary of War. 1858. drawn by Frhr. F. W. v. Egloffstein. Topographer to the Expedition. Scale of 12 miles to one Inch or 1:760320." In: *Report upon the Colorado River of the West, explored in 1857 and 1858 by Lieutenant Joseph C. Ives, Corps of Topographical Engineers, under the direction of the Office of Explorations and Surveys, A. A. Humphreys, Captain Topographical Engineers, in charge. By order of the Secretary of War* (Government Printing Office, Washington, 1861). (Volume: *U.S. 30th Congress, 1st Session, House Document 90*, *Serial 1058*; also as *Senate Document* [unnumbered].) *(Library of Congress)*

A BIG MISUNDERSTANDING





Frontispiece — legend on p. iii

A BIG MISUNDERSTANDING

F. W. von Egloffstein's 1858 Map of the Grand Canyon and Its Influence

Earle E. Spamer

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BIBLIOGRAPHICAL AND HISTORICAL RESOURCES ON THE
GRAND CANYON AND LOWER COLORADO RIVER REGIONS OF THE
UNITED STATES AND MEXICO

A BIG MISUNDERSTANDING

by Earle E. Spamer

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LEGEND FOR FRONTISPIECE

(TOP) "An approximation to a bird's eye view . . ."* Digital rendering by the author, creating the same oblique perspective of the part of Egloffstein's "Map No. 2" encompassed by the space view below. Stylistic representation only.

(BOTTOM) Astronaut photograph ISS039-E-5258; taken by the Expedition 39 crew of the International Space Station.† [Also compare **FIGURE 29** in *Chapter 3*.]

An outstanding northwestward space view of the eastern Grand Canyon region. Marble Canyon is seen as the narrowly encanyoned portion at right, where the Vermilion Cliffs and Echo Cliffs converge at Lee's Ferry. The Little Colorado River approaches the Grand Canyon from the lower-right. The prominent green feature is the forested geological Kaibab upwarp (Kaibab Plateau on the north side; Coconino Plateau on the south). At left is the prominent tributary of Cataract Creek, its downstream segment known as Havasu Canyon. On the north side, left of center, is the prominent tributary of Kanab Creek flowing south from Utah. The Ives expedition departed from the Cataract Creek area south-southeastward (see tracks plotted on Egloffstein's map), just off the left side of this photo, passing beyond the lower edge of the photo before turning east.

Aside from the area to the west of Cataract Creek, the entire region in this view had not been seen by Egloffstein. His necessary interpretation of this expanse on his "Map No. 2" is an admirably restrained effort, though one possibly influenced by the contrived stream courses suggested by earlier maps. See the text regarding his interpretive mapping of areas that he had not been able to survey.

* Quotation from J. C. Ives, "Appendix D" (though probably written by F. W. von Egloffstein; refer to **FIGURE 13** in *Chapter 2*).

† *Legend accompanying Wikimedia Commons image*: "Astronaut photograph ISS039-E-5258 was acquired on March 25, 2014, with a Nikon D3S digital camera using a 180 millimeter lens, and is provided by the ISS Crew Earth Observations Facility and the Earth Science and Remote Sensing Unit, Johnson Space Center. The image was taken by the Expedition 39 crew. It has been cropped and enhanced to improve contrast, and lens artifacts have been removed. The International Space Station Program supports the laboratory as part of the ISS National Lab to help astronauts take pictures of Earth that will be of the greatest value to scientists and the public, and to make those images freely available on the Internet. Additional images taken by astronauts and cosmonauts can be viewed at the NASA/JSC Gateway to Astronaut Photography of Earth. Caption by M. Justin Wilkinson, Jacobs at NASA-JSC."

Wikimedia Commons, https://commons.wikimedia.org/wiki/File:GrandCanyon.NASA.2014.jpg

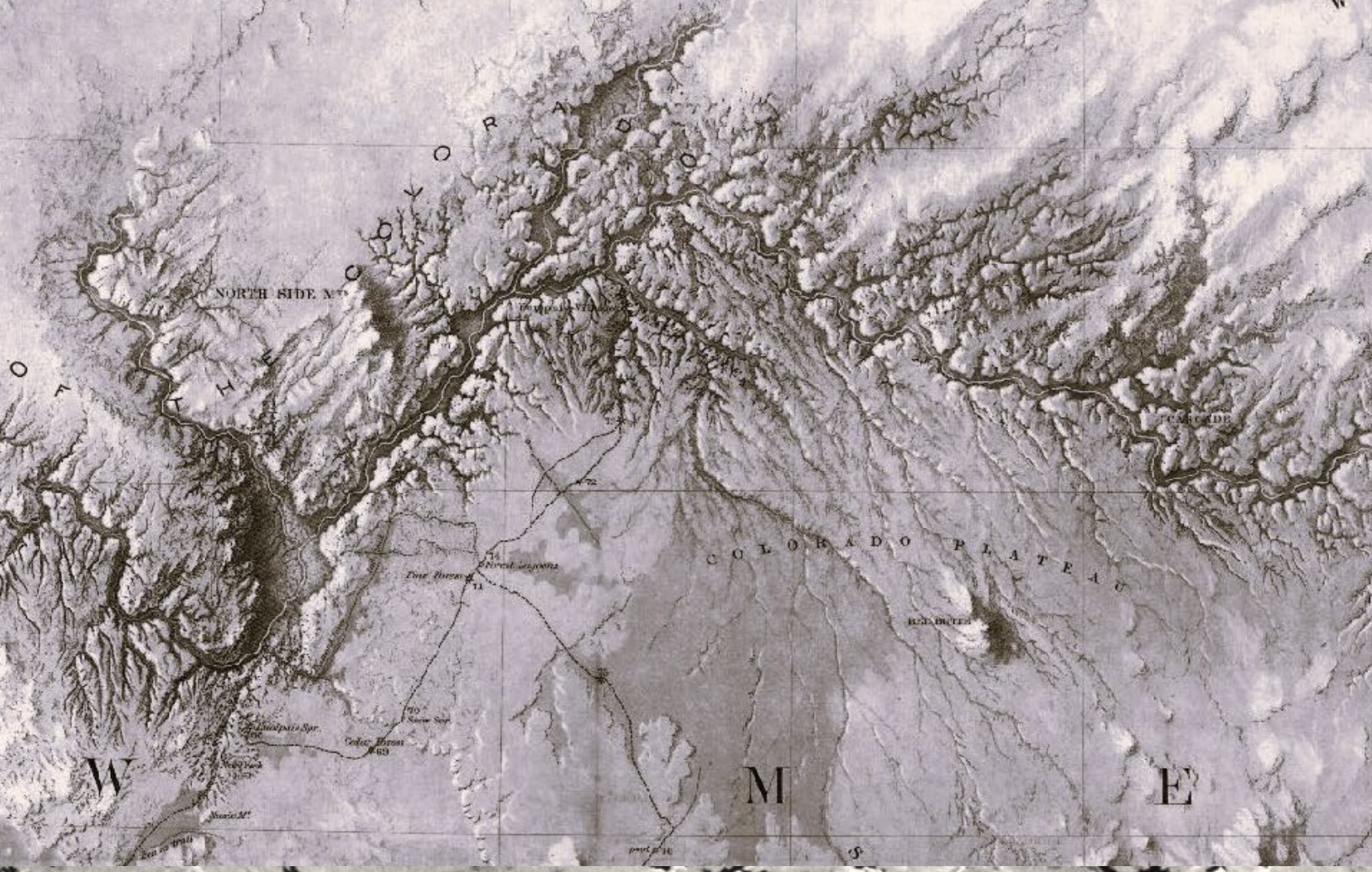
Original source credited:
https://earthobservatory.nasa.gov/images/83495/grand-canyon-geology-lessons-on-view

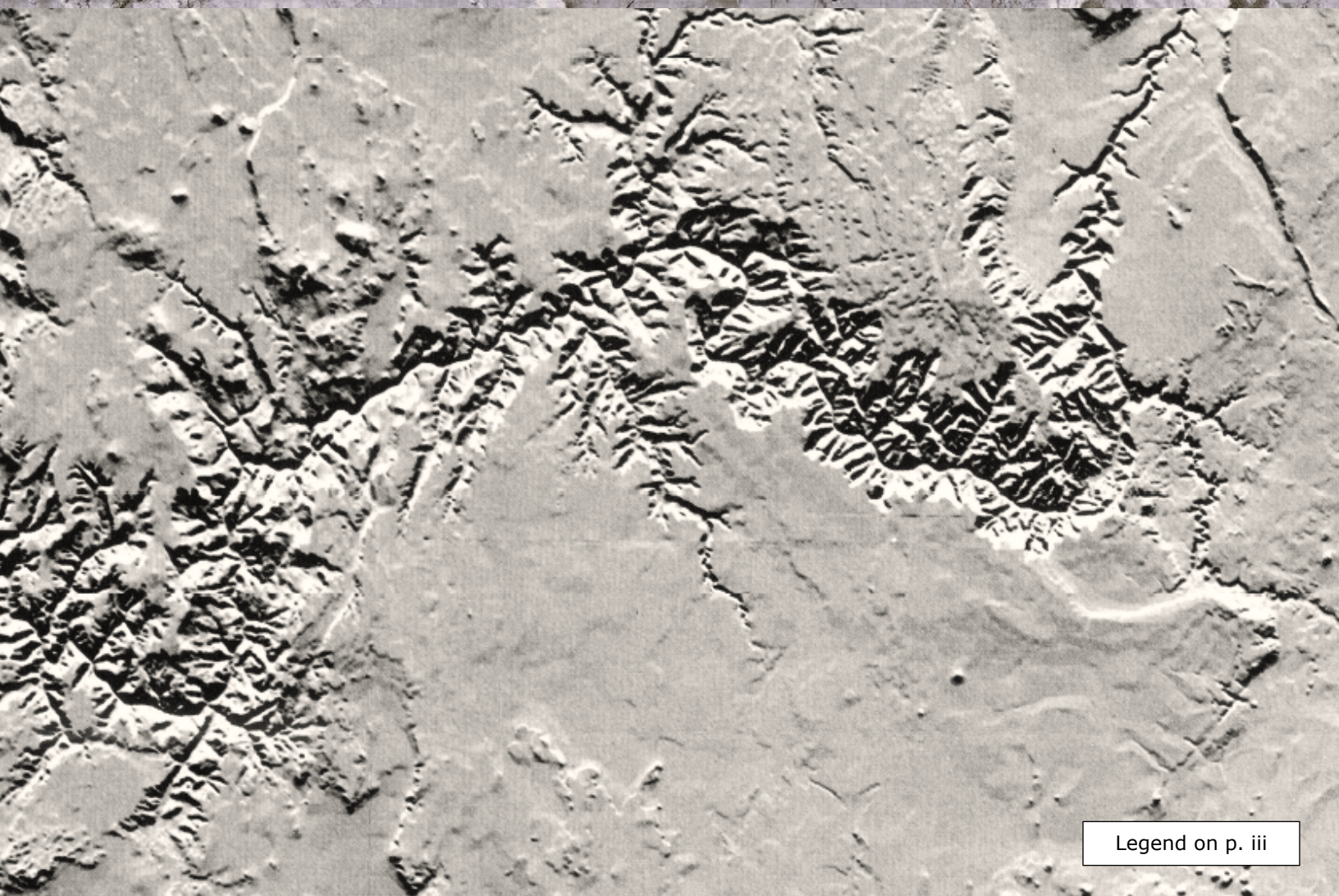
Legend for illustration on page iv ▶

Experiments in shaded relief, then and now—edges encompass approximately the same area.

(TOP) 1858: "Rio Colorado of the West. Map No. 2," by F. W. von Egloffstein *(detail)*.

(BOTTOM) 1990: "Experimental Digital Shaded-Relief Maps of Arizona," by Kathleen Edwards and R. M. Batson (USGS Miscellaneous Investigations Series Map I-1821), Sheet 2 *(detail)* (compiled by Kathleen Edwards and E. M. Sanchez, 1983–4).





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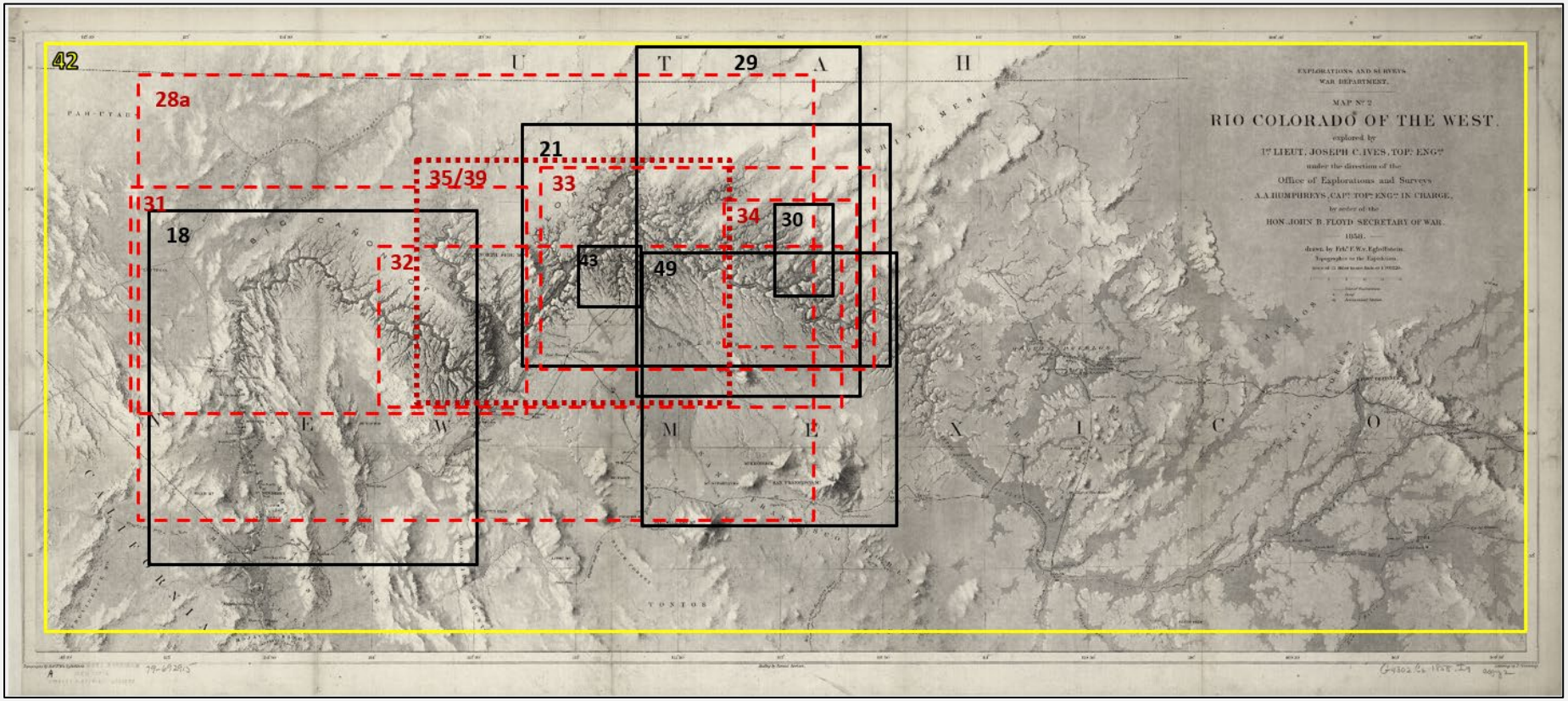
ABSTRACT

In early January 1858, at Fort Yuma, California, Prussian baron Friedrich Wilhelm von Egloffstein joined an exploring expedition under the command of Lt. Joseph Christmas Ives. Their objective was to map the Colorado River and locate its head of navigation, thence explore overland across the northern tier of New Mexico Territory. The mission covertly scouted Mormon advances into the region and sought means by which to gain access to interior locations closer to Utah by way of the river. During the land expedition they hoped to locate the confluence of the Little Colorado River with the main Colorado; in the process they went into the Grand Canyon twice. A veteran of other expeditions in the West, Egloffstein created for Ives' 1861 final report many scenic illustrations and two shaded relief maps. "Map No. 2" depicts—for the first time—a visual concept of the physiography of the Grand Canyon ("Big Cañon" as it was known then). The technical means that he was still in the process of inventing to make these relief maps has been praised. It was a proprietary and still not wholly understood process of heliography, by which a sculpted plaster model was photographically processed as an engraving in steel. But the topographer has been unfairly criticized for geographical oddities on his map, and the present study aims to remove much of that disapproval. The map displays the results of field-based surveys and adds borrowed and hypothetical topographies. As this study demonstrates, the baron's survey work was reasonably accurate, and his interpretive work is explicable though he may have been affected by the geographic notions of available maps. Later, cartographers who depended on his map to help produce newer maps of the greater Southwest and North America redrew landscapes in and around the Grand Canyon that were less faithful to ground truth and were not corrected for years. These cartographical trajectories of "Map No. 2" have not been explored before. *A Big Misunderstanding* is a graphic study of the whole and details of the Grand Canyon map with comparisons to modern and period maps of the region. It rationalizes the limits of visual observation that Egloffstein faced during the land expedition and speculates on what motivated him to fill in the areas that he did not survey. Examples of apparent earlier influences on Egloffstein's cartographic presentation are illustrated, along with specimens of later maps that distorted his geographies. ◈



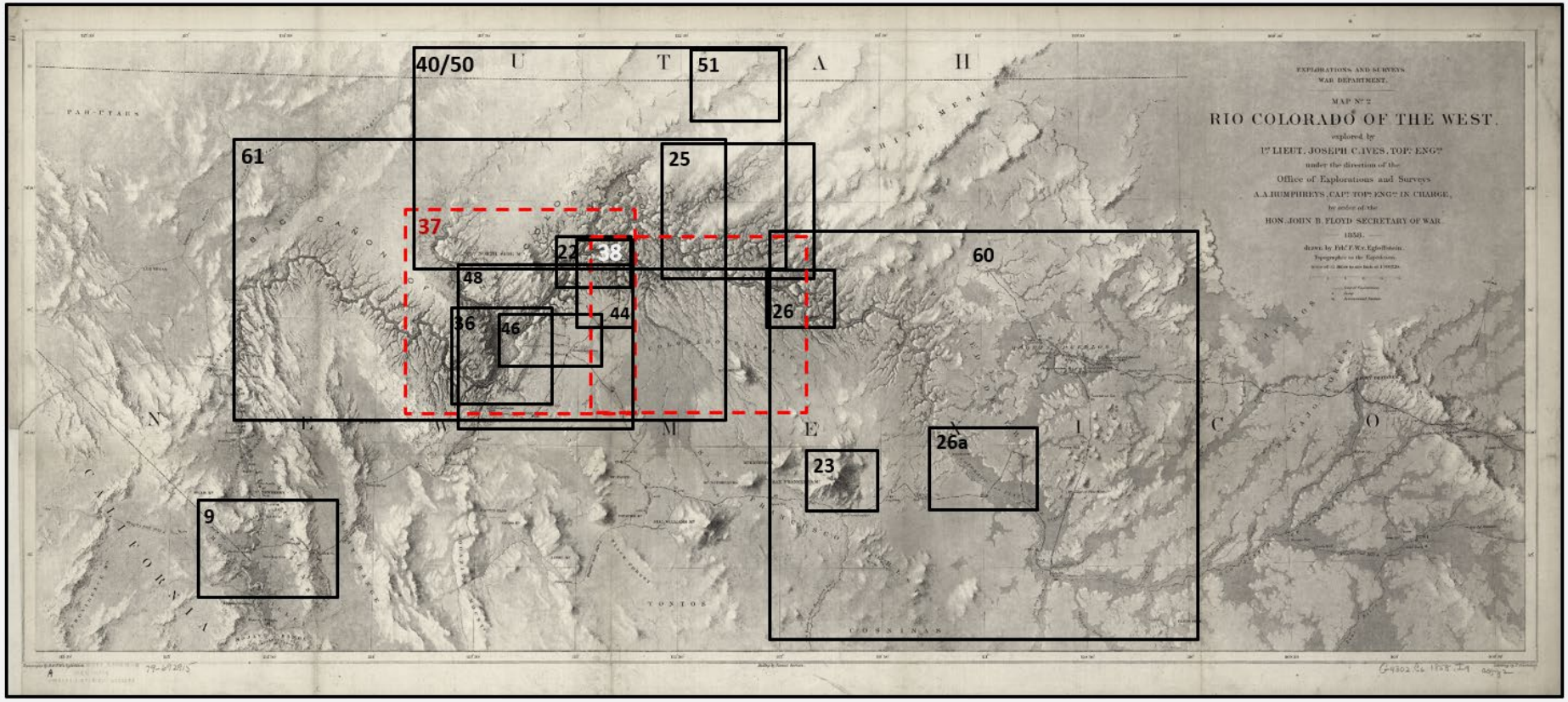
A

INDEX TO DETAIL VIEWS OF "MAP NO. 2" BY FIGURE NUMBER

- black solid lines = large and small detail areas
- red dashed lines = details with modern streams superposed
- red dotted lines = detail from map compared to modern map of the same area
- yellow solid line = map with highlight of Egloffstein's route of travel and clear vantages

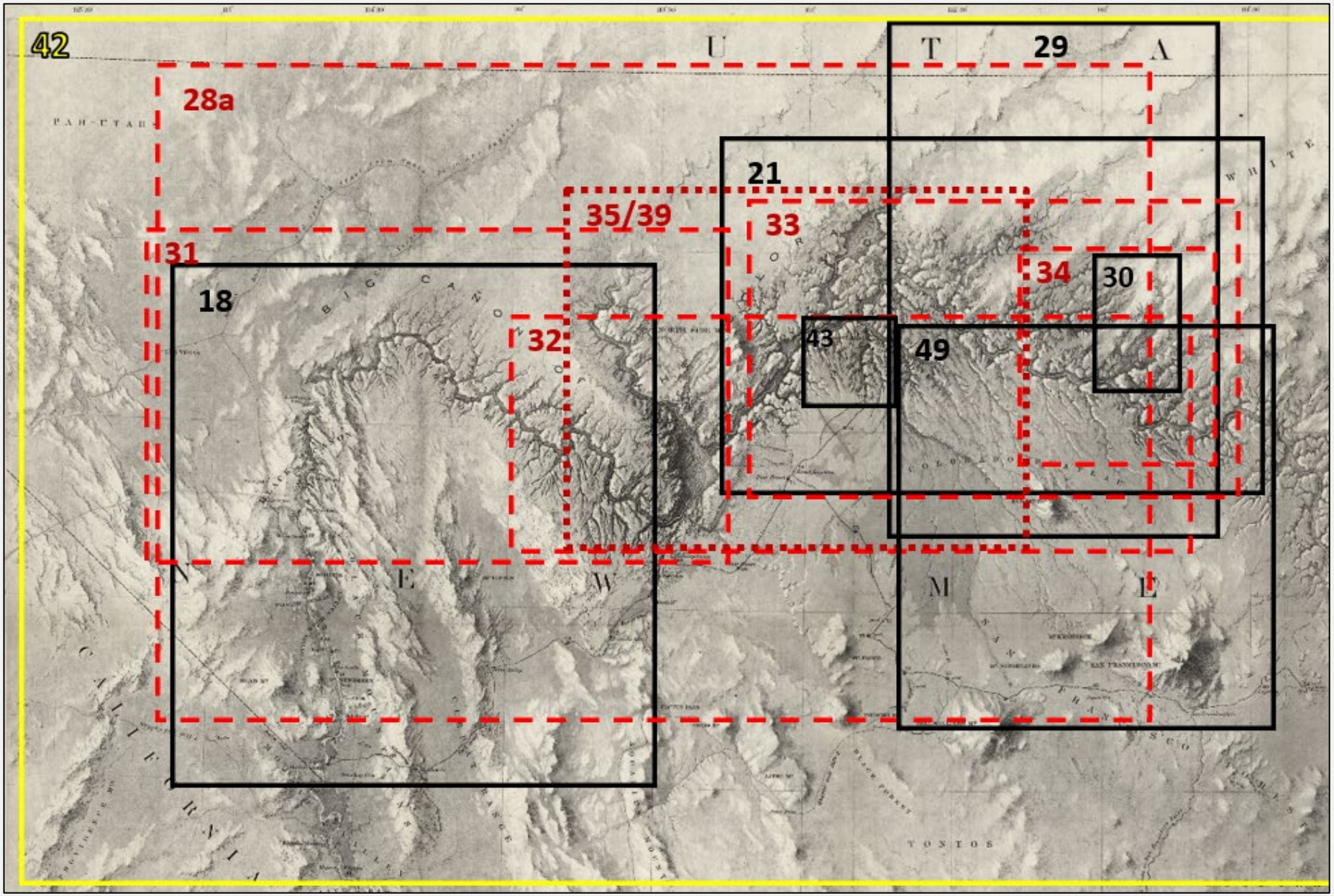
See also a separate index for detail views for Appendix II.

Closer details of index charts A and B appear on pp. x–xi.

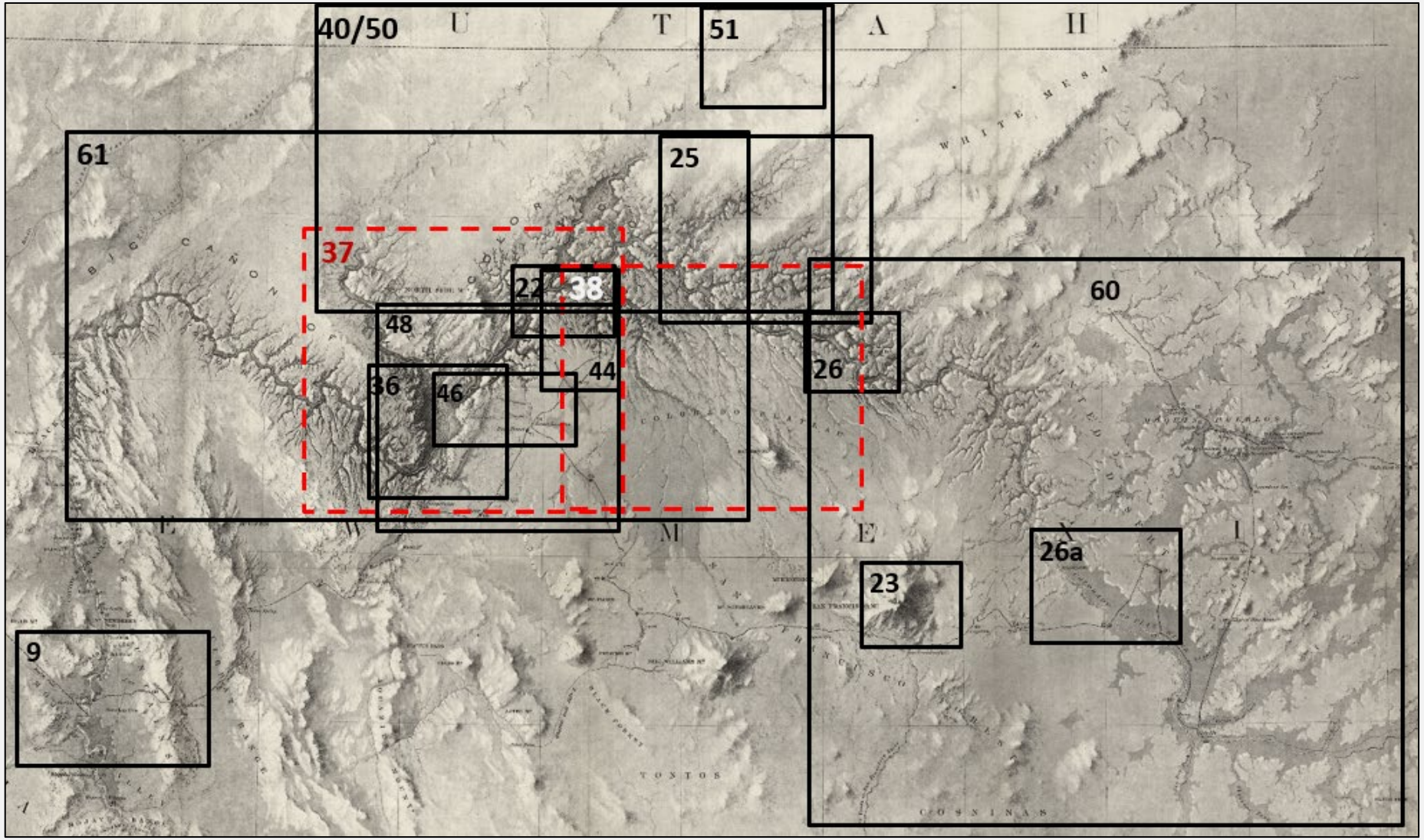


B

Closer details of index charts A and B appear on pp. x–xi.



CLOSER DETAIL OF INDEXED CHART **A**



CLOSER DETAIL OF INDEXED CHART **B**

ANALYTICAL GUIDE TO "MAP NO. 2"

The following three pages, showing western, central, and eastern parts of Egloffstein's "Map No. 2," illustrate areas that this study interprets to exhibit varied sources and levels of reliability for the physiographical presentations. Egloffstein did not survey every area. Particular parts of the map had to have incorporated topographies that were subjectively added by him, or which relied in some fashion upon previously published maps or observations from other expeditions. *The colored zones are only suggestions based on analyses by the author while conducting this survey.* Boundary outlines are not meant to be precise. Overlaps of zones may also be a preferred interpretation. [For a depiction of the areas surveyed by Egloffstein on the Colorado River, displayed on his "Map No. 1," see FIGURE 11a in *Chapter 2*.]

Solid red line delineates the route followed by Egloffstein

Dotted red lines delineate mapped excursions from camp or from lines of travel

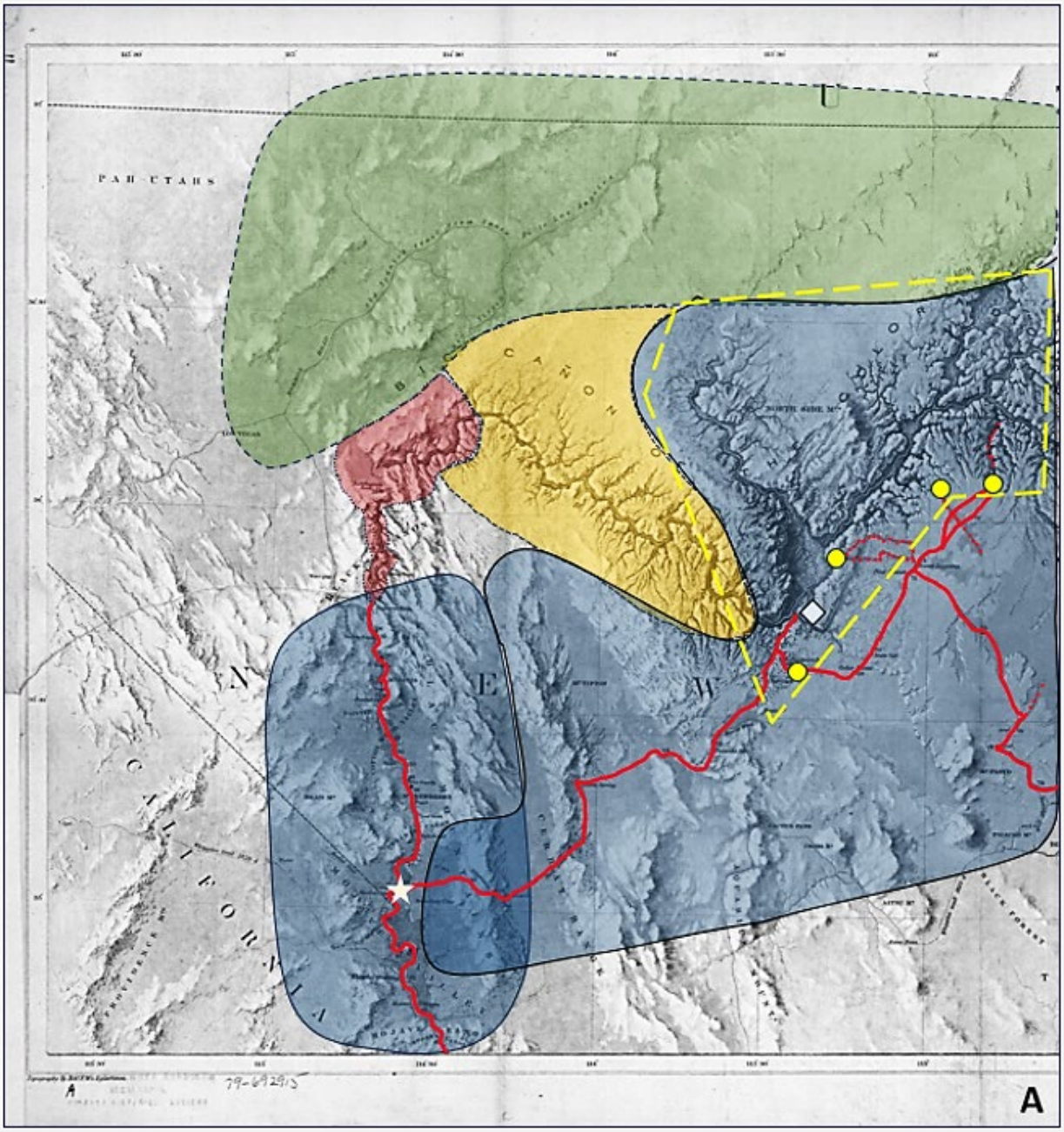
Blue zones with solid-line boundaries
Areas that certainly or were likely to have been surveyed by Egloffstein, whether at close range or from distant views from elevations.

Yellow zones with short-dashed boundaries
Areas that were not surveyed by Egloffstein and are incorporated onto the map subjectively through artistic interpretation and extrapolation from ground surveys in other areas. These are areas created when the plaster landscape model was made.

Green zones with long-dashed boundaries
Areas that were not surveyed by Egloffstein and are likely to have been influenced by the topographies presented on existing maps of his day. In the Little Colorado River valley, information may have been obtained from the results of earlier expeditions (specifically, Sitgreaves and Whipple in 1851 and 1854).

Red zone with dotted boundary
Area added to the map from field observations made by Lt. Ives, with the assistance of steamer captain Robinson, during the skiff trip through Black Canyon and surveillance made of the Great Bend area from Fortification Rock (see *Chapter 2*).

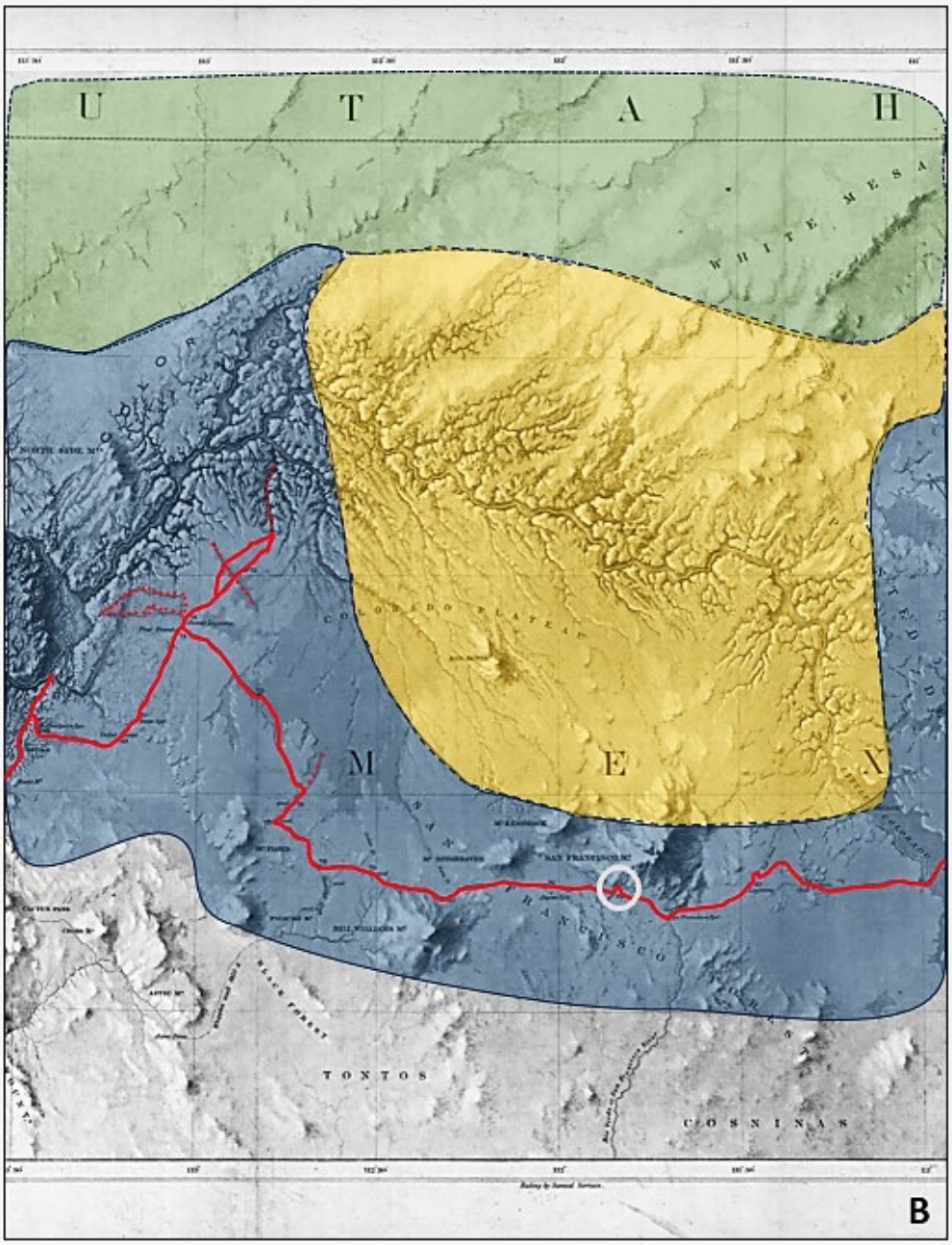
Gray areas exposing the original map are undefined here, where depictions of relief are of uncertain source, which must have relied upon maps and records from other than the Ives expedition, if not otherwise contrived.



Analytical Chart A — western part of "Map No. 2." Two separate areas are shown for Egloffstein's field surveys: on the Colorado River corridor aboard the small government steamboat *Explorer (lower left)* and the land expedition between the Colorado River and Cataract Creek *(right)*. The land expedition departed from Beale's Crossing (☆ white star). Information relating to the red zone was conveyed by Lt. Ives from the skiff excursion (*Chapter 2*).

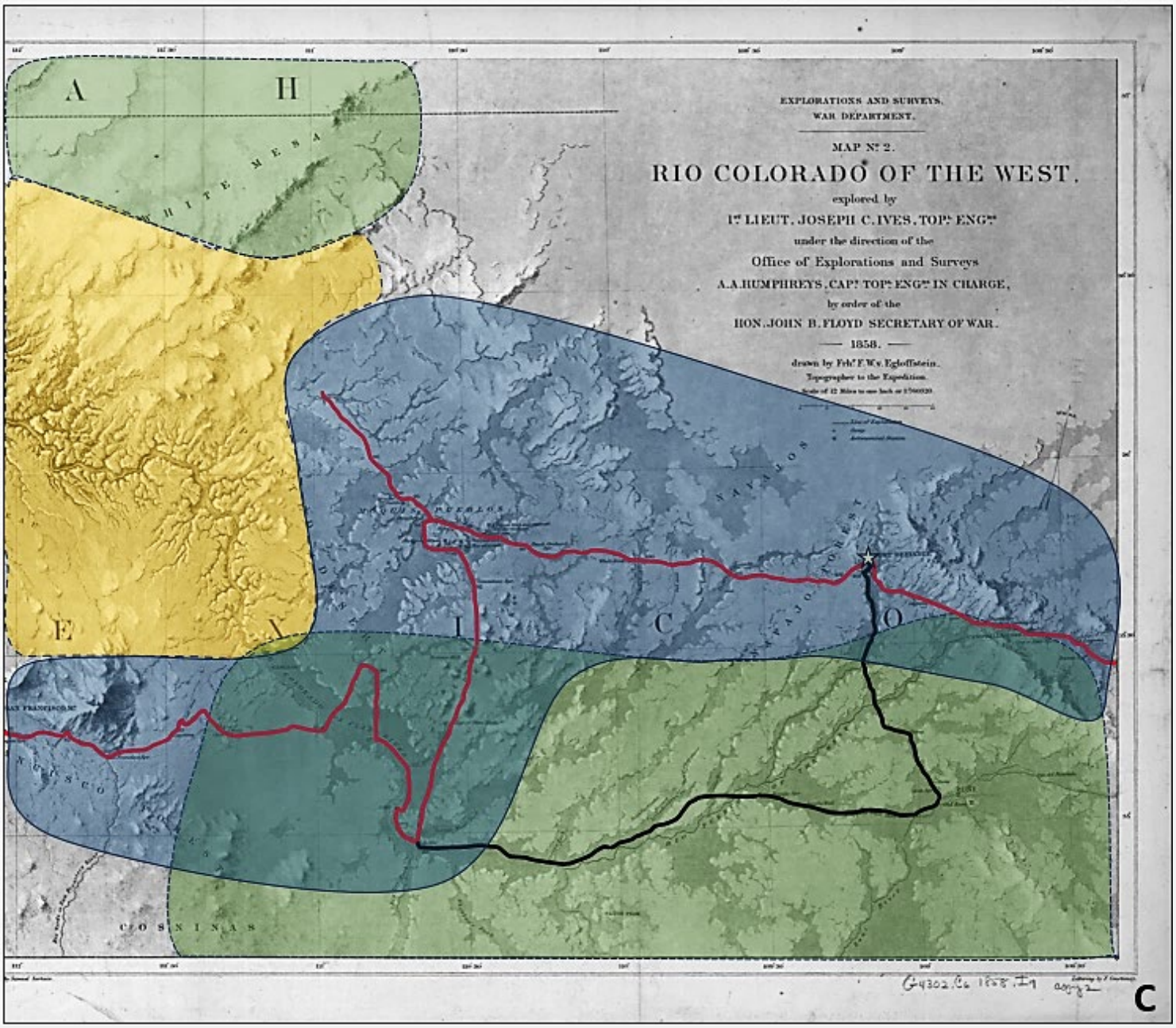
The *dashed yellow polygon* generally encompasses the area of Egloffstein's long-distance surveys that attempted to discern the canyon's physiography and identify key confluence points of rivers and tributaries. Some aspects agree with modern perspectives and others are askew, as discussed in the text. From the southeastern portion of this area the expedition was occasionally afforded substantial views of the Grand Canyon, though its eastern, "grandest," part was not seen at all.

◇ *Light blue diamond* locates Diamond Peak, which Egloffstein may have surmounted for a survey of the region; and ○ *yellow circles* denote other vantage points mentioned in the text (*Chapter 4*).



Analytical Chart B (partly overlaps Charts A and C) — **c**entral part of "Map No. 2." The yellow area encompasses the entire eastern part of the Grand Canyon, which today includes the most heavily visited "South Rim" and "North Rim" portions, an area that Egloffstein did not see at all.

○ circle locates Leroux Spring, where Egloffstein had not been allowed time by Ives to reach the higher elevation on San Francisco Mountain that he would have had to occupy in order to view the region to the north *(Chapter 4)*.



Analytical Chart C — eastern part of "Map No. 2." From Camp 89 *(bottom)* Egloffstein's route follows the northward excursion led by Lt. Ives to the Hopi mesas and to a point northwest from there, before proceeding directly to Fort Defiance (☆ star). The heavy **black line** delineates the route traveled by the main pack train from Camp 89 to Zuñi pueblo, partly following the Whipple trail of 1854, thence northward to Fort Defiance.There the expedition disbanded. The eastward continuation of the red line shows the route followed by Egloffstein and others on their return to the East Coast. (Lt. Ives returned by the southern-route stage from El Paso to Fort Yuma to settle the affairs of the expedition and sell the steamboat *Explorer*, then reversed his westbound itinerary to return home by way of a California port, by rail over the Isthmus of Panama, and by sea again through the Caribbean and up the East Coast.)

PREFACE

> The region explored after leaving the navigable portion of the Colorado—though, in a scientific point of view, of the highest interest, and presenting natural features whose strange sublimity is perhaps unparalleled in any part of the world—is not of much value. Most of it is uninhabitable, and a great deal of it is impassable. A brief statement could comprise the whole of what might be called the practical results of the land explorations.
>
> — J. C. Ives, *Report Upon the Colorado River of the West* (1861), p. 5

THUS ON 1 May 1860 Lt. Joseph Christmas Ives summed his stranger's perspective of the lands his expedition in the Southwest had surveyed two years earlier. In his letter transmitting the finished report to Capt. Andrew Atkinson Humphreys, his superior in charge of the War Department's Office of Explorations and Surveys, Ives probably believed that the expedition's efforts, and his *Report*, were the last word on travel or occupancy for the strange and supposedly inhospitable lands in the northwesternmost part of New Mexico Territory. It was to this land that he had brought the eminent topographer F. W. von Egloffstein, whose maps would document the alleged "uninhabitable" and "impassable" characteristics of the region, substantiating commander Ives' conclusions. Thus, Egloffstein's map of the greater Grand Canyon region published with the *Report* was positioned to be the definitive one for that region. What no one imagined was that his map would turn on him, leading to crazily unconvincing charts that rerouted the Colorado River this way and that—even after John Wesley Powell's first Grand Canyon river expedition accurately plotted the river's course in 1869. The map would also unfairly fall in among the same twentieth century dismissive opinions that skewered the baron's artistic abilities when he drew some improbable canyon scenes for Ives' *Report*.

A Big Misunderstanding began simply enough. Looking at "Map No. 2" once again, I wondered how an overlay of a modern map on Egloffstein's would differ. I was surprised that no such comparison had been made. This very graphic study is the result of that one thought—a new look at his outwardly improbable "Big Cañon of the Colorado." Here are many inquisitive looks at broad areas of the map, numerous peeks at minute details (some surely not noticed before), and a few gatherings about how Egloffstein worked to make his map.

For all the respectful acknowledgment and bad press both that Baron von Egloffstein has attracted—and I admit to having been one of the disfavoring publicists at one time or another—I thought that very close examination of the map was in order. I do not disagree with the accolades he received for his method of shaded relief and engraving, a well known short-lived proprietary style though its methods to this day remain partly obscure. Instead, I investigate what Egloffstein was expressing in the physiography that he had charted, inferred, and implied. For all its fancies, he didn't do such a bad job after all but fell into the bad company of whimsical cartographers who latched on to his map. To the baron's credit, it's not often that one map can be singled out as the source for a new generation of maps, a map that made it possible to exhibit geography in a variety of new ways—even if they were awry.

By Egloffstein's proprietary process of heliography, a sculpted plaster landscape model was photographically reproduced and engraved to steel, attracting wide interest in his day. It displayed field-based and implied topographies, among which he apparently was first influenced by the geographic notions of contemporary maps. He added some of his own interpretive elements, too. The astonishing thing is that the principal features of Egloffstein's map—the stream courses in the Grand Canyon—are reasonably close to those on modern maps, with but a few deviations as shown herein. Yet the follow-up maps from other cartographers who borrowed from "Map No. 2" were, at least for the Grand Canyon region, more off than was the baron's. How could the cohort have gone so wrong? The devil is in the details.

A researcher usually prefers to work with actual articles. The appearance, physical feel, and intellectual assimilation inherent in the original lend a different perspective to a study. Once, if one could not examine an object in person, whether by a visit to a library or archive or through an opportune loan of the material in question, photography was the only recourse. Usually, that meant a black-and-white photograph that probably would not reveal extreme detail of a large item. But details can be crucial when examining maps, thus some studies perhaps never were made, though today they can be done with relative ease. When digital reprography became possible—within the time of one generation—its advantages were immediate and improvements were made continuously. Now viewing an object in a very high resolution image is nearly the same as handling it—not to forget that many of the scarcest of maps can now be examined without travel or expense—or for that matter without risking damage to the original. It is far from the day when Arctic explorer and scholar of maps Adolf Erik Nordenskiöld observed in 1889:

> . . . even printed maps of this period [15th–16th centuries] have become very rare, and extensive collections of them are only to be found in a few libraries. Many of the most important of these documents are therefore not easily accessible to students—a difficulty the unfavorable influence of which may be traced even in elaborate geographical treatises of the most distinguished authors.

Concluding, he hoped that his detailed compilation of historical maps would "promote new discoveries in the recesses of libraries and map-collections."* What he would have thought of the internet today!

Still, the tangible aspects of a map in hand are not delivered in digital form—the subtle differences of ink and the feel of paper, parchment or vellum are lacking; or struggling with large rolled or folded sheets (those that had not the bonus of large-format flat storage). But the ability to make an object available for study widely, clearly, and usually completely satisfactorily makes up for these shortfalls. I hope that the images in the present publication meet that standard, through which one may become a part of the map.

The imagery herein stands in for Egloffstein and the other cartographers. The rest is analytical; one may scrutinize this work to substantiate or disagree with the observations and claims made. The illustrative overlays and comparative images provide clearer explanations than does descriptive text alone, thus most chapters are designed to narrate through their successive figure legends, too. Some of the images are of perspectives not noticed before. Here I hope to defend Egloffstein's reputation, to show that as a whole his map is remarkably accurate. While it has some unbelievable features, they were not introduced as a matter of cartographical whimsy of the "here be dragons" genre. His cartography and engraving both contribute to a substantially good overview. He clearly fussed with the things that he could not see in the field, too, in order to join areas upstream and down that were better known. He also seems to have fiddled with a detail or two but for some reason abandoned the effort.

This is a born-digital production. Generous image sizes and the number of images alike allow the reader to casually examine all the points of discussion—to indeed be a part of the map. Beyond that are matters of corroboration, dispute, and reevaluation. —*E.E.S.*

* *Quotations from* A. E. Nordenskiöld, *Facsimile-atlas of the early history of cartography with reproductions of the most important maps printed in the XV and XVI centuries. Translated from the Swedish original by Johan Adolf Eklöf, Roy. Swed. Navy and Clements R. Markham, C.B., F.R.S.* (Printed by P. A. Norstedt & Söner, Stockholm, 1889), 141 pp., 51 plates [coverage to 1550, actually]. Also a facsimile reprint (Kraus Reprint Corp., New York, 1961, 1970) and another facsimile reprint with new introduction by J. B. Post (Dover Publications, Inc., New York, 1973). [Original Swedish edition: *Facsimile-Atlas till kartografiens äldsta historia innehållande afbildningar af de rigtigaste kartor tryckta före år 1600* (Printed by P. A. Norstedt & Söner, Stockholm, 1889).]

ORGANIZATION OF THIS PUBLICATION & NOTES ON NOMENCLATURE

The Contents page (p. v) provides a concise outline for this publication. Introductory material for each chapter is substantially supported by the figure legends; these legends may be read as a running dialog of their own within the context of the chapters in which they appear. **Viewing most illustrations in color is essential.** Specific figures are arranged within text where appropriate; elsewhere, illustrations are grouped after the chapter's or section's introduction for more convenient reference and for following the study through successive figure legends. Where mention is made to figures that appear somewhere else in the volume, both figure and chapter numbers are indicated to aid in locating them. **In the PDF document all references to figure numbers are live hyperlinks. Similarly, mentions of other chapters are also hyperlinks.** For aesthetic reasons, hyperlinks are in color but not underscored. Footnotes, rather than endnotes, are used so that the information in them will accompany separate copies of pages that might be made from this publication. In quoted material, a square-bracketed ellipsis [. . .] indicates more than a sentence or more than a paragraph is omitted.

At the time of the Ives expedition and for a number of years afterward, the Grand Canyon was known as "**Big Cañon**." In this publication, the Big Cañon term appears in quoted material only; otherwise, the canyon is referred to as Grand Canyon.*

The Little Colorado River was known to the Ives expedition interchangeably as the **Little Colorado River** and as **Flax River**. For the reason that the Little Colorado was unknowingly assigned to the true course of the Colorado River in the eastern part of the Grand Canyon, the name for the "Little Colorado River" is shown where necessary within quotation marks to confirm the misidentification when discussing the elements of a map detail.

Cataract Creek is still known by that name today in its upper reaches. Deeper into the physiographic Grand Canyon, from Havasu Springs to the Colorado River, it is known as Havasu Creek and its canyon as Havasu Canyon. The Ives expedition also occasionally referred to the unified Cataract Creek as Cascade Creek.

---

* For a historical review of the naming of Grand Canyon, see Earle E. Spamer, "Big Canyon, Great Canyon, Grand Canyon: The Mysterious Evolution of a Name" (*The Ol' Pioneer*, Journal of the Grand Canyon Historical Society, Vol. 33, no. 1 [Winter 2022], pp. 8-18); and Spamer, *Naming the Grand Canyon* (Raven's Perch Media, 2024, https://ravensperch.org/wp-content/uploads/2024/12/Naming-GC.pdf).

INTRODUCTION

PRUSSIAN BARON FRIEDRICH WILHELM VON EGLOFFSTEIN (1824–1885) accompanied the Colorado Exploring Expedition of 1857–1858 under the command of Lt. Joseph Christmas Ives, U.S. Army Corps of Topographical Engineers *(Chapter 1)*. In the first days of January 1858, at Fort Yuma, California, with many of the other expedition members he boarded the diminutive, purpose-built steamboat *Explorer* that had come upriver under the command of Lt. Ives and civilian Colorado River pilot Captain David C. Robinson—after the boat had been assembled on the Río Colorado delta in Mexico. (It had been shipped in pieces mostly by sea from Philadelphia.) Egloffstein would serve as the expedition's topographer, cartographer, and artist on the venture upstream thence overland on mules to Fort Defiance, New Mexico Territory. The land party got to the Grand Canyon twice; first on Peach Springs Wash and Diamond Creek, reaching the Colorado there, then at Cataract (Havasu) Creek where a small party, including Egloffstein, attempted but failed to reach the river again. They had also expected to occupy the confluence of the Little and main Colorados, believed to be downstream from Cataract Creek—and Ives even entertained the idea of going on to the confluence of the Green and Grand Rivers in Utah—but the landscape was uncompromising.

Egloffstein served in his topographical and artistic capacities for other western expeditions, both in the field and studio; he came onto Ives' venture with good credentials. He prepared two maps of the "Rio Colorado of the West" *(Chapter 2)*; of them, "Map No. 2" depicts—for the first time—the physiography of the entire Grand Canyon area. The technical means that he was still in the process of inventing to make these shaded relief maps has been widely acknowledged with approbation as the first example of its special form, but that is not the focus of this publication. Further, the genre of shaded relief in cartography falls into analysis in myriad philosophical and artistic studies on what constitutes "realism," usefully critical but also far beyond the scope of this publication.

This study examines the whole and details of the Grand Canyon map *(Chapter 3)*. It requires of us to appreciate the limits of visual observation that Egloffstein experienced during the land expedition *(Chapter 4)*, which necessarily requires inference on our part when analyzing the map. The study concludes with observations of possible influences on Egloffstein from the presentations on preexisting maps, and on the influences his map had on the work of later cartographers *(Chapter 5)*.

It will suffice to say at the outset that Egloffstein was trying to create a sense of ground truth—from high above. He explained,

> This method of representing topography is . . . truer to nature. It is an approximation to a bird's eye view, and is intelligible to every eye. [1]

Egloffstein's new method had less to do with how he surveyed in the field than with the final presentation through cartographical techniques in the studio. He was trying to create a better way to display three-dimensional relief in two dimensions; and at this his efforts were widely noticed.[2] It was a process of heliography, a general form of reproduction already known. But his method required sculpting in plaster, photography, and a novel method of screening and engraving to transfer the photograph onto a steel plate for printing. This involved a very fine etching in glass and materials handling in the studio, but the whole procedure regretfully has never been fully described. He himself had never concisely explained it, nor was any one of his shop hands privy to all the required steps.

The presentation, though, was not lost on future geographers. Three quarters of a century after Egloffstein, the U.S. Science Advisory Board affirmed, while decrying the intellectual state of American cartography in the 1930s,

> Map making is not only a science, it is a graphic art. It has indeed a somewhat unusual opportunity in joining art and science, an opportunity that we [today] have almost missed. There was a time when the Coast and Geodetic Survey engraved marvelously plastic hachure maps of the coast and cameo-like insets of coastal details, and when similar maps were made in connection with interior explorations, as for instance by Eglofstein [*sic*] on Lieutenant Ives's Colorado River survey. [3]

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[1] Egloffstein, apparently writing on behalf of Joseph C. Ives (*Report Upon the Colorado River of the West* [Washington, 1861], Appendix D [reproduced as **FIGURE 13** in *Chapter 2* herein]). While it reads that this is Ives' own explanation, the technicalities are explained in such a way that perhaps it is Egloffstein's own third-person contribution, written for Ives. It sounds like a promotional piece for Egloffstein's ongoing work toward economical heliography.

[2] See the section of the Appendix in the present publication, "Contemporary Notices Regarding Egloffstein's Maps."

[3] Carl O. Sauer, "Preliminary Report to the Land-Use Committee on Land Resource and Land Use in Relation to Public Policy," in *Report of the Science Advisory Board, July 31, 1933 to September 1, 1934* (Science Advisory Board, Washington, D.C., 1934), p. 179.

Despite his creative and successful methods of cartographical expression, Egloffstein has been chided not for errors of basic fieldwork, but for having had traced the Little Colorado River well into the Grand Canyon and for presenting topographic aberrations. Essentially, this is true, but the baron deserves neither ridicule nor dismissal. In the field he did misjudge that the canyon into which Cataract Creek (Havasu Canyon) debouches was the Little Colorado, and that the great Colorado arrived to the same area somehow from the northeast. But it must be added—since other writers seem not to have broadened the charge—that this was with the unstated corroboration of Lt. Ives and the expedition's geologist, John Strong Newberry. Yet by comparing the courses of the streams that he mapped to those on modern maps we see that he actually delineated them fairly well; they are only mislabeled or not labeled.

Reproval of the map has also attended to his detailing. But, as is shown in this study, only where necessary did Egloffstein contrive—reasonably—topographical associations on the broader landscape. Such were applied creatively to establish senses of realism rather than defaulting to blank spaces or simply making things up for the sake of filling in those spaces. This was amplified by the fact that he was not engraving these features reflexively in the studio, but first he sculpted the entire scene in relief in plaster. Intuitively this is a mind's eye process; it had to make sense even if we now understand it is not wholly ground-truthed. He might have been influenced by Lt. Ives' need to present a reliable map that would have uses for military planners, a map that would neither present reckless misinformation nor offer useless vacant landscapes.

The misconceptions presented on the Grand Canyon map are not due to a topographer's faulty observations while on the ground; they follow an obligatory mode of analysis after the fact, *de rigueur* in contemporary cartography, with which to infer areas that are neither closely examined nor understood from distant views of the landscape. In order to connect the Colorado and Little Colorado Rivers in their known courses in other regions to the reaches that he did see at the Grand Canyon, Egloffstein had to run them through areas that might also have been meagerly, perhaps unreliably, reported by travelers (mountain men, expedition guides, and transient visitors, all of whom are likely never to have written things down). In tracing these rivers through landscapes whose topographies were unknown, they must follow invented courses that would suggest, "here a river flows." Although his Grand Canyon map displays obvious inventions and thus errors, as is shown herein the baron still assimilated these areas without large errant excursions of stream courses.

Fatefully, the location of the true confluence of the Colorado and Little Colorado Rivers remained uncorroborated by the Ives expedition, but Egloffstein had to intimate its location. His distant views across the canyon and plateau from the south side were sometimes vague, but they had to be translated to the map. Thus, somewhere in the Grand Canyon the Little Colorado, well known to the southeast, had to meet up with the Colorado that was reasonably well known much farther north even though the confluence points of this and other major streams still were unknown.[4]

He thought the Colorado came in from the northeast, a perspective perhaps gleaned from the creative interpretations of some maps that already were in existence. And so the great canyon that he and others of the expedition glimpsed obliquely from the plateau must have been the Little Colorado arriving to meet the great Colorado. It was, as we know now, actually the main Colorado. Cataract Creek was flowing into his "Little Colorado," a confluence that he knew was very close by though the expedition failed to reach it. Thus, it stood to reason that, since they had already stood on the bank of the great Colorado at Diamond Creek, the confluence of the two Colorados had to be between the mouths of Diamond and Cataract Creeks. Ives and Newberry seemingly concurred, instigating derisive analyses of the map in later, well-mapped, decades.

Egloffstein detected what is the Parashant Wash tributary, too, somewhat misplaced on his map but nonetheless prominent. Its expressed topography seems to have been confused by having seen it while looking over what is known today as Granite Park, downstream from the true mouth of Parashant Wash. (Perhaps his own field notes were somehow mixed up.) Some later cartographers seized on this then-unnamed tributary as the proper incoming course of the Colorado, and, unable to ignore what Egloffstein had mapped, impulsively reinterpreted his unlabeled upper Colorado[5] as a short tributary to the "Little Colorado." Other cartographers, though, continued to accept his upper Colorado course as the *de facto* Colorado and so allowed it to be that river's proper course coming in from Utah along a direct southwesterly route. Cartographic ateliers capitalized on both alternatives in new and reworked maps of the Southwest and the nation as a whole, portraying a variety of

[4] Still wholly unknown also were the confluence points of the Grand and Green Rivers—where geographically began the Colorado River until the legislative renaming of the Grand in 1921—and the confluence of the San Juan River, although each of these rivers were well known in their courses farther upstream (and in the case of the Colorado, also its course downstream along the California–New Mexico Territory boundary and in Mexico).

[5] The term "upper Colorado" in the present publication refers to the implied upstream reach displayed on "Map No. 2," from the Utah boundary to the confluence with the assumed "Little Colorado River"; it does not refer to the modern identity of the Upper Colorado River Basin.

made-up courses for the Colorado and its major tributaries, and by extension providing for a variety of Grand Canyons that just were not so.[6]

No specific later criticism was made of these points, they having been normalized by a compliant nod to errant contemporary cartography. It was obvious what areas the baron had not seen. His critics (after the fact, in the twentieth century mostly) should have appreciated this before rebuking him for his Little Colorado and for imaginary topographies.

Egloffstein's map is as a whole more faithful to ground truth than some have declared. Its marvelously represented shaded topographic relief harbors reliable geography amidst imaginatively sculpted ideas for the unseen landscapes that nestled to the canyon. For example, as is shown herein, he may have modeled from other sources a vague understanding of the area now known as Lee's Ferry, where the Vermilion and Echo Cliffs converge, that had been visited by a Spanish explorational party in 1776 and (perhaps, without written record) by representatives of the roving mountain man era. He also may have been aware of intelligence from members of other explorations of his day whereby geographical observations of leaders and guides were added to expedition reports or conveyed through oral exchanges.

The dismissive opinions held by more modern map readers is with Egloffstein's Grand Canyon regional map ("Map No. 2"), not with the map that accurately plots the course, at a smaller scale, of the Colorado River that he surveyed during the upstream journey to Black Canyon ("Map No. 1"). The Grand Canyon map, which revealed the canyon's place in the world, unwittingly allowed for different solutions to the problem of the Colorado River's course coming into the area from the north.

"Map No. 2" contributed to the baron's progress toward the goal of producing a wholly new means of shaded-relief cartography. It was, however, a short-lived proprietary technique of heliography, one method that enabled the transfer of photographs to engraving plates. While Egloffstein was focused on cartography, the method had obvious ramifications for commercial reprography, too, with which his New York firms were also engaged. His private method, the processes of which have never been completely discovered, nonetheless was soon displaced by more economical, though in some ways less precise, photolithography. He did not envision that this carefully crafted map would be deconstructed to invent other cartographical landscapes.

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[6] A more specific, chorographical and illustrated study of the history of mapping the Colorado River is Earle E. Spamer, *The Colorado River of the West: Cartographic Styles of the 16th to 19th Centuries* (Raven's Perch Media, 2023, https://ravensperch.org/wp-content/uploads/2023/05/CRWest.pdf).

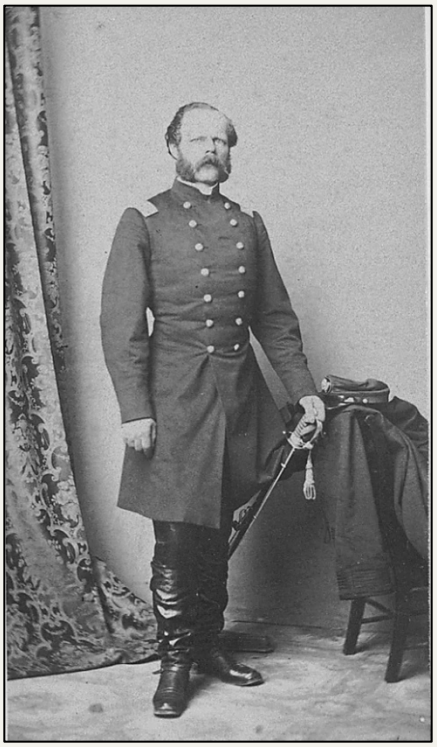
In studying "Map No. 2," a number of things become apparent. The modern stream courses, when superposed on Egloffstein's map, reveal that his overall delineation of the major streams and tributaries was remarkably accurate. There are deviations from his courses, but they are not geographically expansive nor do they wander far away before returning to satisfactory correlation. Only in the eastern and westernmost Grand Canyon is the disparate mapping of stream courses significant, and his generalized and largely formless landscape north of the canyon is inferred or supported by received information that was not especially dependable. The reasons for these fillings-in are understandable, as is advocated herein.

On close examination of map details, the arrangement of smaller tributary streams is mostly conceptual, not actually surveyed; collectively they provide only the idea of the regularity of tributaries to the main streams. The placement of these abstract streams was to represent the frequency of small tributaries met with on the expedition's traverse across the plateau. This device is effectively the same as are the presentations on older and contemporary maps of Egloffstein's time that display river courses with invented meanderings, which never could have been surveyed because no one had been on the ground to do so; they only provide ideas, suggestions that in those areas "a river flows here." On Egloffstein's Grand Canyon map, the methodology of abstract river courses is restricted to the eastern and western sections of the canyon.

The main focus of this study is on "Map No. 2," which embraces the region along the northern tier of New Mexico Territory spanning the area just west of the Colorado River to just east of Fort Defiance (on the present-day Arizona–New Mexico boundary) and from the Utah boundary on the north to the area south of the San Francisco Peaks and the confluence of the Puerco and Little Colorado Rivers. It locates and attempts to explain variances and minor features that appear on the map, accompanied by documentary evidence from the publications produced about the Ives expedition. Detailed views also help to illustrate specific activities and events of the land expedition.

The most prominent shortcomings of the baron's Grand Canyon map have been commented upon over the decades, but the map seems also to have been swept up in, if not swept aside by, judicious and capricious reviews alike of the starkly drawn landscape views he drew for Ives' *Report*. The aberrant scenic pictures can be explained as being a characteristic contemporary art style, but despite its peculiarities the map does not come under that demesne. It is a work of art in and of itself and is technically masterful even upon the very closest of observations. In depicting the greater Grand Canyon landscape from the "bird's eye view," it is remarkably accurate, imprecise only in some respects, integrating an

artist's judgmental discrimination to complete the view where ground visits were not possible. It seems unfair that Egloffstein should be depreciated for his artistic sculpturing of the map. After all, he had much experience in the field on other expeditions, drawing topography and scenery alike across mountains, canyons, and plains, and years of interpretive engraving and reproduction work in the studio to present those findings. He did not come to the Grand Canyon lacking experience; he knew what he was doing—but, like many of Grand Canyon's artists have experienced, he might have been intimidated by the subject in front of him. ◈



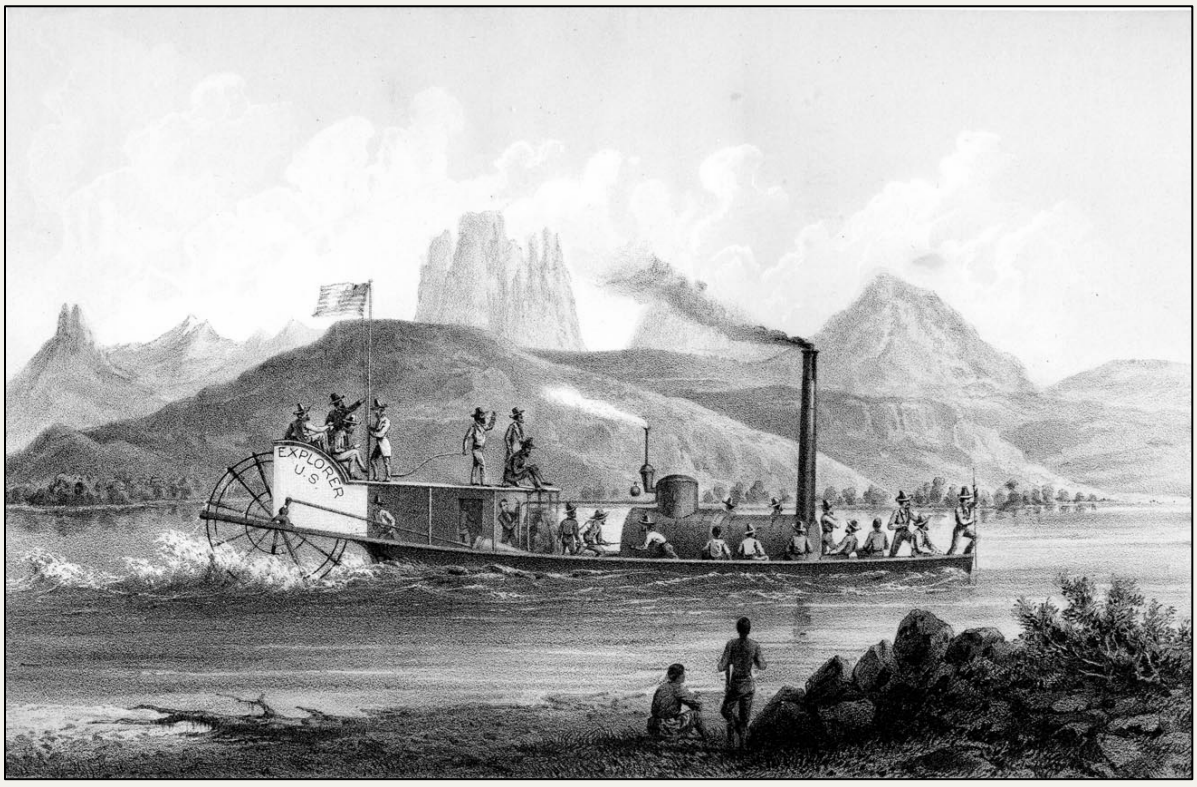
▶ **FIGURE 1. Friedrich Wilhelm von Egloffstein in colonel's uniform, 103rd New York Infantry, *ca.* 1861–1863.** Egloffstein was a civilian at the time of the Colorado Exploring Expedition. ◈

(Library of Congress, https://www.loc.gov/item/2024630246/; LOC square-bracketed description reads "[Brigadier General Frederick Wilhelm Von Egloffstein of 103rd New York Infantry Regiment in uniform with sword]"; verso of photo is annotated in pencil, "Baron Frederick W. Von Egloffstein Col. 103rd NY (Seward Infantry)" and signed (by him?) in ink, "Baron Egloffstein. Commanding 103d N.Y." He was breveted Brigadier General in 1865, hence the LOC's broader historical description.)

▼ **FIGURE 2. "Chimney Peak. J. J. Young, from a sketch by H. B. Mollhausen."** The Ives expedition aboard *Explorer* on the lower Colorado River.

(J. C. Ives, *Report Upon the Colorado River of the West* [Government Printing Office, Washington, 1861], frontispiece.) *

(American Philosophical Society; photo by the author)



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* The engraved depiction of *Explorer* is not as Balduin Möllhausen showed it in his original watercolor painting, which is in the Amon Carter Museum of American Art, Fort Worth, Texas (https://www.cartermuseum.org/collection/steamboat-explorer-chimney-peak-198811).
The lithographer, J. J. Young, took noticeable liberties in redrawing it. See a comparative examination on pp. 56-59 in Earle E. Spamer, *Explorer: Andrew J. Carroll on the Colorado River, 1857–1858* (Raven's Perch Media, 2022, https://ravensperch.org/wp-content/uploads/2022/11/EXPLORER.pdf). ◈

CHAPTER 1
F. W. von Egloffstein and the Ives Expedition

[FIGURES 1–9]

THE COLORADO EXPLORING EXPEDITION commanded by Lieutenant Joseph C. Ives is well known in the annals of the Southwest. Professional and accomplished avocational historians have for more than a century examined the purposes, experiences, and results of this passage up the Colorado River from the Gulf of California, thence overland across the northern tier of New Mexico Territory. It was the first time that the Grand Canyon was reached by a full-fledged exploring party, in April 1858, staffed with a geologist and two artists (one of whom was also the cartographer [**FIGURE 1**]).

They were not the first non-Natives to arrive at the canyon, coming after two known visitations, one more than three centuries earlier, the next some eight decades before Ives. These both were Spanish incursions—the major *entrada* under Francisco Vázquez de Coronado, who in 1540 sent a small unit off to find the Colorado River and found it, unexpectedly, in the Grand Canyon, and a missionary visit to the Havasupai by Franciscan friar Francisco Hermenegildo Tomás Garcés in 1776.

First reports about the Ives expedition were publicized while the party was still on the lower Colorado River downstream from the canyons (**FIGURE 2**),[7] and a well illustrated official report was published in 1861 (**FIGURE 3**).[8] It was that record that brought the canyon and its astonishing scenery to public awareness, mainly in America and Europe, even though the topographically and geologically most dramatic, "grandest," eastern part of the canyon was not seen.

The Ives report was, however, not exclusive, having been scooped by the better part of a year in the more personably engaging, though informal and modestly illustrated, two-volume narrative produced by expedition artist and naturalist's aide Balduin Möllhausen. But

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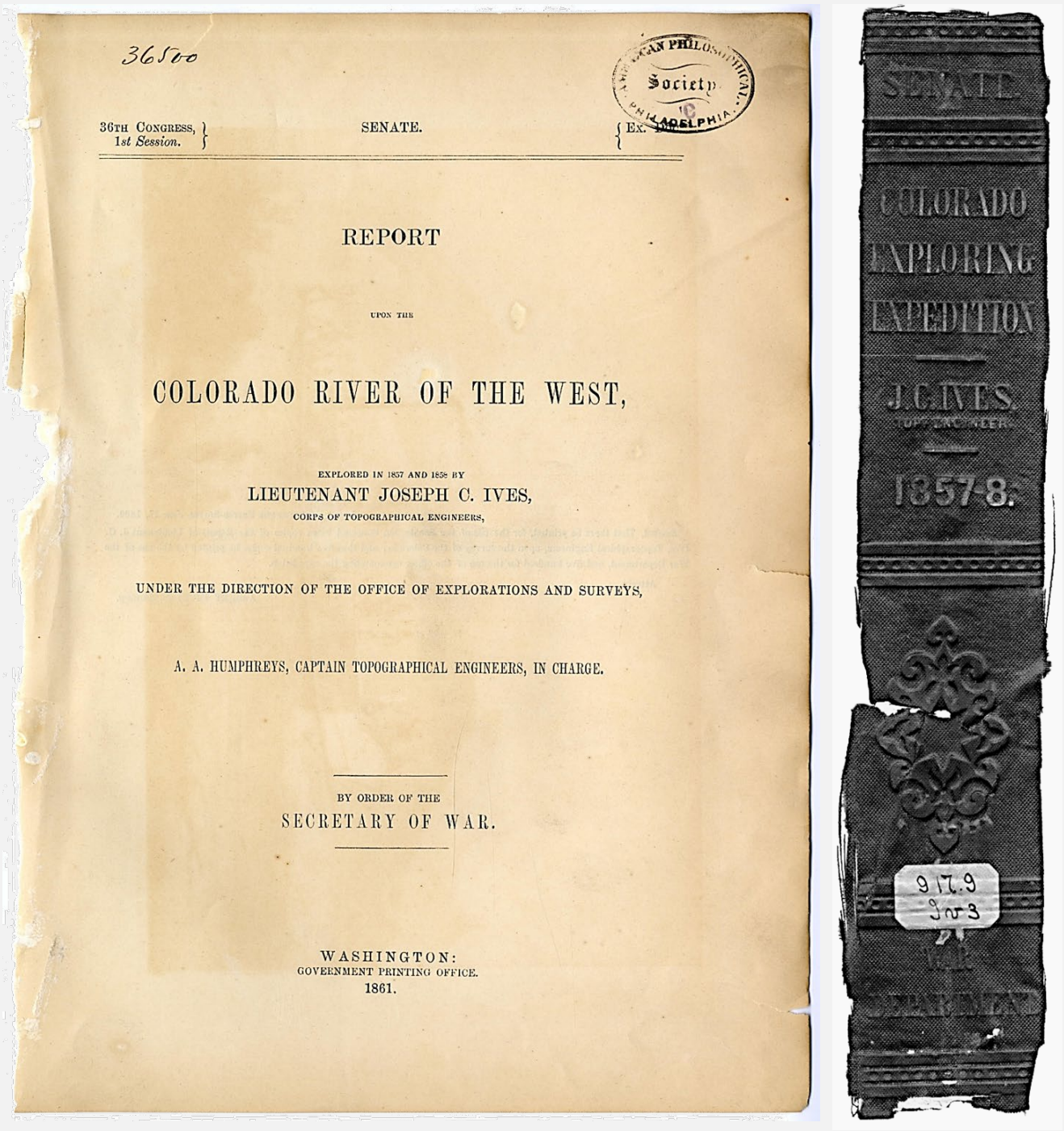
[7] See the Appendix herein, "Augmented Bibliography of the Ives Expedition from Contemporary Sources."

[8] Joseph C. Ives, *Report Upon the Colorado River of the West, Explored in 1857 and 1858 by Lieutenant Joseph C. Ives, Corps of Topographical Engineers, Under the Direction of the Office of Explorations and Surveys, A. A. Humphreys, Captain Topographical Engineers, in Charge. By order of the Secretary of War* (Government Printing Office, Washington, 1861; U.S. 30th Congress, 1st Session, House Executive Document 90 [concurrently produced as a scarcer unnumbered Senate Executive Document], 5 separately paginated parts and four appendices in one volume with two maps accompanying the House version and four maps with the Senate version.



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36TH CONGRESS, 1st Session. } SENATE. { EX.

REPORT

UPON THE

COLORADO RIVER OF THE WEST,

EXPLORED IN 1857 AND 1858 BY

LIEUTENANT JOSEPH C. IVES,

CORPS OF TOPOGRAPHICAL ENGINEERS,

UNDER THE DIRECTION OF THE OFFICE OF EXPLORATIONS AND SURVEYS,

A. A. HUMPHREYS, CAPTAIN TOPOGRAPHICAL ENGINEERS, IN CHARGE.

BY ORDER OF THE

SECRETARY OF WAR.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1861.

SENATE.

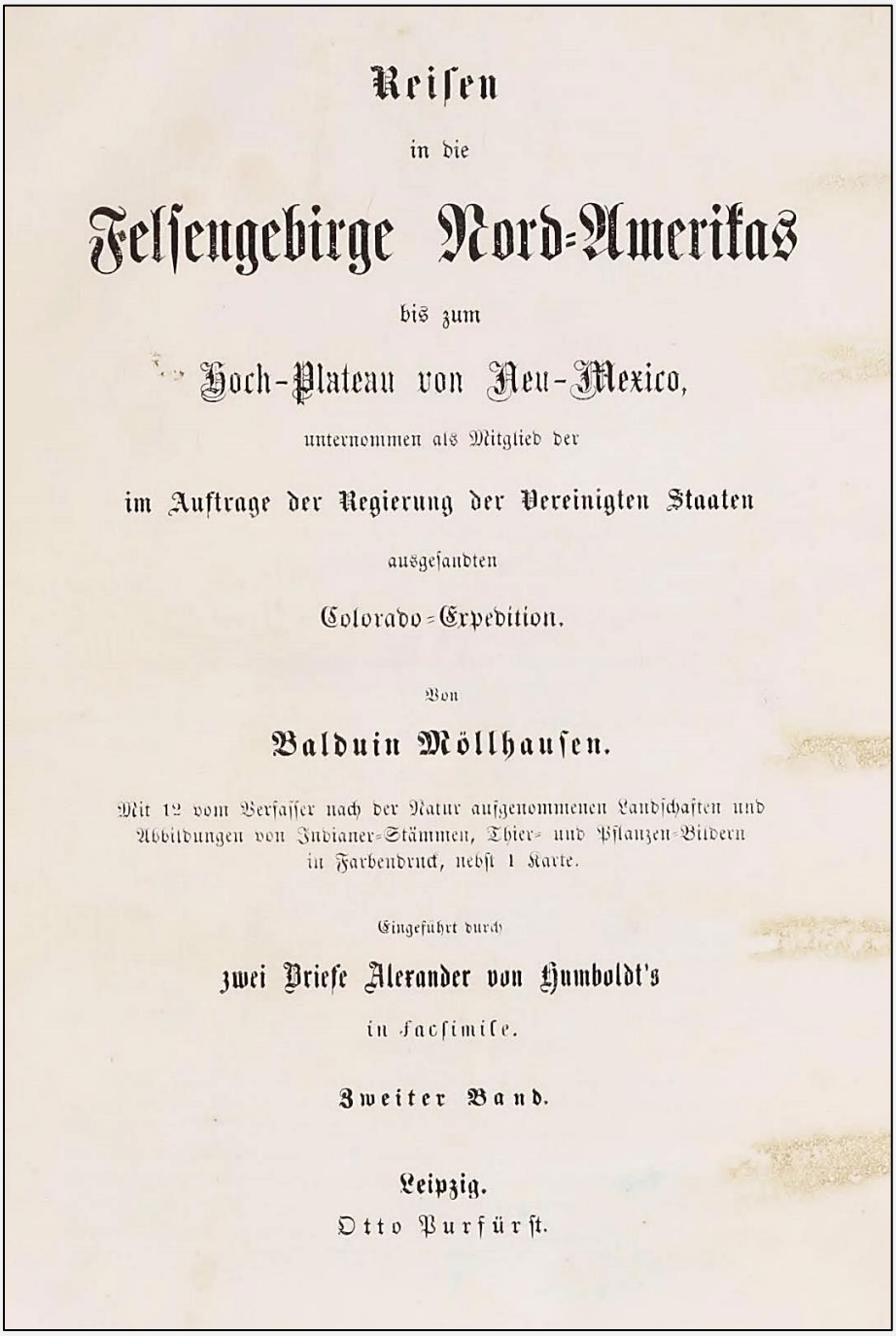
COLORADO EXPLORING EXPEDITION

J.C.IVES.

1857-8.

FIGURE 3. Title page and embossed spine of an often-consulted copy of the scarce Senate Executive Document variant of Joseph C. Ives' *Report Upon the Colorado River of the West*, a presentation copy from the expedition geologist, John Strong Newberry. The House and Senate variants both included the two maps that are the focus of the present publication, but the Senate variant added two color washed geological maps by Newberry, the base maps for which were Egloffstein's shaded relief maps. ◈

(American Philosophical Society Library, call no. 917.9 Iv3; photos by the author)



Reiſen

in die

Felſengebirge Nord-Amerikas

bis zum

Hoch-Plateau von Neu-Mexico,

unternommen als Mitglied der

im Auftrage der Regierung der Vereinigten Staaten

ausgeſandten

Colorado-Expedition.

Von

Balduin Möllhauſen.

Mit 12 vom Verfaſſer nach der Natur aufgenommenen Landſchaften und Abbildungen von Indianer-Stämmen, Thier- und Pflanzen-Bildern in Farbendruck, nebſt 1 Karte.

Eingeführt durch

zwei Briefe Alexander von Humboldt's

in Facſimile.

Zweiter Band.

Leipzig.

Otto Purfürſt.

FIGURE 4. Title-page of Volume 2 of Balduin Möllhausen's *Reisen in die Felsengebirge Nord-Americas* (the undated [1860] Otto Purfürst imprint, published months in advance of Lt. Ives' official *Report*). This volume begins with the start of the Ives expedition's land excursion from the Colorado River to the Grand Canyon. Although Möllhausen's two-volume *Reisen* has never been wholly translated and published in English, the first several chapters of this volume have been translated and published in Earle E. Spamer (ed.), *Balduin Möllhausen's Grand Canyon* (Raven's Perch Media, 2022, https://ravensperch.org/wp-content/uploads/2022/10/MOLLHAUSEN_.pdf). ◈

(Linda Hall Library of Science, Engineering & Technology)

having been published in German in Leipzig it was not known to most American readers; in fact, it still has not been wholly translated into English [**FIGURE 4**].[9]

This publication does not revisit the exploits of the Ives expedition; there is a great body of literature that follows it. Even the literature that is devoted to the illustrations in Ives' *Report* grows, and occasional references are made herein to them. Instead, the focus of this publication is on the baron, Friedrich Wilhelm von Egloffstein (baptized Friedrich Ernst Sigismund Kamill von Egloffstein, who adopted the name Wilhelm and the Anglicized Frederick). More particularly, this work reexamines his map of the Grand Canyon and the influence it had on cartographers and cartographical ateliers.

Egloffstein[10] was a German noble born in 1824 in Altdorf, Nürnbergerland, Bavaria, who entered the Prussian military where his basic training prepared him for surveying, mapping, and drawing, and later served in a forestry position in the court of the prince of Baden. Resigning his commissions, aged 22, he emigrated to the United States in 1846 where he devoted the better part of his adult life to occupations as a surveyor, an artist and topographer on field expeditions in the American West, and a cartographer, engraver, and inventor in engraving and lithography. Following on his military education and service, at the start of the Civil War he was elected by his troops as Colonel of a unit of New York City German- and American-born volunteers, in which capacity he served during 1861–1863. Badly wounded in his leg when his horse was shot from under him in 1862, he never returned to the battlefield and as an invalid was eventually convinced to resign his command, but was

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[9] Balduin Möllhausen, *Reisen in die Felsengebirge Nord-Amerikas bis zum Hoch-Plateau von Neu-Mexico, unternommen als Mitglied der im Auftrage der Regierung der Vereinigten Staaten ausgesandten Colorado-Expedition* ['Travels into the Rocky Mountains of North America to the High Plateau of New Mexico, undertaken as a member of the Colorado Expedition sent on behalf of the United States government'] (Otto Purfürst, Leipzig, no date [1860], 2 volumes; and Hermann Costenoble, Leipzig, 1861, 2 volumes). Regarding the two imprints, apparently coordinated by the Costenoble firm, see Earle E. Spamer, *The Leipzig Imprints of Balduin Möllhausen's* Reisen in die Felsengebirge Nord-Amerikas bis zum Hoch-Plateau von Neu-Mexico *(1860, 1861): Bibliographical Notes* (Raven's Perch Media, 2022, https://ravensperch.org/wp-content/uploads/2022/11/Mollhausen_Reisen_notes.pdf). Neither firm had previously published Möllhausen's writings, and in fact the Purfürst firm had only just come into existence (Deutsche Nationalbibliothek, https://www.dnb.de/). Costenoble produced the more handsomely bound edition.

[10] For a biography of Egloffstein's early life and American engagements, as well as his concluding years, see Steven Rowan, *The Baron in the Grand Canyon: Friedrich Wilhelm von Egloffstein in the West* (University of Missouri Press, Columbia and London [U.K.], 2012). Also see retrospective contemporary acknowledgments by S. H. Horgan, "The Father of Half-Tone," *The Inland Printer*," Vol. 13, no. 6 (September 1894), pp. 526-527; Anonymous, "The Father of Half-Tone," *Anthony's Photographic Bulletin*, Vol. 26, no. 4 (April 1, 1895), pp. 136-138; and William Gamble, "The History of the Half-Tone Dot," *The Photographic Journal* (London), new series, Vol. 21, no. 6 (February 1897); and a more modern perspective by David A. Hanson, "Baron Frederick Wilhelm von Egloffstein: Inventor of the First Commercial Halftone Process in America," *Printing History*, Vol. 15, no. 1 (1993), pp. 12-24.

breveted Brigadier General in 1865. He was not a naturalized citizen of the U.S. and, after managing his own engraving and reproduction business in New York, eventually returned to Germany with his wife, Irmgard (*née* von Kiesenwetter), and their surviving American-born children.

Before the war Egloffstein was attached to several exploring expeditions in the American West as topographer, cartographer, and artist, culminating with the Ives expedition. Before and afterward, principally in Washington, Philadelphia, and New York, he produced scenic illustrations and maps for expedition reports, notably those led by John Charles Frémont (the Pathfinder's last expedition), John Williams Gunnison (and Edward Beckwith, after Gunnison's death in the field), and the monumental series of *Pacific Railroad Reports*, although he had not accompanied all of the expeditions for which he engraved maps.

In terms of technological proficiency, the baron is more widely remembered for his work through "The Geographical Institute," his New York-based engraving business, and later as Superintendent (owner) of the Heliographic Engraving Company. He pioneered a novel means of topographic expression for maps and created new methods of reproduction for illustrations, including his signature halftone process that used photography and very-fine–ruled etched glass screens (200 lines per inch). (As businesses, more routine commercial reproduction jobs were turned out, too.) For the topographical elements of maps, he devised a method that combined photography of plaster models and the fine ruling, together with some kind of control of acid bathing, to create beautifully informative shaded relief in a fashion different from the usual hachuring employed by cartographers and engravers. But due to his proprietary secrecy in his engraving firm—going so far as to assign specific activities to different individuals in different rooms of the shop, with orders not to interact—the techniques of his improvements were forgotten after his departure from America. His declining health, as a likely result of his wartime injury, precluded continuing his work in Germany to where he had returned in 1878, and died in Dresden in 1885. But it had been during his time as a government-expedition engraver and illustrator that he developed and experimented with his techniques, the results of which brilliantly survive in the expedition reports. The Ives expedition maps were part of the experimental phase. While Egloffstein's career in the exacting technologies of engraving and reproduction is altogether a separately fascinating topic, it is far too expansive and out of scope to be addressed here.

As mentioned, historians and general writers of history have observed some of Egloffstein's topographical mapping disapprovingly; again, not for the method but for his interpretations. He is, however, more widely disparaged for the scenic illustrations he prepared for Lt. Ives' 1861 *Report*; and it is for these, more so than his Grand Canyon map, that he is

unfortunately better remembered in the history of the West.[11] The views are, admittedly, gothic if not ghastly unrealistic perspectives of the lower Colorado River canyons and the Grand Canyon in the areas between Diamond Creek and Cataract Creek (Havasu Canyon) (**FIGURES 5a, 7**). Over the decades, the terminology used to describe the images ranges from puzzlement to supercilious hilarity. The exemplary 180° panoramic views that he had prepared for the reports of earlier western expeditions are wanting in the Ives report. The panoramas that do appear in it are only unfinished and weirdly perceived camera lucida sketches, really mnemonic aids for preparing splendid scenes that never came (**FIGURE 5**), though recent research shows that two of them were actually intended for a different expedition report (**FIGURE 8**).[12] Regretfully, those two were supposed to illustrate the Grand Canyon, so we are left with but one that depicts the canyon.

Why Ives even admitted the peculiarly un-Grand Canyon–like illustrations into his report—knowing full well what the canyon looks like—is easily explained for the reason that his attentions were drawn to other duties in Washington (the erection of the Washington Monument, principally) and for the fact that he very soon afterward defected from the Union army to the cause of the southern Confederate States. The *Report*, already written and sent to the Government Printing Office in 1860, was no longer a matter of immediate relevance, the illustrations necessarily now someone else's worry. It is a wonder that, especially given his defection, that the volume under his by-line was published at all—except that Congress had already funded it, that the illustrations were already cut or lithographed, that the nation was increasingly distracted by more pressing concerns of the nascent civil war, and that the government had not yet suspended preexisting projects for the war effort. It also was an unstated important contribution to the geography and military logistics of the Southwest, the expedition having been fielded at the time of the so-called Mormon War, the period of unrest between the Federal government and the Mormon government in Utah. The information gathered into the *Report*, as well as Egloffstein's maps, would have been valuable

(Text continues on p. 20)

[11] Even the Chief of the Map Division of the New York Public Library digressed in a brief piece that noted only Egloffstein's "Map No. 1" (the lower Colorado River, which unlike his "Map No. 2" with Grand Canyon is not very fanciful) and then focused distractedly on the peculiar scenic engravings and the story of the topographer's unexpected adventure in Havasu Canyon (mentioned separately in the present publication) (Alice Hudson, "Joseph Ives' Exploration of the Grand Canyon; von Egloffstein's Fanciful Colorado River," *in* Paul E. Cohen, *Mapping the West: America's Westward Movement, 1524-1890* [Rizzoli International Publications, New York], pp. 176-179). See also John B. Krygier, "Envisioning the American West: Maps, the Representational Barrage of 19th Century Expedition Reports, and the Production of Scientific Knowledge," *Cartography and GIS*, Vol. 24, no. 1 (1997), pp. 27-50, and his 1990 thesis also cited herein.

[12] Some of the Egloffstein images in the Ives report were published there in error, actually portraying Black Canyon in the state of Colorado. See Jeremy Miller and Lena Herzog, "The Long Draw," *Harper's Magazine*, Vol. 324, no. 1940 (January 2012), pp. 50-59, for substantiating data and comparative photography. See also David Miller, "Baron von Egloffstein and the First Published Images of Grand Canyon," in *A Rendezvous of Grand Canyon Historians* (Grand Canyon Historical Society, 2013).

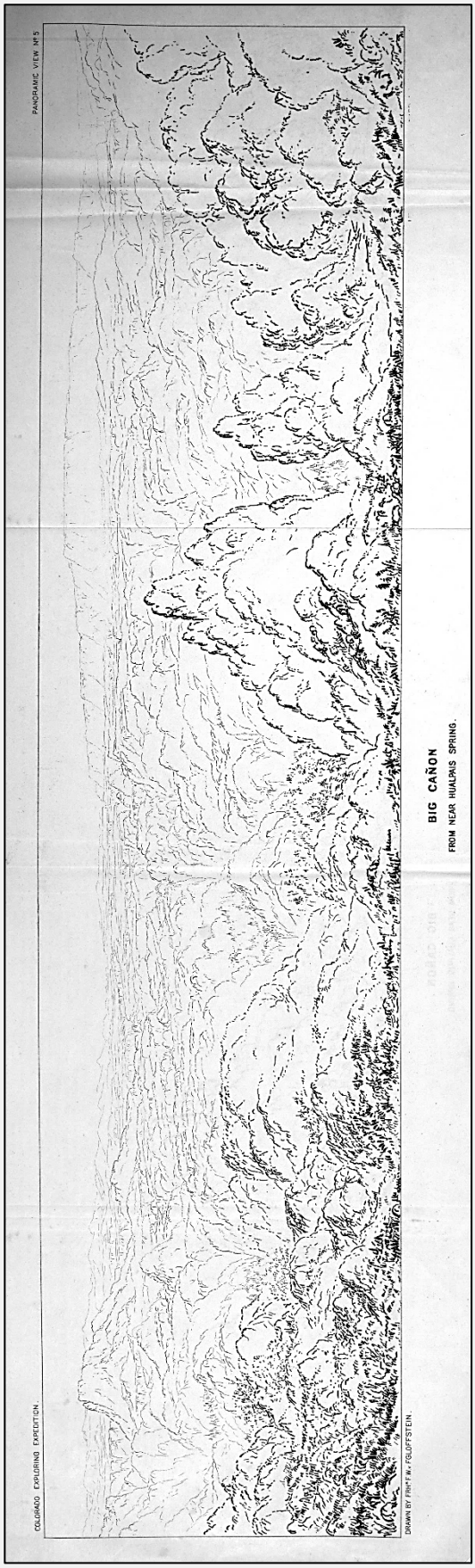
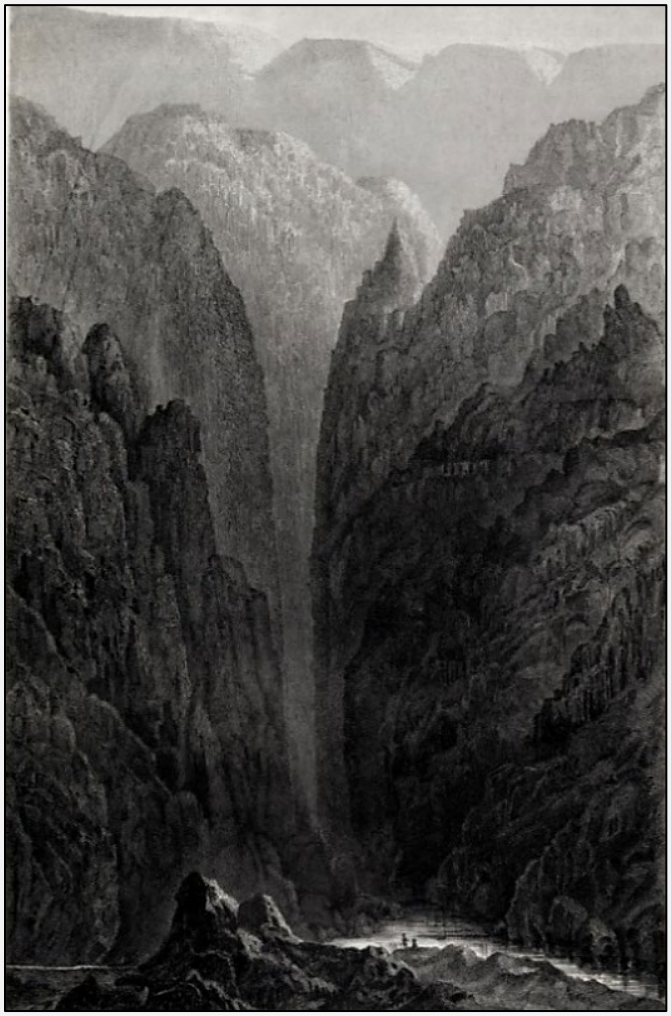


FIGURE 5. Panoramic View No. 5, "Big Cañon from Near Hualpais Spring. Drawn by Freihr. F. W. v. Egloffstein." A camera lucida sketch in the vicinity of today's Peach Springs, Arizona. Of the three panoramas that are labeled "Big Cañon," two have been shown to have been published in Ives' *Report* by mistake (see FIGURE 8). ◈

(Author's collection.)



◀ **FIGURE 5a. "Big Cañon at Mouth of Diamond River; J. J. Young, from a sketch by F. W. Egloffstein."** (General Plate 6 *in* J. C. Ives' "General Report.") This is a downstream view of the Colorado River corridor from an elevation upstream from the mouth of Diamond Creek. It is not among the images questioned as mistakenly published in Ives' *Report*. Despite the exaggerated somberness of the scene, the general appearance recognizes the downstream form of the canyon and Diamond Creek entering from the left. The Colorado's course does indeed turn to the left below Diamond Creek Rapid, then a mile farther turns sharply to the right as betrayed by the alignment of the distant canyon wall (compare **FIGURE 5b** *below*). That those walls do not show stratification in Egloffstein's image resembles the style of other contemporary illustrations, and the lowest rock unit, to river level, is in fact unstratified, artistically homogeneous metamorphic rock. ◈

(American Philosophical Society, photo by the author)

▼ **FIGURE 5b. The Colorado River corridor as viewed from the river, approaching Diamond Creek.**
The squared white spot partially seen at *lower left* is part of a truck on the beach there, a location where some boating trips leave the canyon and where the Hualapai Tribe begins its own downstream commercial boating trips. The left bank is Hualapai tribal land. ◈

(Author's photo, 15 July 1995)

Matching photographic views facing downcanyon and upcanyon at the Diamond Creek confluence, made in 1990, also appear on p. 208 of Ben W. Huseman, *Wild River, Timeless Canyons: Balduin Möllhausen's Watercolors of the Colorado* (Amon Carter Museum, Fort Worth, Texas, 1995).

FIGURE 6. "Der Rio Colorado nahe der Mündung des Diamant-Baches" [The Rio Colorado near the Mouth of Diamond Creek]**.**

Chromolithograph by A. Edelmann (from original artwork by Balduin Möllhausen) of the view *upstream* from below the mouth of Diamond Creek. This is also the first-ever published illustration of a Grand Canyon rapid. From this perspective, the river corridor does curve to the right, as shown, about a half mile upstream. (Möllhausen, *Reisen*, Vol. 2, facing p. 55; and reprinted in Spamer, *Balduin Möllhausen's Grand Canyon*, p. 39.) ◈ *(Linda Hall Library of Science, Engineering & Technology)*

Compare this to Möllhausen's original watercolor painting in the Amon Carter Museum, digitized online at https://www.cartermuseum.org/collection/mouth-diamond-creek-colorado-river-view-south-1988136. Its depiction of the rapid is more realistic, and the artist did not depict the campfire scene. Further, the view is not south as indicated by the Amon Carter Museum but northeastward.

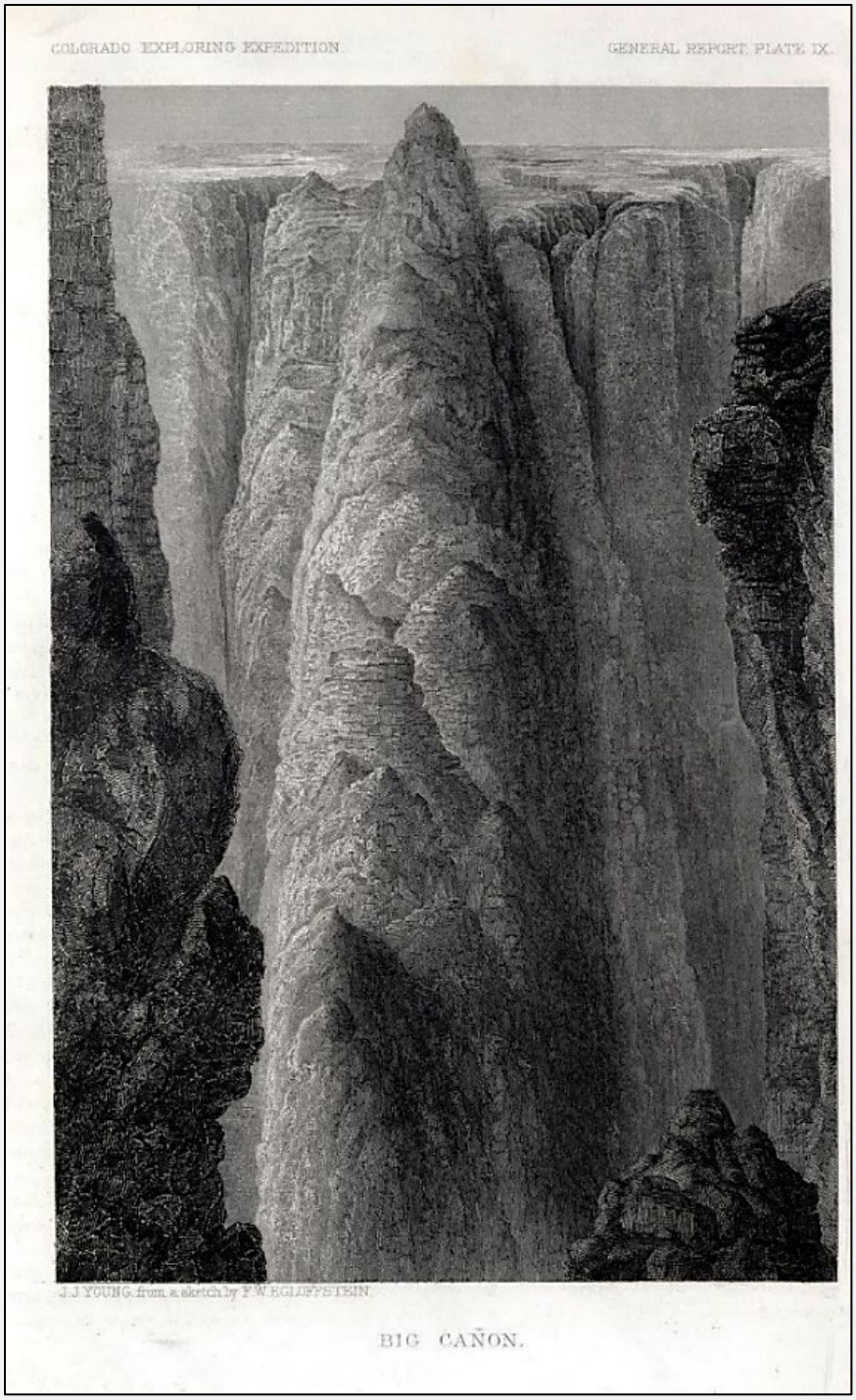


FIGURE 7. "Big Cañon; J. J. Young, from a sketch by F. W. Egloffstein." (General Plate 9 *in* J. C. Ives' "General Report.") This is probably the most startling of Egloffstein's "Grand Canyon" views. The recent research by Miller and Herzog, documented photographically, demonstrates that this and another plate, and two panoramic views (**FIGURE 8**), were published in Ives' report by accident. They portray views of the Black Canyon of the Gunnison River, in the state of Colorado, though for a century and a half have represented fantastical presentations of Grand Canyon's scenery. ◈

(American Philosophical Society; photo by the author)

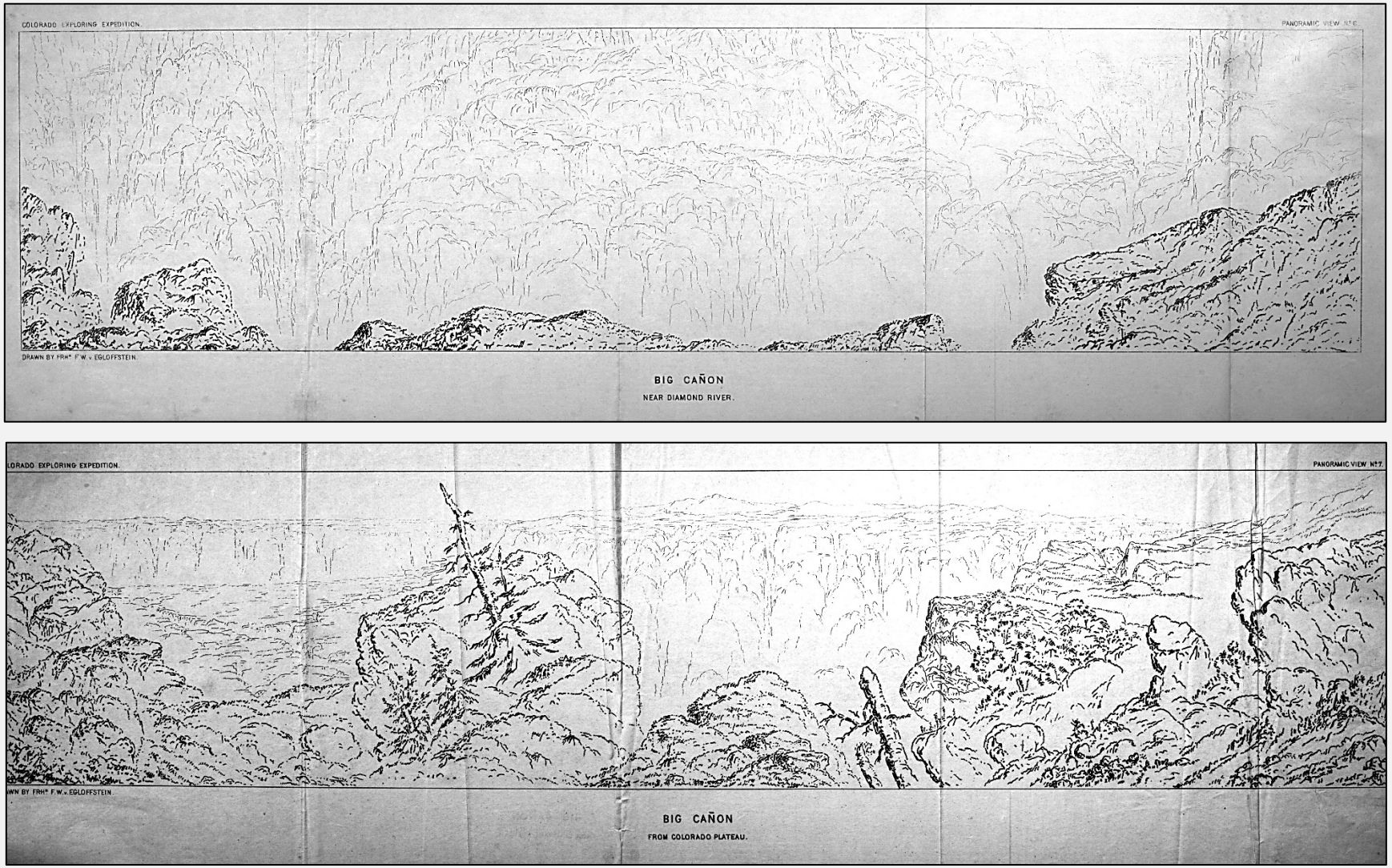


FIGURE 8. Panoramic views from Ives' *Report*, drawn by Egloffstein and only reproducing camera obscura sketches, which have been shown by more recent research, documented photographically, to in fact portray scenes in the Black Canyon of the Gunnison River in the state of Colorado. *(**TOP**:* **Panoramic View No. 6, "Big Cañon near Diamond River. Drawn by Freihr. F. W. v. Egloffstein."** ***BOTTOM*: Panoramic View No. 7, "Big Cañon from Colorado Plateau. Drawn by Freihr. F. W. v. Egloffstein."**) ◈

(Author's collection.)

resources had the Federal government found it necessary to move troops and supplies closer to the interior by first ascending the river.[13] If this was a map intended for potential use by military planners, it had to include subjectively presented information, as is discussed further herein. Blank areas would have been strikingly deficient intelligence. The implied topographies of the unsurveyed regions, and the lining-in of the Little Colorado and Colorado rivers onto the Grand Canyon landscape through unsurveyed areas offered cautious geographic information. Unlike the reckless certainty of stream courses and topographies such as some cartographers might express in the absence of data, Egloffstein's sculptured landforms in these poorly seen areas are subdued. This filling-in may have been expected, if not dictated, by expedition commander Ives.

Parenthetically, it is important to acknowledge Balduin Möllhausen, a Prussian adventurer, artist and writer. He traveled widely in the American West, including two government expeditions—an 1854 survey under Lt. Amiel Weeks Whipple (Lt. Ives also accompanied Whipple) that passed westbound on the route that the Ives land party would partly follow eastbound; and his last expedition, with Ives on the Colorado River. His artistic contributions to Ives' *Report* are renowned. The most comprehensive accounting of his original artwork from that expedition, many pieces of which are now in The Amon Carter Museum of American Art, is that of Ben W. Huseman.[14]

In addition to the Whipple expedition of 1854 that was surveying the 35th parallel route for the proposed railroad to the Pacific,[15] two other expeditions passed through the area south the Grand Canyon around the same time. The first was the exploration under the command of Lt. Lorenzo Sitgreaves, which was charged in 1851 with following the courses

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[13] William P. MacKinnon, ed., *At Sword's Point, Part 2, A Documentary History of the Utah War, 1858-1859* (Norman, Oklahoma, 2016), Chapter 4, "'A Channel of Communication with Utah': Rio Colorado." Although Ives' *Report* contains no particulars pertaining to his orders, military correspondence preserves that information, and Möllhausen's *Reisen* comments on meeting Mormon scouts during the latter part of the river expedition and other news of concerned unrest among locals, Indigenous and American both.

[14] Ben W. Huseman, *Wild River, Timeless Canyons: Balduin Möllhausen's Watercolors of the Colorado* (The Amon Carter Museum of American Art, Fort Worth, Texas, 1995). (The extant watercolors are all reproduced, with an extended narrative; and some graphite sketches made by Möllhausen during the expedition, still in family hands, are published. The end papers in the Huseman volume depict part of Egloffstein's "Map No. 2," but the text only briefly mentions the maps, principally quoting from Ives' Appendix D [about which see *Chapter 2* in the present publication]. See the complete collection of watercolors online at https://www.cartermuseum.org/carter-collection/?art=1&archive=0&keys=Heinrich%20Balduin%20M%C3%B6llhausen.)

[15] A. W. Whipple, "Report of Explorations for a Railway Route, Near the Thirty-fifth Parallel of North Latitude, from the Mississippi River to the Pacific Ocean," in *Reports of Explorations and Surveys, to Ascertain the Most Practicable and Economic Route for a Railroad from the Mississippi River to the Pacific Ocean* (A. O. P. Nicholson, Printer, Washington, 1856; U.S. 33rd Congress, 2nd Session, House Executive Document 91.)

of the Zuñi and Little Colorado Rivers to the confluence of the Colorado. By the time they had reached the San Francisco Peaks, the expedition's supplies and the condition of the animals were diminishing, and at the advice of their guide, the group turned away from the Little Colorado River and so abandoned the bid to reach its confluence with the Colorado River. (It is unlikely they would have reached the confluence with the pack train, given the nature of the Little Colorado River gorge that the guide apparently knew about, though it is unclear whether he had actually been there.) They headed more or less straight westward on a journey of some 200 miles across the plateau south of the Grand Canyon, passing between the 35th and 36th parallels of north latitude, so as to drop into known territory in the lower Colorado River valley downstream from the canyons.[16]

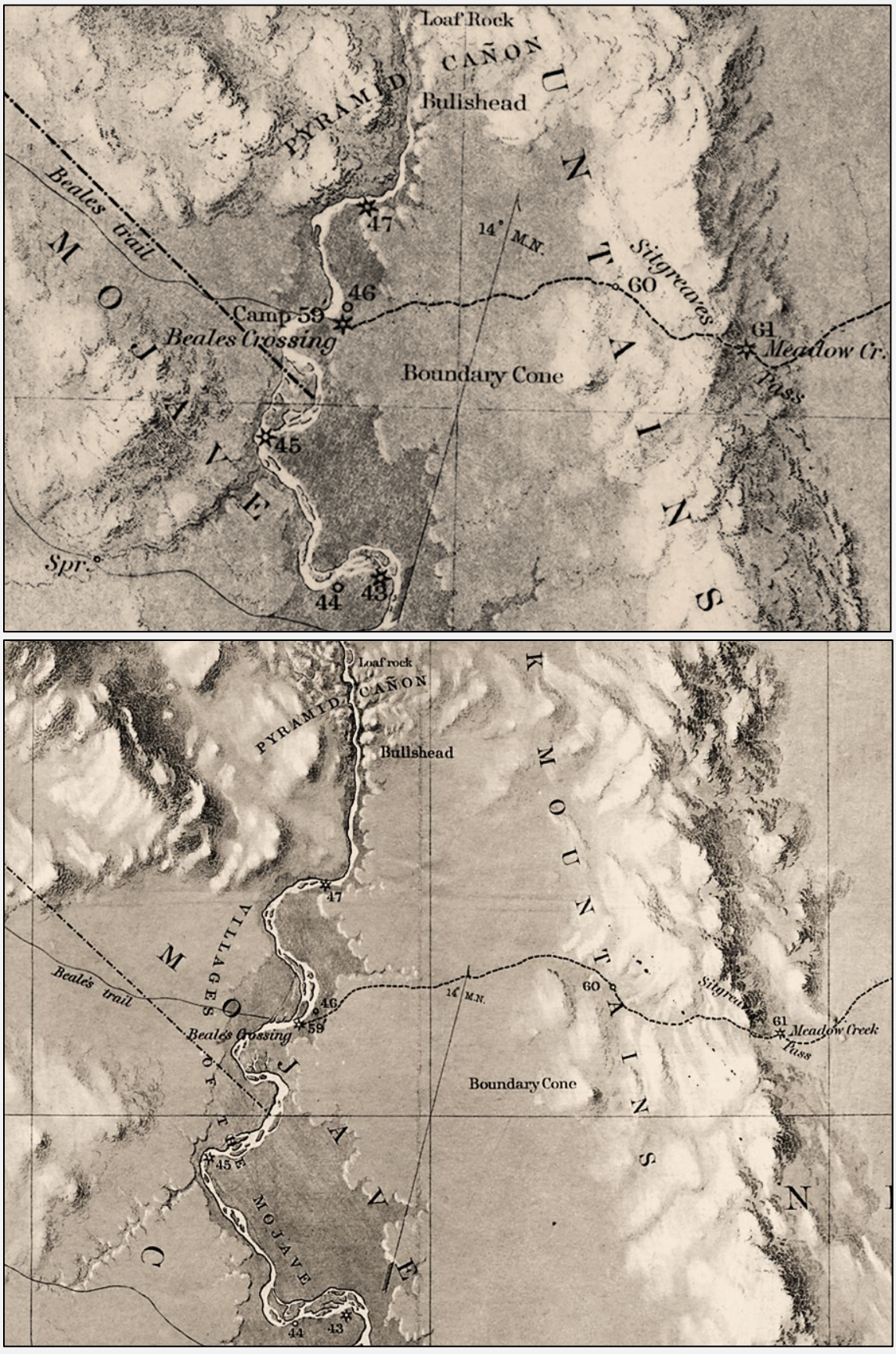
The second expedition passed through shortly before the Ives expedition, in 1857–1858. Under the command of Edward Fitzgerald Beale, formerly a lieutenant in the U.S. Navy, the expedition roughly laid out a wagon road from Fort Smith, Arkansas, to Los Angeles, California.[17] That route passed through Fort Defiance in New Mexico Territory and proceeded westward generally along the 35th parallel and the Whipple route to the Colorado River. There they crossed at what later was called Beale's Crossing, the site from which the Ives expedition's land excursion departed after running farther upriver to Black Canyon (**FIGURE 9**).

(Text continues on p. 24)

[16] L. Sitgreaves, *Report of an Expedition Down the Zuñi and Colorado Rivers* (Robert Armstrong, Public Printer, Washington, 1853; 32nd Congress, 2nd Session, Senate Executive Document 59). East of the San Francisco Peaks near Grand Falls along the Little Colorado River, Sitgreaves noted on October 8 (pp. 8-9): "Having been informed by my guide [Antoine Leroux] and other experienced trappers that this cañon extends down the river to its junction with the Colorado, and the great cañon through which the latter flows, I regarded the attempt to follow the river to its mouth as too hazardous, considering the condition of the animals and the state of the supplies, and therefore, by the advice of the guide, turned off towards the mountains, with the purpose of striking the Colorado below the great cañon, and then exploring it upward as far as might be found practicable."

Although the Grand Canyon was no longer an objective of the Sitgreaves expedition, it was while they were passing around the north side of the San Francisco Peaks that the artist, Richard H. Kern and topographer, with the physician Samuel Washington Woodhouse, ascended to a higher elevation and there witnessed the North Rim of the canyon on the horizon. Kern illustrated that view, which appeared on one of the plates in Sitgreaves' 1853 expedition report. This is illustrated with additional notes in Earle Spamer, "Once Again, 'Who Named the Grand Canyon?'—and Other Obscure Grand Canyon 'Firsts'," *The Ol' Pioneer* (Grand Canyon Historical Society), Vol. 24, no. 2 (Spring 2013), pp. 6-7; and Spamer, *Art of the Grand Canyon: An Introduction and Annotated Bibliography* (Raven's Perch Media, 2023, https://ravensperch.org/wp-content/uploads/2023/05/Artwork.pdf), pp. 10-11. See also **FIGURE 47** in *Chapter 4*.

[17] Edward F. Beale, *Wagon Road from Fort Defiance to the Colorado River. Letter from the Secretary of War, Transmitting the Report of the Superintendent of the Wagon Road from Fort Defiance to the Colorado River* (U.S. 35th Congress, 1st Session, House of Representatives Executive Document 124, 1858). Famously, this expedition added camels brought with handlers from the Mid-East in an experiment to see if they were suitable for such travels and burden bearing in the Southwest.


Loaf Rock
CAÑON
PYRAMID
Bulishead
Beales trail
MOJAVE
47
14° M.N.
MOUNTAINS
Sitgreaves
60
46
Camp 59
Beales Crossing
61
Meadow Cr.
Pass
Boundary Cone
45
Spr.
44
43
Loaf rock
CAÑON
PYRAMID
Bullishead
MOUNTAINS
VILLAGES OF THE MOJAVE
47
Beales trail
14° M.N.
60
Sitgreaves
46
59
Beales Crossing
61
Meadow Creek
Pass
Boundary Cone
45
44
43

◀ **FIGURE 9. Comparison of mapping and shaded relief at two scales, the variances between which establish that there were different plaster models. Illustrated is the "Beales Crossing" area as seen on Map Nos. 1 and 2. (Black Mountains at right.)**

(top) "Map No. 2" (the Grand Canyon map), scale 1:760,320, or 12 miles to the inch on the original sheet

(bottom) "Map No. 1" (lower Colorado map), scale 1:380,160, or 6 miles to the inch on the original sheet

These details illustrate the remarkable abilities of topographer F. W. von Egloffstein not only in the mapping of the expedition's routes and surrounding landscapes, but in creating the shaded relief maps at different scales. Only minor differences in topographic expression may be noted.

The area shown here focuses on Beale's Crossing on the Colorado River, where, shortly before the Ives expedition reached that point, the expedition of Edward Fitzgerald Beale, laying out the route of a wagon road from Fort Smith, Arkansas, to Los Angeles, California, had crossed the river (with a camel caravan, famously*).

After the Ives expedition in the small steamer *Explorer* had ascertained the river's head of navigation farther upstream—where upon entering Black Canyon it crashed into a submerged boulder ("Explorers Rock") necessitating repairs to the boat—the party returned downstream to Beale's Crossing to begin the land expedition to the Grand Canyon and Fort Defiance. At the crossing they were met by a mule train of some hundred and fifty animals that were driven up from Fort Yuma though the herd had first been brought there from the West Coast. The boat's crew returned *Explorer* to Fort Yuma with soldiers not needed for the venture on land.

Numerals indicate the sequentially numbered campsites of the expedition; first upstream on the Colorado, then eastward on land, thus Beale's Crossing has two numbers, 46 and 59. Those that are starred indicate stations where astronomical measurements were obtained in order to fix latitude and estimate longitude.

The straight broken diagonal line at left is the boundary between California *(south of the line)* and New Mexico Territory *(north of the line)* as they then existed. After several political readjustments to the territories of New Mexico, Nevada (created in 1861) and Arizona (created in 1863), the area north of this line, having been the northwestern angle of Arizona Territory, became the recognizable tip of the state of Nevada in 1867 (the latter had been admitted to statehood in 1864). ◈

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* Expedition artist Balduin Möllhausen illustrated Beale's Crossing for Ives' *Report* ("General Report," text-figure 18, p. 74, labeled "Beale's Pass") but his original watercolor painting fancifully added the camels crossing the river. While the camel crossing took place before the Ives expedition reached this point, Möllhausen did see some of the camels while on the West Coast during his journey to join the expedition at Fort Yuma. See his original watercolor digitized online at the Amon Carter Museum, https://www.cartermuseum.org/collection/beales-crossing-beales-pass-1988124.

While the Sitgreaves expedition had intended to locate the confluence of the Little Colorado and Colorado Rivers, only the Ives expedition had the same charge. Neither expedition succeeded, confounded both times by topography and deficient logistical means to carry forward to that goal. During the Ives land expedition, the lieutenant (as Balduin Möllhausen recorded; *see Chapter 4*) entertained the prospect of progressing onward to locate the confluence of the Green and Grand Rivers in Utah, or conversely to move on to the Verde River and ultimately the Gila River to the south, but these, too, were dismissed in the field for want of supplies and time; thus the expedition instead proceeded to the known track of the Whipple expedition and continued to move eastward, concluding at Fort Defiance. The confluence of the Little Colorado would not be gotten to by an exploring expedition until John Wesley Powell's Green–Colorado River voyage of 1869.

The Green–Grand confluence was ascertained closely enough for mapping in 1859 by the expedition under Capt. John N. Macomb, though the report and 1860 map (engraving completed in 1864) were delayed until 1876 in part due to the civil war and post-war administrative and financial difficulties.[18] The confluence itself was not occupied but was discerned from sightings made on the plateau a few miles distant, and of course it was finally visited by the Powell river expedition.

The map from the Macomb expedition was engraved by F. W. von Egloffstein and employed his novel methods of reproduction. It is centered on the Four Corners but does on its southwestern margin extend all the way to the "Supposed junction of the Rio Colorado & Flax river" and the reach of the Colorado leading to it, something wholly new to Egloffstein following on his map from the Ives expedition.[19] (See in *Chapters 2 and 5* for additional notes and illustrations relating to this map.) ◈

[18] J. N. Macomb, *Report of the Exploring Expedition from Santa Fé, New Mexico, to the Junction of the Grand and Green Rivers of the Great Colorado of the West, in 1859, Under the Command of Capt. J. N. Macomb, Corps of Topographical Engineers (now Colonel of Engineers)* (Government Printing Office, Washington, 1876); Steven K. Madsen, *Exploring desert stone: John N. Macomb's 1859 expedition to the canyonlands of the Colorado* (Utah State University Press, Logan, 2010), which also includes some of Egloffstein's correspondence relating to this map.

[19] "Map of Explorations and Surveys in New Mexico and Utah made under the direction of the Secretary of War by Capt. J. N. Macomb Topl. Engrs. assisted by C. H. Dimmock, C. Engr. [Civil Engineer] 1860." (Engraver's credit on map: "Geographical Institute, Baron F. W. von Egloffstein, No. 164 Broadway, N. York. 1864.")

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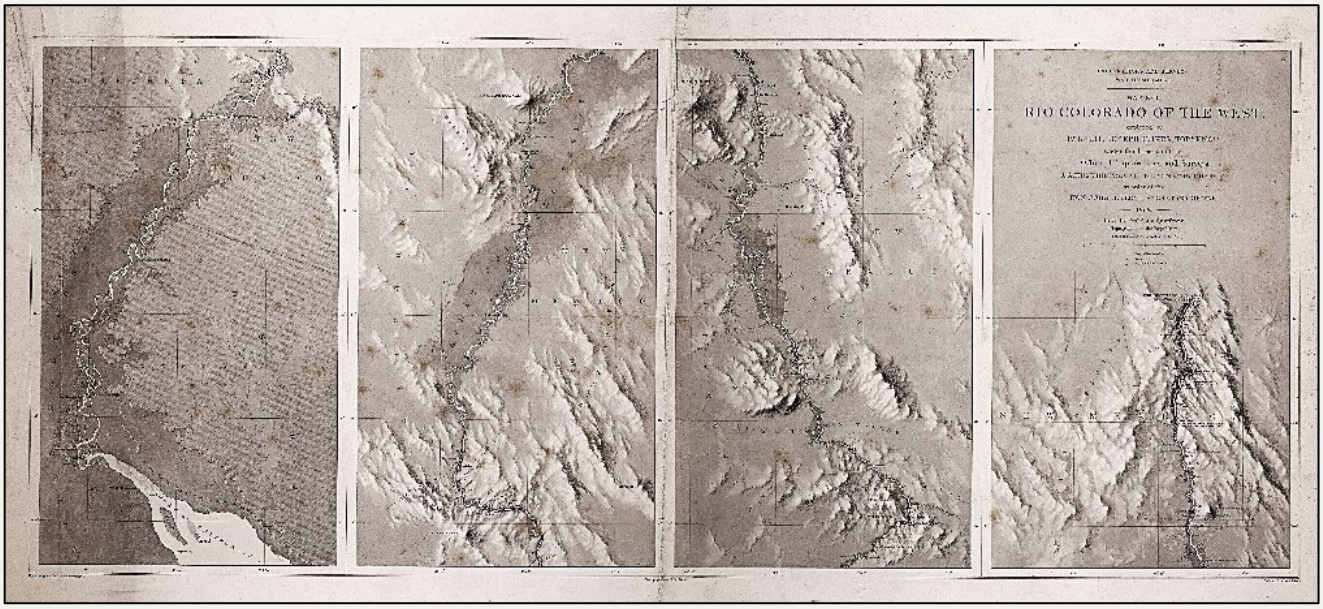


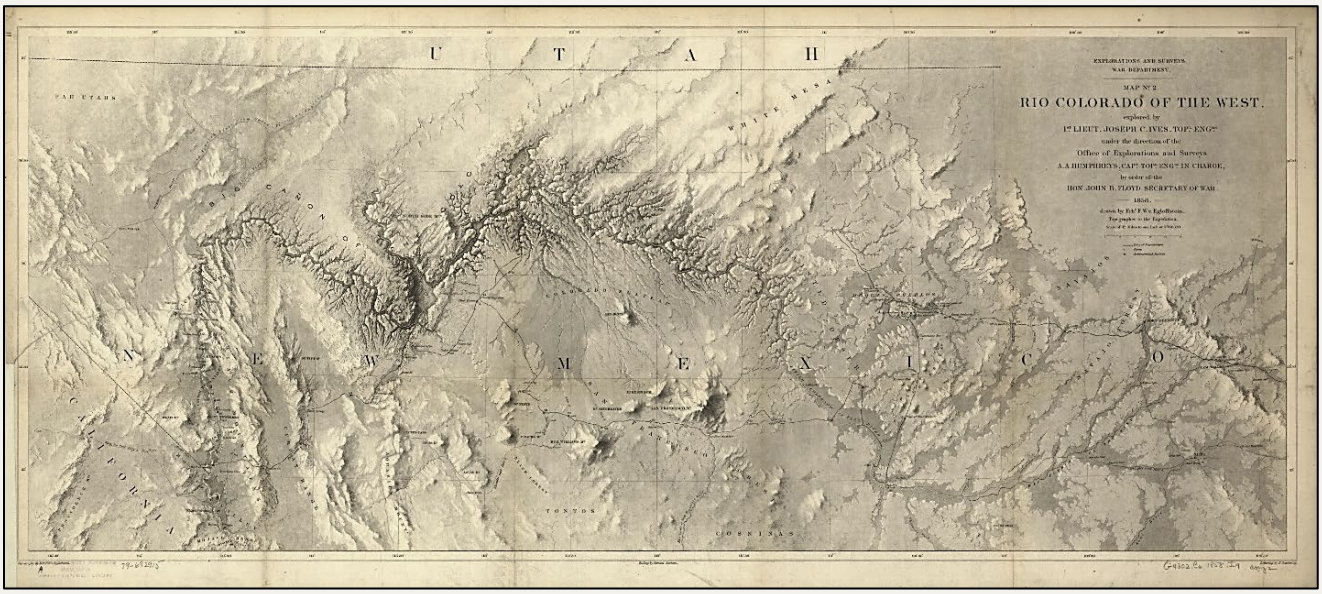


FIGURE 10. "Rio Colorado of the West," Map Nos. 1 and 2, by F. W. von Egloffstein, 1858, from J. C. Ives' *Report Upon the Colorado River of the West* (1861).

(top) *American Philosophical Society*
(bottom) *Library of Congress,* https://www.loc.gov/resource/g4302c.np000062/

CHAPTER 2
The Ives Expedition Maps

[FIGURES 10–18]

FRIEDRICH VON EGLOFFSTEIN'S LIFE was full, complicated, and wearying. In the Colorado River Expedition maps we find him approaching his cartographical peak but still striving for the technological and entrepreneurial goal of economical heliography. He did soon reach that objective, but his processes were eclipsed by those of even more economical and efficient, though somewhat less precise, means of photolithography, at which time anyway his war injury encouraged his 1878 departure from business and America.

As cartographer and (with Balduin Möllhausen) artist to the Ives expedition on the Colorado River and across northern New Mexico Territory, it fell upon Egloffstein to accurately record for the first time the landscapes along the river and in northern areas of present-day Arizona. As noticed in *Chapter 1*, some of his landscape views have been denounced; a few even have been discovered to have been published in Ives' *Report* by mistake. And although Egloffstein's previous cartographical work had been exemplary, his maps from this expedition have received accolades and derision alike. But the baron did a much better job than his critics have assessed.[20]

Two maps, dated 1858 (**FIGURE 10**), accompanied Lt. Ives' 1861 *Report Upon the Colorado River of the West*; and for a variety a reasons they are very different. "Map No. 1" plotted the Colorado River from the Gulf of California nearly to the Virgin River confluence. (Egloffstein borrowed the topographical and hydrological observations of others for the reach between the Colorado's mouth and Fort Yuma, California, since he only joined the expedition at the fort, having come overland from the West Coast with other participants. And the reach through Black Canyon and north of it was surveyed by Lt. Ives.) This map, to accommodate the geographical meandering of the north–south river was prepared as four narrow plates printed on one sheet (**FIGURES 10, 11, 16**). It is detailed and accurate, primarily because Egloffstein was on the scene and the cartographical field of view was relatively narrow. It is also at a larger scale (1:380,160, or 6 miles to the inch) than the more controversial map that is the main focus of this publication ("Map No. 2," scale 1:760,320, or 12 miles to the inch).

(Text continues on p. 34)

[20] The author had been one of those critics; for the general perspective refer to the illustration on *page iv* (legend on p. iii).

FIGURES 11a–11e ▶▶

"Map No. 1. Rio Colorado of the West." Whereas "Map No. 2" is the main focus of the present publication, the individual plates of "Map No. 1" are reproduced on the following pages so as to provide a complete perspective of Egloffstein's mapping from the Colorado Exploring Expedition and the artistic workmanship involved in making them. Together they display the course of the Colorado River in its surrounding landscape between the Gulf of California and Black Canyon. Unlike "Map No. 2," this map is much more faithful to ground truth, with the obvious disclaimer that the meander paths of the river are shown only for the times that the maps were surveyed, and that some reaches today are inundated by dams.

Egloffstein was not the topographer for the reach between the gulf and Fort Yuma *(plate no. 1 of the map as enumerated by Egloffstein)*, nor in the reach in Black Canyon between Explorers Rock and Fortification Rock (*the Black Canyon reach on plate no. 4, with title block*). For these reaches he incorporated the plats made by others.

The details of the Colorado's precise course are likely those of the expedition's hydrographer, Casimir Bielawski. He had been engaged in San Francisco and had traveled across California to the Colorado along with other members of the expedition. From Fort Yuma he was taken by boat to the delta to join Ives on the run up from the gulf in the purpose-built small steamer *Explorer*. It was Bielawski who would also have plotted the meander course of the Colorado all the way to Black Canyon, though he did not join the skiff trip to Las Vegas Wash. Ives' own plat was depended upon for that final reach. Unessential to the land expedition, Bielawski returned to Fort Yuma aboard *Explorer*, while Egloffstein continued with Ives overland.

Ives' *Report* includes "Part II. Hydrographic Report," which incorporates the observations of Ives and Bielawski.[21]

The four separate plates of "Map No. 1" are digitally displayed without color washing in FIGURE 16. ◈

(American Philosophical Society; photos by the author)

For presentations of areas surveyed and interpreted by Egloffstein during the land expedition, as delineated on his "Map No. 2" that is the focus of this study but which partially overlaps plate no. 4 of "Map No. 1," see the Analytical Charts on pp. xii–xv.

[21] "Hydrographic Report," in J. C. Ives, *Report Upon the Colorado River of the West, Explored in 1857 and 1858* (Government Printing Office, Washington, 1861; U.S. 30th Congress, 1st Session, House Executive Document 90 [concurrently as an unnumbered Senate Executive Document], Part II, 14 pp. [separately paginated].

FIGURE 11a.

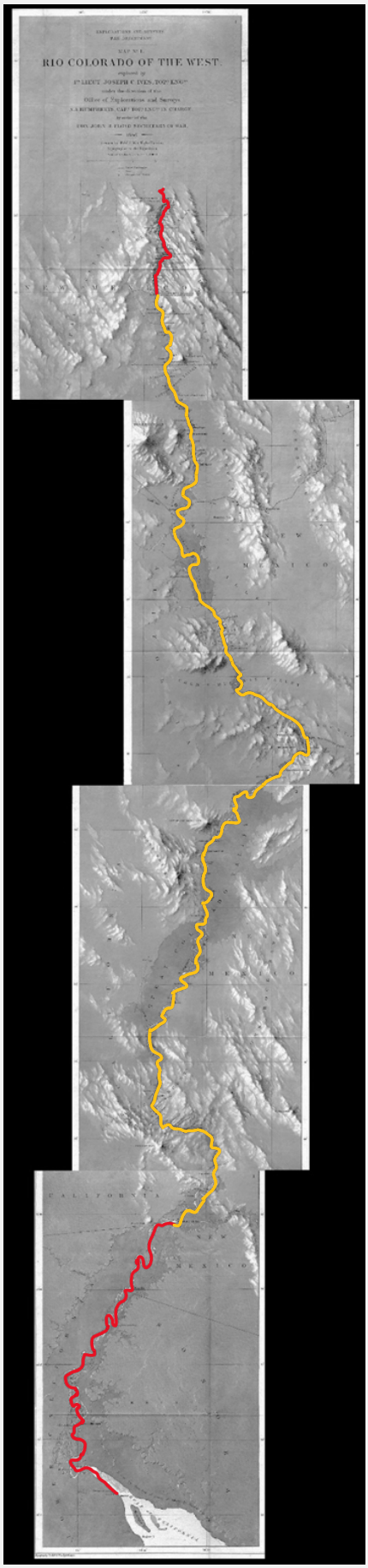
Contiguous arrangement of the four plates of "Map No. 1" delimiting the course followed by *Explorer*.

Line in ***yellow*** signifies the reaches along which landscapes were surveyed by Egloffstein, though the meander course of the river (seen upon close examination of individual plates) is likely based on the information plotted by the hydrographer Casimir Bielawski. Lines in ***red*** signify reaches that were not surveyed by the topographer but show information taken from plats made by either Bielawski (Gulf of California to Fort Yuma) or by Lt. Ives (Explorers Rock to Head of Navigation).

Some of the landscape physiography away from the river corridor may have been adapted from maps produced by other expeditions that crossed or traveled along the lower Colorado River corridor, including the Sitgreaves and Whipple expeditions of 1851 and 1854.

Maps in this figure are darkened to better display *Explorer*'s course. For clearer arrangements of the four plates, see **FIGURES** 10 (as published) and 16 (digitally reordered as in this figure), and **FIGURES** 11b–e *(following)* for separate views of each plate. ◈

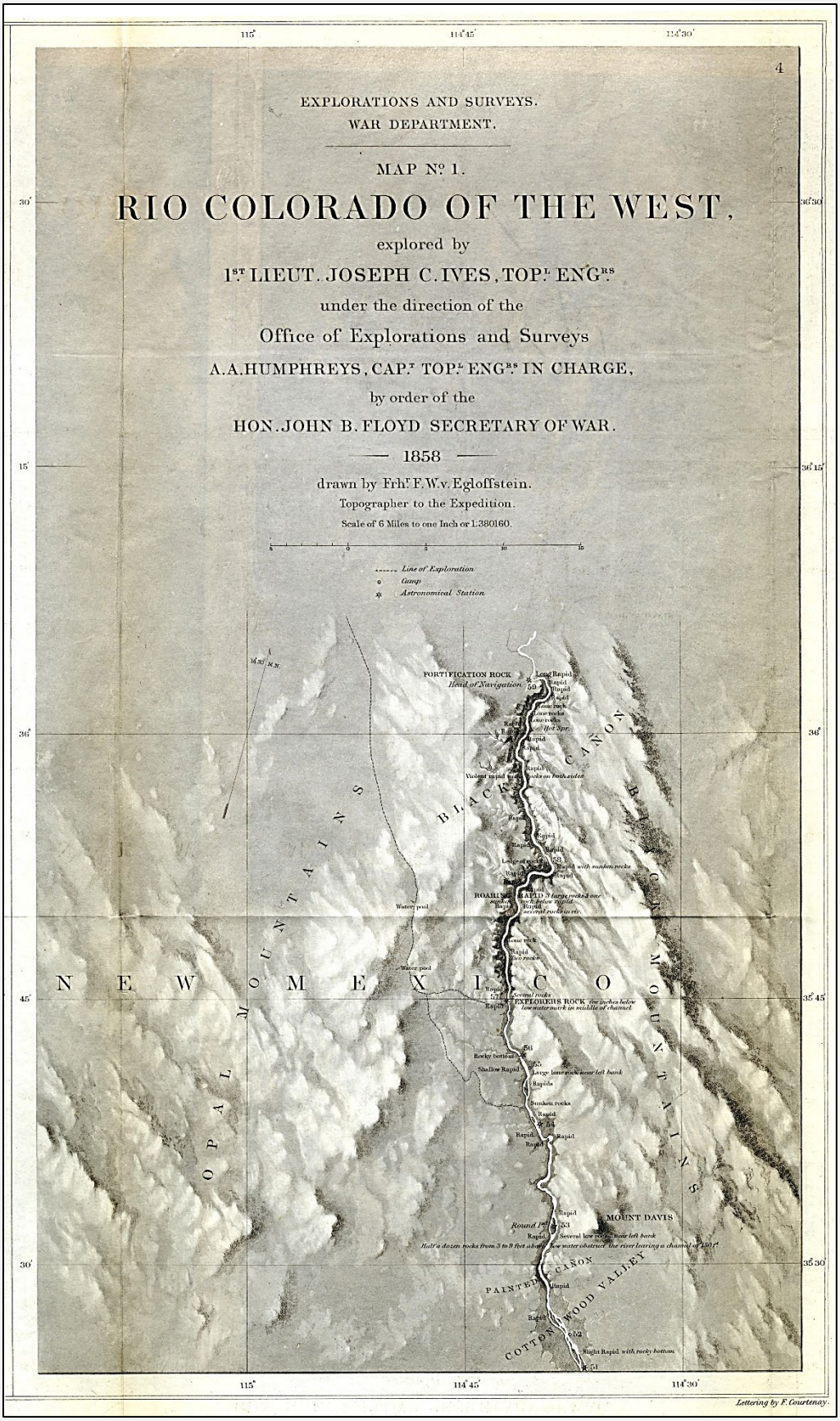
(Digital alteratons by the author)



◄ Plate No. 4. The ***red*** line delimits the course followed by Lt. Ives and two men in a skiff (**FIGURE 12**) between Explorers Rock at the mouth of Black Canyon and the head of navigation upstream from the portal to Black Canyon. This reach was not personally surveyed by Egloffstein.

◄ Plate No. 3 also maps Beale's Crossing *(directly opposite the pointer here)*, where the land expedition began (**FIGURE 9** in Chapter 1).

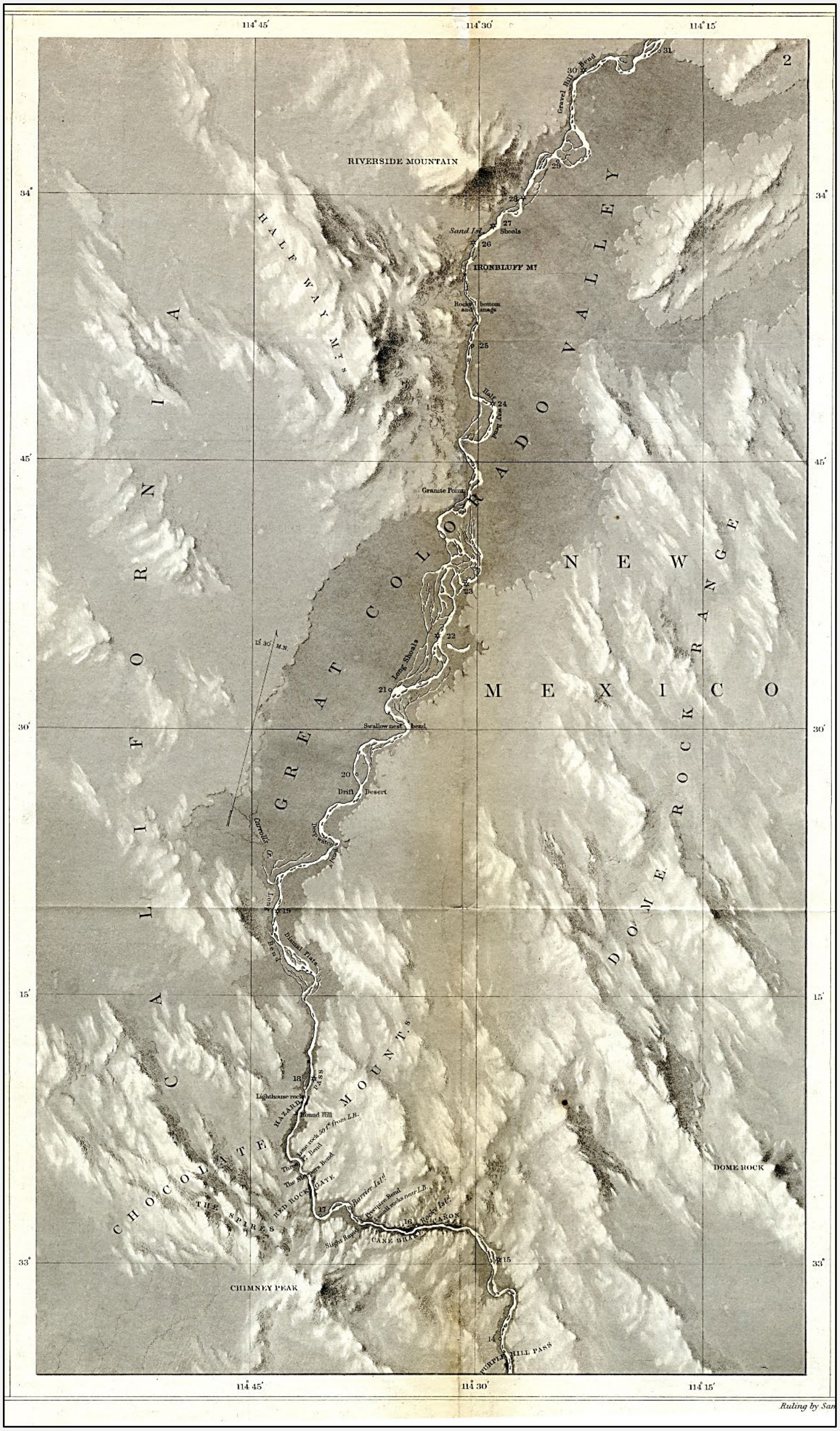
◄ Plate No. 1. The ***red*** line delimits *Explorer*'s course from Robinson's Landing in Baja California, Mexico, to Fort Yuma, California, at the confluence of the Gila River. This reach was not personally surveyed by Egloffstein.


4
EXPLORATIONS AND SURVEYS.
WAR DEPARTMENT.
MAP Nº 1.
RIO COLORADO OF THE WEST,
explored by
1ST LIEUT. JOSEPH C. IVES, TOPL ENGRS
under the direction of the
Office of Explorations and Surveys
A.A.HUMPHREYS, CAPT TOPL ENGRS IN CHARGE,
by order of the
HON. JOHN B. FLOYD SECRETARY OF WAR.
1858
drawn by Frh. W.v. Egloffstein.
Topographer to the Expedition.
Scale of 6 Miles to one Inch or 1:380160.
Line of Exploration
Camp
Astronomical Station
FORTIFICATION ROCK
Head of Navigation
Hot Spr.
BLACK CANON
GRAND CANON
MOUNTAINS
OPAL MOUNTAINS
NEW MEXICO
EXPLORERS ROCK
MOUNT DAVIS
PAINTED CANON
COTTONWOOD VALLEY
Lettering by F. Courtenay.

11b


DEAD MOUNTAIN
M^T. NEWBERRY
PYRAMID CAÑON
Bullhead
BLACK MOUNTAINS
CERBAT RANGE
Bitter Spring
Rail road Pass
Meadow Creek
Beale's trail
Beale's Crossing
VILLAGES OF THE MOJAVE INDIANS
Boundary Cone
MOJAVE VALLEY
NEW MEXICO
CALIFORNIA
Whipple's Crossing
Slight rapid
THE NEEDLES
MOJAVE CAÑON
MOJAVE RANGE
Mohave rock
CHEM-E-HUEVIS VALLEY
Boat rock
MONUMENT MOUNT.s
M^T. WHIPPLE
THE MONUMENT
BILL WILLIAMS FORK
Sunken rock
Sunken rocks near left bank
Corner rock
114° 45′
114° 30′
114° 15′
114°
35°

11c


114° 45'
114° 30'
114° 15'
34°
45'
30'
15'
33°
2
RIVERSIDE MOUNTAIN
HALF WAY MTS
Sand Isl.
Shoals
IRONBLUFF MT
GREAT COLORADO VALLEY
Granite Point
Long Shoals
Swallow nest Bend
Drift
Desert
CALIFORNIA
NEW MEXICO
DOME ROCK RANGE
DOME ROCK
Lighthouse rock
HAZARD PASS
Round Hill
CHOCOLATE MOUNTS
RED ROCK GATE
THE SPIRES
CANE BRAKE CAÑON
CHIMNEY PEAK
PURPLE HILL PASS

11d


CALIFORNIA
LOWER CALIFORNIA
NEW MEXICO
SONORA
DESERT
FORT YUMA
PILOT KNOB
GILA RIVER
BOOT PEAK
PURPLE HILLS
EXPLORERS PASS
Copper mines
Ranch
New River
Pedrick's
Ogdens Landing
Head of tide water
Heintzelmanns Pt.
Howards Pt.
Pt. INVINCIBLE
Robinsons Landing
Camp No. 1
Unwin Pt.
GULF OF CALIFORNIA
Montague I.
Gorce I.
Sargents Pt.
E. Coast line from map of Survey of Sonora by Captain C. P. Stone.
115°
114° 45'
114° 30'
32° 45'
32° 30'
32° 15'
32°
31° 45'
Topography by Frh. F. W. v. Egloffstein.

11e

Although the components of "Map No. 1" are North/South in presentation, and "Map No. 2" in its smaller scale is East/West, they do overlap. "Map No. 2" encompasses the northernmost part of "Map No. 1," including Beale's Crossing where the land expedition began. This locale also provides a good comparison of Egloffstein's styles of modeling and engraving at two different scales (**FIGURE 9** in *Chapter 1*).

The brief "Appendix D" in Ives' *Report* (reproduced in **FIGURE 13**) offers a concise description of the technical procedures of creating these maps. It serves to place them in context with Egloffstein's great abilities and the status of his ongoing improvements that were still short of his goal to create a commercially economical process of heliography. "Appendix D" tends to be a bit obtuse, which was because Egloffstein was secretive about some of the procedures. The issue lies not with the sculpting and photography but in the engraving, which involved aspects of ruling on an light-sensitive asphaltum-covered glass plate, which in turn was used for the photographic transfer, and selective work with acid during the whole production. Nonetheless, the maps are acknowledged as the first to show true shaded relief for any part of the American West.[22]

Lt. Ives also summarized in his letter of transmittal conveying his final report to Capt. A. A. Humphreys, dated 1 May 1860, though somewhat unaware of the sequence of reproduction as actually employed by Egloffstein:

> The accompanying maps were made by Mr. Egloffstein, who went out with me as topographer. Some of the views, it will be perceived, are also from his pencil. The maps have been drawn directly upon the plates, which will obviate the ordinary expense for engraving. The style is partly new. The system of light and shade has been frequently adopted; but the application of the ruled tints—by which the light sides of the mountains are relieved, and the comparative altitudes of different levels exhibited—is original, I believe, with the artist. The beautiful and effective representation of the topography is the best encomium both upon the style and its projector. The privation and exposure to which Mr. Egloffstein freely subjected himself, in order to acquire topographical informa-

[22] Excellent overviews are by Imre Josef Demhardt, "'An approximation to a bird's eye view, and is intelligible to every eye […]'. Friedrich Wilhelm von Egloffstein, the Exploration of the American West, and Its First Relief Shaded Maps," in *Proceedings of the 25th International Cartographic Conference, Paris, France, 3-8 July 2011*, paper no. CO-453; and Demhardt, "Die Pionierkarten des Colorado River in Schummerungsmanier von Friedrich Wilhelm von Egloffstein," *Cartographica Helvetica*, No. 47 (2013), pp. 13-26. [See Bibliography for more complete citations.] See also Wesley A. Brown, "The Revolutionary Cartography of Hal Shelton: Shaded Relief, Natural Colour, and Ski Area Mapping," *IMCOS Map Journal* (International Map Collectors' Society), No. 173 (June 2023), cover, pp. 1, 19-31, which also features Egloffstein's Grand Canyon map.

> tion, has resulted in an accurate delineation of every portion of the region traversed. [23]

Imre Josef Demhardt, however, gave a much better though still vague explanation of Egloffstein's shadowy process *(in translation here)*.

> Perhaps inspired by his collaboration with the photographer [Solomon N.] Carvalho on the Frémont expedition in 1853-54, the baron had pondered a photographic embossing process on printing plates, which was then used for the first time on a trial basis on the two maps for the lves expedition.
>
> The only known but incomplete description of the printing process subsequently developed by Egloffstein comes from Samuel Sartain, a respected map engraver in Philadelphia and friend of the baron, who remembered its basic features in 1895, more than three decades after their joint work on the lves maps: A glass positive was photographically created from a plaster relief. This was transferred to a steel plate that had previously been made light-sensitive with an asphalt solution. This was then followed by a second exposure with a glass plate with a line grid copied onto it (horizontal hatching). The remaining unexposed areas were then developed, *i.e.* washed out and etched into the steel plate using acid. This produced a fine, linearly rasterized image of the original drawing, which could be used directly for intaglio printing. 'I myself,' says Sartain, 'developed a method to prevent the original linework from wearing off. Soon after I had made my contribution, Baron Egloffstein's supply of benzene, which was used as a solvent, ran out' and could no longer be obtained in the required quality when the war broke out. [24]

Sartain is further quoted by various authors from a letter written to *Wilson's Photographic Magazine* (not located for this study) that gave some idea as to the method still under development after the 1858 maps were produced:

> I assisted Baron F. W. von Egloffstein in his experiments for accomplishing heliographic engraving on steel, which he pursued in the summer of the year 1861, in

[23] Ives, *Report*, p. 6. This summary view does not give proper indication of the methods—that is, plaster model sculpting, photography, and fine-ruled screening to the steel plate—though Appendix D does give a moderately better explanation. But, as noted, Egloffstein's exacting process was partly a proprietary secret, about which we do not fully understand even today.

[24] Imre Josef Demhardt, "Die Pionierkarten des Colorado River in Schummerungsmanier von Friedrich Wilhelm von Egloffstein," *Cartographica Helvetica*, No. 47 (2013), p. 22; partly citing D.A. Hanson, "Baron Frederick Wilhelm von Egloffstein: Inventor of the First Commercial Halftone Process in America," *Printing History*, Vol. 15, no. 1 (1993).

> Philadelphia. His method consisted in photographing on a sensitive coating of asphaltum through the glass screen plate, ruled in one direction only, and also through the glass photographic copy of his subject; then dissolving out the unlighted portions and etching into the steel with acid to produce the intaglio printing surface.
>
> He experimented with the first screens that I produced, which were not quite satisfactory in the relation between the opaque and the clear portions; and in the meantime I continued in my trials until I succeeded in making a perfect, evenly ruled glass plate, with the proper proportion of clear and opaque lines, which he desired. [25]

William Gamble illuminated a bit more of the process:

> Eggloffstein's [*sic*] screen consisted of highly polished plate-glass covered with a good asphaltum etching ground, heated and smoked over a wax taper in the manner of the engraver's black etching ground. When cooled the plate was ruled over with a diamond or other point in a ruling machine in one direction only. The method of using this screen was to expose a bitumen coated plate to the action of the light through the screen, and then to the photographic image by a second exposure to light. Both images were thus blended into one, the screen giving texture to the photographic image. The parts not acted on by light were then dissolved out, and the bare steel etched with acid to produce an intaglio printing surface. [26]

The aforementioned *(Chapter 1)* map from the 1859 Macomb expedition to locate the Green–Grand confluence was constructed and engraved by Egloffstein in 1864.[27] He added a text box (**FIGURE 14**) that includes a brief self-promotional note: "A delicate tint was ruled over the whole plate to give the effect of a plaster model of the country. Constructed and engraved by Baron F. W. Von [*sic*] Egloffstein Topographer to the Surveys under the 35th and 38th parallels. Frémont's, Beckwith's and Ives' Expeditions." The technique had been improved upon since his production of the 1858 Ives expedition maps.

The Ives report's "Map No. 1" plots only as far as the expedition's steamboat, *Explorer*, had traveled, with a short venture further upstream made by Ives and two men in a skiff. The

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[25] "The Father of Half-Tone," *Anthony's Photographic Bulletin*, Vol. 26, no. 4 (April 1, 1895), p. 137.

[26] William Gamble, "The History of the Half-Tone Dot," *The Photographic Journal* (London), new series, Vol. 21, no. 6 (February 1897), p. 128. [Refer also to Appendix Figure A20.]

[27] "Map of Explorations and Surveys in New Mexico and Utah made under the direction of the Secretary of War by Capt. J. N. Macomb Topl. Engrs. assisted by C. H. Dimmock, C. Engr. [Civil Engineer] 1860."

openly stated reason for the expedition was to ascertain the navigability of the Colorado River at a time of low water (in winter), yet there is also the issue of a land expedition once the head of navigation was established. The general story is often retold, briefly and at length alike, usually highlighting the accident that nearly ended the expedition, when the boat, entering Black Canyon, struck hard against a submerged rock, damaging the boiler and appurtenant fixtures while providentially not breaking the iron hull.[28] While the engineer conducted repairs, commander Ives took the boat's pilot and mate upriver in a skiff in an attempt to reach the Virgin River confluence, unaware of how far away it really was. It was during this challenging trip of several days that Ives, for reasons of safety, decided not to try to continue farther upstream with the steamboat (**FIGURE 16 and accompanying text box on p. 45**).

On the trip with the skiff (**FIGURE 12**) they reached Fortification Rock (**FIGURE 15**), a prominent geographic feature about three miles upstream from where Hoover Dam would be built eighty years later. Ives and his pilot climbed it to gain a view of the terrain that they would not reach. This feature is now mostly submerged, part of an archipelago of islands in the deep end of Lake Mead. Another couple of miles farther, the mouth of a small tributary was met on the western side of the river, which Ives thought, with some incredulity because of its low flow of only inches, was the Virgin River; it really was what is now known as Las Vegas Wash. It is as far as the Colorado Exploring Expedition went on that waterway. This area was pronounced the "Head of Navigation" and so noted on Egloffstein's "Map No. 1." Although the cartographer had not been on this part of the river, Ives charted the venture, which was incorporated into the map. "Map No. 1" on its northward projection ends, sketchily, at the confluence of Las Vegas Wash (**FIGURE 17**).[29]

There are several so-called "Great Bend" reaches along the Colorado River, the last of them being where it exits from the Grand Canyon to reach the confluence of the Virgin River and turns southward to run toward the Gulf of California (**FIGURE 18**). It is there that "Map No.1" overlaps with "Map No. 2" of the Rio Colorado of the West. Baron von Egloffstein did not attempt to plot that confluence, avoiding an educated guess that another cartographer

[28] For a record of the *Explorer* from the perspective of its engineer, see Earle E. Spamer, *Explorer: Andrew J. Carroll on the Colorado River, 1857–1858* (Raven's Perch Media, 2022, https://ravensperch.org/wp-content/uploads/2022/11/EXPLORER.pdf).

[29] Ives' manuscript river plat for this reach to Fortification Rock and "Virgin R." is illustrated by David Miller, "Baron von Egloffstein and the First Published Images of Grand Canyon," in *A Rendezvous of Grand Canyon Historians* (Richard D. Quartaroli, comp., ed.) (Grand Canyon Historical Society, Flagstaff, 2013), p. 173. The plat specifically labels "Virgin R." on the Las Vegas Wash tributary. (Regarding Miller's title, technically it was Balduin Möllhausen who published the first images from Grand Canyon in his 1860/1861 *Reisen*, Vol. 2, facing pp. 49, 55, 100; and as reprinted in Spamer, *Balduin Möllhausen's Grand Canyon*, pp. 34, 39, 71. See also one of these in **FIGURE 6** in *Chapter 1* of the present publication.)

might have tried. Although he did subjectively fill in other parts of landscape on "Map No. 2" *(Chapter 3)*, he may have avoided making a wrong call for the Virgin River confluence because, in the context of the expedition, his work might have been used for military planning in the event of a civil war with the Utah government *(Chapter 1)*. It's possible that Lt. Ives had had a role in that decision. ◈

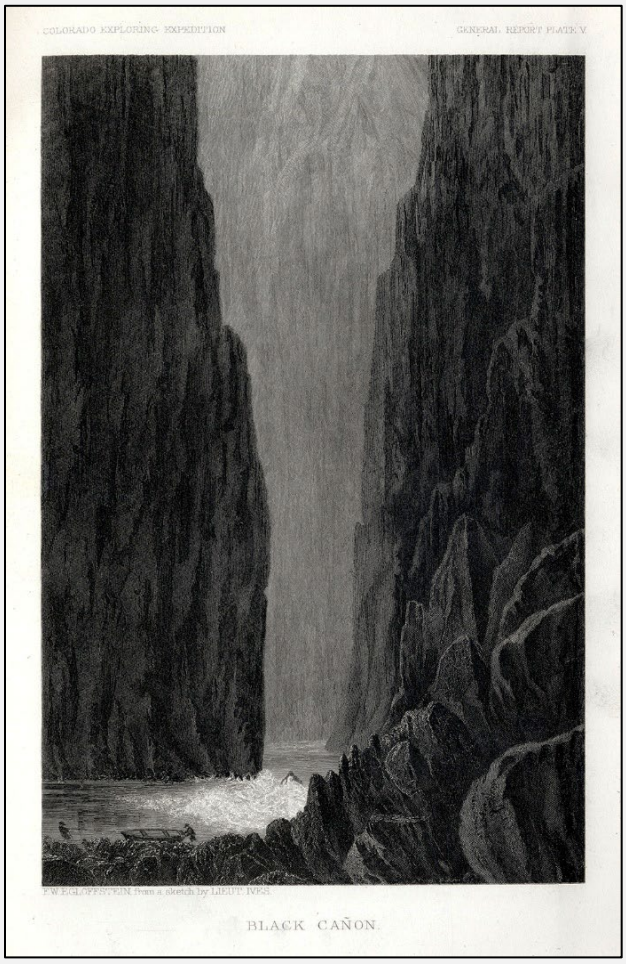
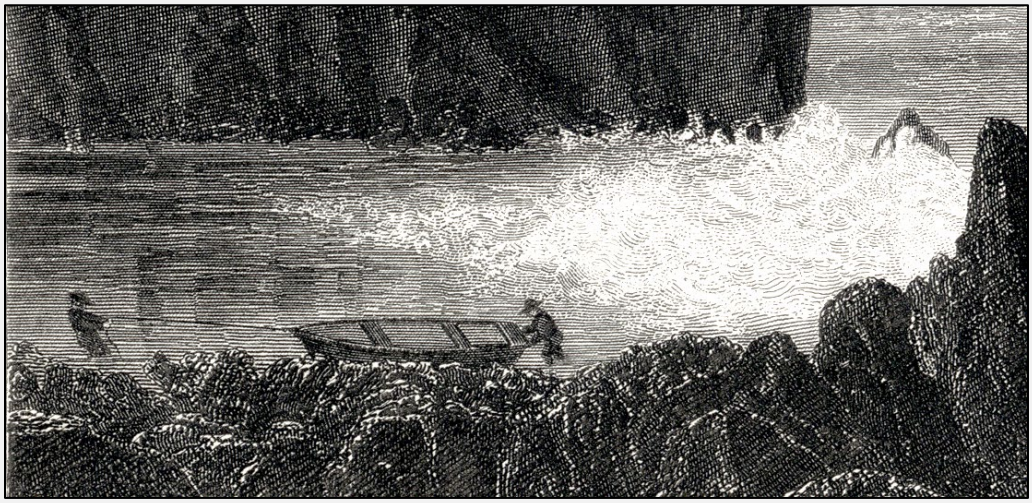


Figure 12. "Black Cañon. F. W. Egloffstein, from a sketch by Lieut. Ives." (General Plate 5 *in* J. C. Ives' "General Report"; *with detail below*.) This is the sole sketch by Ives, redrawn by Egloffstein to depics the trip with the skiff through Black Canyon after the near-wreck of the steam-boat *Explorer*. The scene is likely embellished by his particular style of gloomy representations and probably with his own added staffage of men lining their boat past one of the numerous rapids that were encountered *(detail below)*. This was the only part of the river upstream from Fort Yuma that Egloffstein had not been able to survey, who depended upon Ives' plat for incorporation on "Map No. 1" (refer to **FIGURE 17**). ◈

(American Philosophical Society; photos by the author)



FIGUREs 12a–e *(next five pages ▶▶)*

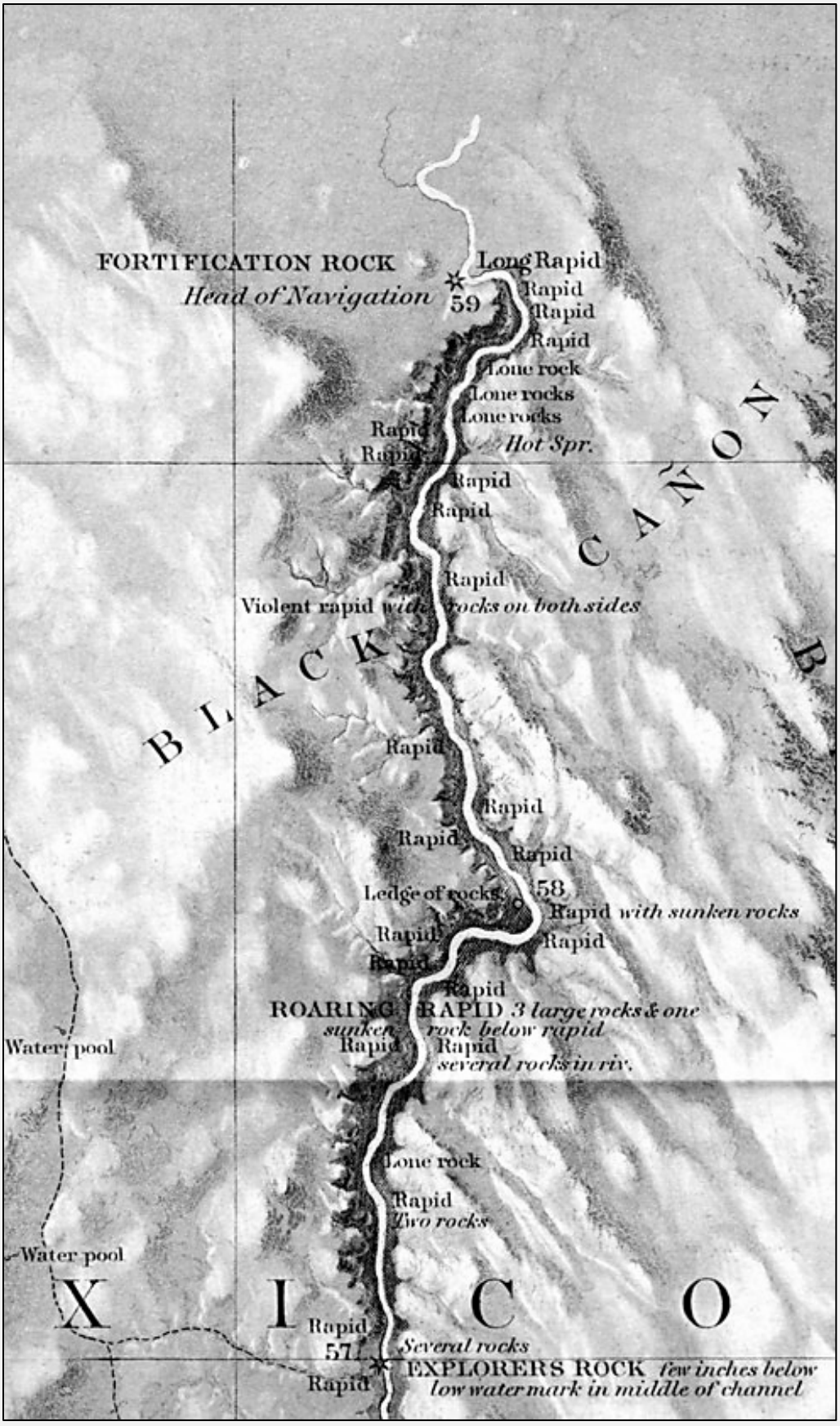
Black Cañon reach of the Colorado River as delineated on "Map No. 1" (FIGURE 12a) and "Map No. 2" (FIGURE 12b). Closer details of the Black Cañon reach on "Map No. 1 (FIGURES 12c–e).

These details pertain to the Black Cañon survey by skiff, conducted by Lt. Ives with *Explorer* Captain Robinson and Robinson's mate (see **FIGURE 12**).

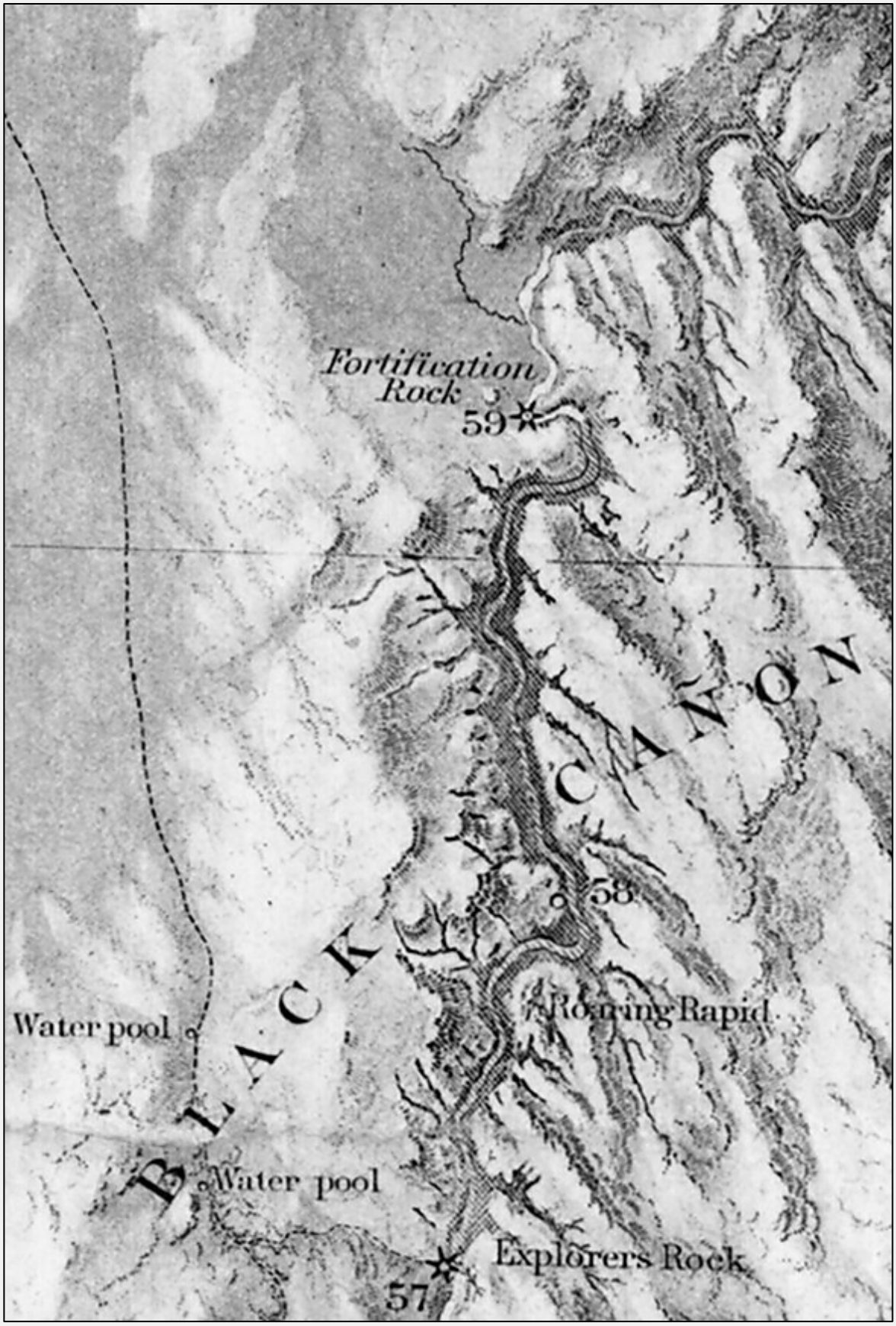
FIGURES 12 a, b. The depiction of the Black Cañon reach of the Colorado River, between Explorers Rock and Fortification Rock, as surveyed by Lt. Ives, is decidedly different on Egloffstein's two maps. "Map No. 1" was created at a larger scale (1:380,160, or 6 miles to the inch) than "Map No. 2" (1:760,320, or 12 miles to the inch) and is enlarged here. For closer detail views of FIGURE 12a, see **FIGURES 12c–e**.

Comparing the gross physiography displayed in FIGURES 12a and b shows how Egloffstein's plaster models differed. Note also subtle differences in the meander course of the Colorado River. The cross-hatching within Black Cañon differs, that on "Map No. 1" (FIGURES 12c–e) the style is not consistent. On "Map No. 2" (FIGURE 12b) parallel ruling crosses the river. ◈

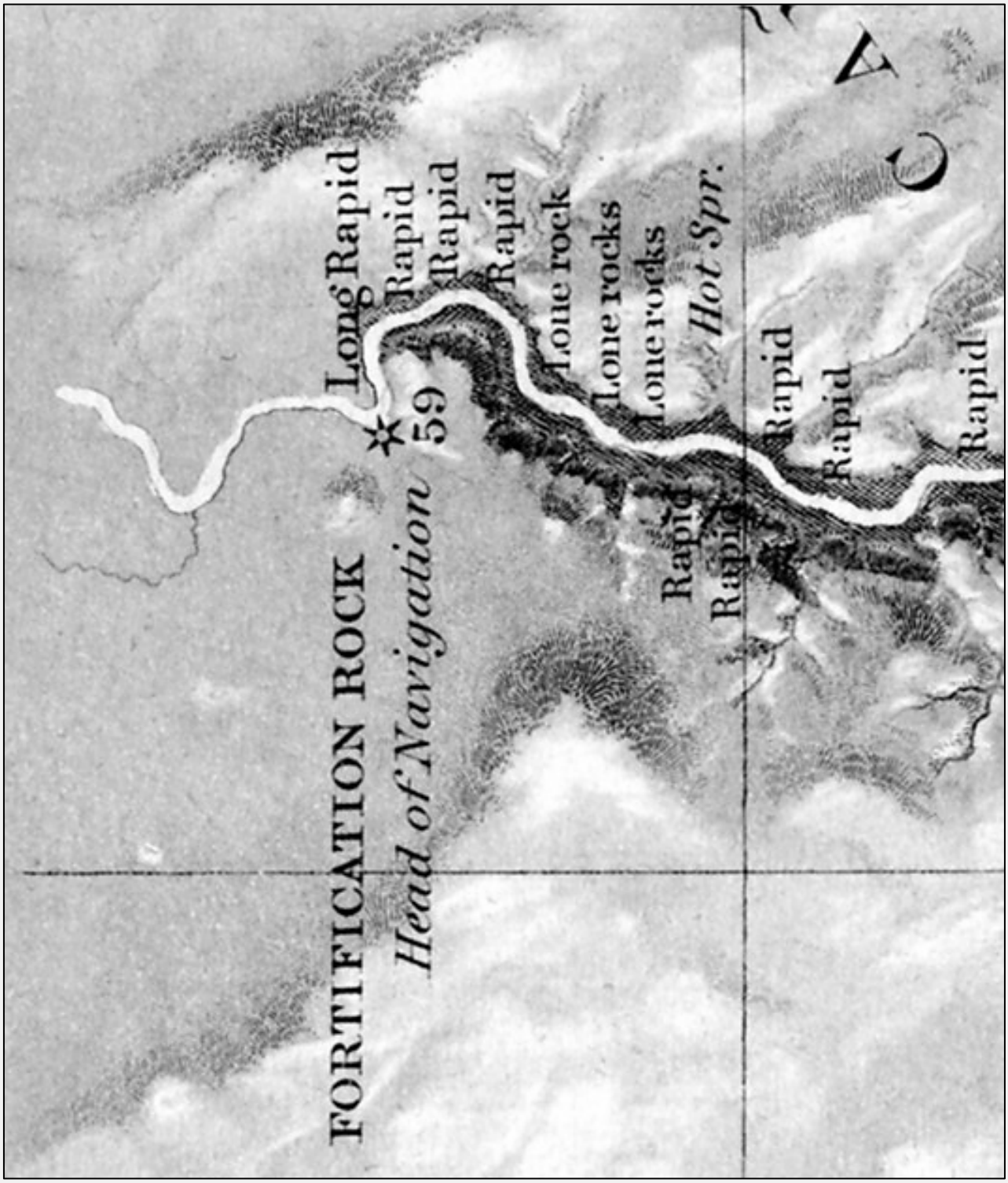
"Map No. 1," American Philosophical Society; photo by the author
"Map No. 2," Library of Congress


FORTIFICATION ROCK
Head of Navigation
59
Long Rapid
Rapid
Rapid
Rapid
Lone rock
Lone rocks
Lone rocks
Rapid
Rapid
Hot Spr.
Rapid
Rapid
Rapid
Violent rapid with rocks on both sides
BLACK CANON
Rapid
Rapid
Rapid
Rapid
Ledge of rocks
58
Rapid with sunken rocks
Rapid
Rapid
Rapid
Rapid
ROARING RAPID 3 large rocks & one sunken rock below rapid
Rapid
Rapid
several rocks in riv.
Water pool
Lone rock
Rapid
Two rocks
Water pool
MEXICO
Rapid
57
Several rocks
EXPLORERS ROCK few inches below low water mark in middle of channel
Rapid

12a


Fortification Rock
59
BLACK CANON
58
Roaring Rapid
Water pool
Water pool
Explorers Rock
57

12b



12c

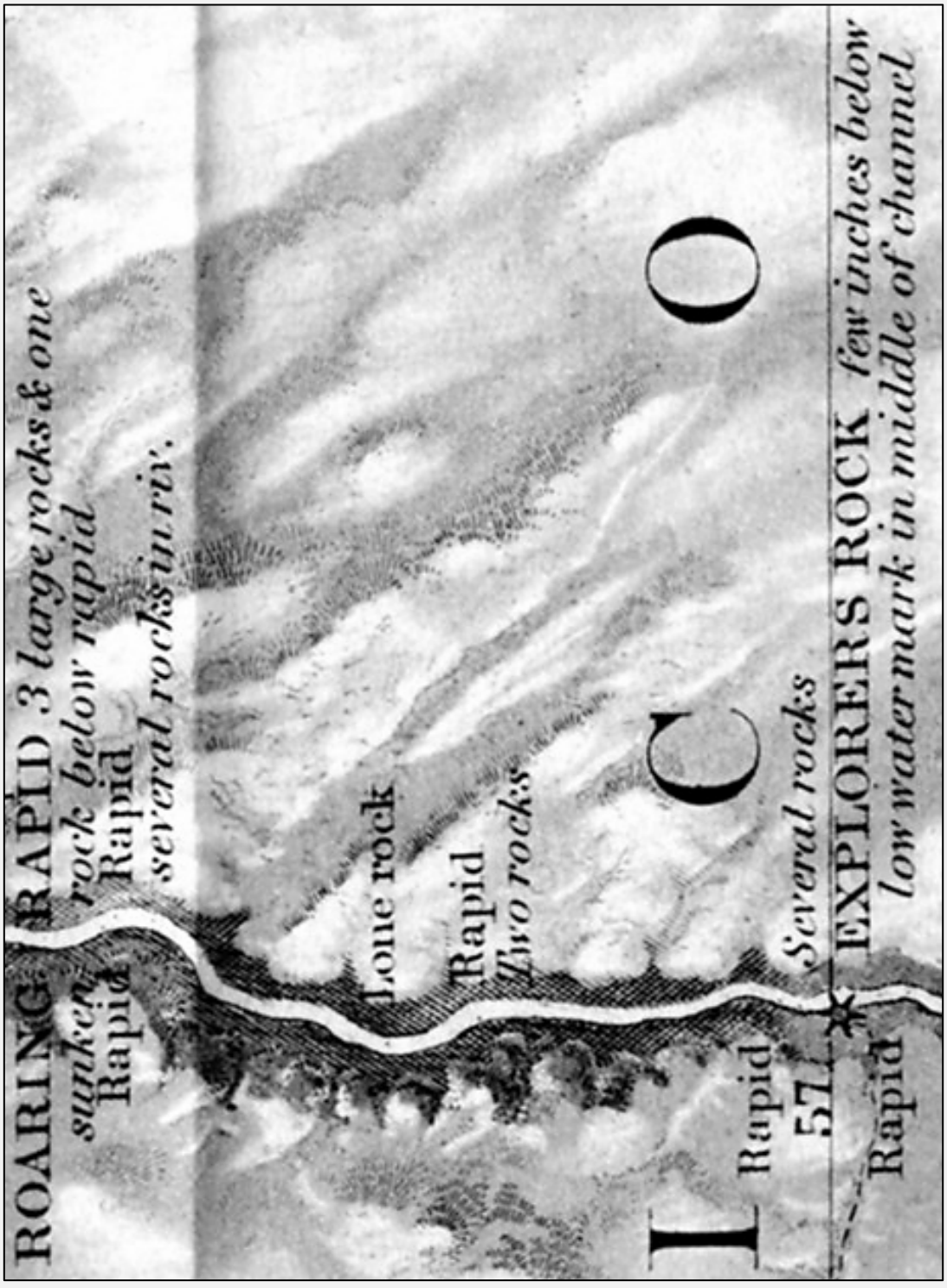
continues on FIGURE 12 d ▶

▼ *continues from FIGURE 12c*

12d

▼ *continues on FIGURE 12e*

▼ *continues from FIGURE 12d*



12e

FIGURE 13 *(next page ▶)*

One-page "Appendix D" from Ives' *Report*.

The construction of Egloffstein's maps is described. While it reads that this is Ives' own explanation, the technicalities are explained in such a way that perhaps it is Egloffstein's own third-person contribution, written for Ives. It indicates that hachuring was dispensed with (it was not), and overall it reads like a promotional piece for Egloffstein's ongoing work toward economical heliography. ◈

Ives, "Appendices" p. [32] (final page of the volume) [the Appendices section is separately paginated].

(Author's collection)

APPENDIX D.

REMARKS UPON THE CONSTRUCTION OF THE MAPS.

The plan of construction of these maps is, in some respects, new. It however embraces a system of topography at one time adopted in France, in which the light is supposed to fall at an oblique angle upon the objects represented; illuminating certain portions, and leaving others in shade

A disadvantage of that system, in copper and steel engraving, was, that it afforded no relief to the light sides of the mountains or ravines, which, in many cases, therefore could not be distinguished from the surrounding plain.

In lithographed maps, printed in black and white, upon tinted paper, this objection could, in a measure, be obviated.

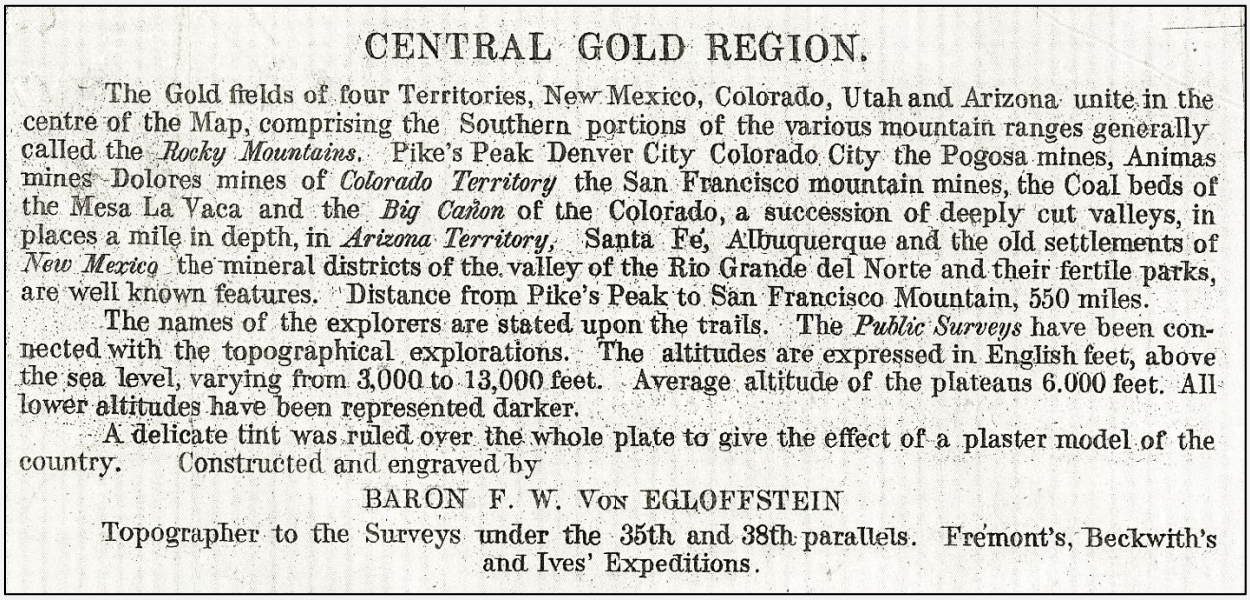
Mr. Egloffstein, the topographer to the expedition, conceived the idea—while sketching the naked mountains, barren plains, and immense gorges that characterized some portion of the region explored—of endeavoring to give to his map the appearance of a small plaster model of the country, with the light falling upon it at a particular angle. Such a model of a bare and rocky region would strongly resemble nature. Portions of the mountain sides and of the edges of the ravines would appear in brilliant light, others in deep shade. Level plateaus and valleys would have a uniform tint; the lightness or darkness of which would depend upon their elevation or depression. Mr. Egloffstein devised the plan of producing the different tints by means of fine parallel lines, drawn upon the plate with a ruling machine; each part of the ruled portion being brought to the requisite shade by exposing it a longer or shorter time to the action of acid. The maps were engraved by him in accordance with this plan. The topography was constructed from the field-notes directly upon the plates. The latter were of steel; it being feared that copper would not be hard enough to give a sufficient number of impressions of the more delicate tints. The topography was first delineated; the lettering was then put on; and afterwards the plates were ruled.

A glance at the result will show how far the experiment has succeeded. There are defects readily to be perceived, and further experience will doubtless suggest many improvements, but I think it will be generally admitted that, for maps of such a character of country, and upon such a scale, this style—which is believed to be new, so far a regards the application of the ruled tints—is, in beauty and effectiveness, much superior to the old. It possesses the power, which the other does not, of exhibiting the comparative altitudes of plateaus of different elevations. This is particularly apparent in map No. 2. The alluvial lands along the Colorado and Flax rivers, being designated by a darker tint, are distinctly defined, as well as the boundaries and extent of the mesas that limit them. The loftier table-lands, by their lighter appearance, may also be distinguished from lower levels. In the old style these effects could not be produced.

This method of representing topography is less conventional than the other, and truer to nature. It is an approximation to a bird's eye view, and is intelligible to every eye.

Another advantage of the system is its economy. Nearly one-half of the most expensive part of map engraving—the *hachures* upon the mountain sides—is dispensed with, and the additional work, the ruling, is attended with little cost.

FIGURE 13 *(legend is on ◄ previous page)*



CENTRAL GOLD REGION.

The Gold fields of four Territories, New Mexico, Colorado, Utah and Arizona unite in the centre of the Map, comprising the Southern portions of the various mountain ranges generally called the *Rocky Mountains*. Pike's Peak Denver City Colorado City the Pogosa mines, Animas mines Dolores mines of *Colorado Territory* the San Francisco mountain mines, the Coal beds of the Mesa La Vaca and the *Big Cañon* of the Colorado, a succession of deeply cut valleys, in places a mile in depth, in *Arizona Territory*, Santa Fé, Albuquerque and the old settlements of *New Mexico* the mineral districts of the valley of the Rio Grande del Norte and their fertile parks, are well known features. Distance from Pike's Peak to San Francisco Mountain, 550 miles.

The names of the explorers are stated upon the trails. The *Public Surveys* have been connected with the topographical explorations. The altitudes are expressed in English feet, above the sea level, varying from 3,000 to 13,000 feet. Average altitude of the plateaus 6.000 feet. All lower altitudes have been represented darker.

A delicate tint was ruled over the whole plate to give the effect of a plaster model of the country. Constructed and engraved by

BARON F. W. Von EGLOFFSTEIN

Topographer to the Surveys under the 35th and 38th parallels. Frémont's, Beckwith's and Ives' Expeditions.

FIGURE 14. Text box by Egloffstein on the 1860 Four Corners map by J. N. Macomb and C. H. Dimmock (engraved 1864, not published until 1876), from the 1859 expedition to ascertain the location of the confluence of the Green and Grand Rivers. It includes brief note regarding the tint and ruling employed to create the map's shaded relief. The text also mentions "*Big Cañon* of the Colorado," even though that locale is barely shown and not specifically labeled on the map. Note, too, that Egloffstein continued with his change, first shown in the 1858 map and some illustrations from the Ives expedition, to include his baronial title ("Freiherr" on the 1858 materials, "Baron" on this map). ◈ *(American Philosophical Society; photo by the author)*

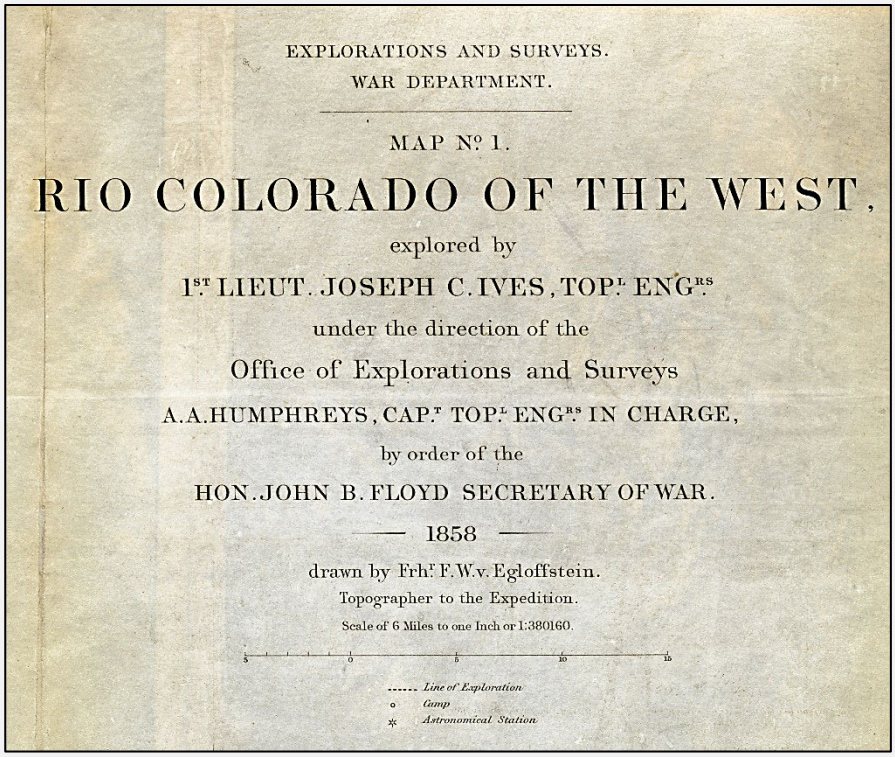
For more regarding this map with respect to the present study, see in *Chapter 5*.

FIGURE 15. "Castellated sand bluffs, Fortification Rock, Colorado River." Fortification Rock as seen from the Colorado River, photographed by Timothy H. O'Sullivan, 1871. From a glass negative.

J. C. Ives named it "Fortification rock," taking note that it is "over a thousand feet high" ("General Report," pp. 86-87). Today this is called Rock Island, the largest and southernmost of the Boulder Islands that are partly exposed in the deep, downstream limit of Lake Mead. Egloffstein also here marked on his map, "Head of Navigation." It should not be confused with Fortification Hill (elev. 3655 ft), the broad-topped summit on the east side of the river near this place. ◈

(U.S. National Archives and Records Administration, Record Group 106: Records of the Smithsonian Institution, 1871-1952; https://catalog.archives.gov/id/524189.)

Albumen silver print from glass negative also included in: George M. Wheeler, *Photographs showing landscapes, geological and other features, of portions of the western territory of the United States, obtained in connection with Geographical and Geological Explorations and Surveys West of the 100th Meridian : season of 1871.* [No imprint, no date], "Geological Series. Castellated Sand-Bluffs, Fortification Rock. No. 87." Volume composed of albumen prints, hand-assembled on heavy card stock, in folio; [Caption and seal] U.S. War Department, U.S. Army, Corps of Engineers, [U.S. Geographical and Geological Survey West of the 100th Meridian, Washington].



EXPLORATIONS AND SURVEYS.
WAR DEPARTMENT.

MAP Nº 1.

RIO COLORADO OF THE WEST,

explored by

1ST LIEUT. JOSEPH C. IVES, TOPL ENGRS

under the direction of the

Office of Explorations and Surveys

A.A.HUMPHREYS, CAPT TOPL ENGRS IN CHARGE,

by order of the

HON. JOHN B. FLOYD SECRETARY OF WAR.

1858

drawn by Frhr F.W.v. Egloffstein.
Topographer to the Expedition.

Scale of 6 Miles to one Inch or 1:380160.

5 0 5 10 15

------ Line of Exploration
o Camp
✲ Astronomical Station

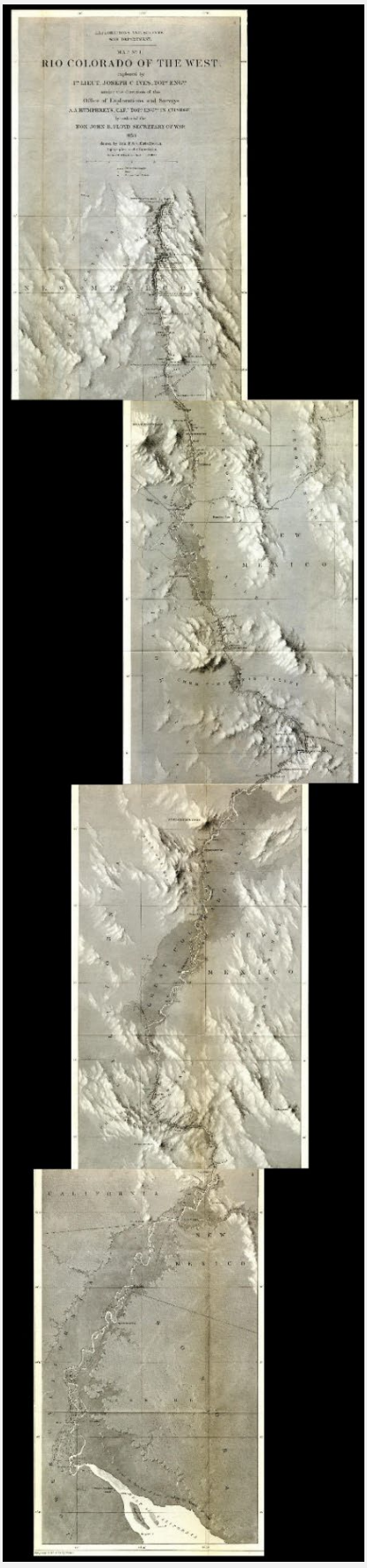


FIGURE 16. "Map No. 1" from J. C. Ives' *Report*, by F. W. von Egloffstein.

▲ Title plate to Egloffstein's "Map No. 1." (The title for "Map No. 2" is identical except for an added period after "1858"; see Appendix Figure A1.) Historians note that at the time when the map title plates and some of the illustrations were composed Egloffstein had for some reason reasserted his baronial title by using the prefix "Freiherr," whereas on earlier productions he had made no such assertion. ◈

▶ Contiguous arrangement of the four plates of "Map No. 1," properly organized so as to follow the course of the Colorado River between the Gulf of California (bottom) and the "Head of Navigation" near present-day Las Vegas Wash. (Compare **FIGURES 10, 11b–e**.) ◈

(American Philosophical Society; digital rearrangement by the author)

FIGURE 17. Detail from the northernmost plate (no. 4) of "Map No. 1." It displays the reach of the Colorado River along which Ives and two men traveled in a skiff (**FIGURE 12**) between "Explorers Rock," the boulder where the steamboat *Explorer* was damaged, and "Fortification Rock," a significant geographical feature that was climbed to gain a view of the terrain nearby *(see text box on the following page)*. Just upstream, where the map ends, an unlabeled, sketchily drawn tributary arrives at the Colorado, which is Las Vegas Wash. Other than the limitrophe between Fort Yuma and the Gulf of California, this is the only reach of the river not seen by Egloffstein; and here he had depended upon Ives' own plat from the excursion *(see also* Note 29 *on p. 37)*. ◈

IN SEARCH OF THE VIRGIN RIVER [30]

(refer to FIGURE 17*)*

In a skiff (see **FIGURE 12**) Lt. Ives, *Explorer*'s civilian Captain David C. Robinson, and the captain's unnamed mate went up through Black Canyon and beyond its upper portal to where they thought they may have reached the Virgin River. This reach was not surveyed by Egloffstein, who used Ives' own plat from the venture. From the mouth of the Virgin it was presumed that overland connections via the "Mormon Road" (see **FIGURE 18a**) might be made with Utah and other interior points (with an eye toward Ives' more covert assignment). But Ives did not at first believe they had reached the Virgin.

> "The appearance of the bed and the banks indicated the existence, during some seasons, of a wide and deep river. It was now but a few inches deep. The water was clear, and had a strong brackish taste. This fact, and its position, led me to suppose that we were at the mouth of the Virgen, but I could scarcely believe that that river could ever present so insignificant an appearance."

Even though he eventually did adopt the supposition that this was the Virgin (notably, Egloffstein did not map it so), current historians confidently believe the men had instead reached Las Vegas Wash. That stream, which heads near Las Vegas, comes to the Colorado just a few miles above the river's entrance into Black Canyon, though its confluence is now submerged in Lake Mead's Las Vegas Bay. On Egloffstein's map it is shown only as a faint, short, spidery tributary (best seen in **FIGURE 18b**). The confluence of the Virgin actually is much farther upstream and could not have been reached in the amount of time the men were away from *Explorer*.

In order to survey the scene, Ives and Robinson climbed Fortification Rock (**FIGURE 15**). The captain would have been able to consult on the potential sighting of river courses. Directing his attention to the region of the Mormon Road, Ives reported,

> "We tried to discover the valley of the Virgen, but could see no indication of any stream coming in from the northwest. The view in that direction was partially obstructed by another summit of Fortification rock."

He focused on the prospect to the northwest, though also took note, "A small open area intervened between camp and a range to the north, and we could trace the course of the river as it wound towards the east, forming the Great Bend." And though his attentions were principally on the Mormon Road area, see the observations (made here) with **FIGURE 18c** that might pertain to northeastward surveillance toward the true Virgin confluence. Ives may have generally recorded and communicated those sightings to Egloffstein along with the Black Canyon plat.

Ives concluded to abandon further exploration on the river:

> "I now determined not to try to ascend the Colorado any further, The water above the Black cañon had been shoal, and the current swift. Rapids had occurred in such quick succession as to make navigation almost impossible, and there would be no object in proceeding beyond the Great Bend. The difficulties encountered in the cañon were of a character to prevent a steamboat from attempting to traverse it at low water, and we had seen drift-wood lodged in clefts fifty feet above the river, betokening a condition of things during the summer freshet that would render navigation more hazardous at that season than now."

---

[30] Quotations from Ives, "General Report," pp. 86-87.

FIGURES 18 ▲, 18a ▶, and 18b, c ▶▶. Details from "Map No. 2" displaying the big bend area of the Colorado River.

This part of "Map No. 2" also plots the Black Canyon reach of the Colorado at a smaller scale than that employed in "Map No. 1" and conceptually joins the two maps. It also displays the transition from the very precise cartography of the lower Colorado River to the more idiosyncratic streamways of "Map No. 2." ◈

FIGURE 18a. Detail from "Map No. 2" displaying the Virgin River confluence area. The "Rio Virgen" is mapped coming from the northeast, with an unlabeled tributary that must be the Muddy River. The Virgin stops short, however, before reaching the Colorado *(see* **FIGURE 18b***)*. Lt. Ives had at first thought that the Virgin confluence was just north of Fortification Rock, but second thoughts held that the improbably small stream there was not that river (it is in fact Las Vegas Wash). Egloffstein, who had not seen that part of the Colorado River, avoided making a subjective error of routing the Virgin around to that stream, leaving its lowest course off the map altogether. It would have been easy to route the Virgin around what appears to be a linear range of hills (as seen in the details in **FIGURES 18b, c**), but he did not, perhaps forcing the decision to not call the short tributary stream the Virgin. Note as well that the canyons in the area of today's Lake Mead are collectively labeled as part of the "BIG CAÑON OF THE COLORADO."

Also delineated here is the "MORMON ROAD" and the "*old Spanish trail from Santa Fé to Los Angeles*" that continues through "LOS VEGAS" [*sic*]. The course of the Virgin River and its unlabeled tributary that is the Muddy River, as well as the road traces, are of course adapted from other sources. These were not part of the Ives expedition surveys. ◈

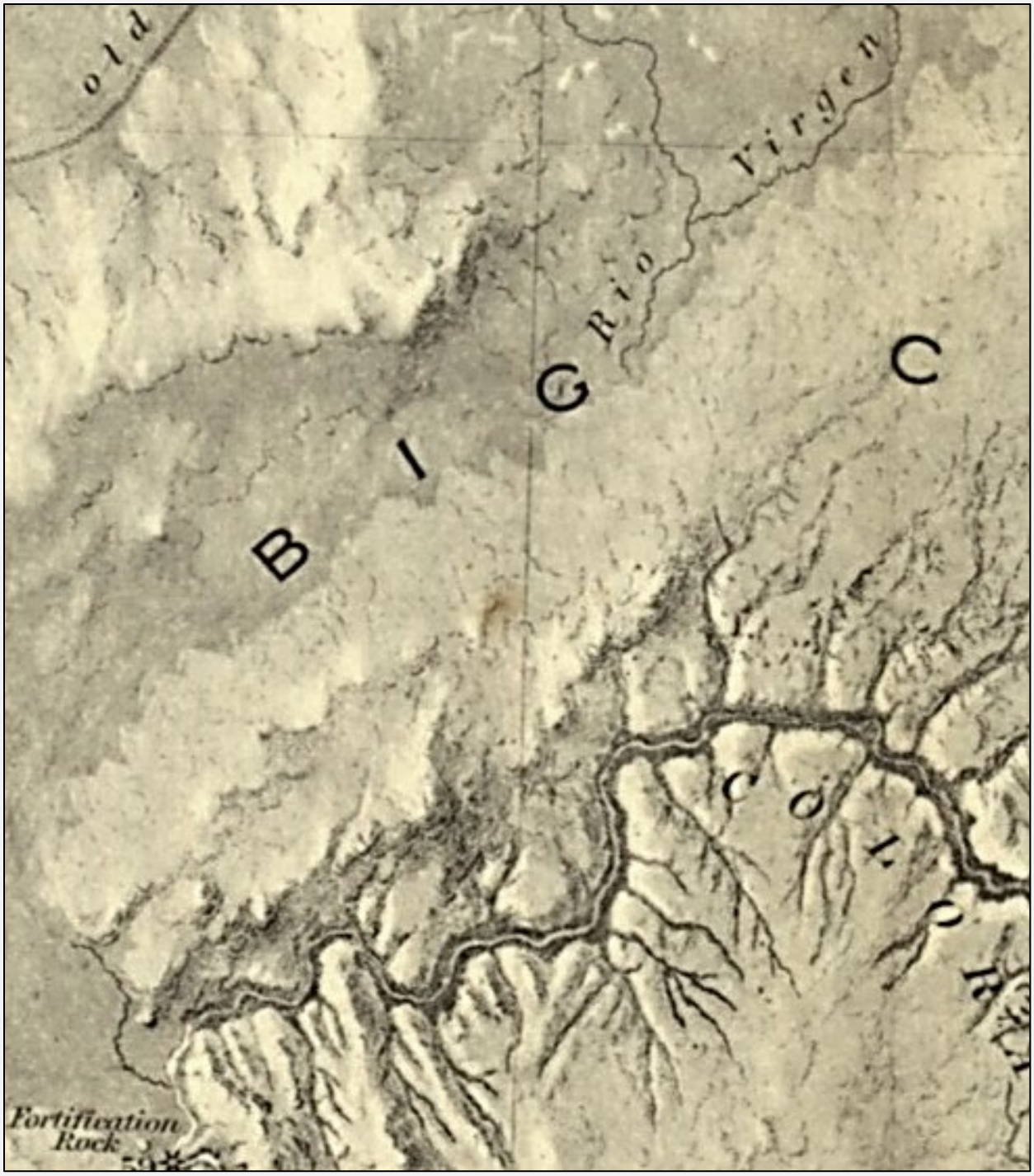


FIGURE 18b. Very close detail of the end of the mapped course of "Rio Virgen" and the lack of a certain confluence with the Colorado River, with the presumed Las Vegas Wash near "Fortification Rock." (Compare annotated FIGURE 18c ▶.)

This detail also exhibits some of the very finely scored, but only conceptual, tributaries to the Colorado River in an area that Egloffstein had not seen (regarding which see more in section 3.1, "Making the Map: Details"). On the eastern side of this detail is the termination of the river course through the unsurveyed area between Diamond Creek and this area. The east–west reach just east of Fortification Rock would have been seen by Ives. ◈

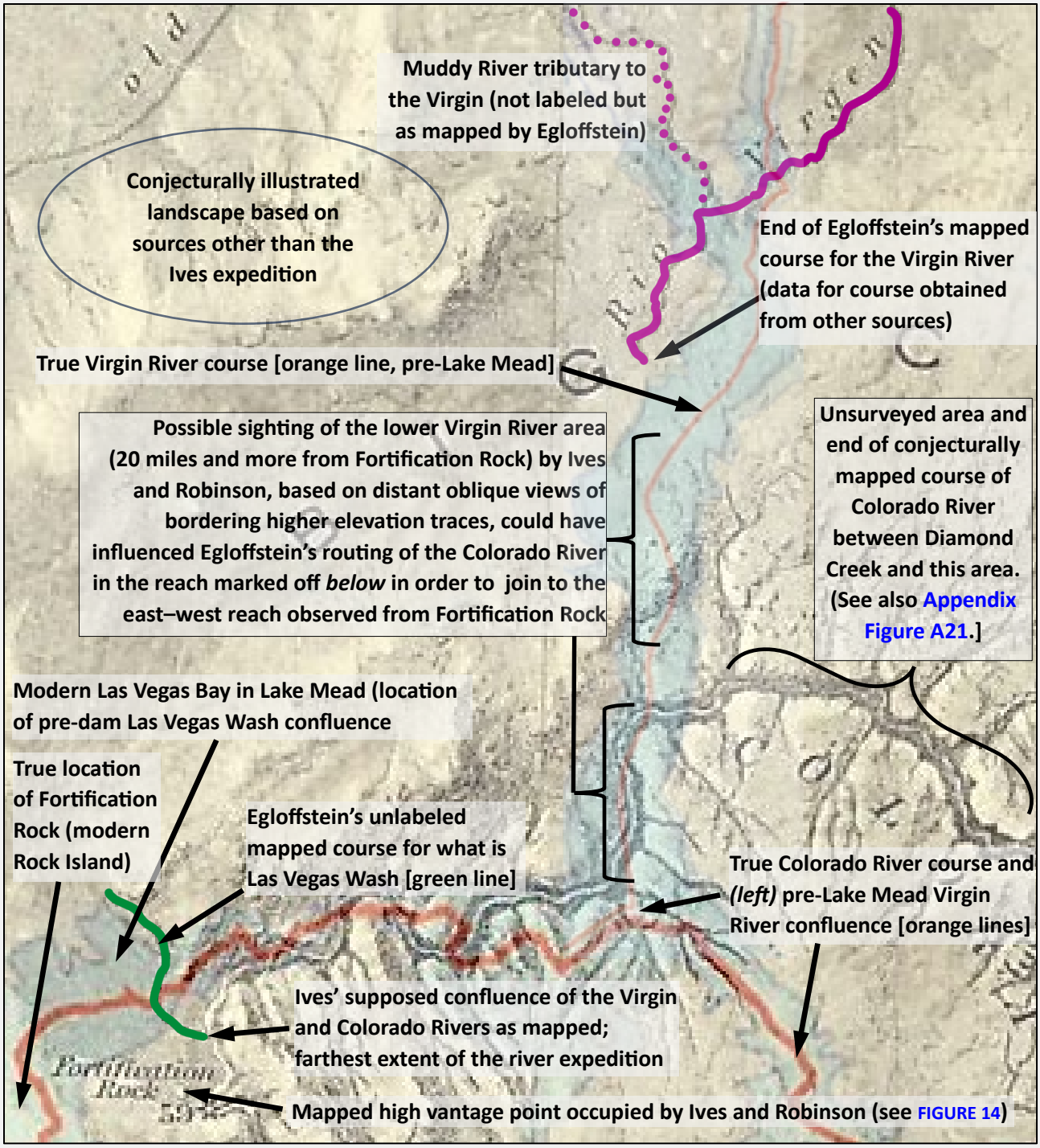


FIGURE 18c. Annotated view of FIGURE 18b, Egloffstein's Virgin River confluence area, with his "Rio Virgen" in *purple* and his mapped unlabeled course of what is Las Vegas Wash in *green*. USGS Streamer modern geography is superposed (pre-lake Colorado and Virgin River courses in *orange*, Lake Mead in *pale blue*). See also text box on p. 45.

The cartographical data for Egloffstein's Virgin and Muddy Rivers are clearly from other sources, in as much as he did not survey these areas. Possibly, the lower Virgin River valley was sighted when Lt. Ives and river captain Robinson climbed Fortification Rock. As noted in the text, possibly reflecting input from Ives, Egloffstein did not commit to connecting the Virgin to the Vegas wash for reasons that potential military intelligence might thereby rely upon erroneous information if the Virgin were expected to be accessed for the transportation of materiel and troops on the Mormon Road. ◈

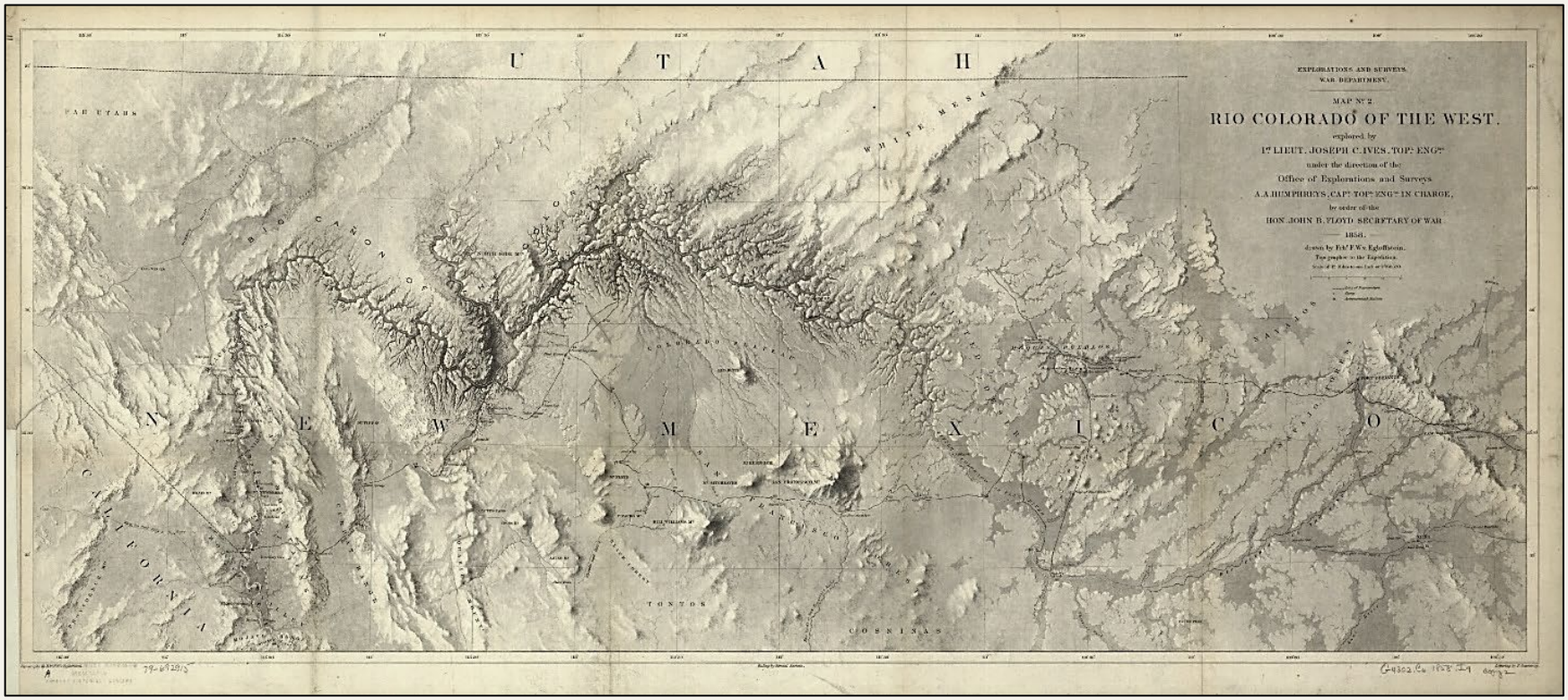


FIGURE 19. "Map No. 2. Rio Colorado of the West, Explored by 1st. Lieut. Joseph C. Ives, Topl. Engrs. under the direction of the Office of Explorations and Surveys, A. A. Humphreys, Capt. Topl. Engrs. in charge, by order of Hon. John B. Floyd, Secretary of War. 1858. drawn by Frhr. F. W. v. Egloffstein. Topographer to the Expedition. Scale of 12 miles to one Inch or 1:760320."

"Topography by Frhr. F. V. v. Egloffstein. Ruling by Samuel Sartain. Lettering by F. Courtenay."

(Library of Congress, https://www.loc.gov/resource/g4302c.np000062/*.)*

CHAPTER 3
"Map No. 2": Reexamining a Classic

[FIGURES 19–41]

The figure legends in this chapter are a key part of the interpretations and may accordingly be read as their own narrative. Refer also to the Analytical Charts (pp. xii–xv).

"MAP NO. 2" of "Rio Colorado of the West" (**FIGURE 19**) is well known for its first, and partly speculative, depiction of the greater Grand Canyon region. For years it served as the authoritative, standard model for mapping the Colorado River and other major streams of the region. Although the map's title block refers to "Rio Colorado," the river is labeled "Colorado River" on the map. Nowhere on "Map No. 1" does the river's name appear, except in the "Rio Colorado" title block.

Measuring 15 × 35 inches (38 × 89 cm), "Map No. 2" encompasses a broad territory between approximate longitudes 108°15′ to 115°45′ W and approximate latitudes 34°10′ to 37°05′ N. Drawn at a scale of 1:760,320, it covers approximately 180 × 420 miles, about 75,600 square miles (290 × 676 km, about 196,000 square kilometers). Aside from its display of the "BIG CAÑON OF THE COLORADO," with its numerous tributaries, its most striking prospect is that fully half of the "Big Cañon" is given over to the "Little Colorado or Flax River." Egloffstein, Ives, and others had not realized that they were looking toward the Colorado River canyon when they visited Cataract Creek, but mapped it as the Little Colorado, the true confluence of which was in 1858 still unvisited by explorers.[31]

What makes "Map No. 2" seem so peculiar at first glance is its haphazard web of tributaries to the Little Colorado and Colorado Rivers. With the exception of major tributaries like Parashant Wash (not labeled) and Cataract Creek, though each has its own peculiarities, most of the tributaries actually are mnemonic representations of streams and their canyons that were not surveyed; they do not actually exist as shown (**FIGURES 19, 21**). These tendrils were sculpted on the plaster model from which the map was eventually reproduced. Collectively they are visual prompts for the viewer to infer the presence of numerous side canyons.

[31] It must be noted that the exacting cartobibliographer Carl L. Wheat specifically commented on this misorganized relationship in his lengthy analysis of "Map No. 2", published in his commanding study of maps of the Trans-Mississippi West, but took no further note of the peculiar topographical relationships compared to the modern map. Instead, he turned his commentary over to historical notes about the Ives expedition and, regarding Egloffstein's maps, devoted considerable space to the technical process by which they were made, mostly by quoting all of Ives' Appendix D. (Carl L. Wheat, *Mapping the Transmississippi West, Volume Four* [The Institute of Historical Cartography, San Francisco, 1960], pp. 98-101.)

Coupled with the largely accurate courses of the main streams, they present both a fairly truthful idea of the Grand Canyon as it might have been seen from great altitude. It also casts an unsettling oddness to the overall view, for which the map has garnered criticism in the past century likely because of Egloffstein’s association with the demonstrable abnormalities of some of his scenic views that were reproduced in Ives’ *Report (see Chapter 1 herein)*.

This chapter re-examines Egloffstein’s “Map No. 2” generally as well as in significant detail. With the exception of section 3.1, “Making the Map: Details,” the focus is not on his widely acknowledged innovations in topographic display and his inventive techniques in engraving and reproduction, but in analyzing the topographic elements themselves, compared to modern maps of the region. So many detailed views are provided herein because a born-digital production such as this one may be less mindful of the expenses incurred in page composition and printing. For this reason, too, the sizes of the illustrations are purposely generous, to facilitate better viewing of the details presented thereon.

Although this map has been feted by historians and cartographers, it also has been swept up in the incredulity of Egloffstein’s scenic illustrations of the Grand Canyon (*see in Chapter 1*). Accordingly, its eccentric portrayals of parts of the Grand Canyon and, more glaringly, the running of the Little Colorado River all the way to the middle portion of the canyon, have been treated as distractions of hypothesis or fantasy on what otherwise is a technical masterpiece of cartographic construction. It is partly the purpose of the present publication to reduce some of that incredulous opinion by explaining why these elements are on the map.

To place “Map No. 2” in modern perspective, see the whole-map comparisons shown by **FIGURES 20a and 20b**. (Refer also to the illustration on *page iv*; legend on p. iii) These displays will allow the reader a broad view of the generalities of ground truth as well as the interpreted landscapes.

This chapter comprises several sections that closely analyze details of the map:

Making the Map: Details — comprising close examination of specific details on the map that illustrate the styles of engraving and the expression of smaller topographical elements

Principal Stream Courses — mostly regarding the delineation of the Colorado and Little Colorado Rivers

Parashant Wash and Cataract Creek — examinations of the two main tributaries shown on “Map No. 2”

Upper Reach of the Colorado River — analysis of Egloffstein’s implied Colorado River course where it approaches the better-mapped parts of the Grand Canyon

Putting “Map No. 2” to Use: The First Grand Canyon Geological Map — notes and illustrations pertaining to J. S. Newberry’s “Geological Map No. 2” that used Egloffstein’s map as its base

While the associations of the superposed maps illustrated in the present publication are, at these scales, accurate, they are not meant to be exactly precise if interpreted at large scales. Further, differences in the styles of map projections that were employed will necessarily preclude that sort of precision while not affecting general accuracy. ◈

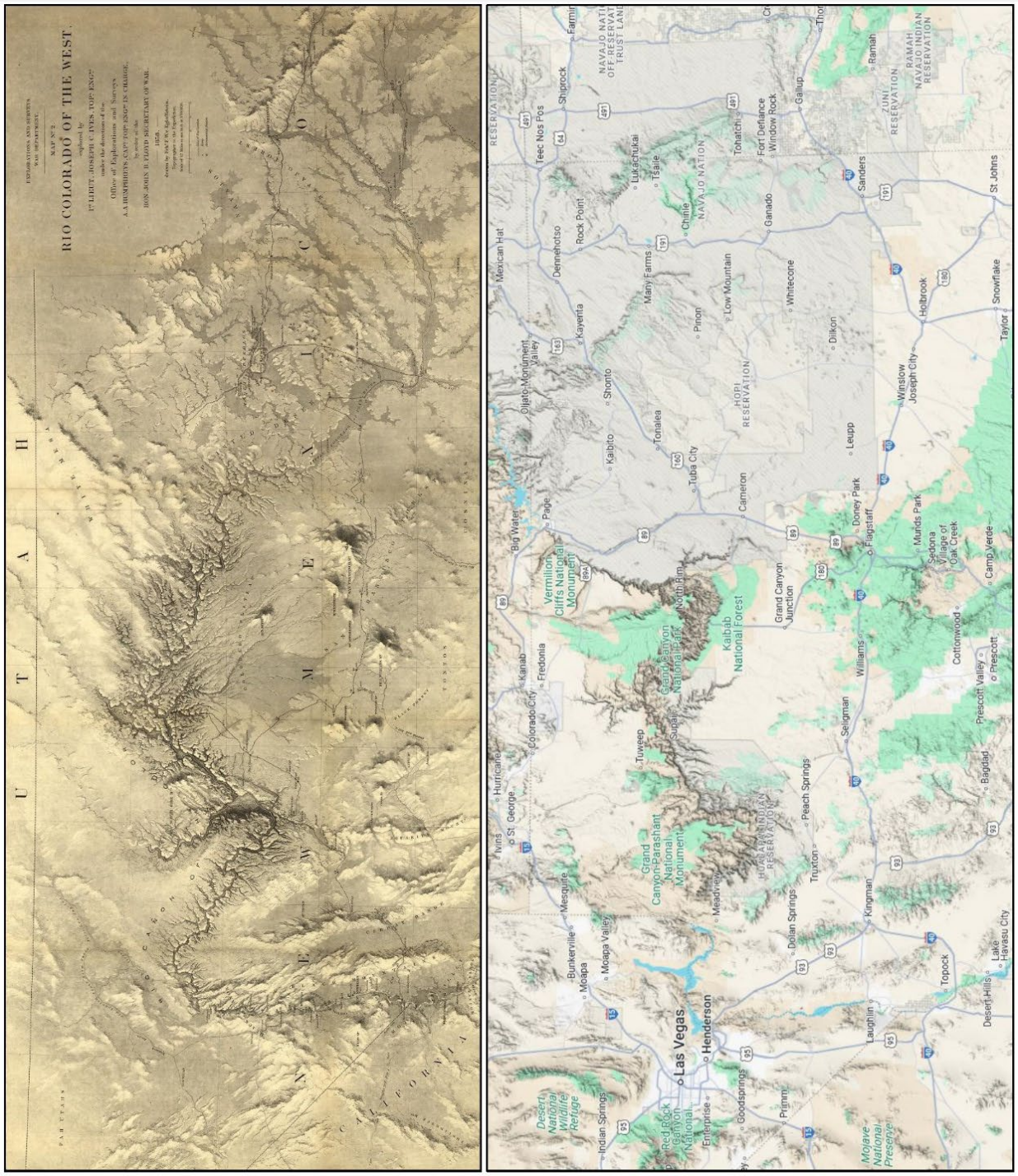


FIGURE 20a. Egloffstein’s “Map No. 2” *(top)* compared to the same area on present-day Google Maps *(bottom)*. ◈ (Map data © 2025 Google.) [See in part also the illustration on *page iv* (legend on p. iii)]

FIGURE 20b. Egloffstein’s “Map No. 2” *(top)* compared to the satellite view of the same area *(bottom)*. ◈

(Satellite imagery from Google Maps. Imagery © 2025 Landsat/Copernicus. Imagery © 2025 TerraMetrics.)

FIGURE 21. The greatest area of dendrification on "Map No. 2" is shown in the region where surveys were made over long, oblique vistas or could not be made at all *(eastern half of this detail)***.** The profusion of tributaries is mnemonic and were scored in the plaster model that the topographer created in the studio. What Egloffstein had encountered on the ground on the plateau were numerous shallow streamways, which are represented by some of these dendritic forms and finer characteristics that can be examined in enlarged views of the map. He also had distant panoramic views to the west and north. From these he interpreted the courses of major tributaries en route to either of his main streams, the "Little Colorado River" (actually the Colorado) and the Colorado (downstream from Cataract Creek and in his upstream projection [*top-left in this detail*] that is discussed elsewhere herein). ◈

3.1 ◈ Making the Map: Details [FIGURES 22–27]

Egloffstein was not as unguarded about his methods of cartographic reproduction as we wish. Regardless of what had been intimated in Ives’ “Appendix D” (**FIGURE 13** in *Chapter 2*), very close examination of his maps help reveal how they were crafted. While it is still partly a mystery how the reproductions were made (recall that his secrecy extended to distributing the production among physically segregated people and departments), one can interpret some known procedures through examining fine details. Other close examinations of “Map No. 2” reveal some points that can be clues to Egloffstein’s heliographic methodology of portraying a landscape at larger scales. One of the obvious details is the method of shading, about which cartographic historians have explicated, and which in 1858 was still not evolved to its most developed state, mixing its modes of expression (*see* **FIGURES 22, 23**).

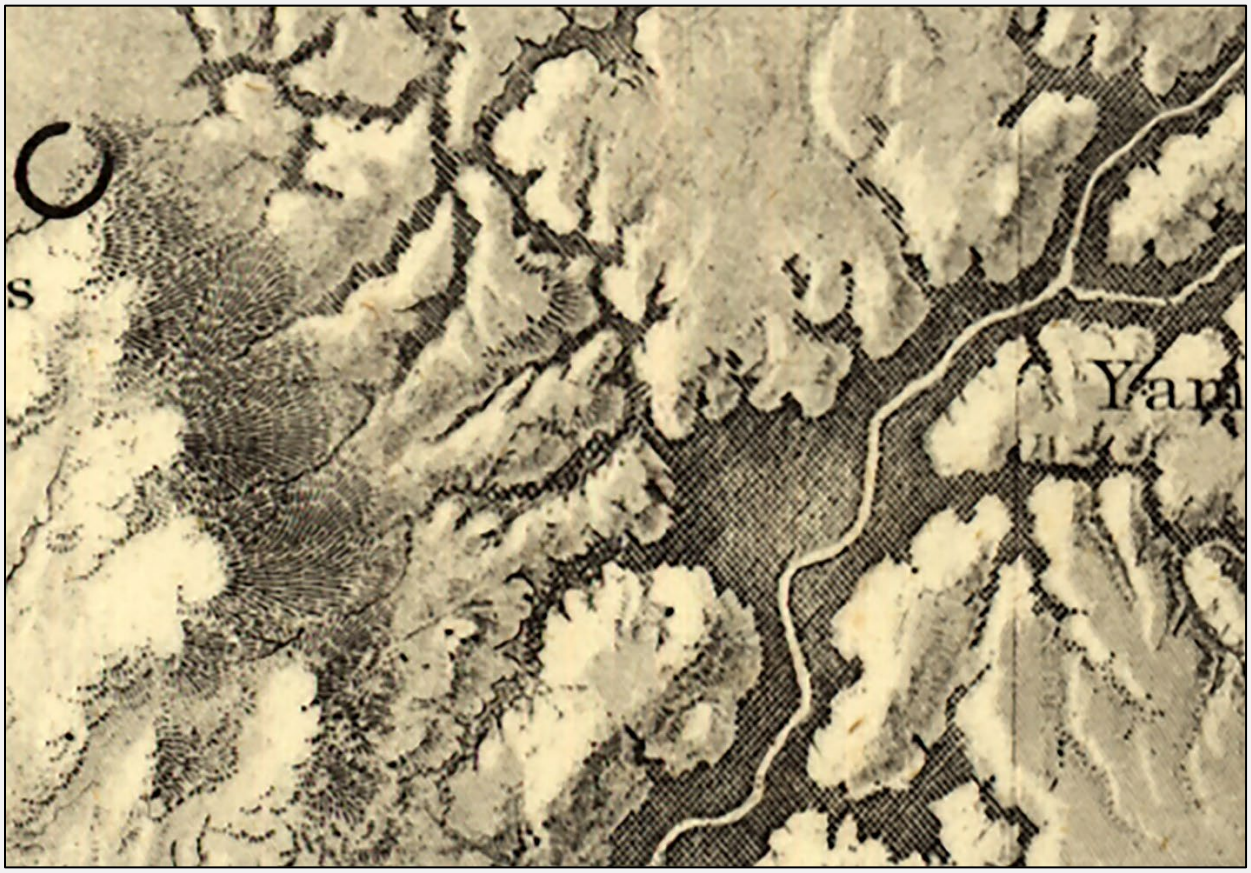


FIGURE 22. Hachuring and very fine criss-crossed ruling are seen side-by-side. The conventional sort of hachuring *(at left)*, portraying the shaded side of a geographic feature, was used across Egloffstein’s map (even though Ives’ “Appendix D” had indicated that hachuring had been discontinued in the production of the Colorado Exploring Expedition’s maps—a note intended to promote forthcoming advances in technique that Egloffstein was then improving). The criss-crossed ruling was reserved to show areas of deeper relief, including in the smallest of the convoluted tributaries. This fine detail is at the supposed confluence *(upper right)* of the Little Colorado River with the great Colorado. ◈

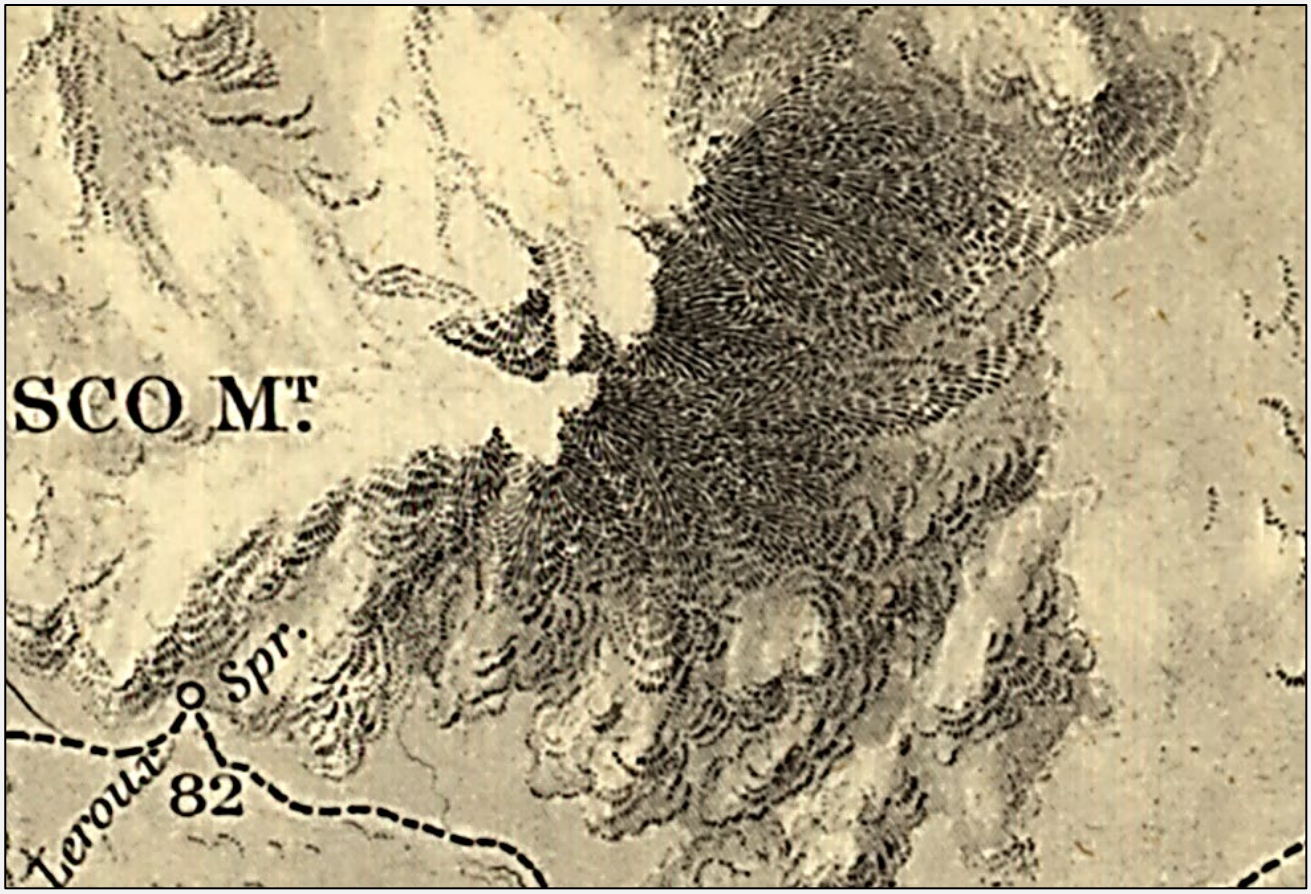


FIGURE 23. Very close detail of hachuring on the southeastern slopes of San Francisco Mountain. This digitally enhanced detail more clearly displays a prominent area of hachuring, further belying the statement in Ives’ “Appendix D” that Egloffstein’s use of hachuring had been discontinued. ◈

At first glance, the principal streamways on the map around the Grand Canyon region are laced with an intricate system of narrow tributaries, feathering away from the main body of the chasm in fine dendrites like frost tracing a window pane (**FIGURES** 21, 24, 25, 26). In the areas that Egloffstein could not have surveyed, the dendrites fill in for what intuitively should be there. Many of these tributary systems indicate a sense for the general slope of the terrain rather than strict ground truth, thus they disclose Egloffstein’s remarkably astute ability to imagine the physiography of the unvisited landscape that lay between the areas that he did visit.

All of the tributary systems, down to very fine details, probably had been sculpted into the plaster model, then photographed, rather than added in the process of engraving the steel plate during Egloffstein’s secretive shop processes. With the exception of the largest tributaries, indications of which may have been seen from long distances, none of these dendritic features can be said to trace actual streams (**FIGURES** 24, 25, 26). ◈

FIGURE 24. Very close detail showing parallel ruling as the result of using the very-fine–ruled glass screen, here showing the delicate headwater tendrils of shallowly excavated stream courses. This detail is from the headwaters of the Cataract Creek basin. Here one may see how the very fine ruling made light work of the depiction of comparatively shallow streamways scored on the plaster model, where hachuring would have been more time-consuming. [See also Appendix Figure A20.]

See also an example from another map engraved by Egloffstein, **FIGURE 27**. And another interesting very close detail on “Map. No. 2” (**FIGURE 30**) displays an odd combination of apparent hand-engraved ruling, cross-hatched ruling, and alterations made during engraving as opposed to work done during plaster sculpting. Bear in mind that part of Egloffstein’s process involved episodes of acid washing to reveal specific aspects of the photographed plaster model. These demonstrate Egloffstein’s ongoing modifications to his methods, and that not all topographic expression was finished once the plaster model had been photographed. ◈

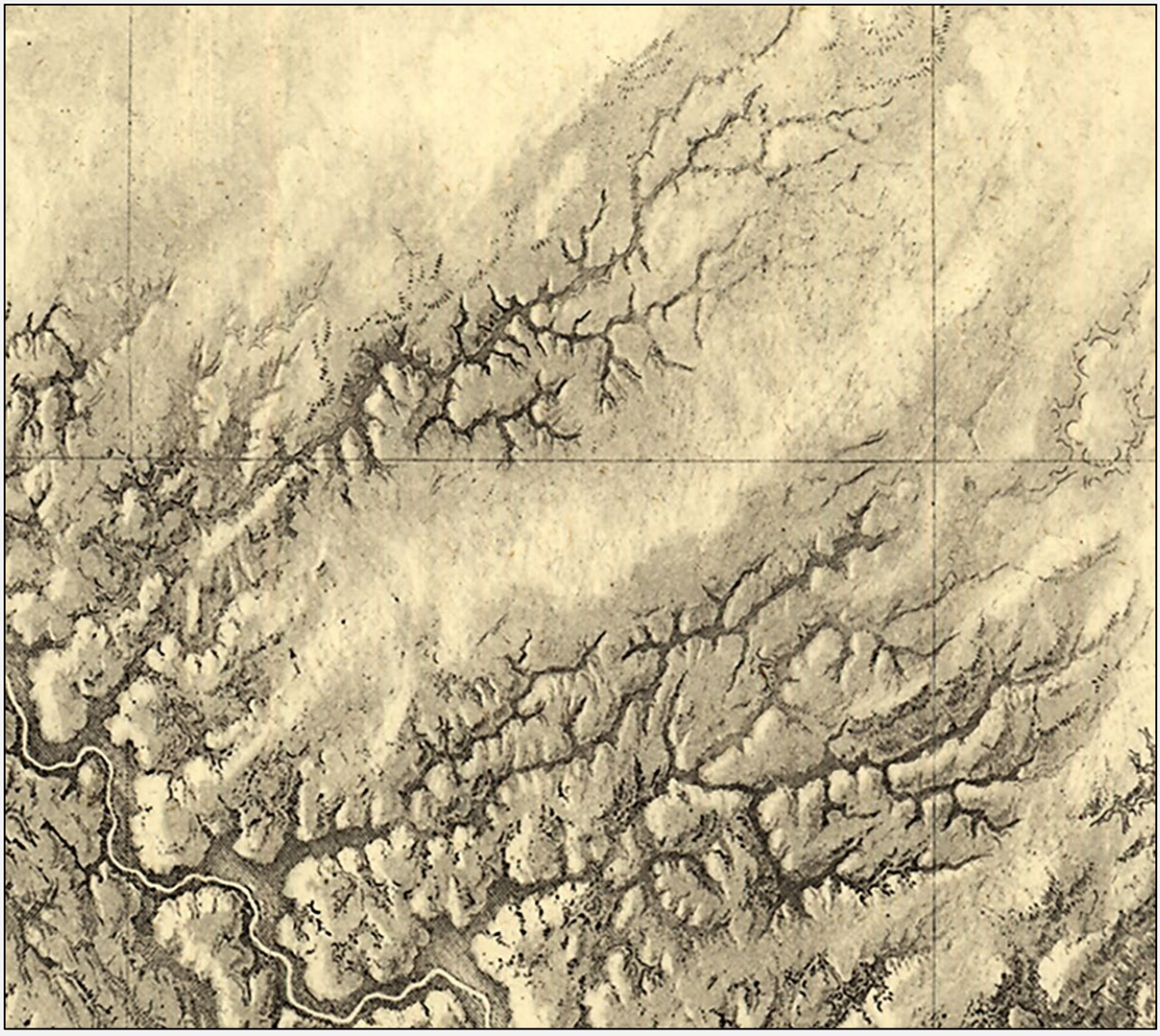


FIGURE 25. Systems of contrived dendritic tributaries probably scored in the original plaster model. This detail is from the main part of the Grand Canyon, an area that Egloffstein had not been able to see. They fill in, interpretively, drainages that Egloffstein thought should be there. Note that these tributary systems are in parallel, indicating a sense for the general slope of the landscape as Egloffstein perceived it. ◈

▲ **FIGURE 26. Very close detail of tiny strands of tributaries *(see in lower left quadrant)*.** This detail is from the contrived landscape of the eastern Grand Canyon area, along Egloffstein’s Little Colorado River. While these are simply suggestions of tributaries, their numerous presence was likely remembered from the expedition’s sojourn across the plateau, where small drainages were frequently crossed. Some of the more “aimless” of them may also be cracks in the dried plaster of the original model, photographically captured. Note also that this area juxtaposes the “messy” area of very odd, if not careless, shaded relief just to its north (see **FIGURE 30**).

The label, “CASCADE”, may have been written in error and not corrected. While Cataract Creek had also been informally called Cascade Creek, this label is too far east (and on the wrong side of the “Little Colorado River”) to have been applied to that tributary. Neither is it the cascade of the Grand Falls on the Little Colorado far southeast of the Grand Canyon, which was correctly labeled on Egloffstein’s map (**FIGURE 26a** ▼), a feature already known from and lithographically illustrated in Sitgreaves’ expedition report (1853, Plate II, “Cascade of the Little Colorado River, near Camp 13”).

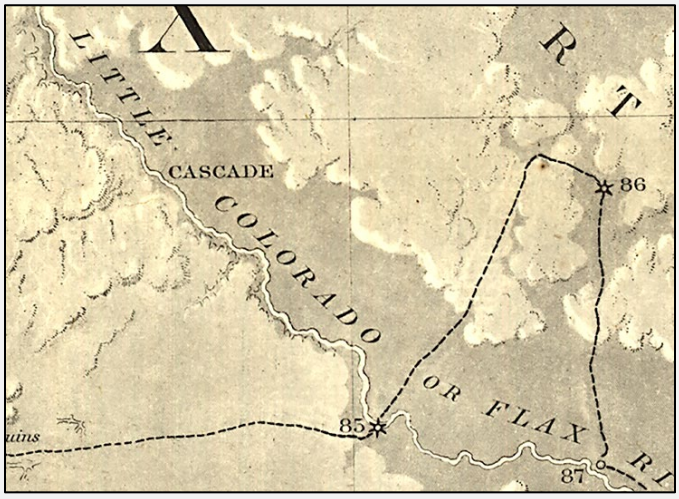


FIGURE 26a ▶

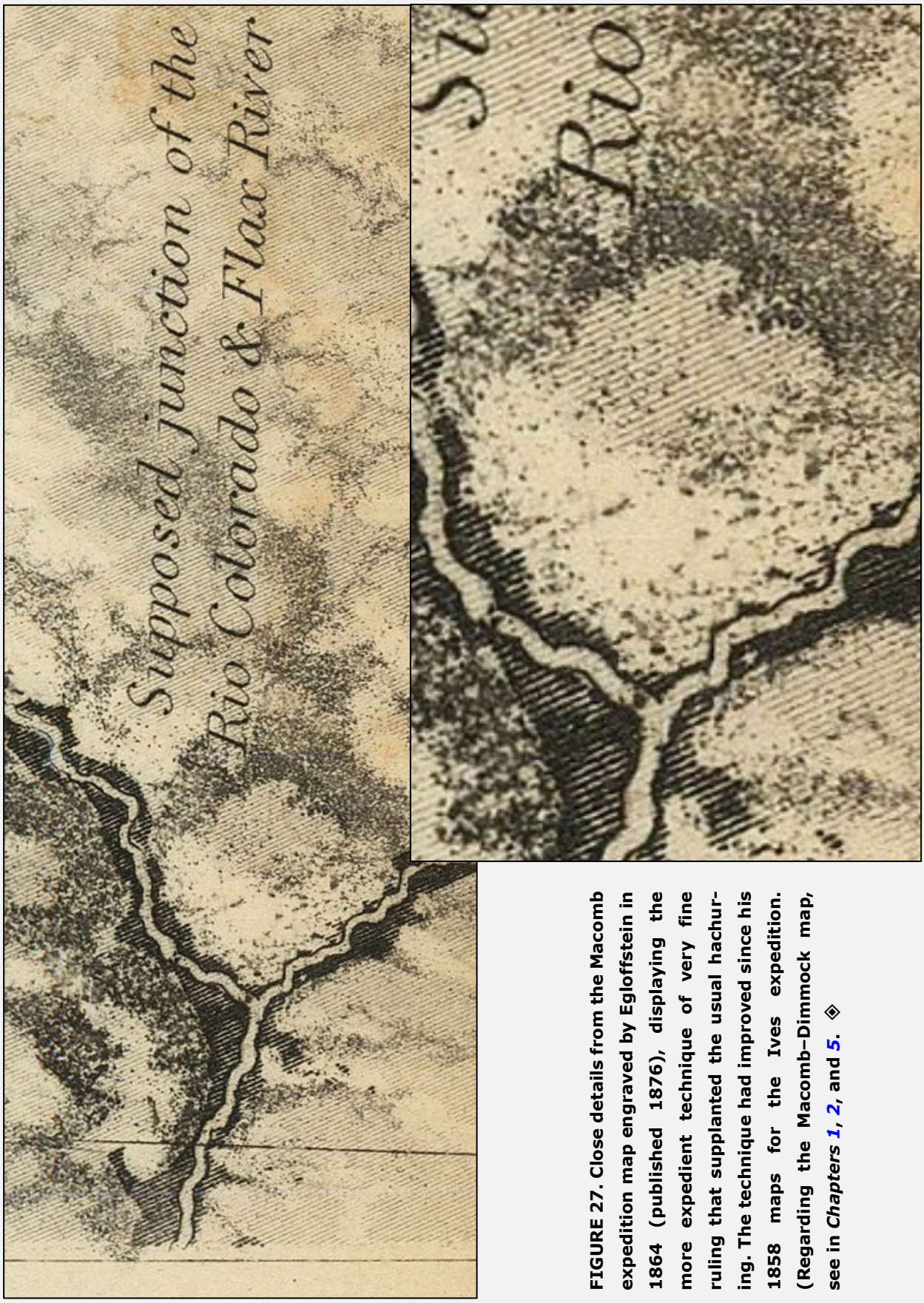


FIGURE 27. Close details from the Macomb expedition map engraved by Egloffstein in 1864 (published 1876), displaying the more expedient technique of very fine ruling that supplanted the usual hachuring. The technique had improved since his 1858 maps for the Ives expedition. (Regarding the Macomb–Dimmock map, see in *Chapters 1, 2,* and *5*. ◈

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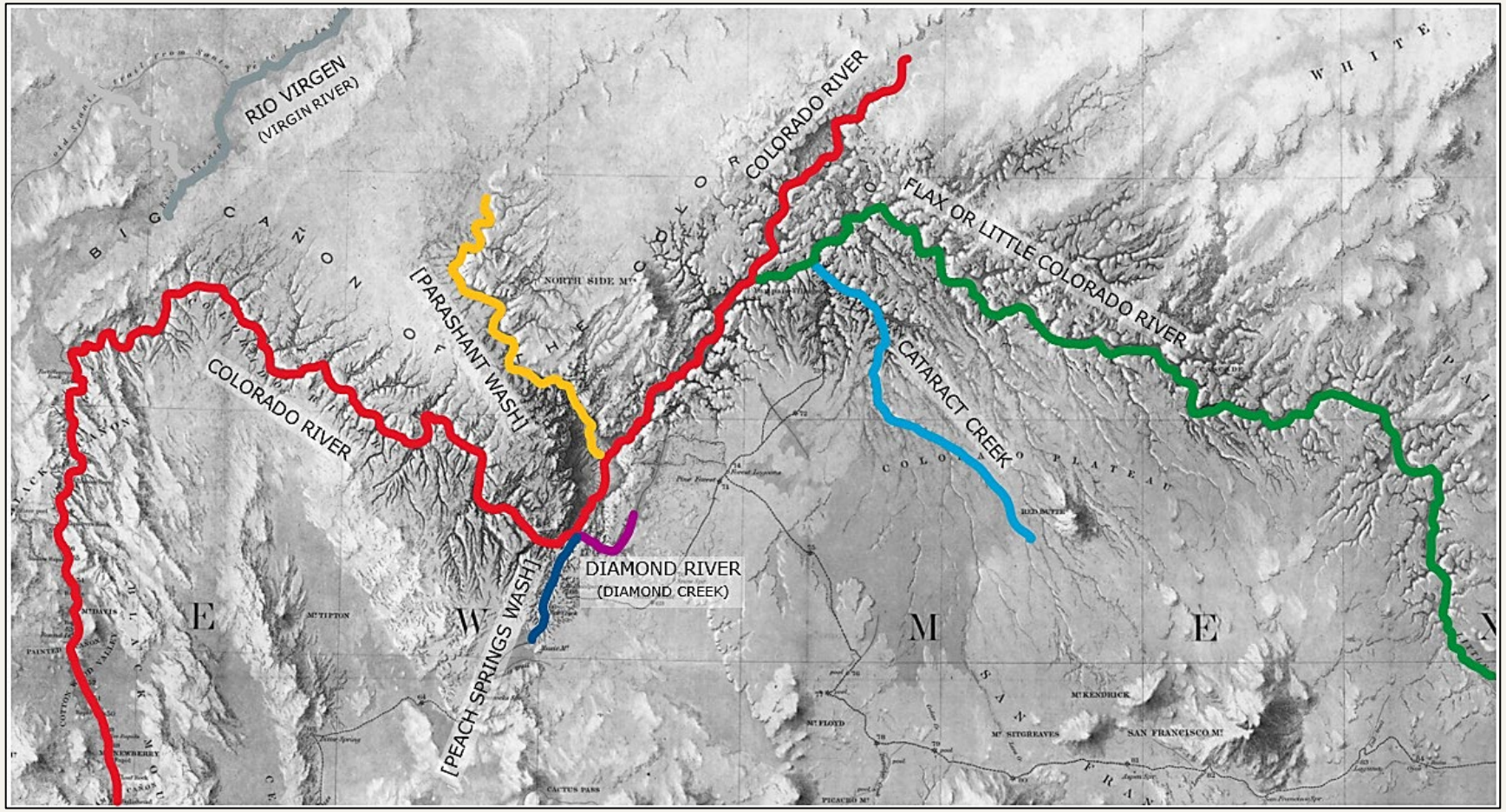


FIGURE 27A. Principal stream courses on "Map No. 2." Stream names in [square brackets] were not labeled by Egloffstein.

3.2 ◈ Principal Stream Courses [FIGURES 27A, 28–34]

"The positions of the main water-courses have been determined with considerable accuracy."
Lt. J. C. Ives, "General Report," *p. 110*

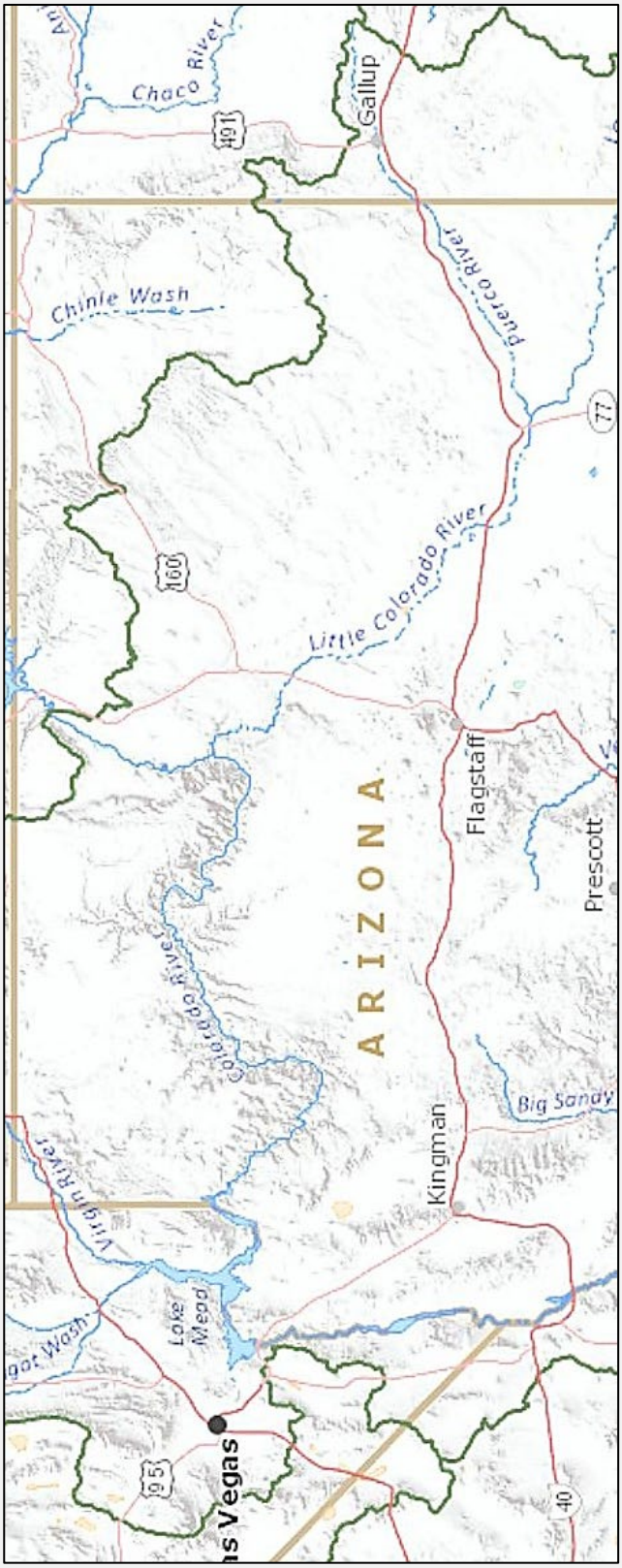
This restudy of "Map No. 2" began simply enough, by comparing the stream courses drawn by Egloffstein (**FIGURE 27A**) with those on a modern map. This was effected by using "Streamer," an interactive, web-based application from the U.S. Geological Survey (https://webapps.usgs.gov/streamer/). With it one may draw complete down- or upstream courses from any selected point along a river or principal tributary in the U.S. It employs a master map at a scale of 1:1,000,000, which can be greatly enlarged though it does not add tributaries when zoomed in to larger scales.

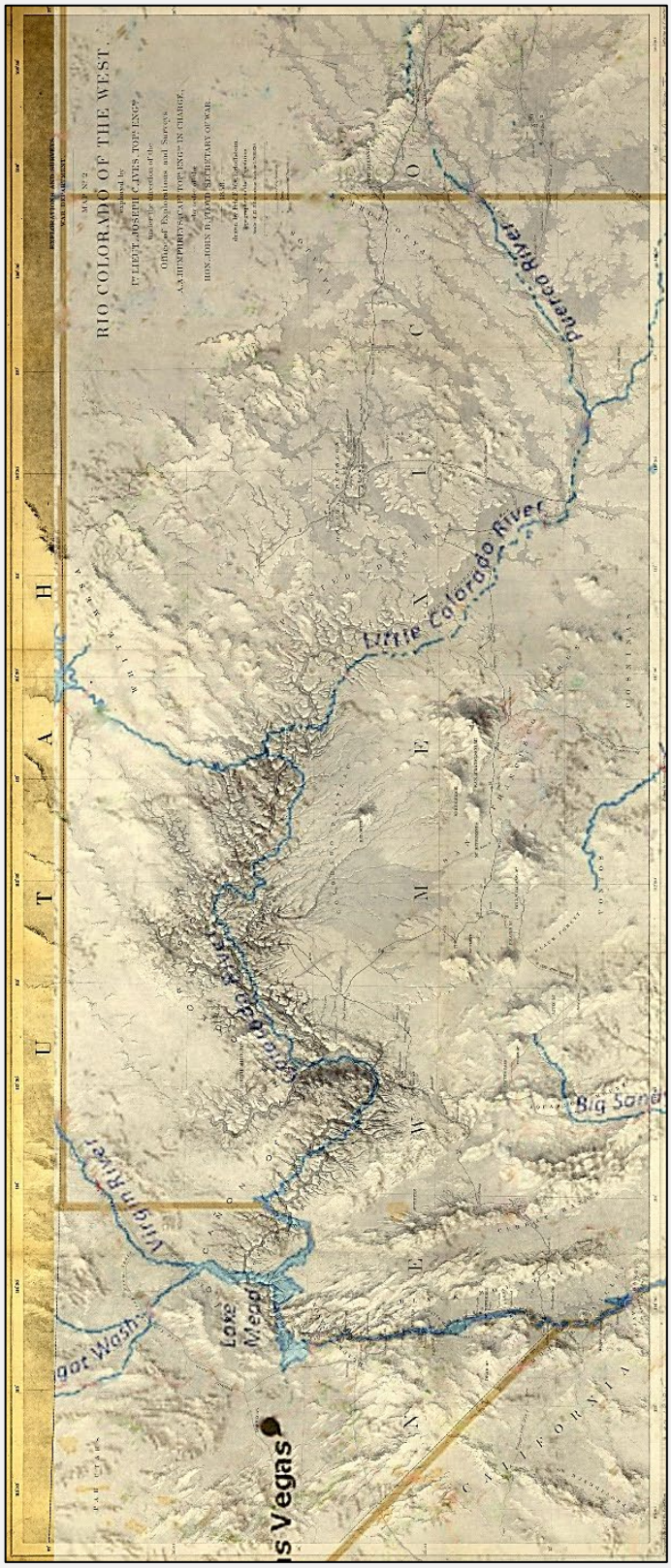
To create the Streamer overlays for various figures of this publication, latitude and longitude data were not considered because the Egloffstein maps are not perfectly correlated to these data in modern maps. Instead, two well-located positions on "Map No. 2" served to anchor themselves to the same positions on the fixed modern map. When the Egloffstein map is resized to effect this match, allowing the modern map to be superposed on it, the two maps are at the same relative scale by which variances may be seen.

Along the Colorado River, the confluences of Diamond Creek and Cataract Creek are the principal superposition anchor points used for this study.[32] The Diamond Creek confluence had been occupied and fixed astronometrically by the Ives expedition and thus is close to the position shown on modern maps. The Cataract Creek confluence, which was not reached because the terrain was impassable to the explorers, was some 15 straight-line miles from an astronometrically fixed campsite (no. 73 on the map) at the head of then-unnamed Hualapai Canyon, a western tributary to Cataract Creek down which a few members of the expedition descended in an attempt to reach the confluence *(see Chapter 4)*.

Once the two confluences on "Map No. 2" and the modern map are superposed, variances appear as expected across the Grand Canyon region. The revealed overall correlation is amazingly good, though whether this is a surprise or not is biased by negative perceptions that have been held of Egloffstein's depicted geographies. The significant discrepancies are constrained, not wholesale, as explained in the figure legends and elsewhere in the present publication. (The lower Colorado River corridor of "Map No. 1," more precisely surveyed at a larger scale, superposes very well, though that is not the focus of this publication.) ◈

[32] Recall that Egloffstein and others of the expedition thought it was the Little Colorado River running along most of the true Colorado's course in the eastern and central Grand Canyon, hence the discrepancy in labeling.


Chaco River
491
Gallup
Chinle Wash
Puerco River
77
160
Little Colorado River
ARIZONA
Flagstaff
Prescott
Colorado River
Kingman
Big Sandy
Virgin River
Lake Mead
95
40
Vegas


RIO COLORADO OF THE WEST.
Little Colorado River
Puerco River
Big Sandy
Virgin River
Lake Mead
Vegas

▲ **FIGURE 28. U.S. Geological Survey Streamer base map *(top)* with stream courses superposed on Egloffstein's "Map No. 2" *(bottom, in light blue, and be alert that some of the modern map's own shaded relief may show faintly when superposed on Egloffstein's own more boldly shaded relief)*.**

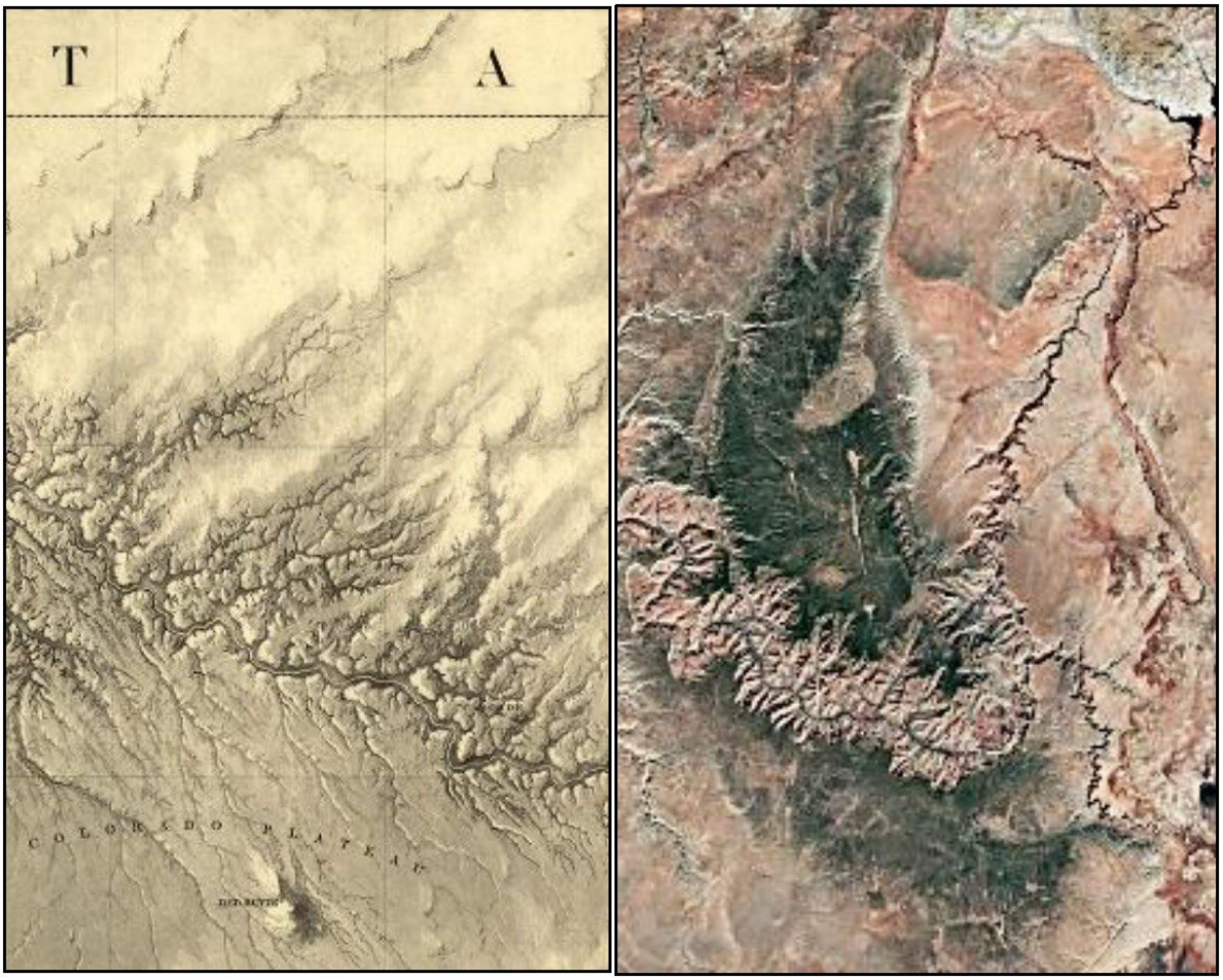
At this scale, the most striking observation is how closely most of the stream courses on the modern map follow Egloffstein's courses, though with localized deviations. If nothing else, this is a great testimonial to his abilities. Whereas the lower Colorado River and the flatland Little Colorado and Puerto River valleys were known factors, he had to connect the two across the vast Grand Canyon landscape. The most significant omission is the Colorado River's true course coming southward from Utah into Marble Canyon and toward the true confluence of the Little Colorado River in eastern Grand Canyon, an error introduced only by Egloffstein having not been able to see any of the landscapes, even at a distance. Only on closer inspection are other misconceptions revealed. ◈

(See also closer details in FIGURE 28a)

FIGURE 28a. Details of FIGURE 28 focus on the Grand Canyon itself, the eastern part of which is surely the most contentious part of Egloffstein’s map. The Colorado River is non-existent in the northeastern part, and Egloffstein’s supposed course of the “Little Colorado River” does not even become parallel to the true course of the Colorado until it passes the area now known to be the easternmost Grand Canyon. Further, the entire region to the north of this area is topographically misconstrued—there is not even a suggestion of Marble Canyon nor the distinctive Kaibab Plateau (compare **FIGURE 29**), for the simple reason that Egloffstein had no survey notes for this whole area. (The Kaibab could be inferred from the hummocky landscape north of the canyon in this area, which would have been interpreted from long-distance views toward this greater

[*continued* ↗

[*Figure 28a legend continued* elevation and perhaps from anecdotal information received through expedition guides.) While constructing this map—the plaster model, specifically—Egloffstein had to connect this vague area as judiciously as possible to the areas that he did see and survey, which were the Diamond–Cataract Creek vicinity to the west of this detail and the Little Colorado River and Puerco River valleys off to the southeast. To have left these areas unconnected, as he had with the Virgin River confluence, would have been aesthetically defective at this scale even though it called for supposition. Still, as is noted in this study, there remain difficulties even within the areas he did survey. ◈



▲ **FIGURE 29. The greatest topographical deviation** between Egloffstein’s and modern maps is arrestingly illustrated by these same-area views shown to the same scale *(Google Maps satellite view at right)*. (See also **FIGURE 34**; and compare the *frontispiece* in the present publication and the illustration on *page iv* [legend on p. iii]) This view encompasses eastern Grand Canyon, Marble Canyon, Vermilion/ Echo Cliffs, and Kaibab Plateau, areas that Egloffstein did not see *(see Chapter 4)*. He did pass through the area farther south, just below these views. The prominent north–south trending shaded area about a quarter way from the right of the map detail, seeming to coincide with the north–south Colorado River in the space view, is apparently only a coincidental feature in the manufacturing of shaded relief—though compare, and take note of the comments with, **FIGURE 30**. ◈

3. “MAP NO. 2”: REEXAMINING A CLASSIC

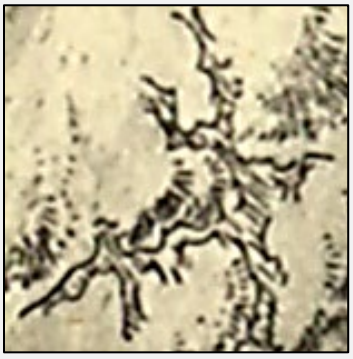
◀ **FIGURE 30. Very close detail of the prominent north–south shaded relief area that could correlate to the true course of the Colorado River’s approach to the true Little Colorado confluence; in an area that Egloffstein had not been able to survey during the Ives expedition. This area measures more than 20 miles in length on the map.**

The form of shaded relief is odd for this map (refer to section 3.1, “Making the Map: Details”). It is an uncharacteristically messy presentation, in which some areas display the cross-hatching of deeply excavated canyons mixed with relief-slope hachuring. There is evidence that some tributaries or cliff lines are further defined by the use of outlines and radial hachuring ***(see enhanced details below)***, clearly added during engraving as opposed to having been scored during plaster sculpturing. The general east-facing slope of this feature in shaded relief shows rough, irregular ruling—seemingly an attempt to hand-engrave the fine parallel ruling—that is quite unlike the photographically applied precise parallel glass ruling displayed elsewhere on this map and others engraved by Egloffstein.

This ambiguous feature does not present any indication that an attempt was made to draw in the course of the Colorado River, in as much as there is no twin-lined principal stream course embedded in it (such as with the “Little Colorado River” glimpsed at the *lower-left* of this detail). But especially note the coincidence of the Colorado here on the later Macomb–Dimmock map of 1860, which Egloffstein himself engraved in 1864 (**FIGURE 60** in *Chapter 5*)! Might he have had some advance understanding of this and thought to add it, but gave up while finishing “Map No. 2” for the Ives report? We know from Ives’ cover letter of 1 May 1860 to Capt. Humphreys that the report had ”been delayed until the maps of the region explored should be completed,” three years since the expedition (*Report*, 1861, p. 5).

This mixture of late-phase emendations to the map could have been an attempt to display something that failed, was interrupted, or changed intention. Note also that this area juxtaposes the peculiar area that delineates very small tributaries, some of which actually may have been cracks in dried plaster, captured photographically, which appear nowhere else *(see* **FIGURE 26***)*. Together these are another mystery of Egloffstein’s studio work.

Since the topographer had not seen this area, what clues he may have had through notes or reports that instigated these attempts and repairs are unknown. One could also argue that this was an effort to display part of the southeastern end of the Kaibab Plateau; but if that is so, the source and credibility of his information is unknown to us. ◈



Enhanced details showing some areas where unusual outlining appears. Note also that the cross-hatching is interrupted.

FIGURE 31. Detail of the USGS Streamer overlay for the western Grand Canyon, Great Bend, and northern portion of the lower Colorado River—between Parashant Wash/Diamond Creek and Explorers Rock. Anchor points for this map are Las Vegas and Diamond Creek. The modern Colorado River course is accentuated in ***red***; other tributaries on the Streamer map are shown in ***pale blue*** (some of the modern parts of Lake Mead do not fully show on the reduced-opacity overlay). Note that Egloffstein's mapped course for the Colorado in western Grand Canyon is effectively straight (as he had similarly portrayed his "Little Colorado River" in eastern Grand Canyon, another reach that he had not been able to survey). The true Colorado River course deviates from this path, but once it has reached into the Great Bend area Egloffstein's river course better matches the modern map, with modest deviations. The Black Canyon reach is noticeably displaced perhaps because it was a stretch of the river not traveled and surveyed by Egloffstein, who depended upon Ives' own plat drawn on a trip taken in a skiff (refer to **FIGURE 17** and associated text box in *Chapter 2*). ◈

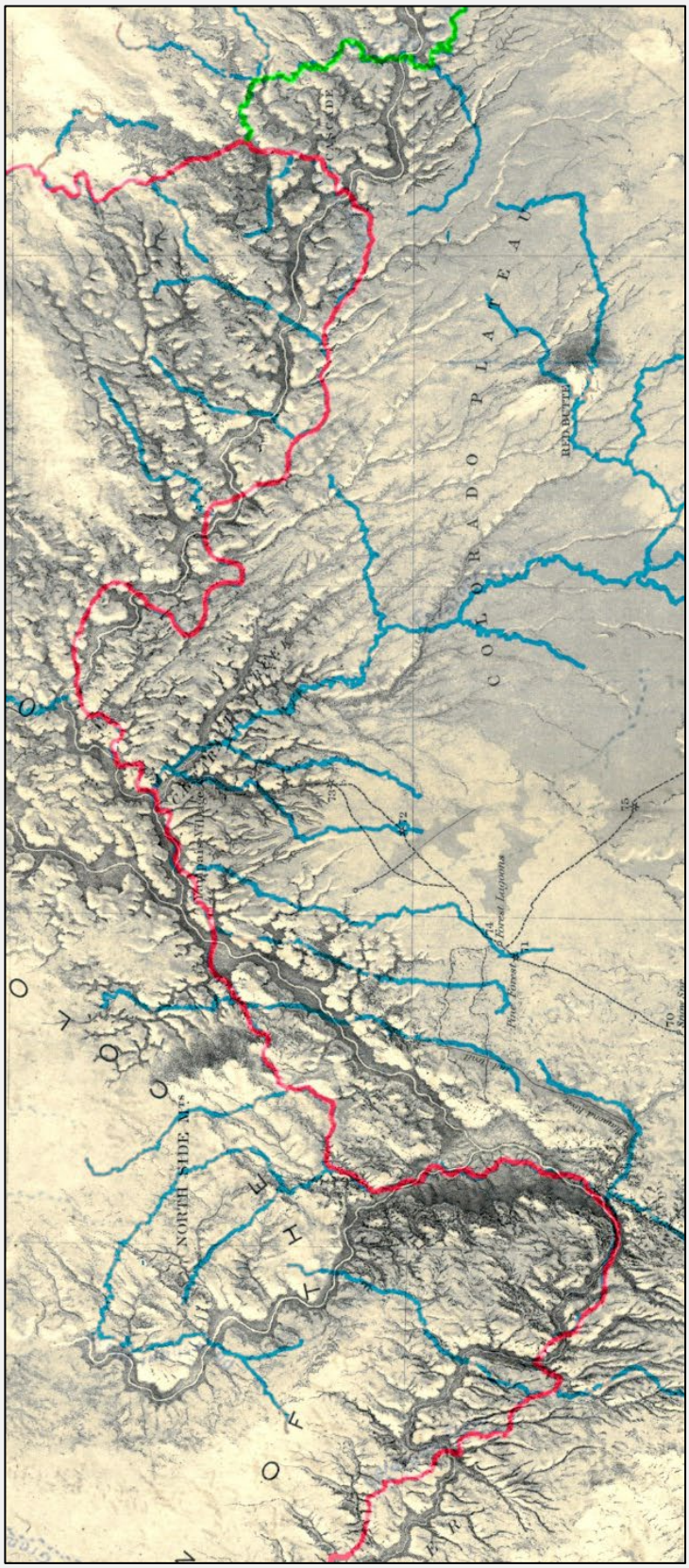


FIGURE 32. USGS Streamer river and tributary courses superposed on Egloffstein’s map of the Grand Canyon. The Colorado River is here recolored ***red***, and the Little Colorado River recolored ***green***, in order to distinguish these streams from the ***blue***-lined tributaries of the 1:1,000,000-scale Streamer map. The Egloffstein base map (in gray and pale yellow tints) reveals where his cartographical interpretations vary significantly from ground truth, particularly in the eastern Grand Canyon and in the vicinity of the unlabeled Parashant Wash basin on the west. Course deviations of the Colorado in the westernmost part of this detail, northwest of the Diamond Creek confluence (lowest arc on the west side here), are also pronounced though the two are in parallel. Red Butte is clearly misplaced westward and misleadingly enlarged on Egloffstein’s map (see Appendix Figure A12). Note the dashed-line routes traveled by the Ives expedition *(lower part of map, left of center)*, revealing that Egloffstein had had no vantages on the eastern half of this detail view.◈

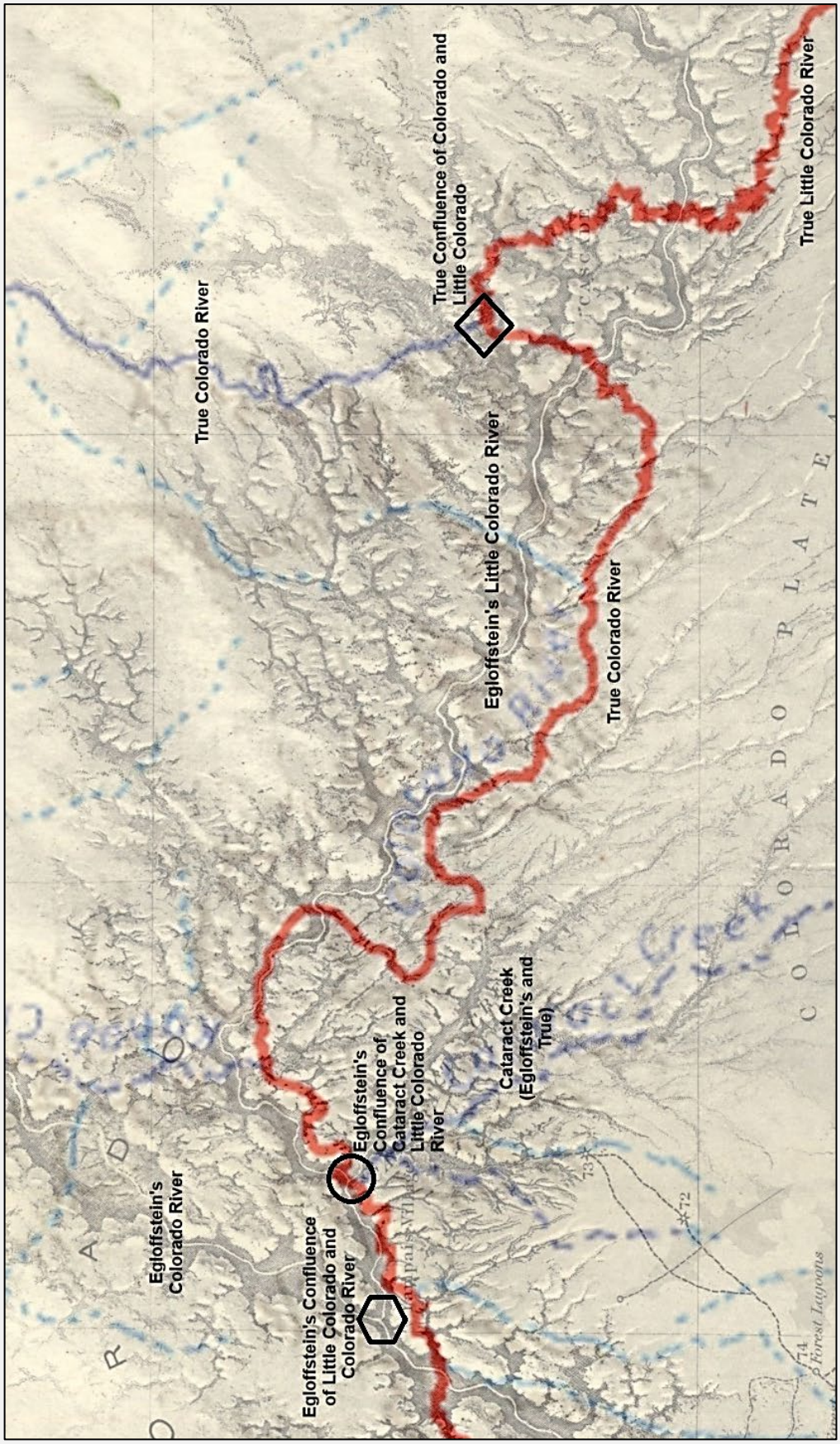


FIGURE 33. Comparison of Egloffstein’s eastern Grand Canyon region with USGS Streamer stream courses superposed (*red* and *pale blue*). Egloffstein’s projection of the Little Colorado River into the eastern Grand Canyon area is obvious, whereas the approach of his Colorado River to the a supposed Little Colorado confluence is west of Cataract Creek. ◈

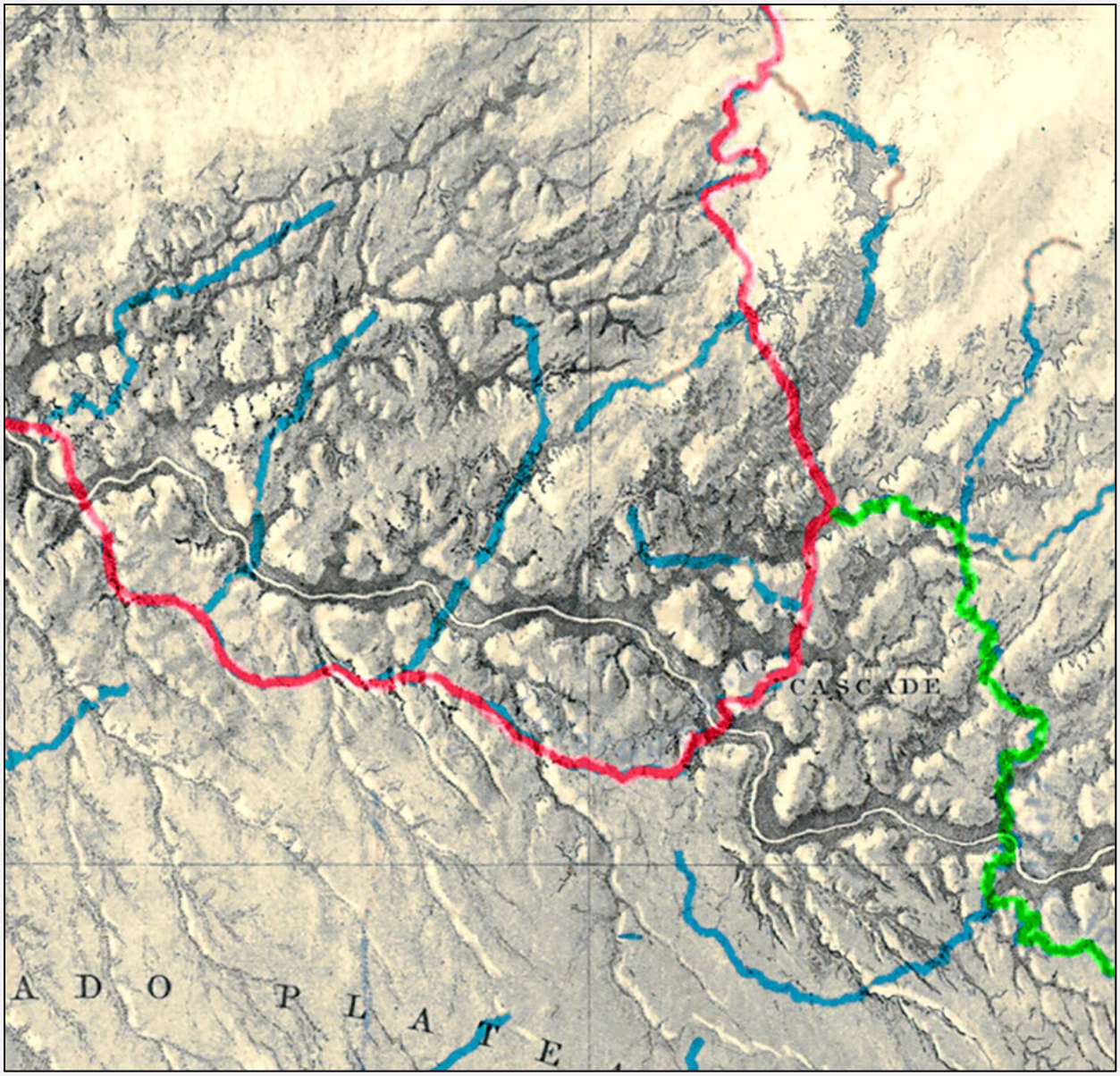


FIGURE 34. Area of greatest discrepancies between Egloffstein’s map and true stream courses. USGS Streamer overlay: ***red*** depicts the true Colorado River; ***green*** depicts the true Little Colorado River; ***blue*** depicts true tributary streams. ◈


Parashant Wash
Cataract Creek


COLORADO
RIVER
GRAND CANYON
NORTH SIDE Mts
COLORADO
Pine Forest
Forest Lagoons
Snow Spr.

3.3 ◈ Parashant Wash and Cataract Creek [FIGURES 35–38]

It does not require very close examination of “Map No. 2” to notice the prominent, openly bulbous topographical element on the Colorado River upstream from the Diamond Creek confluence **(FIGURES 34, 36)**. There Egloffstein has mapped the confluence of an unlabeled but significant tributary from the northwest. Examining modern maps reveals that this can only be **Parashant Wash**, a locally significant, obvious tributary to the Colorado though one of no exceptional length. Curiously, Egloffstein applied no name to Parashant Wash either from existing usage or as a new geographical name. Its principal topographic element, Parashant Canyon, was named around 1900.[33]

On modern maps the Parashant confluence with the Colorado is farther upstream and is not so prominent. This is a peculiar difference because it is an area of the canyon that Egloffstein had been able to visually survey, first from a high elevation in the Diamond Creek area (probably Diamond Peak), then from a separate excursion to the rim from a later camp on the plateau *(Chapter 4)*. If the route of the plateau excursion is correctly mapped, it leads to an area of the rim looking over what is known today as Granite Park, which is in fact part of that bulbous open space on his map. While the actual Parashant Wash confluence area is also somewhat open, the map shape and its position on “Map No. 2” does not correlate with the smaller open area of the true Parashant confluence. The reason for this disparity, considering this was an area apparently more closely surveyed than other areas from great distances, is not particularly obvious. Lacking Egloffstein’s actual field notes, we are left only to the nuances of inference and interpretation. [Also compare **FIGURES 48, 48a** in *Chapter 4*.] Had this tributary been named, as like Cataract Creek was already known and Diamond Creek named anew by the Ives expedition, the errors of later maps that forced the Colorado River into this channel might have been avoided.

◄ **FIGURE 35. Comparison of the Diamond Creek–Cataract Creek area, embracing Parashant Wash and Cataract Creek. USGS Streamer base map *(top)* and Egloffstein’s “Map No. 2” *(bottom)*.** The overall agreement is reasonable, with the greatest discrepancies in Parashant Wash *(lower left)* and Egloffstein’s upper Colorado River course *(top center)*. In the area of Cataract Creek, what Egloffstein had mapped as the Little Colorado River agrees well with the modern map of the Colorado River. His upper Colorado course might be construed to be a misplaced and conceptually enlarged Kanab Creek, although that tributary’s actual confluence is farther upstream. ◈

[33] Nancy Brian, *River To Rim*, Third Edition (Earthquest Press, 2024), pp. 188-189.

FIGURE 36. This bulbous topographical peculiarity is mapped at the confluence of Egloffstein’s Parashant Wash (from the northwest and not labeled by him) with the Colorado River (from the northeast, also not labeled). It is one of the more unusual features on the map, all the more curious because it is in an area fairly well surveyed by Egloffstein, who had high vantage points near Diamond Creek and later while the expedition was camping on the plateau. A separate excursion was conducted to the rim looking over the area (part of that excursion route can be seen as the pointed dashed line that arrives at and departs from the rim on the east side of this detail; and see also **FIGURE 46** in *Chapter 4*). Viewing the Granite Park area may have contributed to this very open depiction (compare **FIGURES 48, 48a** in *Chapter 4*) but attributing this area to the Parashant Wash confluence does not correlate with the true confluence farther upstream on the Colorado River (**FIGURES 35, 37**). ◈

In any case, the Parashant Wash tributary on Egloffstein’s map is a significant one physiographically and cartographically, so it is no wonder that later cartographers seized upon it for reuse in their rearrangements of regional streamways. *Chapter 5* demonstrates how Parashant came into play on commercial and government maps that would be prepared in the next decade or two.

Cataract Creek, on the other hand, is the most expansive of Grand Canyon’s tributaries on “Map No. 2.” Other than Peach Springs Wash and Diamond Creek, it is the one area of the Ives land expedition that garnered the most attention. It is the prominent tributary of the plateau on the south side of the Grand Canyon, heading at the bases of the San Francisco Peaks and nearby mounts. While its upper reaches are shallowly excavated streams (see for example **FIGURE 24**), they soon combine and deeply excavate to form what today is named Havasu Canyon.

After the expedition’s sojourn to the Colorado River at Diamond Creek, they ascended to the forested plateau where a number of encampments were made as they progressed forward and back across that landscape. Their ultimate goal was to locate the Little Colorado River confluence, which in the end they failed to reach because the canyons were impassable to their small company and mules.[34] They further believed that the descent to Cataract Creek and its confluence would give them access to the “Little Colorado River,” thence easily to that waterway’s confluence with the great Colorado. ◈

[34] Ives’ “General Report” contains lengthy narratives about the expedition’s time on the plateau, and the attempt to descend into Havasu Canyon.

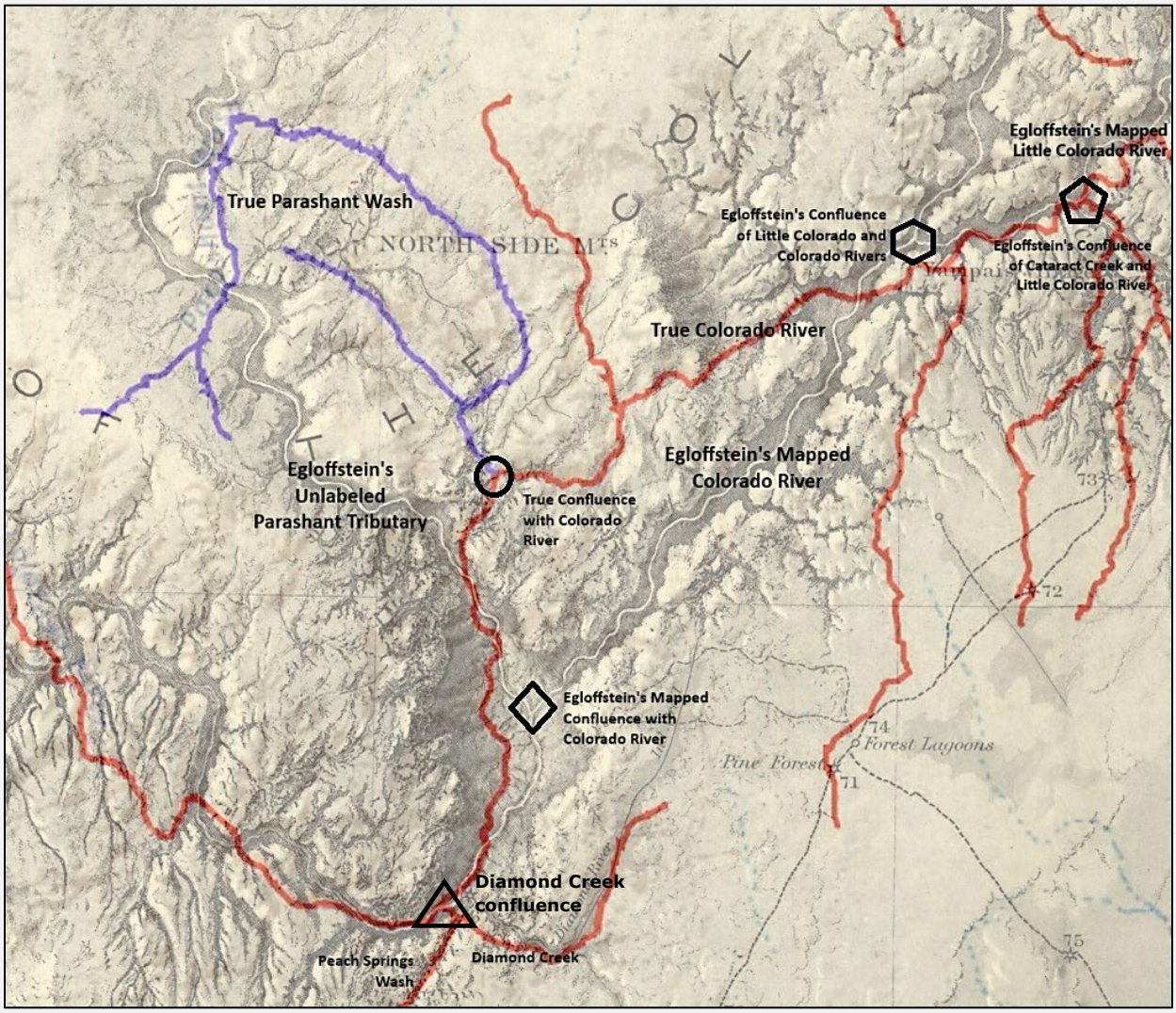


FIGURE 37. Egloffstein map overlaid with true stream courses from USGS Streamer (in *red* and *purple*), with attention to the tributaries Cataract Creek (partially seen at right) and Parashant Wash (upper left, in *purple*). For this study, the Diamond Creek and Cataract Creek confluences serve as coincident anchor points between the two maps. Note how Egloffstein’s Colorado River course deviates from the river’s true course, the result of distant vantages. Likewise misplaced are the Parashant Wash main stem and its confluence with the Colorado. This does seem to have been an area of some difficulty in Egloffstein’s survey, for reasons not altogether apparent. ◈

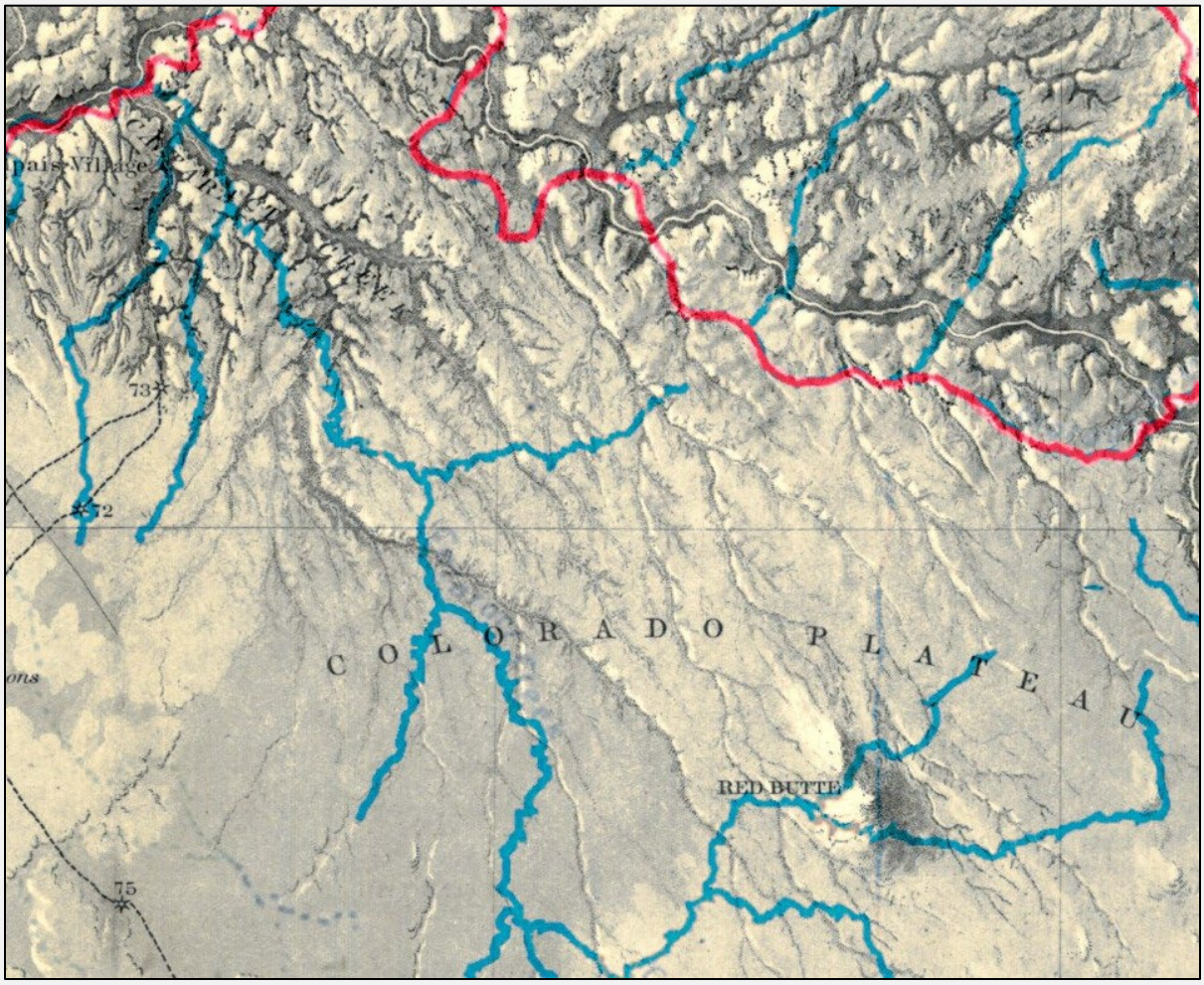


FIGURE 38. The Cataract Creek area on the Egloffstein map is superposed with USGS Streamer stream courses. The true course of the Colorado River (in ***red***, from USGS Streamer) generally parallels Egloffstein’s Little Colorado River course (**gray**). ***Blue*** lines are USGS Streamer tributaries to the true Colorado River, with the prominent one belonging to the true Cataract Creek drainage system. The main course of lower Cataract Creek (today’s Havasu Canyon) generally parallels part of Egloffstein’s mapped main course of Cataract Creek. The dashed lines at left and lower left depict portions of the routes followed by the Ives expedition, as mapped by Egloffstein. The position and relative size of Egloffstein’s Red Butte has been noted by historians and cartographers to be too large and too far to the west (Appendix Figure A12). The numerous shallow northwest-trending tributaries, as noted elsewhere herein, are not ground truth but are only suggestions of the trend of regional drainage, in as much as Egloffstein was not able to survey that area, instead interpreting it from the areas on the plateau through which the expedition traveled. ◈

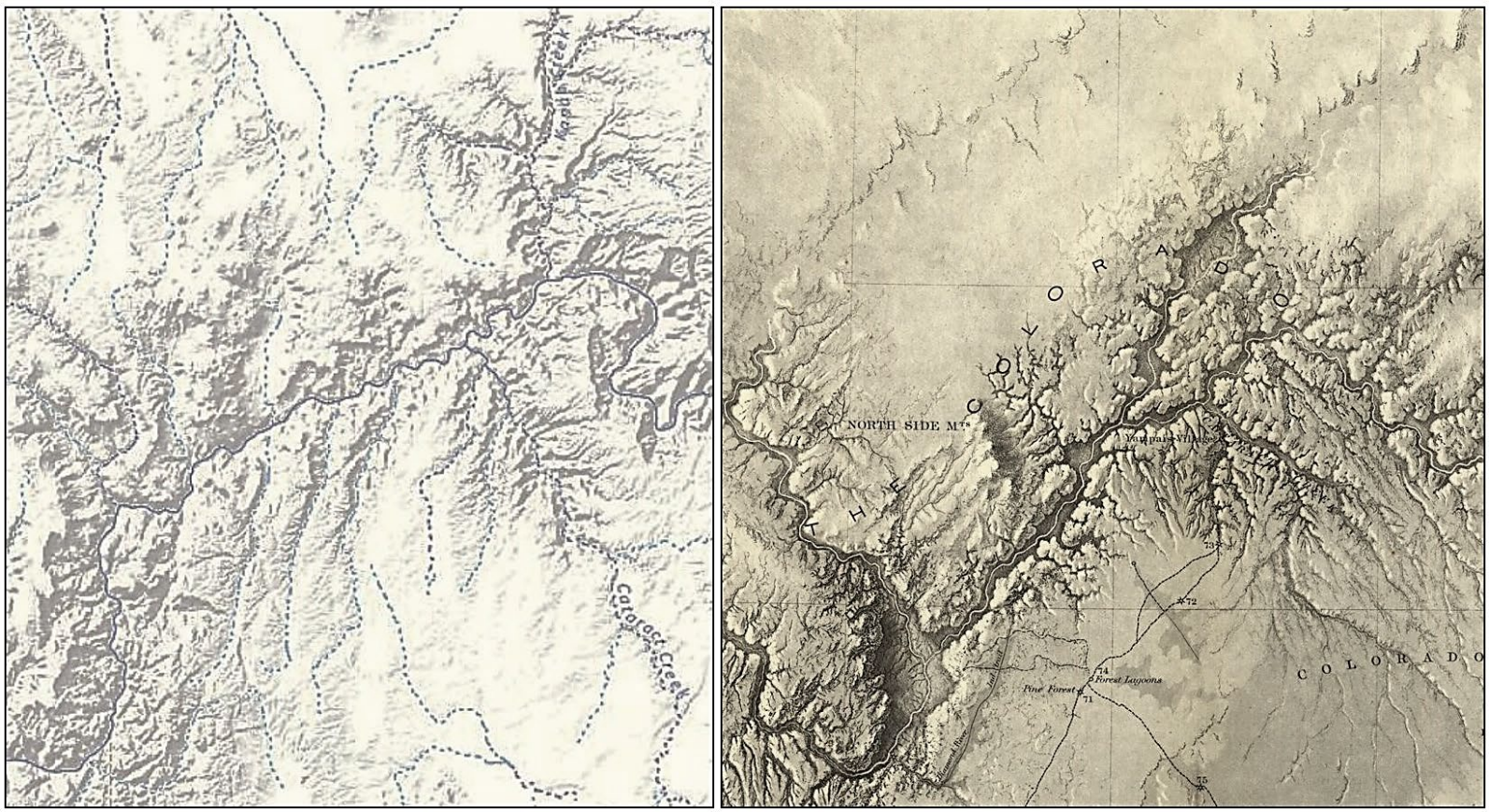


FIGURE 39. Comparing Egloffstein's upper reach of the Colorado River. On Egloffstein's map *(right)* the supposed Little Colorado River comes from the southeast and turns to the southwest; en route it receives Cataract Creek from the southeast. Just beyond that confluence the Little Colorado arrives at the Colorado River, which comes from the undefined area to the northeast, with a decided open area along that reach. Compared to the modern USGS Streamer map *(left)* the only significant streamway coming from the northeastern area (in this case directly from the north) is Kanab Creek; but its confluence with the true Colorado is much farther upstream, which would on Egloffstein's map have had to lead to the Great Bend of the "Little Colorado." It seems likely that Egloffstein misjudged the placement of the Kanab Creek canyon—if that is what he had seen—supposing it to be the Colorado coming in from Utah. ◈

3.4 ◈ Upper Reach of the Colorado River [35] [FIGURES 39, 40]

When a place cannot be visited but for the sake of data must be displayed on maps by something other than unsatisfactory blank space, fudging is inevitable. Egloffstein did not leave the lands to the north of the eastern part of the canyon blank, but resorted to bare suggestions of topography. He drew what he had perceived from distant sightings, but beyond that, farther to the northeast along both the Parashant stream course and what he mapped as a true Colorado River course, his sculptings on the plaster model faded to mere concepts, notably avoiding the dashed lines of hypothetical stream courses that often appeared on maps, which lines regardless communicate a sense of presumption to the viewer. Conjecturally, it would have been unseemly for Lt. Ives’ report to represent blank space for the geography of river courses and lands in an area that was then in jeopardy of military action against the Utah government, despite the more judicious line of access to Utah on the Mormon Road delineated on the map *(Chapter 1)*. Circumventing the Grand Canyon would also be possible from the Colorado River eastward along the Whipple–Beale route, then northward from the Little Colorado River valley. However, that possibility, strictly conjectural on “Map No. 2,” was negated by the Macomb expedition of 1859 to the Four Corners (with the Macomb–Dimmock map of 1860, engraved by Egloffstein in 1864; *see Chapter 5)*. Although publication of its expedition report was significantly delayed until 1876, the information gleaned from those surveys and available within the War Department, superseded Ives’ report and Egloffstein’s 1858 map. An eastern circumvention from the Little Colorado River valley was an unlikely alternative had the movement come up the Colorado.

In his conceptual sculpting of vague landscapes north of the Grand Canyon, Egloffstein may have borrowed some ideas from previously published maps, though these geographies were contrived, including the run of parallel Green and Grand rivers into the Grand Canyon region *(see Chapter 5)*. The two prominent northeast–southwest trending impressions of stream courses in the right half of the detail view in **FIGURE 39** (delineated in **FIGURE 40**) suggest those parallel courses. The western one feeds into the Parashant tributary; the eastern one represents the Colorado River.

While Egloffstein was misled to map the Little Colorado River along what is the true course of the Colorado River in the eastern Grand Canyon area, he ran the Colorado directly from the northeast, reaching the supposed Little Colorado confluence west of Cataract Creek.

[35] The term “upper Colorado” in the present publication refers to the faintly implied upstream reach displayed on “Map No. 2,” between the Utah boundary and the confluence with the assumed “Little Colorado River”; it does not refer to the modern hydrological identity of the Upper Colorado River Basin.

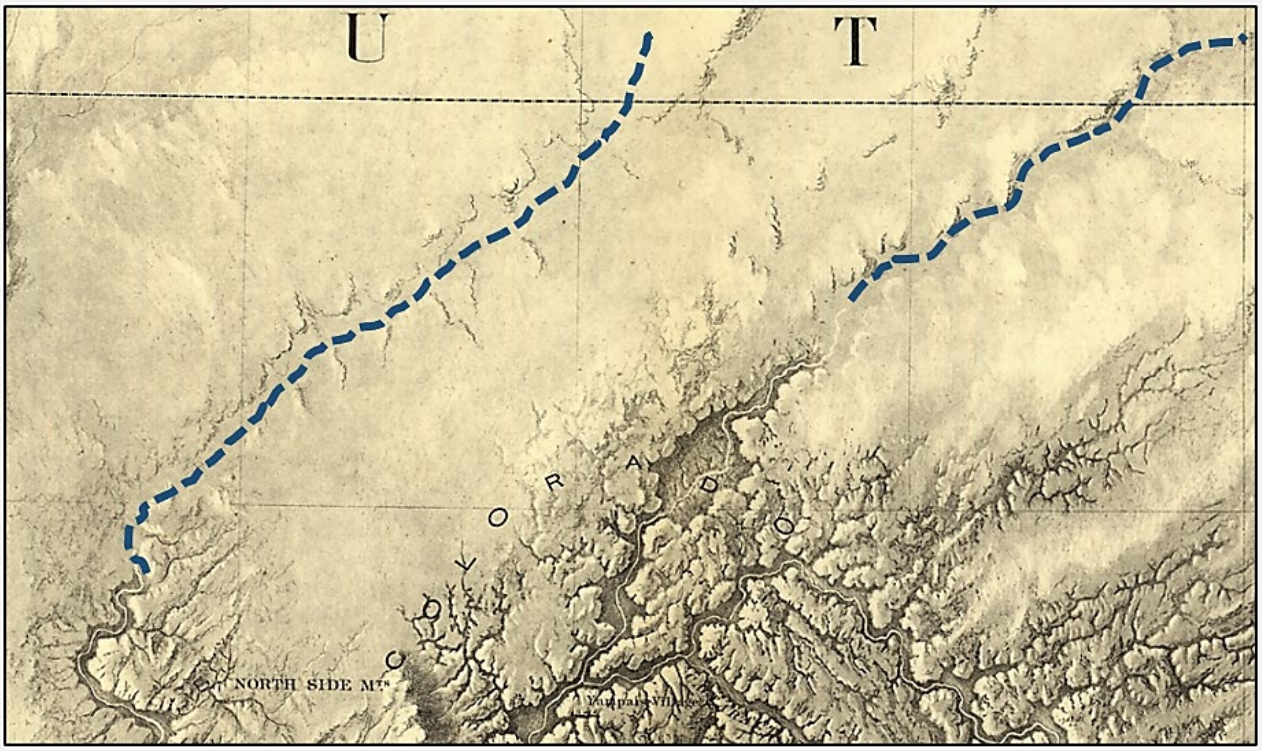


FIGURE 40. Egloffstein’s courses of streamways from the north implied to join with the assertively mapped topography of “Map No. 2.” *(Left)* Projected Parashant Wash course; *(right)* projected upper Colorado River course.

These suggested courses plotted by Egloffstein may have been drawn partly from vague interpretations of the landscapes that he had viewed distantly from the south side of the Colorado River, with further conjecture toward the Utah boundary, so as to accommodate the geographies of river courses on preexisting maps of the region. This specific arrangement is reminiscent of the representations of parallel Green and Grand Rivers. They also allowed later cartographers to run the course of the Colorado River from Utah into Egloffstein’s map: the Parashant Wash route is at *left*, and the through-flowing Colorado River route (Egloffstein’s own implied course) is at *right*. Many creative variants were devised to accommodate these reaches. ◈

But his Colorado’s upper reach is peculiarly hard to identify. Not labeling the Colorado here, he had to have implied it because the “Little Colorado River” was already run into the scene; and besides, the expedition knew that they had reached the bank of the Colorado at the Diamond Creek confluence. Thus the “Little Colorado’s” confluence had to lie between there and the confluence of Cataract Creek. Why some later topographers refused to accept this relationship might be attributable to simple inattentiveness and haste in the delineation of their own maps.

One might suppose that Egloffstein’s upper Colorado course could have been confused with a distant oblique view of the Kanab Creek canyon, which does come to the true Colorado

River in this general area, but that tributary’s confluence is farther upstream. Egloffstein maps this reach with much implied certainty, so while any perspective he might have had of Kanab Creek is hard to reconcile with the placement and decisiveness of his Colorado upper reach.

On the broader scale, Egloffstein (and others of the expedition) of course were mistaken in assessing the Little Colorado’s course, but the damage had been done. Cartographically it now was the “Little Colorado River” into which Cataract Creek flowed; and the Little Colorado as they well knew came to the region directly from the valley lands southeast of the Grand Canyon, so the course from there to central Grand Canyon was a just matter of extrapolation. Thus the “Little Colorado” ran in the canyon of the true Colorado through the eastern half of “Big Cañon” to meet up with the great Colorado that intuitively flowed more directly southwest from Utah.

Egloffstein rather corroborated the general means of routing the main streams of the area, and these “facts” continued for years on other maps. What he had unwittingly done was to open the way for cartographers to create newly misguided maps of their own. For the most part they retired the parallel Green and Grand Rivers but eagerly adopted the surveyed and interpolated Little Colorado River course, and inserted the great Colorado’s course from Utah into one or the other of the two northern streamways—the Kanab-like tributary and the Parashant route. It would take another generation of cartographers’ work to discard these practices. This matter is taken up more fully in *Chapter 5*. ◈

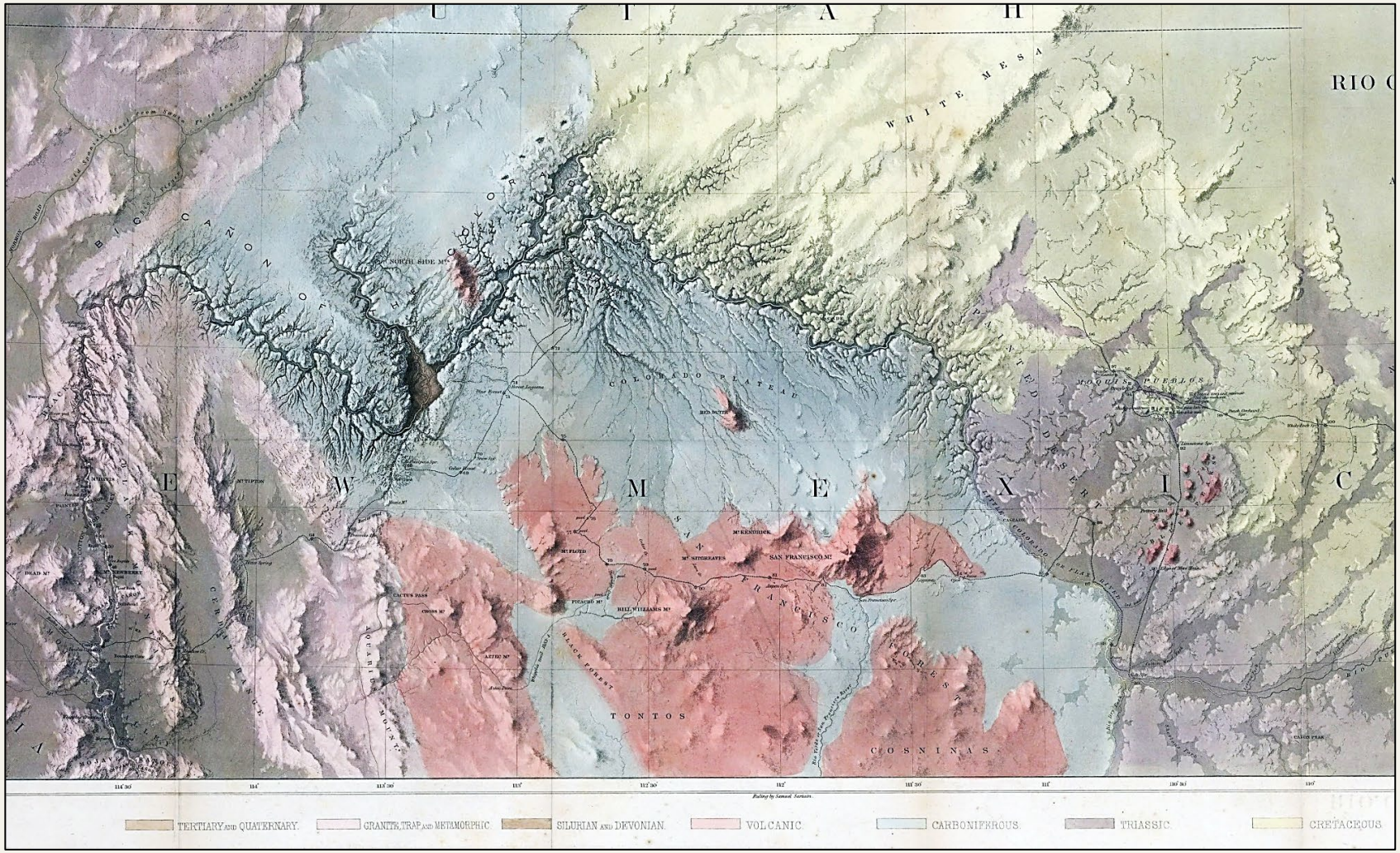


FIGURE 41. Detail of **"Geological Map No. 2 : prepared by J. S. Newberry M.D. geologist of the expedition."** Image is slightly cropped to show only the principal area of initerest to this study. The base map is "Map No. 2, Rio Colorado of the West, Explored by 1st. Lieut. Joseph C. Ives, Topl. Engrs. under the direction of the Office of Explorations and Surveys, A. A. Humphreys, Capt. Topl. Engrs. in charge, by order of Hon. John B. Floyd, Secretary of War. 1858." The geological map displays the rock units that are interpreted to be exposed *at the surface* within the depicted areas, whether on the plateau or inside the canyons. Remarks on the time-stratigraphic nomenclature used on this map appear in the text and on the following illustrations. ◈

(American Philosophical Society; digitally enhanced image by the author. Although colors are enhanced, the original washes are likely to have faded during the last century and a half, thus the colors shown here may not replicate those of the original washes.) (This map can also be viewed online in the David Rumsey Map Collection, https://www.davidrumsey.com/luna/servlet/detail/RUMSEY~8~1~218271~610094 *.)*

3.5 ◈ Putting "Map No. 2" to Work: The First Grand Canyon Geological Map

[FIGURES 41, 41a–i]

The Senate Executive Document variant of J. C. Ives' *Report Upon the Colorado River of the West* added two maps to Egloffstein's own maps of the lower Colorado River and Grand Canyon regions. These are the first small-scale geological maps of these areas, prepared by expedition geologist John Strong Newberry, who contributed the Ives report's section on geology.[36] The geological data are color washed on Egloffstein's shaded relief maps in seven colors ("Geological Map No. 1" [added for reference here as **FIGURE 41i**] and "Geological Map No. 2" [**FIGURE 41**]).

Newberry was a Connecticut-born scholar educated in medicine and natural history. He was a veteran of a West Coast expedition in 1855 under Lt. Robert Stockton Williamson, but his accompaniment on the Ives expedition in the capacities of both doctor and naturalist was his first explorational venture into the interior. The assignment to him of Balduin Möllhausen as an assistant in his natural history duties was advantageous, in that the Prussian was a keen avocational natural historian who incorporated numerous biological and geological observations into his own narrative of the expedition.

We have Newberry's detailed "Geological Report" in Ives' expedition final report, surely derived from his field notes, but regretfully his personal papers seem not to survive. A diary, if he had kept one, would be of great interest in a retrospective study such as this one. Newberry no doubt consulted with Egloffstein all during the expedition, but there are clues in the published journalings of Ives and Möllhausen that the two were not always together on individual exploratory sojourns away from camps and along the expedition route. Whether Newberry helped in the field when excursions were made to ascertain the confluences of Cataract Creek and the "Little Colorado River" may be probable, but is uncertain. His geological maps, especially No. 2, are necessarily very general, partly because Egloffstein's base maps are also generalized.

The geological maps from the Ives expedition are widely recognized as the first of their kind, in geographical location and by employing Egloffstein's uniquely styled shaded

[36] J. S. Newberry, "Geological Report," *in* Joseph C. Ives, *Report Upon the Colorado River of the West* (Government Printing Office, Washington, 1861), Part III [separately paginated, with two geological maps accompanying the Senate Executive Document variant only].

reliefs as base maps.[37] While the mapped "Volcanic" rocks are mostly not inaccurate, other stratigraphic relationships reflect very different contemporary understandings of time-stratigraphic nomenclature.[38] Perhaps the most noticeable disparity is that the "Little Colorado River" (actually the Colorado River) delineates a decisive boundary between "Carboniferous" rocks on the plateau to the south of the river and "Cretaceous" rocks to the north, with some "Triassic" rocks on the Painted Desert to the east. That stark boundary along the river through the Grand Canyon is incorrect and obviously very generalized (**FIGURE 41a**). It reflects only the understanding that broadly defined "Cretaceous"-age rocks present on plateaus to the north might be mappable into northern New Mexico Territory (Arizona, now, in this area). This is equivalent to the so-called "Grand Staircase" that became well known a couple of decades later as the result of other, far more exhaustive geological surveys in the region.[39] Note as well that all of the area north of the canyon was not visited by the Ives expedition, thus the geological interpretations are conveyed conceptually, the same as Egloffstein had abstractly mapped the area.

In the Grand Canyon region, the area of greatest attention was the area mapped by Egloffstien as "Colorado Plateau," which embraced the area between Diamond Creek and Cataract Creek that gave access to vantage points along the rim of the canyon (**FIGURE 41d**). It was here that geologist Newberry was able to discern geological views of a vast area,

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[37] See for example brief notes on p. 659 of Karl Karlstrom *et al.*, "One Hundred and Sixty Years of Grand Canyon Geological Mapping," *Journal of Arizona History*, Vol. 60, no. 4 (Winter 2019). Although the authors recognize Egloffstein's mismapping of the Little Colorado River into the central Grand Canyon, they observed that it "mistakenly showed the Little Colorado River as the headwaters of the Colorado River," meaning of course the upstream part as shown on the map, not the actual headwaters of the river. (The headwaters of both the Colorado and Little Colorado were not unknown.) As reasserted in the present publication, the Colorado River is shown coming to the Grand Canyon from the northeast through a prominent but unlabeled stream course, which reflects earlier maps' configurations of the Colorado's course between Utah and its established lower course where it continues to the Gulf of California.

[38] Contemporary geological studies of stratigraphic relationships worldwide underwent dramatic changes as this expression of geologic time was continually refined and resolved during the late 19th century. Compared to modern understandings, terminology was broadly applied to the rock layers seen in the field, which with passing decades was continually subdivided, renamed, and reorganized within other time-stratigraphic units. Newberry's use on his map of "Silurian and Devonian", "Carboniferous", "Cretaceous", "Tertiary", and "Tertiary and Quaternary" conveyed only that broad contemporary understanding; the units do not directly correlate to the same names that are in use today. (Refer to **FIGURE 41b**.) This also was a time before radiometrically determined absolute dates of rocks, when only relative understandings were had of the ages of stratigraphic units that were generally ascertained through the identification of key forms of fossils that allow a particular rock unit to be assigned to a specific geological age.

[39] C. V. Abyssus (Richard Quartaroli pseud.), "Grand Staircase or Great Stairway?" *The Ol' Pioneer* (Grand Canyon Historical Society), Vol. 34, no. 2 (Spring 2023), pp. 3-9.

following upon his close examinations made possible along Peach Springs Wash, Diamond Creek, and at the mouth of Diamond Creek on the Colorado River itself.

Newberry's "Geological Report" illustrated the first stratigraphic sections for the Grand Canyon region, including the section displayed on the plateau and along Peach Springs Wash and Diamond Creek to the Colorado River—the entire Paleozoic sequence and the underlying metamorphic "basement" rocks (**FIGURE 41b**). It was, however, Balduin Möllhausen who first published this stratigraphic section, crediting Newberry, in advance of the geologist by several months at least, probably in 1860 (see *Chapter 1* and **FIGURE 41c** in the present study). Möllhausen was not a geologist but was a capable avocational naturalist and was Newberry's assistant in these capacities in the field.

Other than the trip up the Colorado River from Fort Yuma to Black Canyon, and at Diamond Creek, the only other region that Newberry had had the opportunity to closely study was during a northward excursion, departing from the pack train's main line of travel east of the San Francisco Peaks. With Lt. Ives, Egloffstein, and a small party, he traveled to the Hopi mesas and the Painted Desert (**FIGURE 41e**; Appendix Figure A4. After the expedition disbanded at Fort Defiance, Newberry traveled home eastward and continued his geological studies en route, which came to play in later reports of western geology. The doctor also would go on to accompany the Four Corners expedition under Capt. John N. Macomb in 1859, the general map for which was also engraved by Egloffstein *(see in Chapter 5)*, although his geological map for that expedition was disappointingly not published with Macomb's greatly delayed expedition report.[40]

Newberry's Grand Canyon map was soon enough and welcomely superseded by the field work of the Powell Survey's Clarence E. Dutton, who produced the magnificent *Atlas* accompanying his *Tertiary History of the Grand Cañon District* (1882). This double-folio atlas included the first comprehensive geological maps for the canyon, with updated though still contemporary terminology for relative ages (**FIGURE 41f**).[41]

(Text continues on p. 102)

[40] Steven K. Madsen, *Exploring desert stone: John N. Macomb's 1859 expedition to the canyonlands of the Colorado* (Utah State University Press, Logan, 2010), pp. 110-111.

[41] Clarence E. Dutton, *Tertiary History of the Grand Cañon District; with Atlas* (U.S. Geological Survey Monograph 2, 1882).

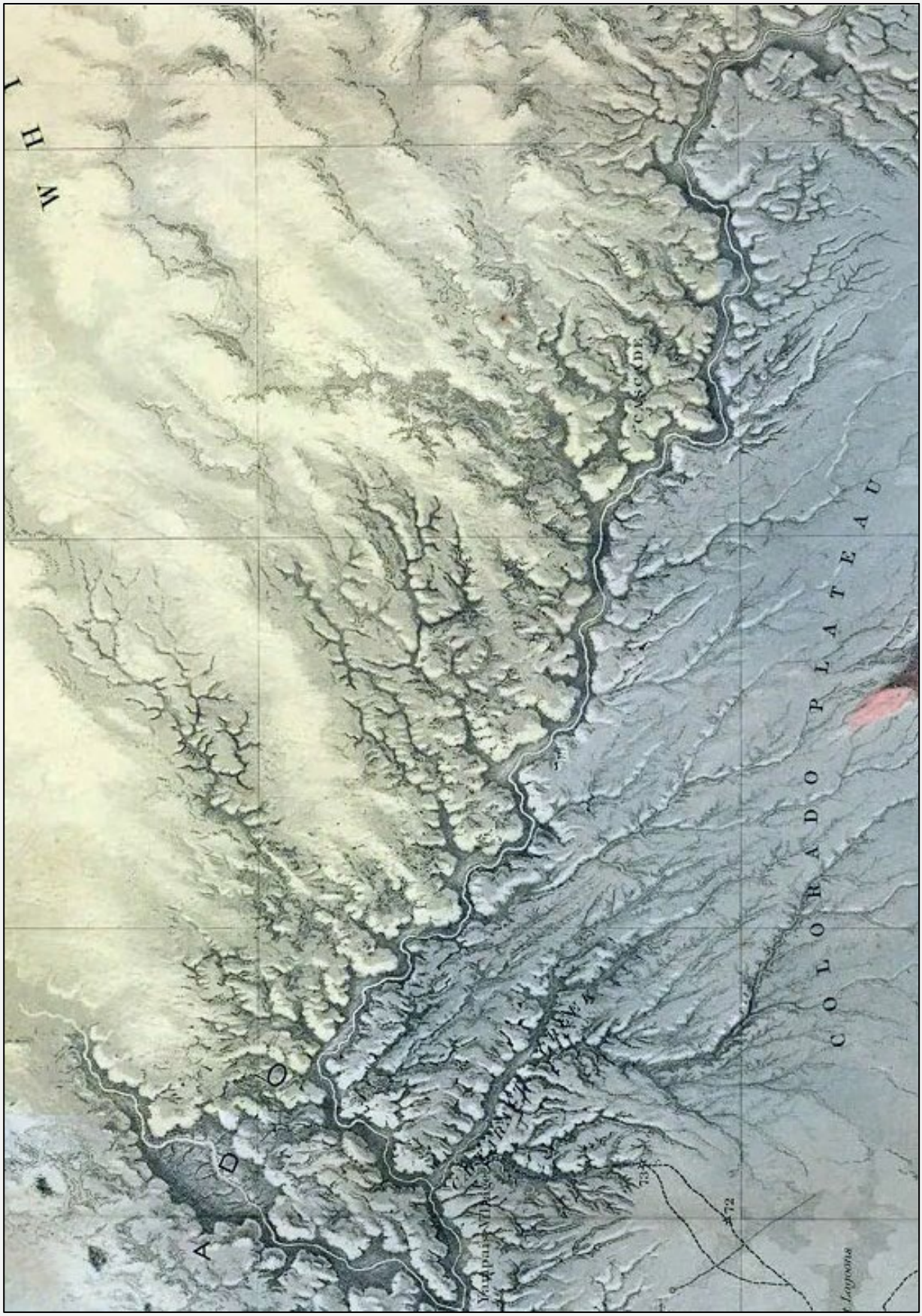


FIGURE 41a. Decisive, though notional, geological boundary along the supposed “Little Colorado River,” eastern Grand Canyon area. This detail from FIGURE 41 more clearly shows the abruptness of the boundary between the “Carboniferous” strata *(gray-blue)* on the south side of the river and the “Cretaceous” strata *(yellow-green)* on the north. ◈

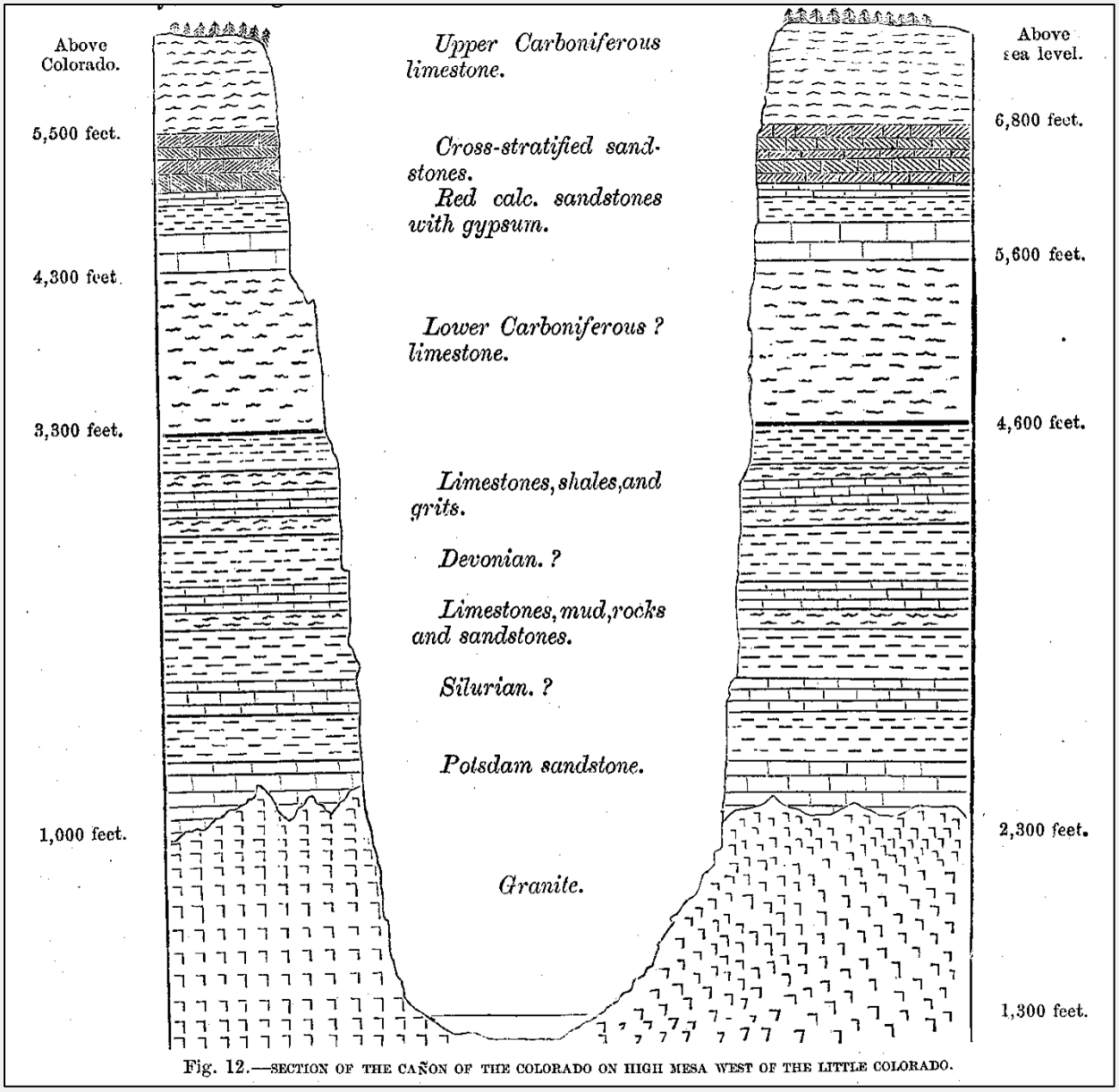
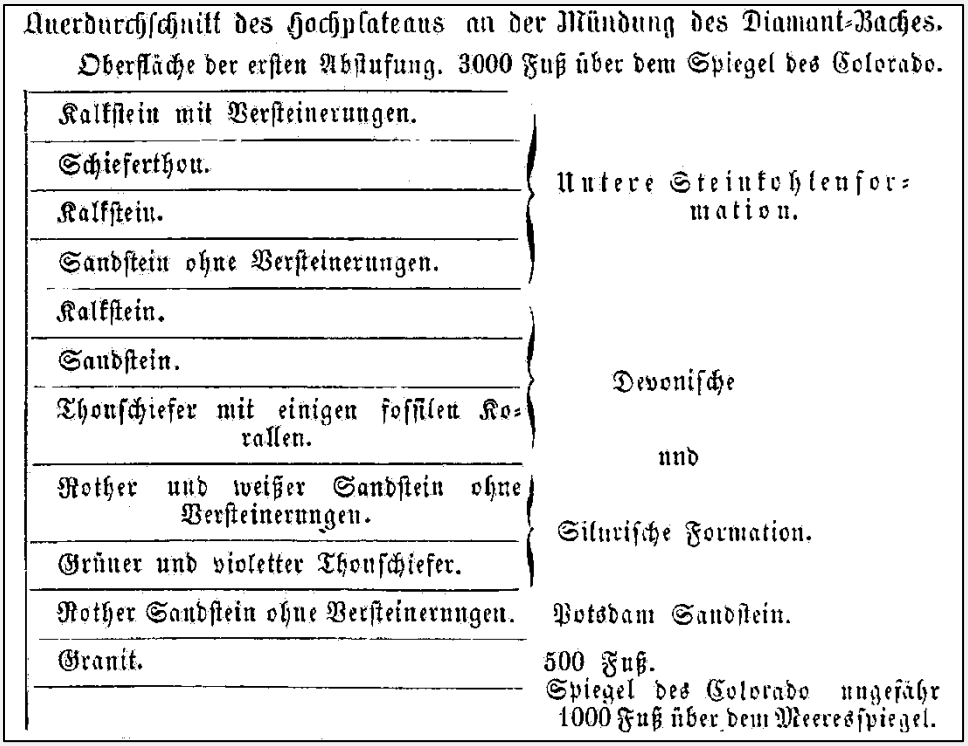


FIGURE 41b. “Section of the Cañon of the Colorado on High Mesa West of the Little Colorado.” J. S. Newberry’s stratigraphic section for the western Grand Canyon, from the plateau surface to the Colorado River at the mouth of Diamond Creek *(refer to* FIGURE 41d*)*. This serves as a key to some stratigraphic nomenclature in use in Newberry’s day and as he used it at Grand Canyon. It does not correspond to modern time scales of geology. The “Granite” at the bottom is a simplistic contemporary term that can include all of the metamorphic and comparable non-sedimentary rock units earlier than the layered strata of Paleozoic and later Proterozoic times. These so-called “basement rocks” were encountered at the mouth of Diamond Creek (see **FIGURE 5b** in *Chapter 1*), though the scale of the map precluded delineating this outcrop on it. Today these rocks at Diamond Creek are mapped as part of what is called the Diamond Creek Pluton, of Paleoproterozoic age. ◈

J. S. Newberry, “Geological Report,” *in* J. C. Ives, *Report Upon the Colorado River of the West* (Government Printing Office, Washington, 1861), Part III, text-figure 12 (p. 42) [Part III is separately paginated]. *(Author’s collection.)*



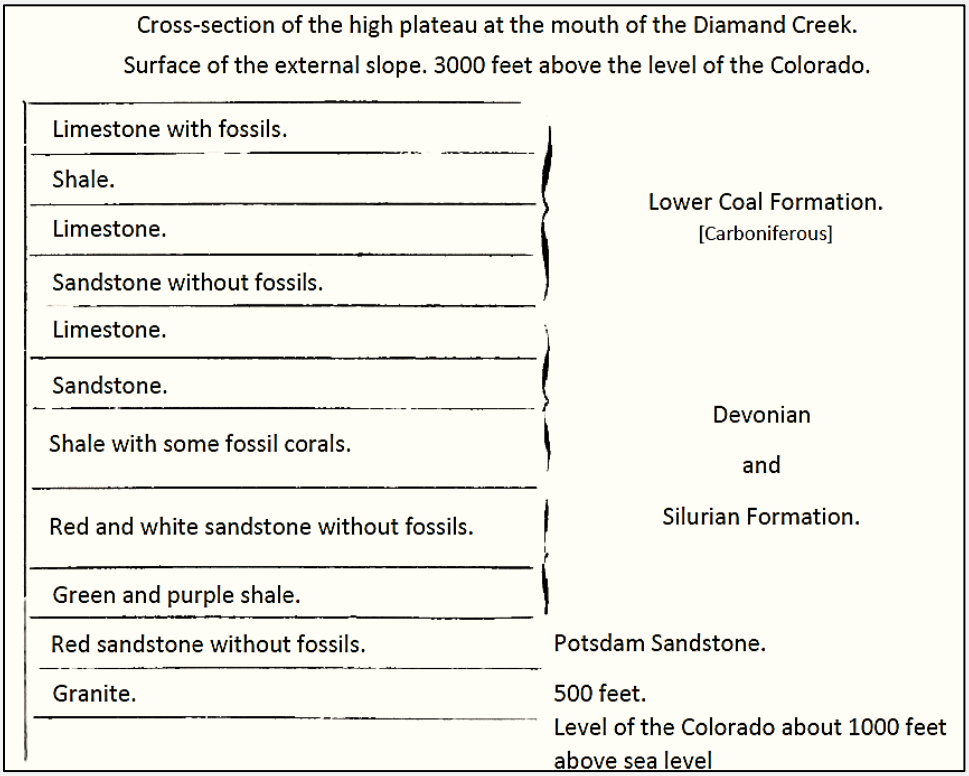


FIGURE 41c. “Cross-section of the Colorado Canyons at the mouth of Diamond Creek taken by Dr. Newberry, the geologist of the Colorado expedition.” *(Compare* **FIGURE 41b***.)* ***(top)*** This is Balduin Möllhausen’s stratigraphic section in endnote no. 6, p. 395 in Vol. 2 of *Reisen in die Felsengebirge Nord-Amerikas*, published (in German) months in advance of Newberry’s “Geological Report” in Ives’ 1861 report of the expedition *(see in Chapter 1)*. ***(bottom)*** Translation of Möllhausen’s table from Spamer, *Balduin Möllhausen’s Grand Canyon*, p. 76.

[*The elevation of the Colorado River at Diamond Creek is 1,343 feet above sea level.]

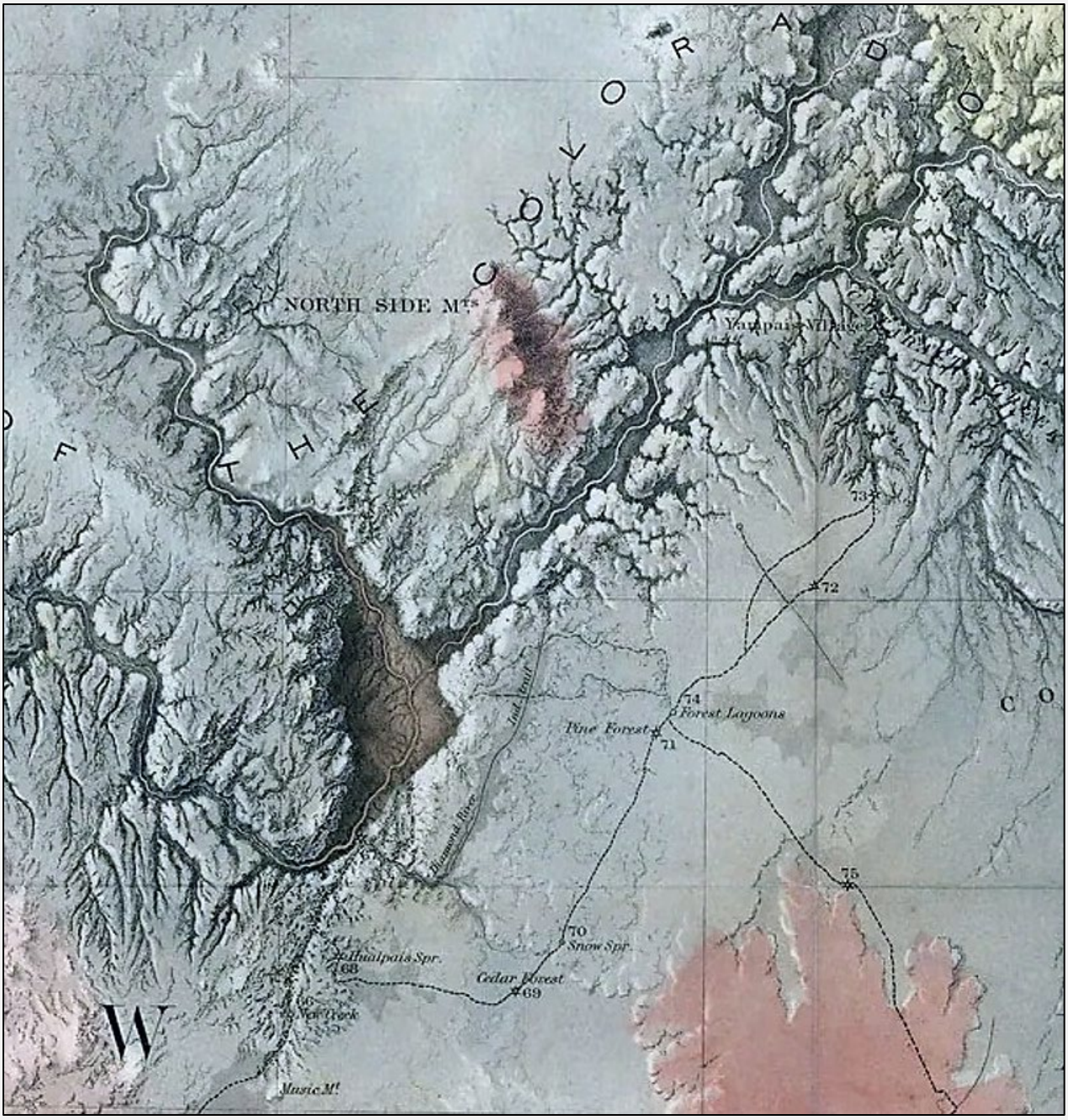


FIGURE 41d. Detail of the area around the Grand Canyon that was most closely examined by geologist Newberry. The region is principally defined as exposing “Carboniferous” strata *(**gray-blue**)* with distantly seen “Cretaceous” strata *(**yellow-green**)* to the northeast. Volcanic terrain is colored ***dull red***. Note that the Uinkaret volcanic field (“North Side Mts.”) was particularly recognizable. At the lower left of this detail a portion of the “Granite, Trap and Metamorphic” rocks of the Basin and Range province, through which the expedition had passed en route to the canyon, is colored ***pale rose***. (Newberry’s “Geological Map No. 1,” using Egloffstein’s “Map No. 1” as a base, depicts much more of those exposures.) The bulbous, open area, discussed in the text, was apparently descried while looking over the presently named Granite Park area of the canyon; within it are mapped “Silurian and Devonian” strata, colored ***brown***. The scale of the map does not allow for the depiction of the “granite,” the metamorphic so-called “basement rocks” that were seen at the mouth of Diamond Creek (see **FIGURE 5b** in *Chapter 1*) but are included in Newberry’s graphical illustration of the canyon’s stratigraphic section there (**FIGURE 41b**). ◈

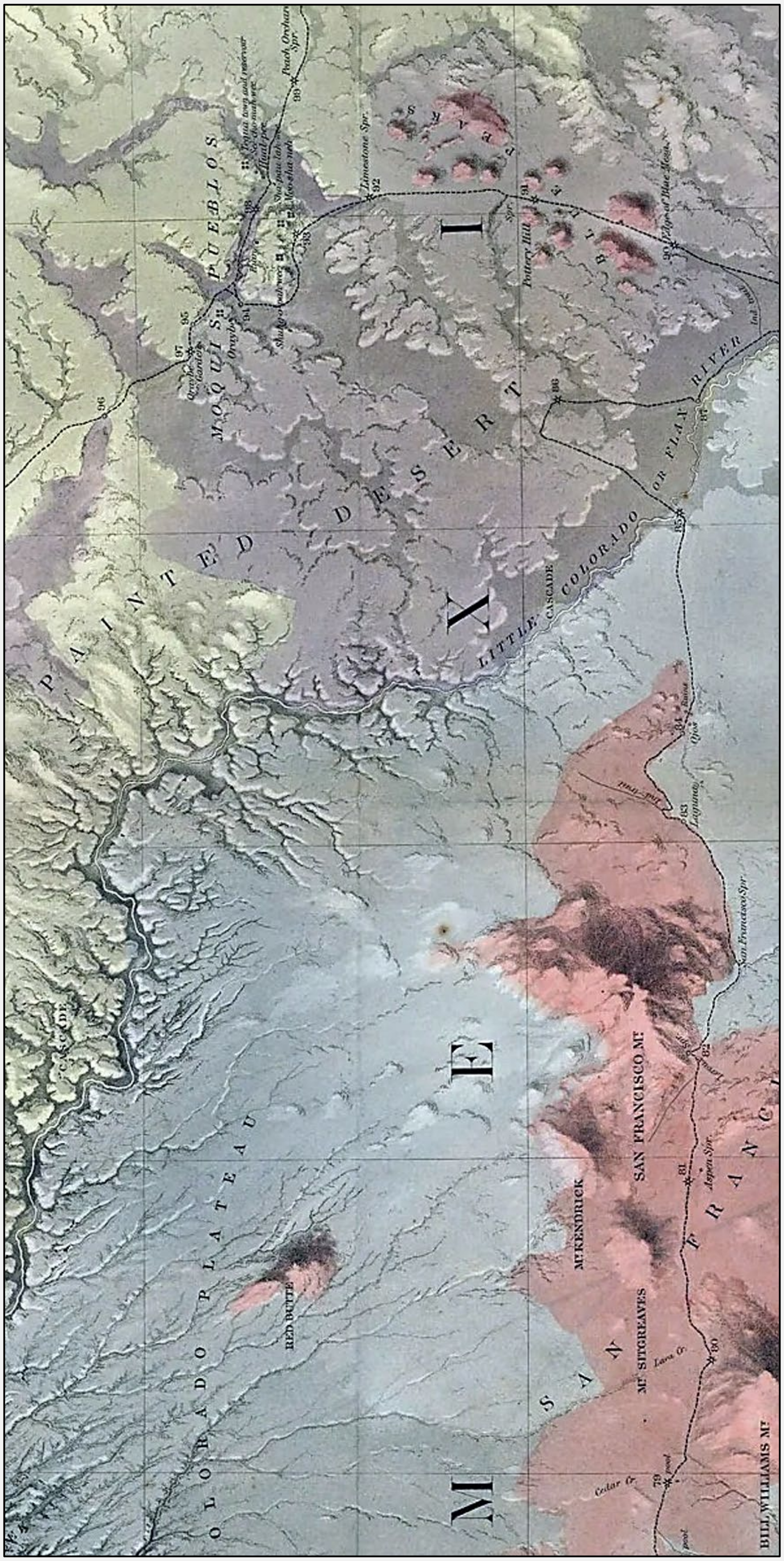


FIGURE 41e. Detail of the Painted Desert–San Francisco Mountain–Colorado Plateau area, illustrating the four principal time-stratigraphic geologic units used on "Geological Map No. 2." Seen here are "Carboniferous" strata (*gray-**blue***) on the south side of the river, "Cretaceous" strata (*yellow-green*) on the north, "Tertiary" strata in the Painted Desert (***bluish-tan***), and volcanic terrain (***dull red***). ◈

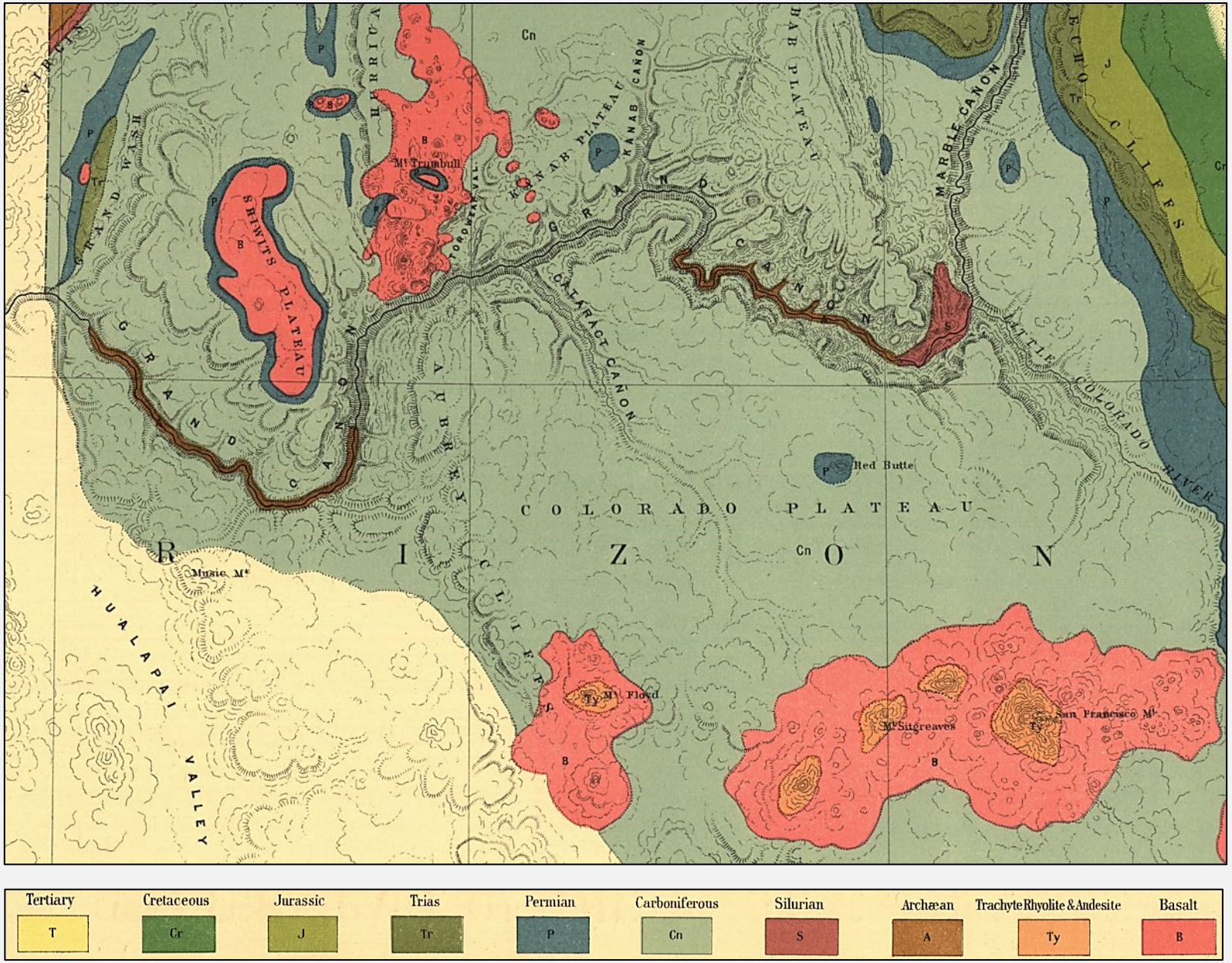


FIGURE 41f. Detail of **"Geological Map of the Western Part of the Plateau Province," C. E. Dutton, *Tertiary History of the Grand Cañon District* (1882), Atlas Sheet II.** Published scale "1:1,000,000 nearly." This detail, shown here for comparison, includes most of the area of interest to the present study of Egloffstein's 1858 "Map No. 2." Note the western limit of the geological mapping. ◈ *(Library of Congress)*

◈

Geological maps earlier than Newberry’s, by default of their broad geographical coverage, encompassed the Grand Canyon region but without particular attention to it. The area was not yet known to Western explorers and scholars, thus the geological cartographers were simply canvassing entire provinces as did cartographers genearally. These maps were not only superficial, they were at even smaller scales (for example, **FIGURE 41g**).

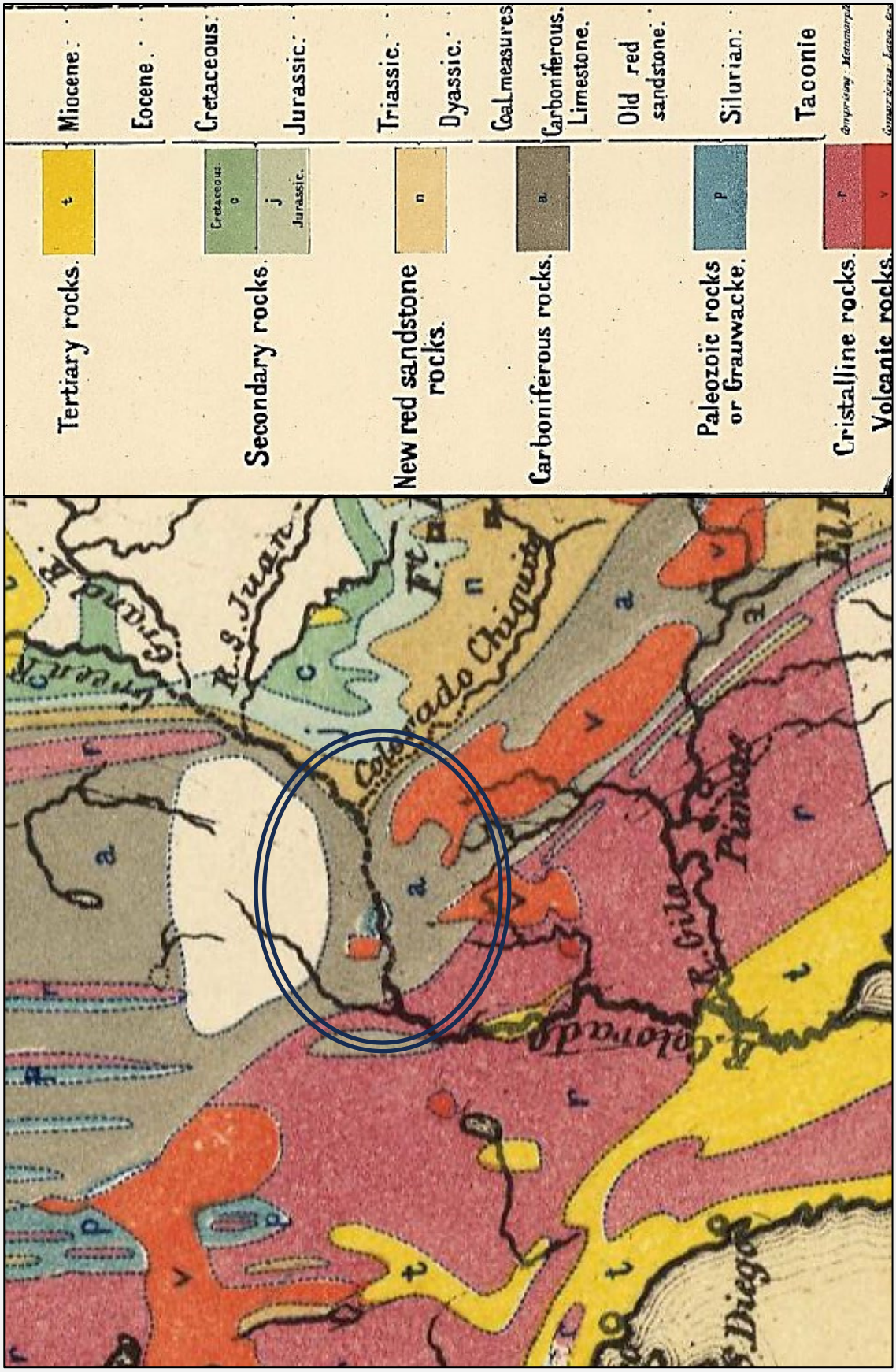
As a first effort of regional extent, the geological presentations on Newberry’s map are reasonably satisfactory, given that his time on the ground was limited by the continual movement of the expeditionary party and constrained to specific areas that he was able to closely examine during sojourns from camps. It also testifies to his keen abilities to study and evaluate what was before him quickly and reliably.

It seems, however, that Newberry’s geological maps were only marginally influential on the displays of later maps, probably given the fact that the region was soon much more closely studied, thus superseding his efforts. Comparing the 1850 world geological map shown in FIGURE 41g, a comparable world map was created by the internationally preeminent geologist Jules Marcou in 1875. As shown in **FIGURE 41h**, he seems to have borrowed generally from Newberry’s map while modifying the relative ages of the different rocks there. ◈

FIGURE 41g. Close detail from **“Geological Map of the World.”** (“Drawn & Engraved by John Emslie”). In: *Introduction to natural philosophy, comprising a popular acount of the properties of bodies; mechanical powers; motion and machinery* (James Reynolds, London, **1850**).

The world map is necessarily very generalized. The detail shown here exhibits the Colorado River on its course to the head of the Gulf of California. Where the Grand Canyon region would be is mapped solely as “Lower Secondary” age strata. This is illustrated here solely to indicate the very limited contemporary knowledge of geology over broad, poorly explored areas at the time shortly before the Ives expedition took to the field. ◈

(David Rumsey Map Collection,
https://www.davidrumsey.com/luna/servlet/detail/RUMSEY~8~1~312663~90081919:Geological-map-of-the-world*)*


Miocene.
Eocene.
Cretaceous.
Jurassic.
Triassic.
Dyassic.
Coal measures
Carboniferous. Limestone.
Old red sandstone.
Silurian.
Taconie
Tertiary rocks.
Secondary rocks.
New red sandstone rocks.
Carboniferous rocks.
Paleozoic rocks or Grauwacke.
Cristalline rocks.
Volcanic rocks.
Colorado Chiquito
R. Gila
Pimos
Diego

▲ **FIGURE 41h** *(facing page)*. Close detail from **"Carte géologique de la terre par Jules Marcou. Construite par J. M. Ziegler. / Geological map of the world by Jules Marcou Constructed by J. M. Ziegler.** 2nd edition. (J. Wurster & Cie. Editeurs, Zurich; Edward Stanford, London; F. Savy, Paris; Ulrico Hoepli, Milano, Napoli, Pisa, **1875**).

More or less the same region as that shown in FIGURE 41g. Marcou seems to have unwittingly accepted the more or less straight run of the Little Colorado River in this area, or, conversely, he may have recognized the error by assigning the straight run to the Colorado even though the river's northwesterly approach to the Great Bend area—recognized even by Egloffstein—is ignored.

The ◯ ***blue double-lined oval*** added here generally delineates the area of Egloffstein's "Map No. 2." Although *Colorado Chiquito* seems to have its confluence with *R. Colorado* about where it should be, and even though the Colorado has an effectively straight run through the Grand Canyon, the **style of the outcrop areas in that region are reminiscent of those depicted on Newberry's "Geological Map No. 2"** from the Ives expedition though with different relative age assignments. These are the broadly mapped as Jurassic "Secondary rocks" (j, **pale green**), Triassic "New red sandstone rocks" (n, **tan**), "Carboniferous Limestone" (a, **brownish-gray**), one spot of Silurian "Palaeozoic rocks or Grauwacke" (p, **blue**) that apparently is the area mapped in brown by Newberry as his "Silurian and Devonian" strata in the Granite Park area (**FIGURE 41d**), and "Volcanic rocks" (v, **orange**) including the singular occurrence of the Uinkaret volcanic field (Ives' "North Side Mountains") north of the river. The blank area in the plateau-bench areas immediately north of the Grand Canyon indicates data not available. Note that the decisive age-stratigraphic boundary between Newberry's "Carboniferous" and "Cretaceous" (**FIGURE 41a**) along the Colorado River (his Little Colorado) is eliminated. ◈

(David Rumsey Map Collection,
https://www.davidrumsey.com/luna/servlet/view/search?q=pub_list_no%3d%229971.000%22&sort=&qvq=q:carte%20geologique%20de%20la%20terre;lc:RUMSEY~8~1&mi=2&trs=12*)*

▲ **FIGURE 41i. "Geological Map No. 1 : prepared by J. S. Newberry M.D. geologist of the expedition."** Base map is Egloffstein's "Map No. 1." Image is digitally enhanced to compensate for the faded appearance of the color washed original. It is in any case effectively with one color, in that "Quaternary and Tertiary" rock exposures are colored with a grayish tint and "Erupted and Metamorphic" rock exposures are colored in **light red or rose**. This map is shown here solely as a matter of completeness for this study. ◈

(David Rumsey Map Collection, https://www.davidrumsey.com/luna/servlet/detail/RUMSEY~8~1~218268~610093)

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FIGURE 42. Areas of clear vantages on F. W. von Egloffstein's route of travel along the northern part of the lower Colorado River and across the northern part of New Mexico Territory to Fort Defiance. These are the regions where he had a good view of the surrounding terrain. From occasional higher vantage points he may have had good lines of sight, chiefly oblique views, to some regional landmarks and topographical trends. The *narrow white line* delineates the route to Fort Defiance taken by the main pack train after Ives, Egloffstein and party departed for the Hopi mesas. Overlaid on the map in ***pale blue*** are modern-day stream courses as plotted by the USGS Streamer. The straight golden lines are modern-day state boundaries on the USGS Streamer map. Refer also to the Analytical Charts (pp. xii–xv). ◈

See **FIGURE 11a** (p. 29 in *Chapter 2*) for a depiction of Egloffstein's vantages during the lower Colorado River portion of the expediton aboard *Explorer* ("Map. No. 1").

CHAPTER 4
Vantages: Egloffstein in the Field

[FIGURES 42–49]

Refer also to the Analytical Charts (pp. xii–xv).

THE SURVEY ON the lower Colorado River was a continuous one for Baron von Egloffstein, both on the steamboat and on excursions from camps. But given that he was not always able to see over long distances during the land expedition between the Colorado River and Fort Defiance, except from the occasional perspective of a higher elevation, one may wonder just what this veteran expedition topographer did see while crossing New Mexico Territory.

FIGURE 42 delineates the path that the expedition followed, as mapped by Egloffstein, with the principal modern streamways superposed on it. The diffused white boundaries, provided here, suggest the topographer's limited lines of sight without gaining higher elevations. As noted from Ives' and Möllhausen's journalings, the expedition divided after passing the San Francisco Peaks. Ives, Newberry, Egloffstein, and ten men went off to the Hopi mesas, apparently part of the lieutenant's military investigation of Mormon activities (see also Appendix Figure A4). The main column proceeded to Fort Defiance by way of the Pueblo of Zuñi, partly along the route blazed by the Whipple expedition of 1854, which was familiar to Möllhausen; their route is shown by a thin white line on FIGURE 42.[42]

There is little of record that tells of Egloffstein's actual cartographical activities during the expedition, though Lt. Ives wrote enticingly in his letter of transmittal to Capt. Humphreys, "The privation and exposure to which Mr. Egloffstein freely subjected himself, in order to acquire topographical information, has resulted in an accurate delineation of every portion of the region traversed." We have, however, only the end results—Map Nos. 1 and 2. For all else we rely on Lt. Ives' "General Report," Balduin Möllhausen's *Reisen*, and a single relevant entry from the "Geological Report" of John Strong Newberry.[43] Following are those

[42] When the expedition disbanded at Fort Defiance, most of its members, including Möllhausen and Egloffstein continued eastward overland to the East Coast. Lt. Ives went south to the southern stage route through El Paso and Tucson to return to Fort Yuma where he settled the affairs of the steamboat *Explorer* and its crew and sold the boat. He returned to the eastern U.S. by reversing the way he had come west, through a California port by sea to the Panamanian isthmus (crossing by rail) and by sea again through the Caribbean and up the East Coast.

[43] Joseph C. Ives, "General Report," in *Report Upon the Colorado River of the West* (Government Printing Office, Washington, 1861) [the General Report is the separately paginated first part of the volume]; J. S. Newberry, "Geological Report," in *Report Upon the Colorado River of the West* [the Geological Report is the separately

pertinent excerpts from these publications, with Egloffstein's name highlighted by bold lettering to bring attention to him. A couple of the entries, while not mentioning him, are important records of distant landscape views from stations that the topographer had to have occupied.

The translations of Möllhausen's record are from *Balduin Möllhausen's Grand Canyon*.[44] Of the dates given for each quotation (all are in 1858), Möllhausen's are presumably precise, whereas Ives' dates record those from his diary. The lieutenant added to his diary at various camps; the dates might reflect that day's events but sometimes they report the events of several days previous, for the days during which had not made separate diary entries. The dates of some events recorded by Ives can be correlated more precisely by referring to Möllhausen. Also, some of Ives' spelling is like British English (for example, "centre" and "marvellous").

The Prussian's writings are clearly a travel memoir written for a general audience after the expeditions, a form in which he was already experienced, having similarly chronicled the 1854 Whipple expedition. Ives' diary entries are more of a commander's record.[45]

Notice: Some of the contemporary language used by the narrators in writing about Native Americans may be construed as offensive.

Möllhausen, March 29; translation p. 19
[Cerbat Mountains]

"After the order of the camp had been established, some of the Mexicans were sent into the mountains to search for hidden springs, or for snow-water left behind in the hollows of the rocks. Also, Dr. Newberry, **Egloffstein**, and I shared in this task, but of course keeping an eye on our related work, for while **Egloffstein** was struggling with his charts to climb a steep crag,

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paginated third part of the volume]; Balduin Möllhausen, *Reisen in die Felsengebirge Nord-Amerikas bis zum Hoch-Plateau von Neu-Mexico* (Otto Purfürst, Leipzig, no date [1860], and Hermann Costenoble, Leipzig, 1861).

[44] Earle E. Spamer (ed.), *Balduin Möllhausen's Grand Canyon* (Raven's Perch Media, 2022, https://ravensperch.org/wp-content/uploads/2022/10/MOLLHAUSEN_.pdf).

[45] Ives was, even so, clear in explaining to his military superiors why he purposely presented his diary entries for his "General Report" instead of a more formal and clinically observational description. He wrote in his "Letter to the Officer in Charge of the Office of Explorations and Surveys," Capt. A. A. Humphreys (*Report*, pp. 5-6): ". . . it being doubtful whether any party will ever again pursue the same line of travel, I have thought it would be better, in place of condensing into a few lines the prominent facts noticed, to transmit the journal kept during the expedition. [¶]This involves the presentation of what may appear extraneous, and perhaps beyond the limits of a strictly official communication; but a record of the every-day incidents of travel, set down while fresh in the mind, serves to convey a general idea of a country that can scarcely be imparted in any other way, and can hardly fail of reproducing, to some extent, in the mind of the reader the impression made upon that of the traveller."

from which he surveyed an extensive landscape, I went in the company of the doctor [Newberry, also the geologist of the expedition] into a gorge and soon got deep into the mountains."

Möllhausen, March 31; translation p. 24
[Northern end of Aquarius Mountains]

"Due to the condition of our herd, it was decided to remain at the spring [Peacock's Spring, Camp 65] on March 31st. It was again a clear, very warm day, and some of our people, lured by the wild surroundings, set out early in the morning to search for game in the intersecting gorges. As **Egloffstein** had already won Ireteba [one of the Mojave Indian guides who joined the expedition at the Colorado River] for his companion, I chose the trusty Hamotamaque as my companion, and climbed the high country in a southerly direction . . . ."

Möllhausen, April 3; translation pp. 38, 40, 42–43
[In the canyon, vicinity of Peach Springs Wash and Diamond Creek]

"Because of our research and observations, but also with regard to the condition of the herd, the onward journey should not be started until the following day. This gave us plenty of time to roam the immediate area, and most of us left the camp early in the morning. **Egloffstein** chose the most arduous path, because accompanied by a soldier, an Indian, and unfortunately also our dog, he tried to gain one of the heights from which he was able to follow the direction of the Colorado a little further and to correct it on the map; Dr. Newberry and I, on the other hand, rejoined the stream, and while the former was busily hammering about among the rocks, I looked for a suitable place from which, for the purpose of drawing, I had a full and at the same time beautiful view of the picturesque rock gateway through which the foaming Colorado tumbled down." [See **FIGURE 6** in *Chapter 1*.]

[Apparently, Egloffstein had chosen to climb Diamond Peak. Whether he managed to ascent the top is not clear. It is on record that many early tourists to Diamond Creek, in the late 1800s, were conducted or climbed on their own to a lower elevation above Diamond Creek for a view of the river and the surrounding landscape; others may have gone to the peak.[46]]

[46] For an anthological selection of early tourists' visits to Peach Springs and Diamond Creek, see in Earle E. Spamer, *"My God, there it is!" The World Encounters the Grand Canyon, 1540–1926* (Raven's Perch Media, 2022, https://ravensperch.org/wp-content/uploads/2022/10/ENCOUNTERS_PD_1540-1926.pdf). One of the earliest such records, if not the first, from one who ascended Diamond Peak is that of 26-year-old Charles F. Lummis (who later became a well-regarded editor, Native American rights activist, librarian, and museum founder). He was on a solo trek by foot across the country, during which in 1885 he climbed Diamond Peak with his greyhound dog, Shadow. He wrote of the scene that Egloffstein would have viewed: **"Before daybreak next morning we were up and climbing one of the rugged terraced walls of a vast butte to get the view from its crest. It was a toilsome and painful climb to me, thanks to the arm [which he had broken earlier in the trip], and at the easiest points it is no easy task for any one; but the reward of that groaning, sore, skyward mile**

" [. . .] The evening came gradually, and the twilight quickly turned into black darkness; the Wallpays [Hualapai] had moved away, the campfires, which one does not like to do without in front of the tents in the evening, even in warm weather, flickered in the air, and **Egloffstein** and his companion still hadn't returned from their trip up the mountain. We began to feel disquieted at his absence, and not without apprehension we gazed up at the black slopes of the plateaus, the only limit of which was the star-studded vault of heaven. While we were aware of his experiences on previous travels with Colonel Frémont, we were again not unfamiliar with the difficulty in controlling his enthusiasm, which easily got him into awkward and very dangerous situations. The descent from the rugged mountains at night was such that **Egloffstein** and his companion were able to save their lives. However, an accident of such a serious nature was not in store for us; those who were absent returned to camp late in the evening with torn boots, sore feet, and racked with hunger and thirst, and this time it was only Grizzly whose passing we had to mourn. The poor dog had followed them up into the mountains, had also happily reached the top of the plateau, but had succumbed to thirst and exhaustion on the way back. **Egloffstein**, like Hamotamaque, had carried the poor animal a long way, but when darkness fell and they were only able to recognize the dangerous path by touch and feel, they had to leave the dog to its fate, and it can be assumed that that he was either torn to pieces by the hungry wolves a short distance from the camp, or devoured by the equally rapacious Wallpays. The loss of Grizzly was painful for all of us, because the friendly, affectionate animal had accompanied us from Pueblo de los Angeles on the South Sea [Pacific Ocean] more than a thousand miles, through the most terrible wilderness, had given us some entertainment through its trusting nature and through its cheerfulness, and just when his vigilance began to be of value to us, we lost it." [47]

Ives, "General Report," *April 3, pp. 98–99*

[Reporting on the scene first viewed near present-day Peach Springs, Arizona. Written later, in camp at the confluence of Peach Springs Wash and Diamond Creek.]

"*Camp* 67, *Big cañon of the Colorado, April* 3. [. . .]

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lay at the top. From that dizzy lookout I could see a hundred miles of the stupendous workshop of the Colorado—that ineffable wilderness of flat-topped buttes threaded by the windings of the vast cleft." (Lummis, *A Tramp Across the Continent* [Charles Scribner's Sons, New York, 1892], p. 245; and in *"My God, there it is!"*, pp. 198–199). Lummis and Shadow had a very difficult time of the climb and descent, as had the men from the Ives expedition, but the outcomes for the dogs differed. The Ives expedition's "Grizzly" had to be abandoned to a certainly fatal end during the descent (see the end of Möllhausen's April 3rd account, *above*).

[47] Grizzly is not mention in Ives' *Report*, and only a few times in Möllhausen's *Reisen* (Vols. 1 and 2), but see a couple of privately held pencil sketches of the dog made by Möllhausen, reproduced in Ben W. Huseman's *Wild River, Timeless Canyons*.

"At the end of ten miles the ridge of the swell was attained, and a splendid panorama burst suddenly into view. In the foreground were low table-hills, intersected by numberless ravines; beyond these a lofting line of bluffs marked the edge of an immense cañon; a wide gap was directly ahead, and through it were beheld, to the extreme limit of vision, vast plateaus, towering one above the other thousands of feet in the air, the long horizontal bands broken at intervals by wide and profound abysses, and extending a hundred miles to the north, till the deep azure blue faded into a light cerulean tint that blended with the dome of the heavens. The famous "Big cañon" was before us; and for a long time we paused in wondering delight, surveying this stupendous formation through which the Colorado and its tributaries break their way."

Newberry, "Geological Report," undated, *p. 58*
[After having left Diamond Creek and climbing to the plateau.]

"Retracing our steps, as the only means of exit from the bottom of the Colorado cañon, and reaching the surface of the mesa, a short distance east of Camp 66,[48] we obtained a fine panoramic view of the geological structure of the country for many miles about us. [. . .]

"From this point the view towards the north was particularly grand; the course of the Colorado was visible for nearly a hundred miles, and the series of Cyclopean walls into which the mesas of different elevations have been cut by that stream and its tributaries formed a scene of which the sublime features deeply impressed each member of our party. Some conception of the character of this scenery may be gathered from the sketches of the artists of the party, Messrs. **Egloffstein** and Mollhausen."

Möllhausen, April 7; translation pp. 53–54
[At one of the camps on the plateau near Cataract Creek]

[Here is the record (not noted in Ives' "General Report") of the unrealistic challenge to reach the confluence of the Little Colorado River with the great Colorado (which was thought to be nearby)—and then to follow the Colorado upstream to the confluence of the Green and Grand (Colorado) Rivers, in Utah. Had either of these been attained, Egloffstein's map would have been completely different. See farther below in the records for April 13 and 14 regarding the attempt to go into the canyon of Cataract Creek and to locate its confluence with the presumed Little Colorado.]

"We were just about to leave the leisurely spot in front of the fire for the tent when Lieutenant Ives joined us to acquaint us with his next plans for the journey. According to these the whole expedition was to advance to the mouth of the Colorado Chiquito, but there it was to be

[48] Camp 66 was near the head of Peach Springs Wash, the campsite labeled on the map "New Creek."

divided in two halves in such a way that Lieutenant Ives, accompanied by Dr. Newberry, **Egloffstein**, and a corresponding number of soldiers and packers, cross the Colorado Chiquito at the first suitable place in order to make a last attempt to follow the course of the Rio Colorado up to the junction of the Grand and Green rivers. Peacock, the commander of the escort, and I, on the other hand, were to go up the Colorado Chiquito near the San Francisco mountains with the greater part of the expedition, then turn south and set up camp at the sources of the San Francisco river, called the Rio Verde, to await Lieutenant Ives with his detachment, in case he did not get there before us. Both Lieutenant Ives and I, on the occasion of the trip under the command of Captain Whipple, had become familiar enough with the vicinity of the San Francisco mountains to fear mutual misunderstanding, and then these ancient volcanoes formed such prominent landmarks that that we could have easily determined our movements on both sides according to their position. After our meeting at that point, we should proceed without delay to the exploration of the Rio Verde, and following its course we would at last come to the Rio Gila, near the villages of the Pimo [Pima] Indians. From there Fort Yuma and soon San Francisco would have been our destination.

"The execution of this plan, however, depended on the condition of the food, for should we encounter obstacles of a more serious nature in the near future, we could hardly count on extending our journey further than to the Rocky Mountains, and from there to the nearest town at the Rio Grande, and to prevent any emergency that may arise. Attractive as the exploration of the Rio Verde was to all of us, none could quell the doubts which he entertained as to the carrying out of this plan. Peacock knew well enough that there was scarcely enough food for a month; and that we would not be able in that time to complete our explorations in the difficult-to-reach region was pretty clear.

"Inspired by the best of wishes, we finally retired to our camp, but for a long time we talked about the beautiful bear hunts that awaited us in the vicinity of the San Francisco mountains."

Möllhausen, April 13; translation pp. 63, 66

[Camp 73, on the brink of a tributary to Cataract Creek.]

"Early on April 13th, a reconnaissance detachment left the camp to undertake the journey once more into the wild ravine. The company consisted of Lieutenant Ives, Dr. Newberry, **Egloffstein**, Peacock, Lieutenant Tipton and myself, with six soldiers. [. . .]

"I later showed the sketch I had made to Lieutenant Ives and **Herr von Egloffstein**, but both of them did not recognize the basin, because on their hike the view had been constantly restricted by towering rock faces and they had found themselves in deep gorges, which I had seen from up high only as insignificant gullies."

[Möllhausen had not accompanied the party all the way into the canyon but remained at higher elevations in order to gain perspectives of the Cataract Creek tributary and the surrounding area. The confounding difficulty of judging sizes and distances from the rim of the canyon is well known, ever since the first non-Indigenous visitors arrived on the rim of Grand Canyon in 1540. The misadventure experienced by Egloffstein in the canyon is recounted in the following quotations from Möllhausen's and Ives' journals. See also text box on next page.]

Möllhausen, April 14; translation pp. 68–70

[Written after the descent into the canyon of Cataract Creek.]

[This is Möllhausen's second-hand account of the exploration into Havasu Canyon in the attempt to reach the mouth of Cataract Creek. Particulars are described quite differently in Ives' longer, personally experienced rendition, as is quoted farther below.]

"Lieutenant Ives' and **Egloffstein's** reports were as follows: Having reached the point where we had been forced to turn back with the [pack] train, they followed the path down, and at length, after much toil, reached the bottom of the ravine. Keeping the westward direction, they went lower and lower until at last high walls of rock towered up anew on either side of them, and blocked any further view. This was the spot which I described above as the red sandstone plain surmounted by the rock tower. Following as much as could be done in a definite direction in the tangle of gorges, and partly guided by a scarcely discernible Indian path, they finally came upon a ledge about twenty feet deep, against which stood a rotten post, the last rung of a crude ladder. Not far from there they saw a brook rushing over the rocks and watering a small valley. Held by ropes and gun belts knotted together, **Egloffstein** climbed down, not without risking his life, but there he encountered new obstacles that hampered his further movements. Looking further down, however, he noticed that the narrow space of the valley was divided into small fields, as if for irrigation, and he thought he could make out fishing gear from afar. In his observations he was suddenly interrupted by the sight of a native perching on a higher cliff and looking down at him curiously. Hoping to find here a welcome guide for our further operations, he made signs for the savage to come down to him, but the shy Indian, who understood the signs well, answered that he might come up to him first, but that was beyond the reach of his [Egloffstein's] powers. After many vain attempts to win the savage over, he returned to his companions, and after a short while was taken home [hoisted back up].

" [. . .] As I have remarked above, the drawing I made of that basin aroused the greatest interest, and **Egloffstein**, animated by the desire to enjoy a similar sight, in spite of his sore feet, decided in the afternoon to accompany Dr. Newberry and myself on a new excursion [FIGURE 44]. We chose a more northerly direction this time, because just there we discovered a major depression in the ground, which could possibly be the low-lying bed of the Colorado

(Text continues on p. 118)

THE DESCENT INTO HAVASU CANYON down the tributary Hualapai Canyon (unnamed by the Ives party) is frequently recounted in historical texts. It was an increasingly arduous journey, requiring that the few mules that were brought along be turned around (a process hardly accomplished on the narrowing trail). A few men, including Ives and Egloffstein, continued on foot. It was here, as many writers have repeated for the adventure in store, that when the way was blocked Egloffstein attempted to go down an old, precarious Havasupai ladder, but was precipitated in a barely controlled drop with pieces of the collapsing ladder to the floor beneath. There (*see* **FIGURE 43a**) he was stranded for a while and met a few Havasupai. He seems to have gone as far as the nearby village of Supai, in as much as there are remarks about the cascades below there. Ives also writes of some familiarity with the design of the habitations in the village (see Ives' diary entry for April 18; details apparently conveyed by Egloffstein). One of the Havasupai was reportedly interested in accompanying Egloffstein on his return, but the man declined after seeing the wrecked ladder. The baron was rescued when the soldiers strung together their gun slings and raised him by a straight pull, after he decided it was better to risk his life than to be left behind.

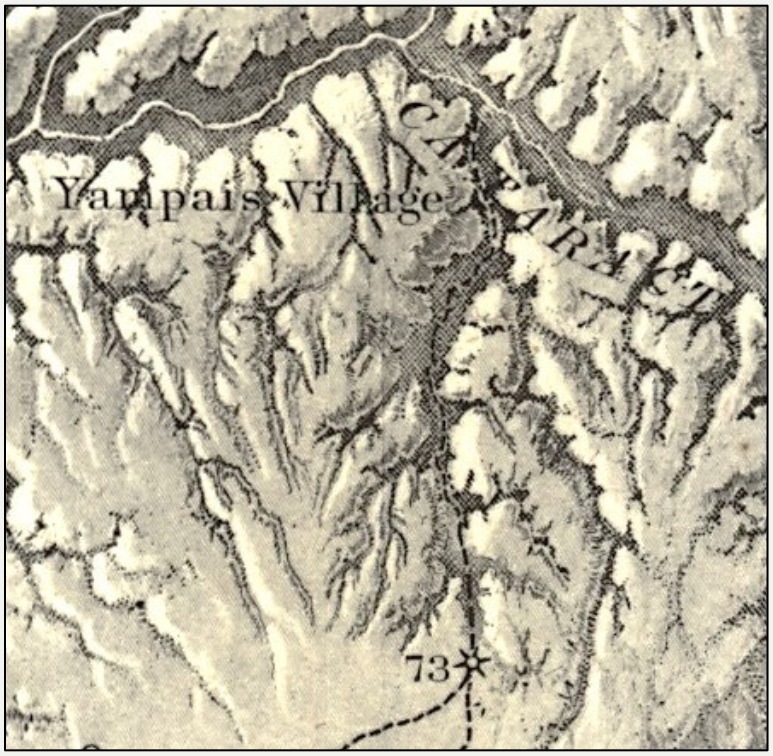

FIGURE 43. Expedition route into Hualapai Canyon, a tributary to Cataract Creek *(dashed line hidden in the fine shaded-relief ruling)*. Note that the route extends into the canyon at "Yampais Village," which is the Havasupai village of Supai, mispositioned here nearly at the creek's confluence with the supposed Little Colorado River *(top center)*. This confluence and that of the Little Colorado with the great Colorado *(upper left)* were established by distant observations on a separate excursion to the rim nearby (*see* **FIGURE 44**). Ives, Egloffstein, and Newberry apparently agreed that they were almost at the mouth even though it also was reported that the area was significantly higher in elevation. In fact, the village is about ten miles by trail from the Colorado. ◈

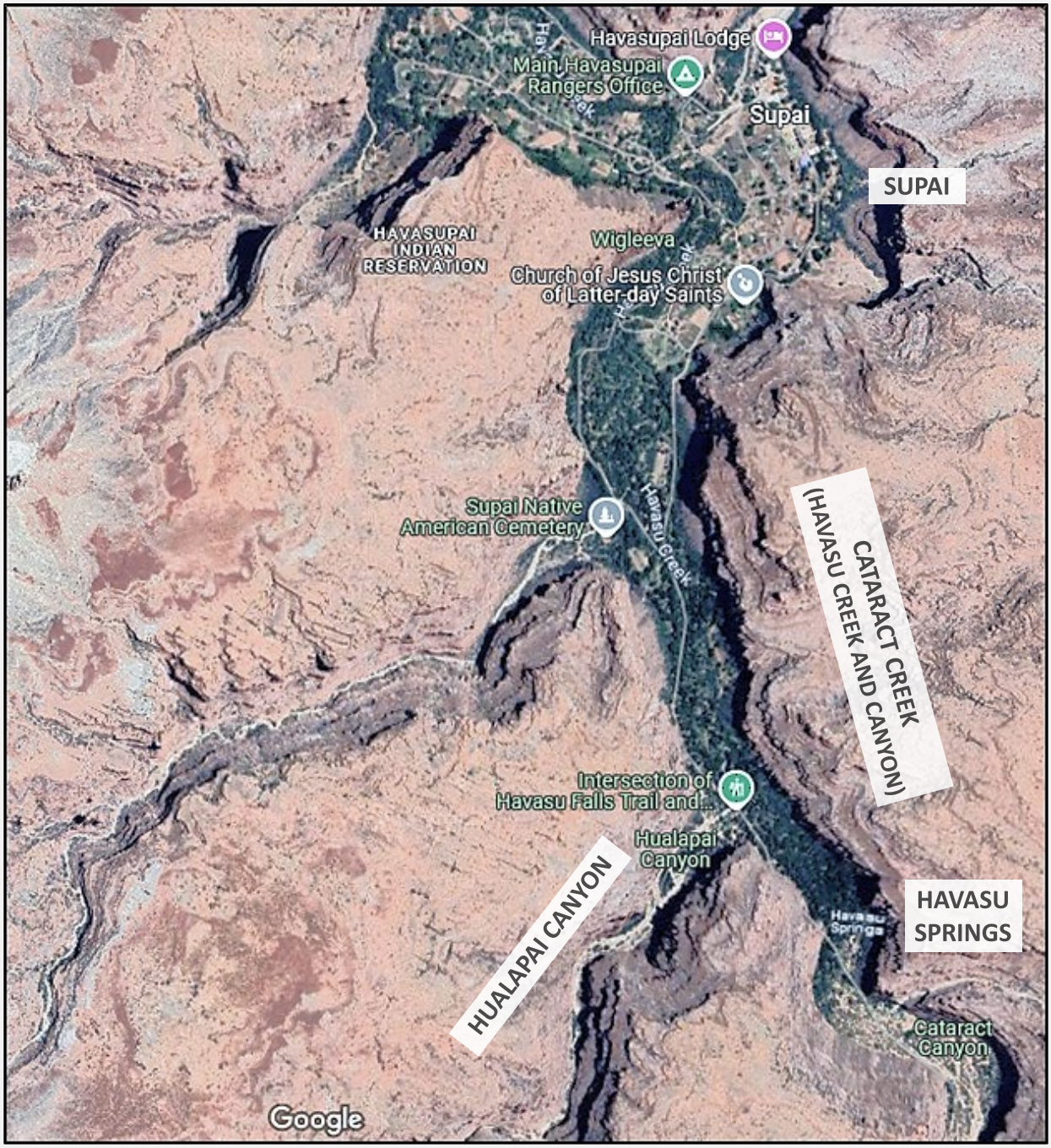

FIGURE 43a. Google Maps aerial view of the vicinity of Egloffstein's adventure in Havasu Canyon. Image contrast adjusted improve clarity of scene and labeling.

The descent of Hualapai Canyon *(its lowest reach is shown at bottom center)* to Cataract (Havasu) Creek ended here with Egloffstein's swift descent upon breaking an old Havasupai ladder. The journals refer to a nearby spring (likely Havasu Springs, *lower right*). The cataracts farther downcanyon along Havasu Creek, past the village of Supai *(top)*, were likely reported by Egloffstein in as much as no other member of the expedition accompanied him, though whether he saw the falls or was informed of them by the Havasupai is not clearly stated in the published journals. ◈

("Imagery © 2025 Airbus, Imagery © 2025 Airbus/Landsat/Copernicus, Maxar Technologies, Map data © 2025 Google")

FIGURE 44. Excursion en route to Camp 74.

The excursion made northwest to the rim of the canyon *(lower left)* is the one where Newberry, Egloffstein and Möllhausen estimated the geographic positions of the confluences of Cataract Creek *(upper right)* and the Little Colorado River with the main Colorado *(upper left)*. (Compare also **FIGURES 48, 48a**.) ◈

Chiquito, which was our next sight to see again [on the expedition's extended itinerary]. We had already completely given up hope of getting down to the great Colorado at that latitude.

"At last, after a march of three miles, we stood at the edge of the ravine, and before me lay a picture similar in character to that which I have already described, and yet so different in its parts and forms. [See Egloffstein's probable portrayal of the scene in **FIGURE 45**.] The impression made on us by the mighty rock basin was heightened by the fact that we stood hard on the edge of the plateau and the horrible depths opened up directly at our feet. Hesitantly we shuffled down to the dark red bed of the dry basin, about two thousand feet deep; in innumerable meanders, like fantastic arabesques, the various water channels ran along, and with them the ravines were joined by the gorges that reached far into the basin from the deep crevasses of the highlands. The average breadth of this crag was not less than six miles, but it was as it were divided in two by a wall-like extension of the plateau, which was adorned with such strange formations that one really thought one saw before one the well-

FIGURE 45. "Upper Cataract Creek, near Big Cañon. J. J. Young, from a sketch by F. W. Egloffstein." (Ives, General Report Plate VIII.) *(American Philosophical Society; photo by the author)*

Despite Egloffstein's typically overworked topography in this northward view into Havasu Canyon from the plateau, the picture provides an idea of what he could see at a distance and apply to his map. Toward the top, one can make out a horizontal gash across the entire picture, drawn as a palisade wall, that is meant to be the canyon of the Little Colorado River toward which Cataract Creek is flowing to a junction just out of sight, occluded by the canyon wall in the middle ground. Farther beyond to the north lies the continuing plateau, with (at the top of the picture) a discernable distant line cliffs that may represent the canyon's north rim. Egloffstein also captures the idea of deeply incised, narrow inner portions of the canyon, which Ives commented upon during the excursion into Havasu Canyon ("General Report," p. 107): "Along the centre we were surprised to find an inner cañon, a kind of under cellar, with low walls at the starting point, which were soon converted into lofty precipices, as the base of the ravine sank deeper and deeper into the earth." ◈

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preserved ruins of an Indian city. Even more striking was a mighty amphitheater, which stretched out in a beautiful, regular curve between our point of view and the rock face crowned with ruins. Through a wide opening it was connected with the main basin, but it

formed a closed structure, which, more than anything else, had to excite the observer to contemplation.

"Just as impressions, feelings and thoughts were often repeated on my lonely hikes in those wild places, it is also forgivable if I allow the same repetitions to occur in the description; and I gladly endure the reproach I may incur in attempting a repeated description of that strangely rugged high country.

"So there, at a dizzying height, on the edge of the curve, I sat again and drew. The formations of different epochs piled up in front of me from a horrible depth, one above the other, which can be clearly distinguished by the glaring color contrasts, each individual layer designating a world age. The walls stood upright, as if the slightest tremor might throw them down, and the features, which clearly proved that the falling drop of water formed the gorges that stared at me from all sides, seemed to me like a reminder to infinity. I grasped and drew, and at the same time looked longingly at the high cliff that rose out of the plain about twenty miles away, and at the foot of which the little or the big Colorado must froth past.

"Both rivers could not, by our calculation, be more than fifteen hundred feet above sea-level at that latitude, and as the elevation of the plateau was nine thousand feet, the peculiar picture must have lain hidden before us, in which a river flows between vertical walls of seven thousand feet or more, or, in gradual, consecutive falls, overcomes the difference in altitude. On my return from that country the question has often been raised, whether the Colorado could not have dug its bed under the surface of the Plateau, since the elevation of the ground near the junction of the Grand and Green rivers is only about five thousand feet; the same is certainly conceivable, but on the spot one easily recognizes the improbability of undermining the massive strata of rock which form the surface of the earth over an immense space. Moreover, looking at the innumerable gorges which traverse the highlands like veins, there is no doubt that the deep, hitherto unknown beds of the streams in those regions, like the gorges, were gradually formed by erosion from above.[49] Incidentally, from the heights of the San Francisco mountains one can see the openings of the fissures through which the two rivers presumably flow.[50]

"With a certain melancholy I looked across at the mighty embankment, which marked the course of great waters, and from which I was separated by obstacles that would have

[49] This statement is clearly from the observations first expressed by expedition geologist John Strong Newberry in Part III of Ives' *Report*. However, as purely a point of absolute priority, Möllhausen's statement precedes in publication Newberry's by the better part of a year.

[50] The note of viewing the Little and great Colorado courses from "the heights of the San Francisco mountains," while accurate, is suppositional by Möllhausen. No one of the Ives expedition reached these elevations (see Möllhausen's remark at Camp 82, *below*).

required more than human strength to overcome; with melancholy I also observed a harrier that soared on sure wings at the same height as my lofty standpoint over the depths. I envied the bird's strength, followed it in spirit and created in my mind, with foreboding horror, a picture of the rocky valley of the Colorado 'of the West', which will perhaps remain a secret to people for centuries to come. When I turned to return to camp I found the seemingly uninterrupted plain before me again, the sky had clouded over, some rose-colored streaks shimmered in the west, heralding the imminent setting of the sun, and I sped to avoid being surprised by darkness between the ravines."

Ives, "General Report," *April 14, pp. 107–108*

[This is Ives' account of the exploration into Havasu Canyon in the fruitless attempt to occupy the mouth of Cataract Creek. Refer to **FIGURE 43**.]

"*Camp* 73, *Colorado plateau, April* 14.—Lieutenant Tipton, **Mr. Egloffstein**, Mr. Peacock, and myself, with a dozen men, formed the party to explore the cañon. It was about five miles to the precipice. The descent of the latter was accomplished without serious trouble. In one or two places the path traversed smooth inclined ledges, where the insecure footing made the crossing dangerous. The bottom of the cañon, which from the summit looked smooth, was covered with hills, thirty or forty feet high. Along the centre we were surprised to find an inner cañon, a kind of under cellar, with low walls at the starting point, which were soon converted into lofty precipices, as the base of the ravine sank deeper and deeper into the earth. Along the bottom of this gorge we followed the trail, distinctly seen when the surface was not covered with rocks. Every few moments, low falls and ledges, which we had to jump or slide down, were met with, till there had accumulated a formidable number of obstacles to be encountered in returning. Like other cañons, it was circuitous, and at each turn we were impatient to find something novel or interesting. We were deeper in the bowels of the earth than we had ever been before, and surrounded by walls and towers of such imposing dimensions that it would be useless to attempt describing them; but the effects of magnitude had begun to pall, and the walk from the foot of the precipice was monotonously dull; no sign of life could be discerned above or below. At the end of thirteen miles from the precipice an obstacle presented itself that there seemed to be no possibility of overcoming. A stone slab, reaching from one side of the cañon to the other, terminated the plane which we were descending. Looking over the edge it appeared that the next level was forty feet below. This time there was no trail along the side bluffs, for these were smooth and perpendicular. A spring of water rose from the bed of the cañon not far above [Havasu Springs, presumably; refer to **FIGURE 43a**], and trickled over the ledge, forming a pretty cascade. It was supposed that the Indians

must have come to this point merely to procure water, but this theory was not altogether satisfactory, and we sat down upon the rocks to discuss the matter.

"**Mr. Egloffstein** lay down by the side of the creek, and projecting his head over the ledge to watch the cascade, discovered a solution of the mystery. Below the shelving rock, and hidden by it and the fall, stood a crazy looking ladder, made of rough sticks bound together with thongs of bark. It was almost perpendicular, and rested upon a bed of angular stones. The rounds had become rotten from the incessant flow of water. **Mr. Egloffstein**, anxious to have the first view of what was below, scrambled over the ledge and got his feet upon the upper round. Being a solid weight, he was too much for the insecure fabric, which commenced giving way. One side fortunately stood firm, and holding on to this with a tight grip, he made a precipitate descent. The other side and all the rounds broke loose and accompanied him to the bottom in a general crash, effectually cutting off the communication. Leaving us to devise means of getting him back he ran to the bend to explore. The bottom of the cañon had been reached. He found that he was at the edge of a stream, ten or fifteen yards wide, fringed with cottonwoods and willows. The walls of the cañon spread out for a short distance, leaving room for a narrow belt of bottom land, on which were fields of corn and a few scattered huts.

"A place was found near the ledge where one could clamber a little way up the wall, and we thus got a view of the valley. The river was nearly as large as the Gila at low water, and, with the exception of that stream, the most important tributary of the Colorado between its mouth and our position. The cañon **Mr. Egloffstein** saw could not be followed far; there were cascades just below. He perceived, however, that he was very near to its mouth, though perhaps at a thousand feet greater altitude, and an Indian pointed out the exact spot where it united with the cañon of the Rio Colorado [Little Colorado River of the map].

" [. . .] One of them accompanied **Mr. Egloffstein** to the foot of the ledge, and intimated a willingness to go with us to camp, but when he saw the broken ladder gave up his intention. The accident did not appear otherwise to concern him. There must have been some other trail leading to the retreat, for the use of the ladder had evidently been long abandoned.

"Having looked at all that was to be seen, it now remained to get **Mr. Egloffstein** back. The slings upon the soldiers' muskets were taken off and knotted together, and a line thus made which reached to the bottom. Whether it would support his weight was a matter of experiment. The general impression was that it would not, but of the two evils—breaking his neck or remaining among the Yampais [Havasupai]—he preferred the former, and fastened the strap around his shoulders. It was a hard straight lift. The ladder pole was left, and

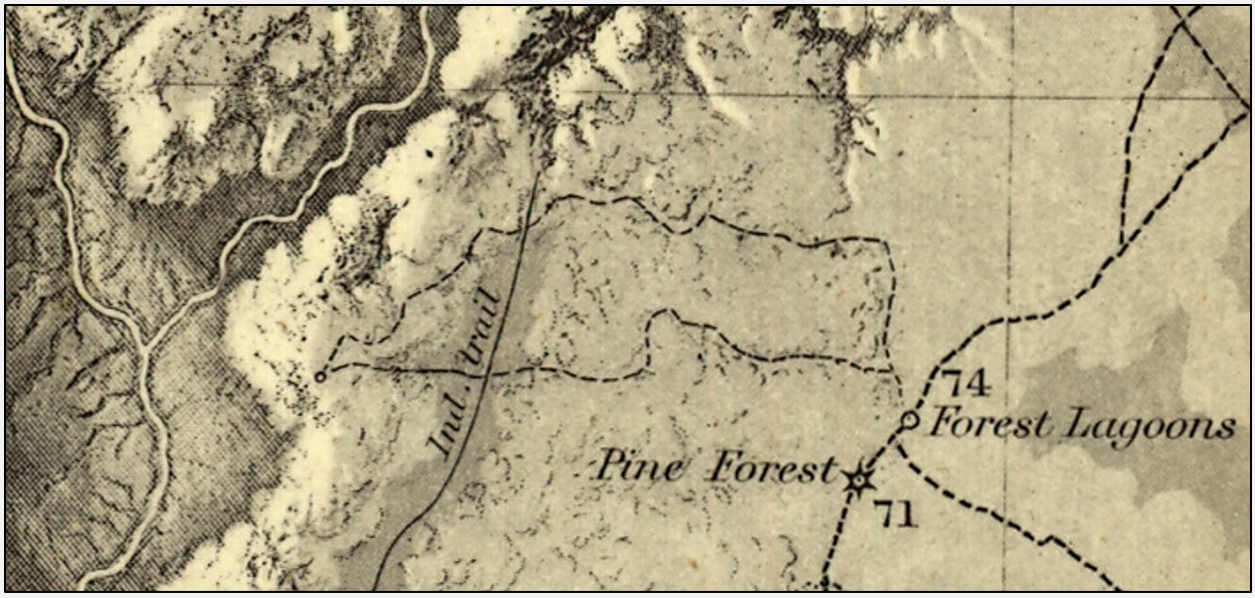

FIGURE 46. Excursion from the "Forest Lagoons" (Camp 74).

The excursion probably traced the canyon rim on its westbound track, at the end looking over the Granite Park area, though on the finished map it is implied to view the Parashant Wash confluence. They returned eastbound to camp more directly. (Compare also **FIGURES 48, 48a**.) ◈

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rendered great assistance both to us and the rope, and the ascent was safely accomplished. We invited the Indian to follow **Mr. Egloffstein**'s example, but this he energetically declined."

Ives, "General Report," *April 18, p. 110*

[This is a record of the excursion to the canyon rim where the supposed confluence of the Little Colorado River with the great Colorado was established (**bold** emphais added here). Written in Camp 74 after the Havasu Canyon descent.]

"*Camp* 74, *Forest lagoons*, *April* 18.—Midway between the last camp and the lagoons, a trail was encountered leading towards another point of the Big cañon. With a small detachment I left the main party and followed its course. [**FIGURE 46.**] It headed directly for the north side mountains—the peaks already spoken of as seen upon the opposite bank of the Colorado.[51] We travelled till dark; the trail ended near some deserted huts that resembled those seen at the Yampais village[52]; they were in the midst of a pine grove; there was no water in the neigh-

[51] The "North Side Mts." on Egloffstein's map are the Uinkaret Mountains, a volcanic field in the Toroweap area of the North Rim. The trail here noted by Ives soon turned westward, as shown on the map. (See also Appendix Figure A13.)

[52] Probably as reported by Egloffstein from his time while stranded in the canyon.

borhood, and the Yampais, who doubtless make this place their summer resort, must be compelled to send to the bottom of the cañon for their supply.

"The country become rough and so much cut up by ravines that it was impossible to approach very closely to the main river. **A good view was obtained of the walls of the Flax river cañon, and its mouth approximately located. The junction was below the mouth of Cascade creek [Cataract Creek], showing that that stream is not, as had been supposed, a tributary of the Colorado, but of its smaller affluent.**[53]

"We had to camp without water, and it being the second day that the animals had had nothing to drink, a great part of them broke from the herders as soon as their saddles were removed, and made a stampede for the lagoons. Barely enough were left to pack the few articles that had been brought.

"Another reconnaissance has since been made on foot from the lagoons westward. A line thirty miles in extent was traversed, with results similar to those previously obtained. An excellent view was had of the Big cañon. The barometric observations upon the surface of the plateau and at the mouths of Diamond and Cataract rivers, showed that the walls of this portion of the cañon were over a mile high. The formation of the ground was such that the eye could not follow them the whole distance to the bottom; but as far down as they could be traced they appeared almost vertical. A sketch taken upon the spot by **Mr. Egloffstein** does better justice than any description can do to the marvellous scene."

"Our reconnoitering parties have now been out in all directions, and everywhere have been headed off by impassable obstacles. The positions of the main water-courses have been determined with considerable accuracy. The region last explored is, of course, altogether valueless. It can be approached only from the south, and after entering it there is nothing to do but to leave. Ours has been the first, and will doubtless be the last, party of whites to visit this profitless locality. It seems intended by nature that the Colorado river, along the greater portion of its lonely and majestic way, shall be forever unvisited and undisturbed."[54]

[53] The passage highlighted here corroborates that the surveying members of the expedition did not, *in their view*, confuse the Little and great Colorados even though in fact their Little Colorado River was the main Colorado.

[54] This of course is Ives' most often-quoted passage, but for the amusement it supplies with hindsight in light of today's throngs of tourists. It echoes the end of Möllhausen' diary entry for April 14th, quoted above, where he supposed that "the rocky valley of the Colorado 'of the West' . . . will perhaps remain a secret to people for centuries to come."

Möllhausen, Reisen, *Vol. 2, pp. 137–138.* (Translated here [55])
[At Camp 82, Leroux Spring, San Francisco Mountain *(see at lower right in* FIGURE 49*)*]

[This is probably the most consequentially negative decision made by Ives, in so far as it affected Egloffstein's ability to map any part of the country between the San Francisco Peaks and the eastern end of the Grand Canyon—today's heavily visited South Rim. Even though Möllhausen indicated that Egloffstein needed to better survey the configuration of the Little and great Colorados where they supposedly approached their confluence off to the northwest, the topographer surely would have been surprised to see what is the Grand Canyon's North Rim on the horizon had he been able to climb to a higher elevation here. See **FIGURE 47**.]

"**Mr. von Egloffstein** had expressed the wish that the expedition should stay another day at Leroux's Spring, so that he could climb the highest peak of the San Francisco Mountains to gain a view of the northwestern lands and to learn more about the geographical position of the Little and Big Colorado near their junction. However, due to the lack of time and provisions, Lieutenant Ives refused his request, the fulfillment of which would certainly not have been without importance."

Ives, "General Report," *May 2, pp. 115, 116*
[At the Little Colorado River, east of San Francisco Mountain]

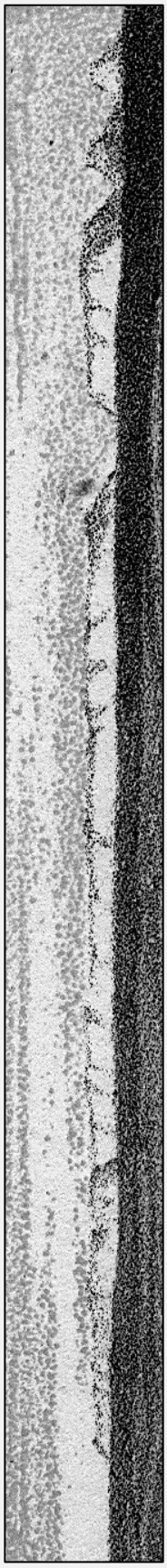
"*Camp* 85, *Flax river, May* 2. [. . .]

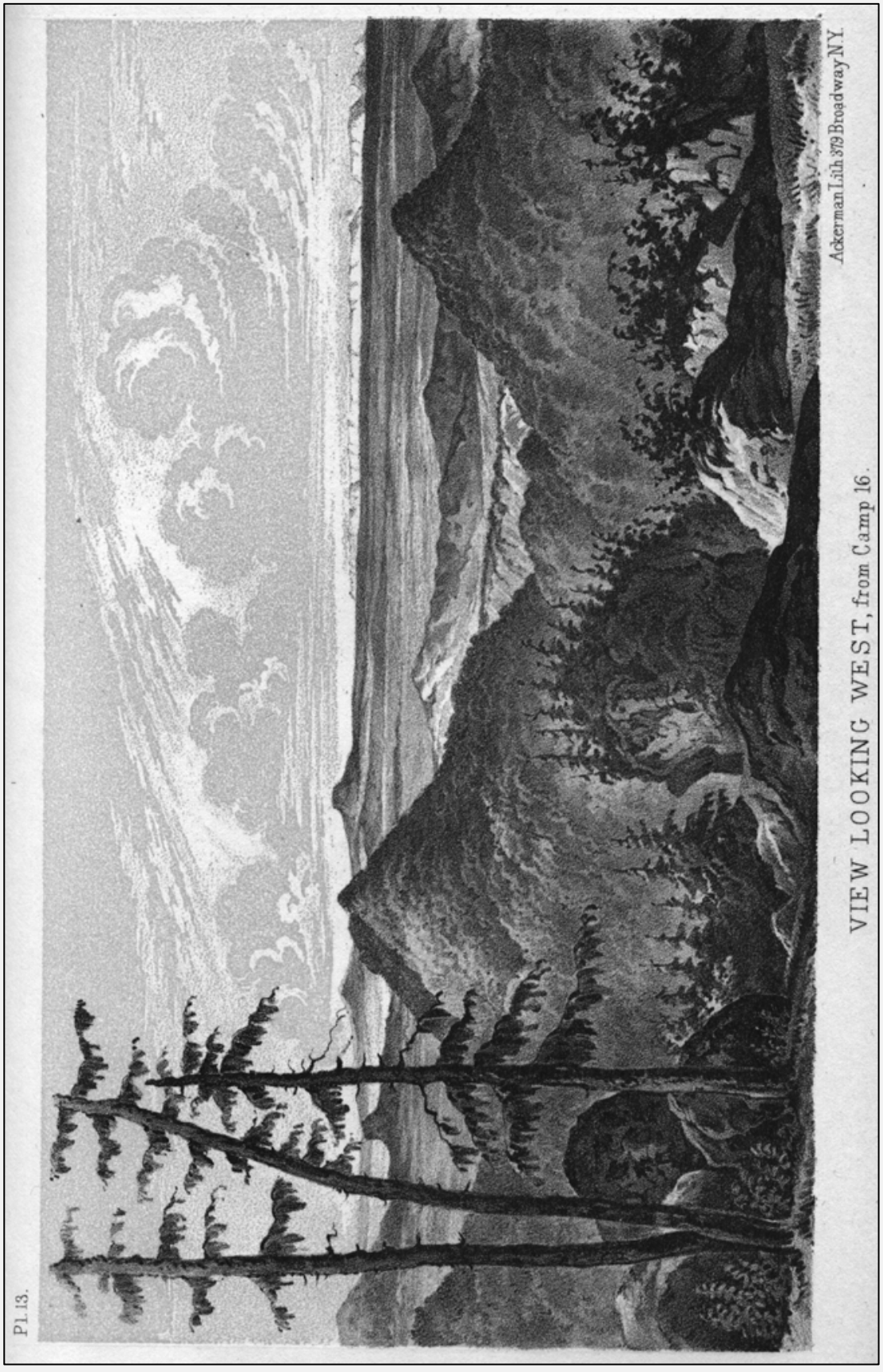
"It has been finally arranged for Lieutenant Tipton to take the train and follow Lieutenant Whipple's trail to Zuñi, and thence go to Fort Defiance, while Dr. Newberry, **Mr. Egloffstein**, and myself, with ten men and a few of the least exhausted mules, are to proceed northward. A reduction through the command in the amount of the accustomed ration will enable our small number to be kept in the field for a week or two longer than the time it would require to go directly to the fort."

[The party visited the Hopi mesas, perhaps to inquire into the Mormon movements in the area considering Ives' more clandestine mission. They proceeded some distance even farther to the northwest, without guides, before doubling back to continue onward on a direct route to Fort Defiance where the expedition disbanded.] ◈

[55] This entry is not included in *Balduin Möllhausen's Grand Canyon* because it was geographically extralimital to the coverage of that volume. The original text reads: "**Herr von Egloffstein** hatte den Wunsch ausgesprochen, daß die Expedition noch einen Tag an Leroux's Quelle verweilen möge, damit er dan höchsten Gipfel der San Francisco-Berge ersteigen könne, um einen Blick auf die nordwestlichen Ländereien zu gewinnen und etwas Genaueres über die geographische Lage des kleinen und des großen Colorado nahe ihrer Bereinigung zu erfahren. Doch, mit Rücksicht auf den Mangel an Zeit und an Lebensmitteln, schlug lieutenant Ives ihm die Bitte ab, deren Erfüllung gewiß nicht ohne Wichtigkeit gewesen wäre."

Ives ("General Report," p. 115) dedicated but one five-line paragraph to the stay at Leroux Spring, the report of which was not written until two camps afterward. The condition of the pack train, and in some measure the men, was somewhat deteriorated after a long waterless march.




Pl. 13.
VIEW LOOKING WEST, from Camp 16.
Ackerman Lith. 379 Broadway N.Y.

▲ FIGURE 47. What Egloffstein missed. "View Looking West, from Camp 16" (Plate 13 in L. Sitgreaves, *Report of an Expedition Down the Zuñi and Colorado Rivers* (U.S. 32nd Congress, 2nd Session, Senate Executive Document 59, 1853). (With detail at top, added here.)

Had the Ives expedition's topographer been able to ascend to a higher elevation in the San Francisco Peaks, he would have spied the Grand Canyon's North Rim rising over the horizon, like icebergs in the sea *(digitally enhanced detail at top)*. The view here, part way up the mountain's western flank and more panoramic than the misleading "West" intimated by the lithograph's legend, was made by the artist Richard H. Kern while attached to the Sitgreaves expedition of 1851 and published as Plate 13 in Sitgreaves' *Report of an Expedition Down the Zuñi and Colorado Rivers* (U.S. 32nd Congress, 2nd Session, Senate Executive Document 59 [1853]). This is further explained with other historical notes and comments about the view in Earle Spamer, "Once Again, 'Who Named the Grand Canyon?'—and Other Obscure Grand Canyon 'Firsts'," *The Ol' Pioneer* (Grand Canyon Historical Society), Vol. 24, no. 2 (Spring 2013), pp. 6-7; and Spamer, *Art of the Grand Canyon: An Introduction and Annotated Bibliography* (Raven's Perch Media, 2023, https://ravensperch.org/wp-content/uploads/2023/05/Artwork.pdf), pp. 10-11. ◈ *(Author's collection)*

The view of the distant North Rim is, incidentally, the first graphic depiction of the Grand Canyon. Kern and expedition physician–naturalist Samuel Washington Woodhouse viewed the scene, which Woodhouse commented on in his diary on 11 October 1851 (FIGURE 47a▶; his writing lacks punctuation and some capitalization): "*from here was to be seen the course of the great Colorado and the tops of the mountain and rocky bluffs which form the great canon this must really be an awful yet grand spectacl* [sic] *I should suppose that the nearest point was about 70 miles nothing like water was to be seen*" (first illustrated by Spamer, "Once Again…", p. 7, legend there unintentionally omitted by editor.) *(Courtesy of the Archives, Academy of Natural Sciences of Drexel University, Philadelphia, Collection 387B, Box 1, folder 8, p. 124; the author had been Archivist of what then was the Academy of Natural Sciences of Philadelphia during 2001–2005.)*

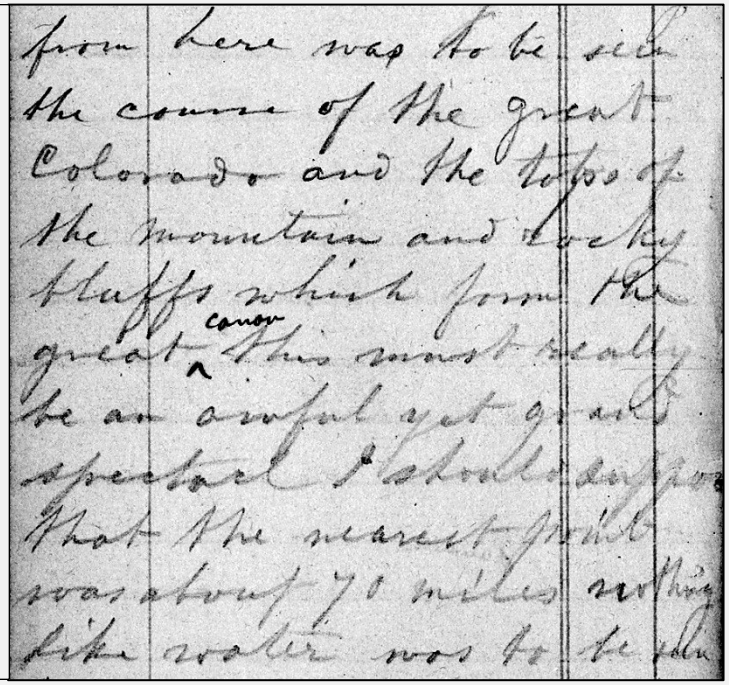


FIGURE 48. The exploratory routes of the Ives expedition on the plateau between Peach Springs Wash and Cataract Creek. The main route is the bold-dashed line along which are enumerated campsites of the expedition. Camp 73 denotes the head of Hualapai Canyon, the tributary to Cataract Creek down which some of the company, including Egloffstein, descended in an attempt to reach the confluence of Cataract Creek with the "Little Colorado River," and perhaps to reach the main Colorado confluence downstream from there. See also details of the mapped excursions in **FIGURES** 44 and 46. The expedition was led in this area by Hualapai guides, thus the route was one that was familiar to the local Indigenous peoples.

Compare this to **FIGURE 48a**, which demonstrates both the partial accuracy of Egloffstein's surveys and the difficulty in ascertaining at a distance proper topographical relationships. ◈

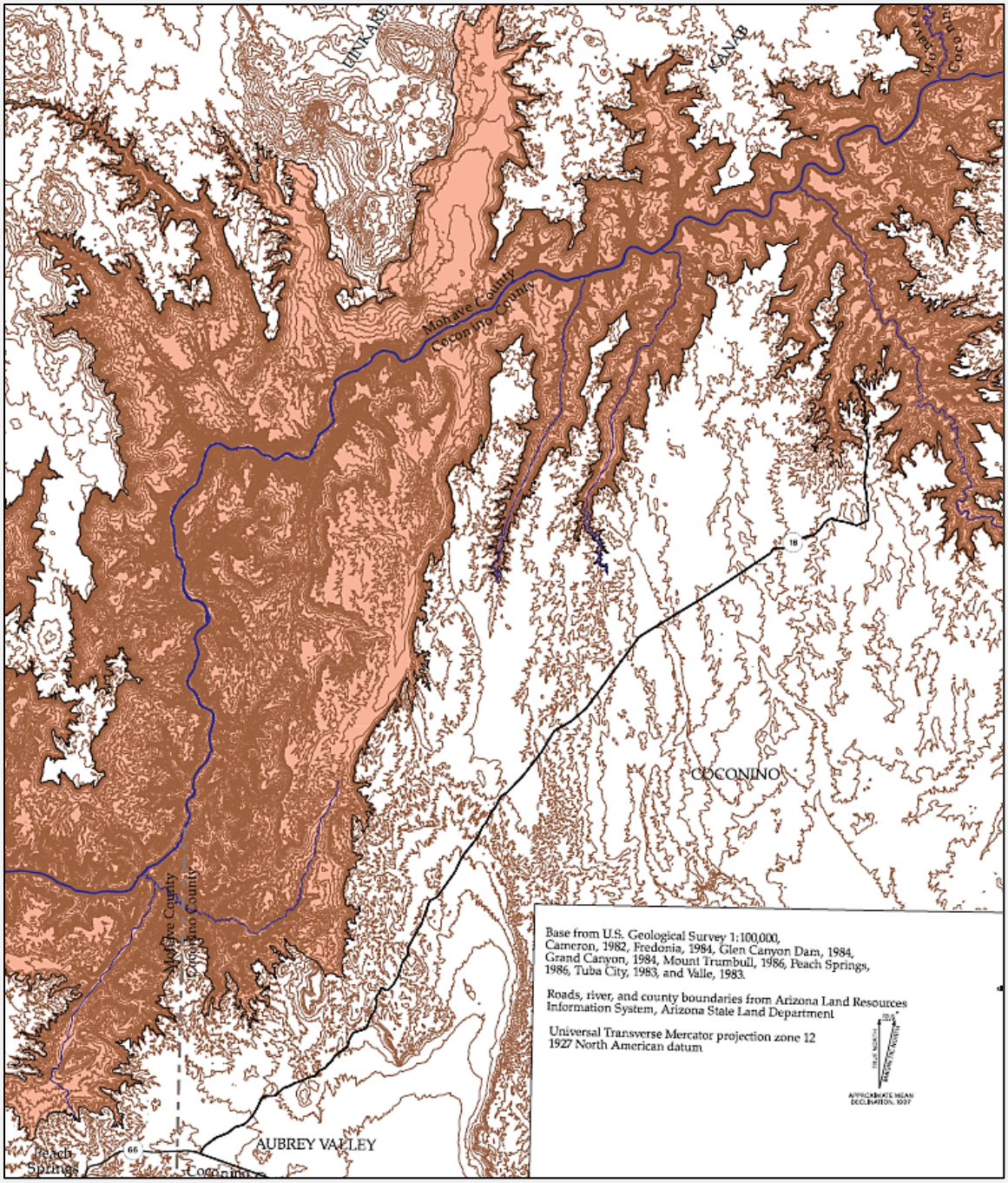


FIGURE 48a. Detail from **"Physiographic Rim of the Grand Canyon, Arizona," by George H. Billingsley and Haydee M. Hampton (*U.S. Geological Survey, Open-File Report 99-30*, 1999, scale 1:250,000, contour intervals 25 and 50 m).** Detail encompasses approximately the same area as that shown in **FIGURE 48**. Note that present-day Indian Road 18 fairly follows the path taken by the Ives expedition (it begins in modern Peach Springs on the Hualapai Indian Reservation and ends at Hualapai Hilltop on the Havasupai Indian Reservation, the start of the most frequently used trail to Supai). ◈

FIGURE 49. The "Colorado Plateau" area between the San Francisco Peaks and the Grand Canyon.

This area was not visited by the expedition, As noted in the text, Egloffstein was refused the opportunity to gain the view from higher elevations of San Francisco Mountain while camped at Leroux Spring (Camp 82, *lower right*). For that reason alone, he never had the opportunity to spot the topographically most "grand" portion of the Grand Canyon along today's heavily visited "South Rim." He would at least have seen the North Rim on the horizon (**FIGURE 47**). This area also displays the headwaters of Cataract Creek as reckoned by Egloffstein. Red Butte, shown by Egloffstein too large, misformed, and to the west of its true location (Appendix Figure A12), is the only landmark of significance that may have been adopted from the maps of earlier expeditions that passed by the San Francisco Peaks. The Grand Canyon itself is entirely artificial on this reach of the supposed Little Colorado River course, and most of the northwest-trending tributaries to it are likewise implied, probably mirroring the landscape slope of the Cataract Creek and nearby tributaries. The line across the bottom is the expedition's eastbound route of travel, having left the plateau area between Diamond and Cataract Creeks. ◈

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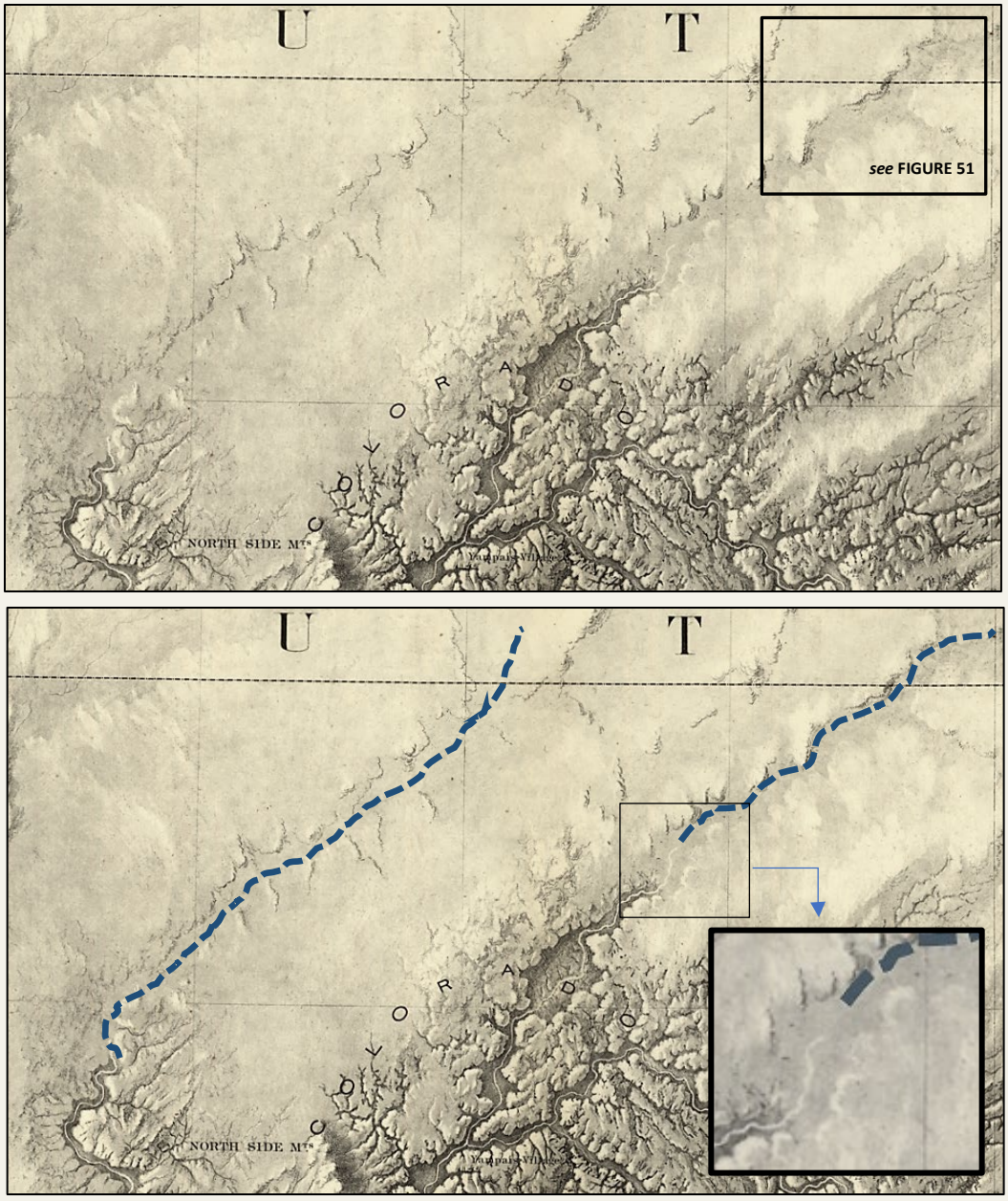


FIGURE 50. Egloffstein's courses of streamways from the north implied to join with the assertively mapped topography of "Map No. 2."

These suggested courses plotted by Egloffstein may have been drawn partly from vague interpretations of the landscapes that he had viewed distantly from the south side of the Colorado River, with further conjecture toward the Utah boundary, so as to accommodate the geographies of river courses on preexisting maps of the region. This specific arrangement is reminiscent of the representations of parallel Green and Grand Rivers. They also allowed later cartographers to run the course of the Colorado River from Utah into Egloffstein's map: the Parashant Wash route is at *left*, and the through-flowing Colorado River route (Egloffstein's own inferred course) is at *right* (the **INSET** better reveals the farthest upstream reach of the "definitive" course). Many creative variants were devised to accommodate these reaches. ◈

CHAPTER 5
Influences

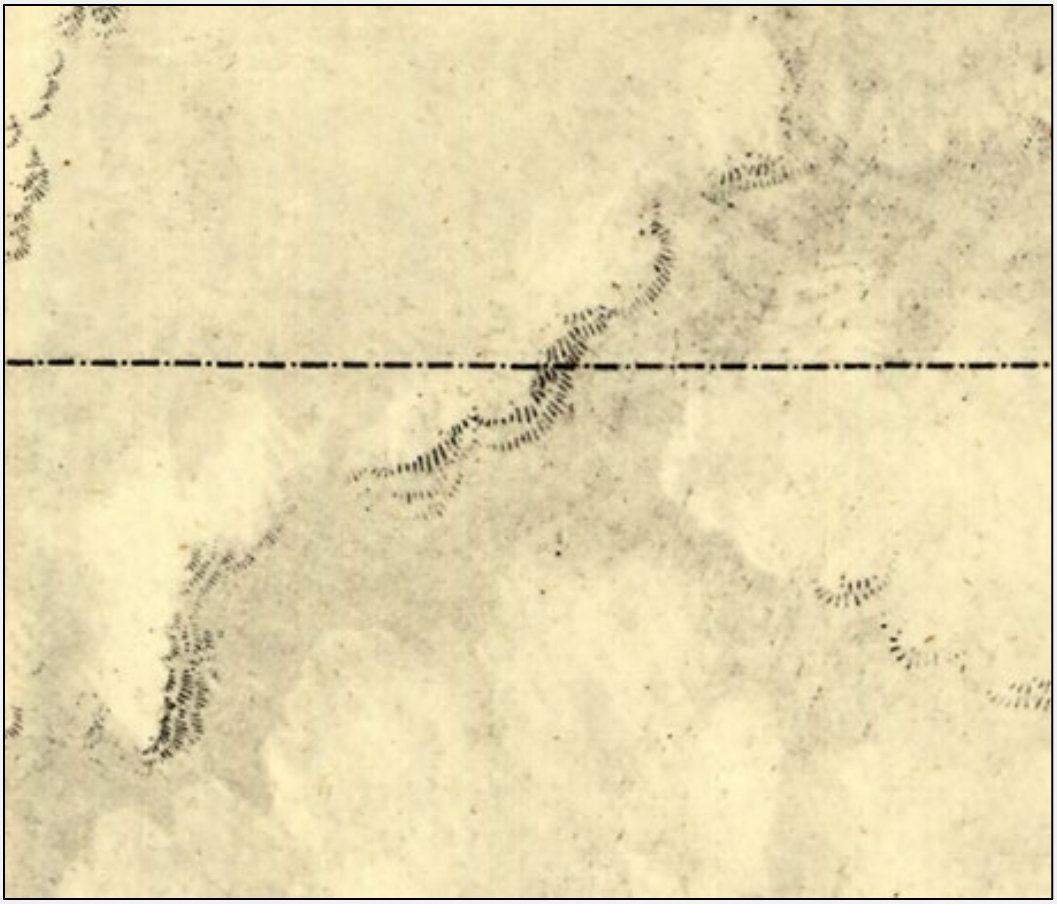
[FIGURES 50–82]

The figure legends in this chapter are a key part of the interpretations and may accordingly be read as their own narrative. Refer also to the Analytical Charts (pp. xii–xv).

THIS HIGHLY GRAPHIC CHAPTER examines the possible influences that earlier maps may have had on F. W. von Egloffstein's survey of the greater Grand Canyon area, and the influence that his finished map had on cartographers after its publication.

It is not reasonable to expect that Egloffstein had gone to the Grand Canyon region without some comprehension of how it had been portrayed on earlier maps, whether as blank "UNEXPLORED" territory or with imagined courses of streams through there. The upper reaches of the Green and Grand (now Colorado) river basins were known, as was the lower part of the Colorado on its final approach to the Gulf of California. Likewise the upper reaches of the Little Colorado River and its tributaries were known. What still lay in the imagination was how to tie these main streams together. Some maps even ran the Green and Grand in parallel all the way into the area now known as the Grand Canyon, and the Little Colorado overland to reach them. And it seems that Egloffstein made allowances for these undetermined courses when he sculpted his model from his own observations during the Ives expedition. He could also have contemplated oral reports and superficial records from earlier decades, even centuries, during which small parties or individuals infiltrated these lands. Basic histories were not unknown, but neither were they documented with the same robustness that we have gained from scholarship about them in the past century and more.

Egloffstein's proposed course for the Colorado River—arriving from the northeast to an assumed confluence of the Little Colorado River downstream from the confluence of Cataract Creek—may be less creative than has been assumed. A careful examination of the topographies he has drawn where the Colorado's projected course crosses the Utah boundary (**FIGURE 50**) has a decided resemblance to where the Vermilion and Echo Cliffs converge at the locale known today as Lee's Ferry (**FIGURE 51**)—possibly an echo of history preserved. The general topography was known, though not visited by "expeditions" of Egloffstein's day. Accounts as early as the Domínguez–Escalante expedition of 1776 were known recorded that the Spanish padres had come to that locale along the Vermilion Cliffs but, unable to cross the Colorado there, retreated northward and eventually found the so-called Ute ford that later was called El Vado de los Padres (The Crossing of the Fathers; compare also **FIGURE 58b**). It was not all absolutely unknown. ◈




GLEN CANYON
NATIONAL RECREATION AREA
GLEN CANYON DAM
Page
PLATEAU
Lees Ferry
Red Butte
Marble Canyon
Vermilion Cliffs
Valley
Bitter Springs
LAKE POWELL

5.1 ◈ Egloffstein's Grand Canyon Map Influenced By Earlier Geographies?

[FIGURES 52–57]

Maps of the greater Grand Canyon region and the course of the Colorado River prior to Egloffstein's mapping during the Ives expedition established an erroneous sense for the lay of the land. Some were the products of government expeditions to other areas, whose maps more broadly embraced the Grand Canyon area even if that area was prominently labeled "UNEXPLORED". In order to cartographically route the Colorado River through those unexplored lands, the courses were run as though there was some sense of truth to them. Other maps were the inventions of cartographic ateliers, which in turn may have inferred and promoted the "authoritative" versions of government maps.

How many—indeed, which ones—of these maps influenced Egloffstein's perspective of the region's geography is unknown, though he had to have been aware of some of their depictions. After the expedition, they might have given him some conceptual ideas for areas that he was not able to survey himself. He, too, had to deliver the Colorado River from courses known farther upstream in Utah and Colorado to the known course below the great canyons where the river finally debouched into the Gulf of California. After he filled in the "unknown" part that is the Grand Canyon, it seems that he did indeed adopt the generalities of some of these forced courses in order to feed the Colorado from the north onto his own "Map No. 2."

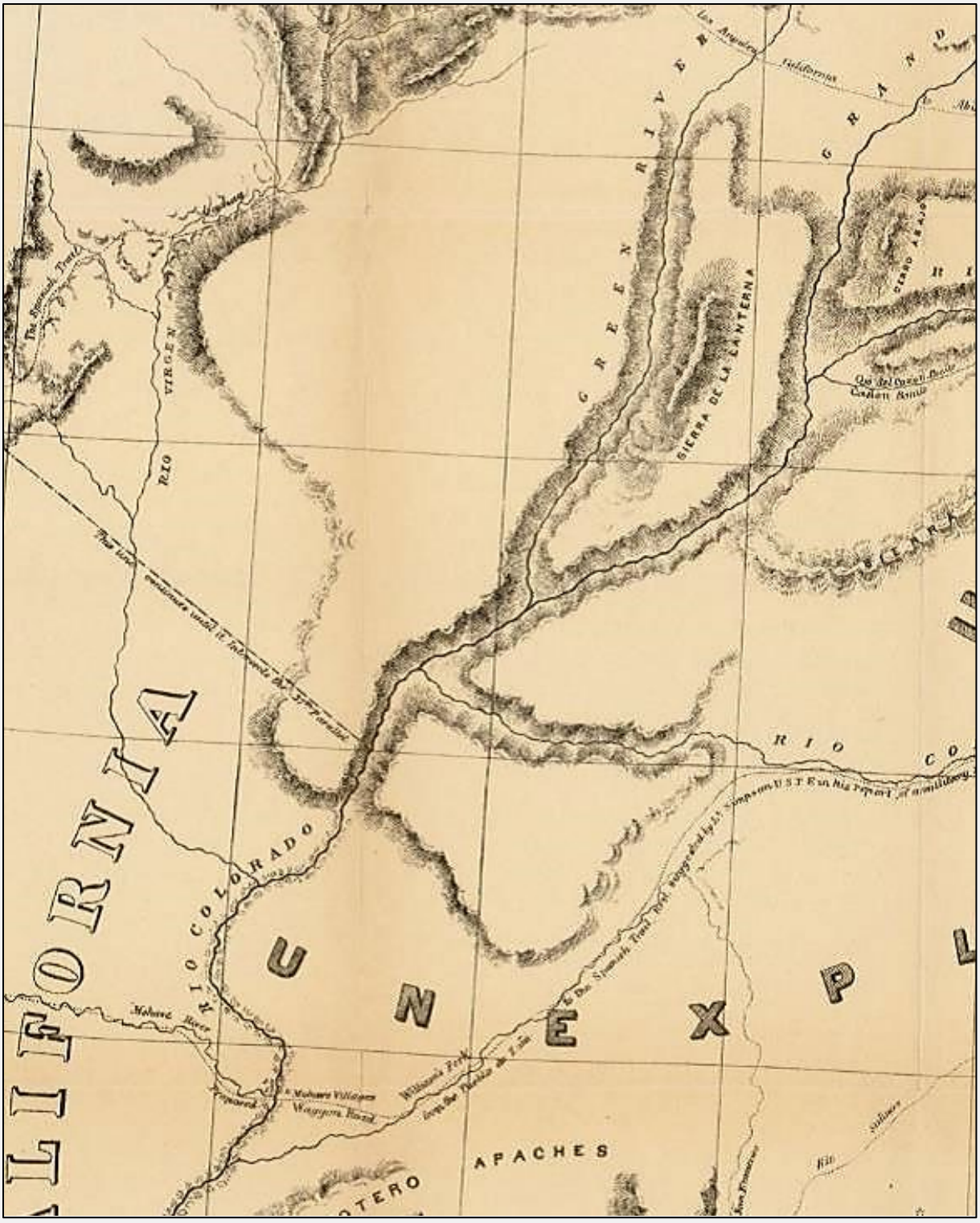
Any sway that earlier impressions may have had on Egloffstein would have been mnemonic, from having perused contemporary maps of the American West. Nonetheless it seems safe to interpret some of his plaster sculpting as allowing for these presupposed connections of the upper course of the Colorado River to his own map.

In this section are shown a few maps that show how Egloffstein could have allowed for the connection of those geographies to his own. ◈

◀ **FIGURE 51.** The adjacent topographies are only to be generally compared between the two maps; they do not align with respect to contemporary and modern latitude and longitude. (For Egloffstein's map compare **FIGURE 50**; compare also **FIGURE 58b**.)

(top) **Detailed enlargement of *upper-right corner of* FIGURE 50, the location on Egloffstein's map where the Colorado River may have been postulated to pass southward from Utah, with topography perhaps influenced by historical geographical reports.** This is not to say that the depiction is correctly located, only that he understood the area to be in the vicinity. (Note the use of radial hachuring rather than the mechanical fine parallel ruling to indicate shaded relief on the cliff faces, another example that belies the statement in Ives' "Appendix D" that hachuring had not been used.)

(bottom) Detail from **USGS 1:500,000 shaded relief map of "State of Arizona" (1981) showing the general vicinity where the Vermilion and Echo Cliffs converge.** ◈



Early Example 1 — 1851

Here and through the remainder of Chapter 5 groups of examples are in chronological order by year. They do not, however, represent a progression of advancement in geographical understanding.

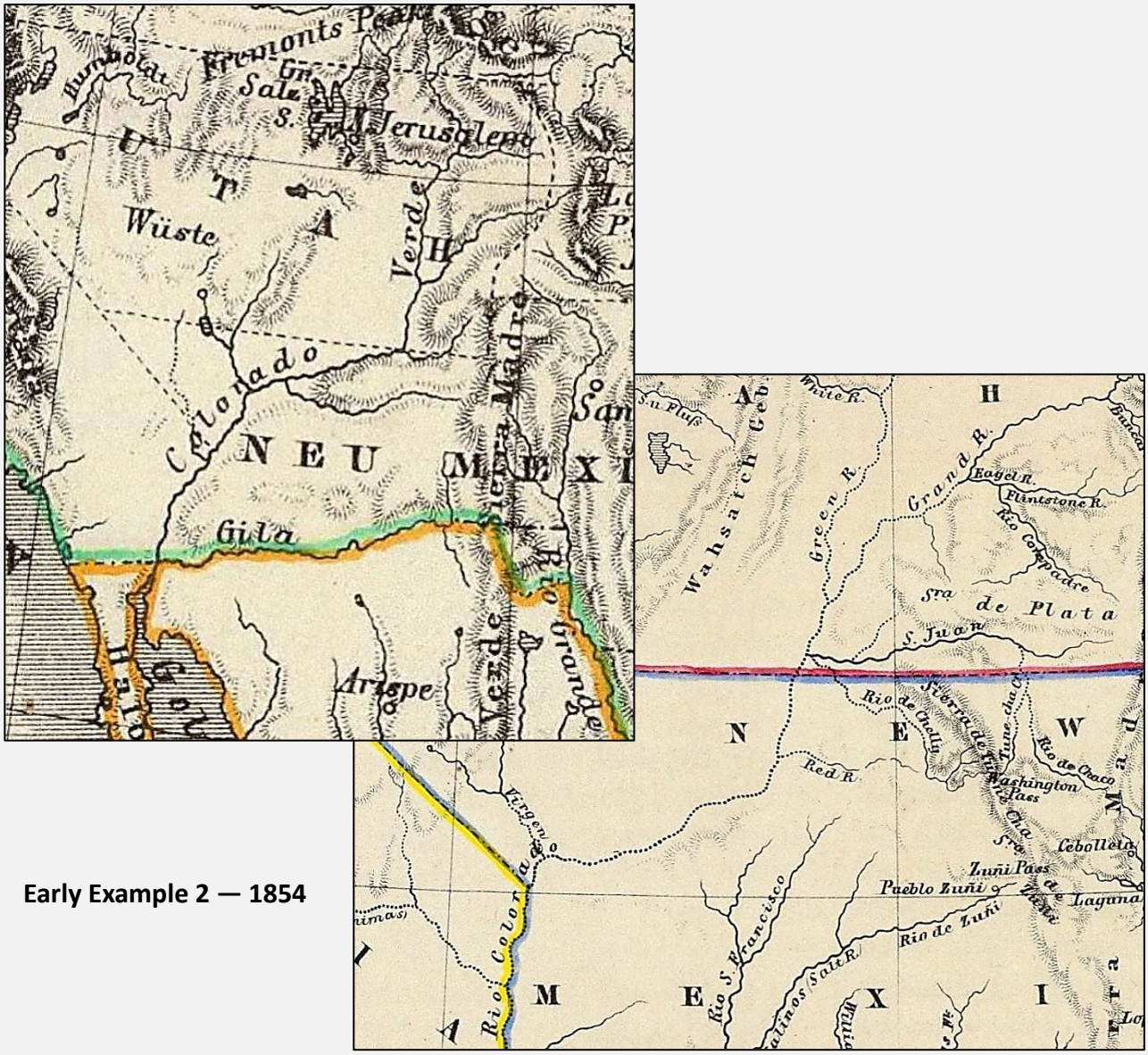
◀ **FIGURE 52.** Detail from **"Map of the Territory of New Mexico compiled by Bvt. 2nd Lt. Jno. G. Parke, U.S.T.E. assisted by Mr. Richard H. Kern. by order of Bvt. Col. Jno. Munroe. U.S.A. comdg. 9th Mil. Dept, drawn by R. H. Kern. Santa Fé, N.M. 1851. Constructed under general orders from Col. J. J. Abert, Chief of Topogl. Engrs."** (J. and D. Major, New York). [*Note*: The "Proposed Waggon Road" that appears on this map likely follows on the Sitgreaves expedition's traverse of northern New Mexico Territory in 1851, which foreshadowed the 1854 railway survey by the Whipple expedition and soon thereafter the laying out of the Beale Wagon Road in 1857.]

The courses of the Green and Grand Rivers seem to enter the Grand Canyon area in the fashion by which Egloffstein shows two streamways coming from the northeast and Utah, the eastern one of which is his main Colorado.

MAP NOTES: *Green River* and *Grand River* are shown in canyons on either side of the *Sierra de la Lanterna*, with their confluence approximately in the area where the central Grand Canyon is situated. Below that confluence, continuing in a canyon, is *Rio Colorado*. In that reach, *Rio Colorado Chiquito* (Little Colorado River; label partly shown) is a tributary to it from the east, with its confluence unexpectedly positioned just north of the boundary angle that later would form the southern point of Nevada. *Rio Virgen* (Virgin River) is much too far west, with its Colorado confluence south of the boundary angle.

Sierra de la Lanterna is a forgotten name for the Kaibab Plateau, as seemingly corroborated by geographical coordinates published in an 1854 gazetteer. The 1854 gazetteer provides the following data, the coordinates for which place it where exists the Kaibab Plateau: "Sierra de la Lanterna, a mountain range in the N. part of the Territory of New Mexico, lat. about 36° 20′ N., long. 112° 15′ W." It may have been misplaced, too, and thus may not be the Kaibab. The name may be a corruption of the Spanish *linterna* (lantern), but the origin or significance of this geographical name has not been identified.[56] ◈

[56] Thomas Baldwin and J. Thomas, *A New and Complete Gazetteer of the United States* (Lippincott, Grambo and Co., Philadelphia, 1854), p. 262. (Note that this is the old New Mexico Territory, from which a part of it Arizona Territory was created.) A gazetteer from 1859 picked up on this name (probably from Baldwin and Thomas), identifying it as "*m* New Mex." (a mountain in New Mexico), but without further pinpointing its location (Elias Longley, *Pronouncing vocabulary of geographical and personal names* [Longley Brothers, Publishers, Cincinnati, 1859], p. 105.) The name "Sierra de Lanterna" [*sic*] does appear once in the novel, *Overland,* by J. W. de Forest (Sheldon and Co., New York, 1871, p. 136), which feature was said to be above the confluence of the Green and Grand Rivers (much like as displayed here in FIGURE 52). The same geographical placement is noticed as "Sierra Lanterna" [*sic*] on p. 177 in Virginia Sánchez, "Survival of Captivity: Hybrid identities, gender, and culture in territorial Colorado," in *Nación Genízara: Ethnogenesis, place, and identity in New Mexico* (Moises Gonzalez and Enrique R. Lamadrid, eds., University of New Mexico Press, Albuquerque, 2019).

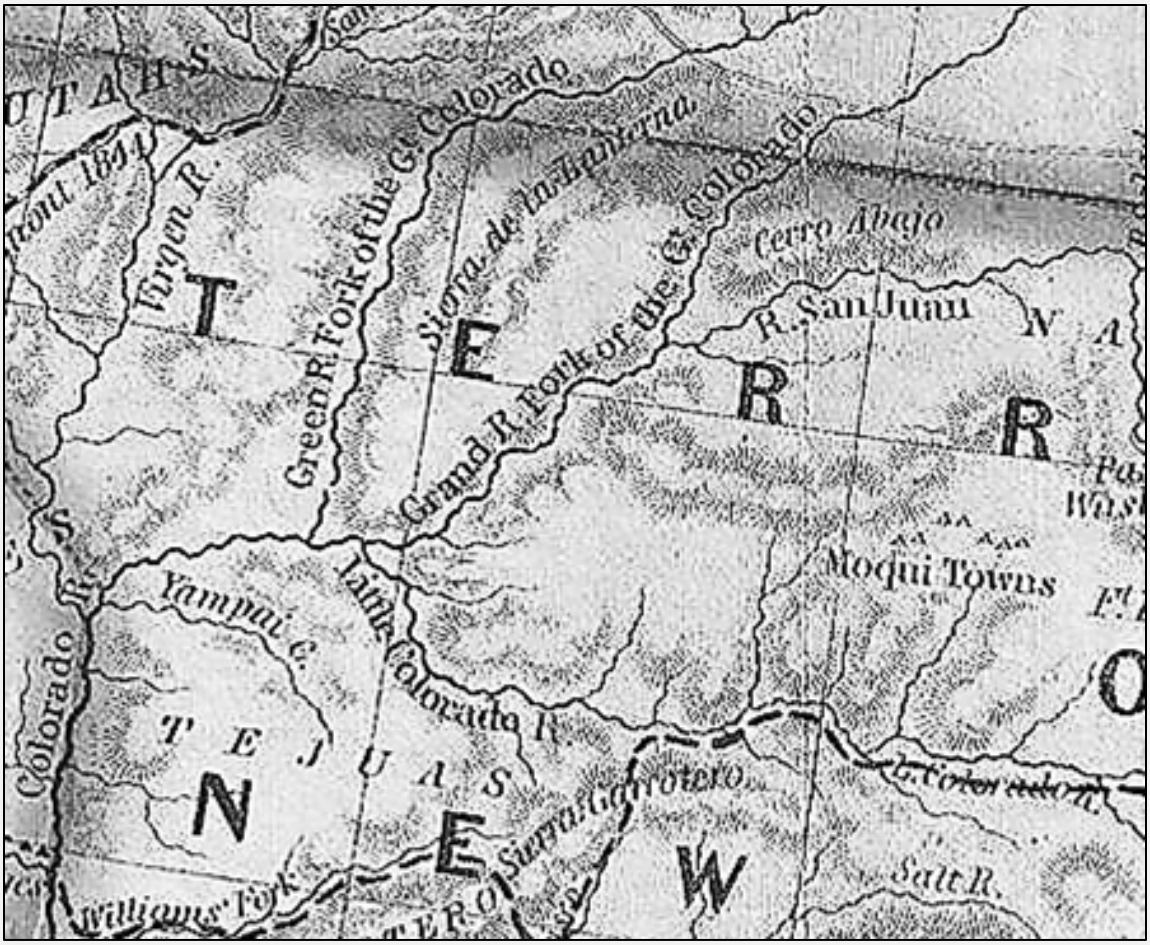


Early Example 2 — 1854

FIGURE 53. Details from two different maps published in Henry Lange, *Atlas von Nord-Amerika* (Verlag von George Westermann, Braunschweig, 1854). *(Left)* "**Nord Amerika**" (Blatt I). *(Right)* "**Oregon, Californien, Utah, Neu Mexico, etc.**" (Blatt XIII).

Egloffstein could have seen this recently published German atlas, perhaps acquired by a German community association or library that he might have frequented. These maps display different solutions to the problem of linking the reaches of the Colorado between regions farther to the north and along the California boundary, a problem that would have been on his mind during the Ives land expedition in 1858.

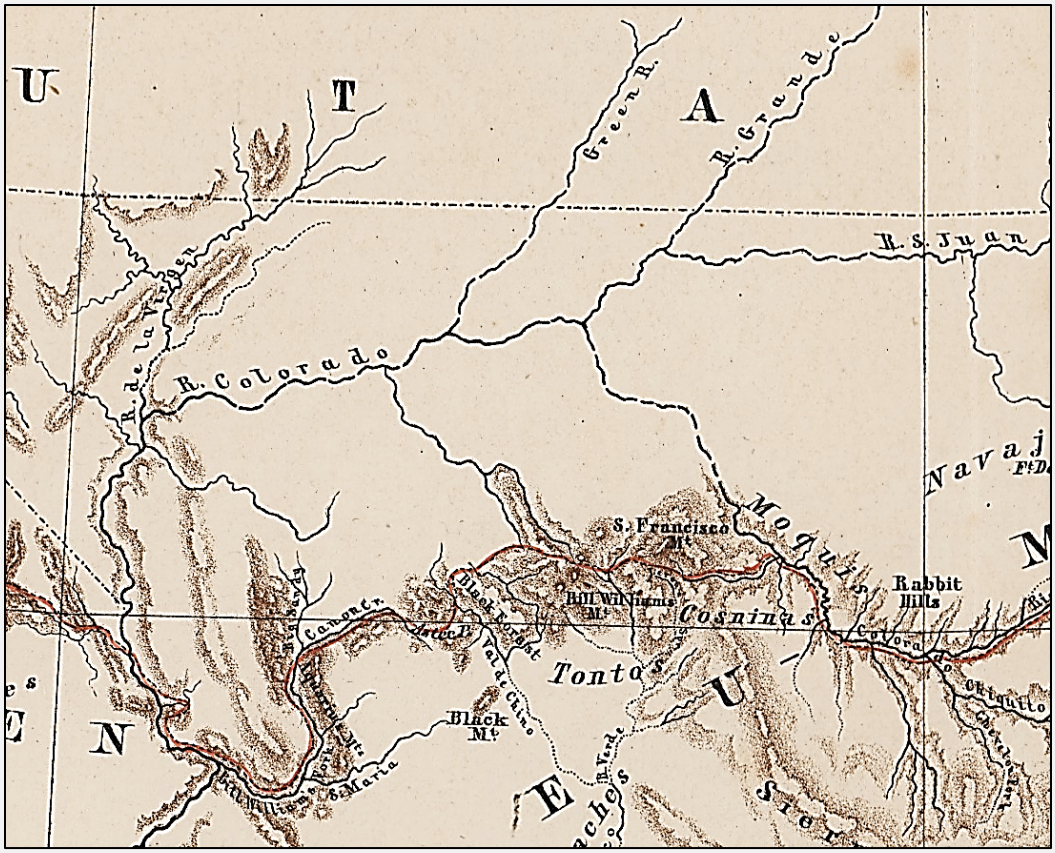
MAP NOTES: The **generalized map for North America** *(left)* displays an unlabeled Little Colorado River reaching far to the Colorado where the Grand Canyon is in fact situated, foreshadowing Egloffstein's Little Colorado River. To reach that point, the Colorado has made a long run across lines of longitude from the confluence of *Verde* (Green River) and an unlabeled Grand River. The Virgin River is likewise unlabeled, with a confluence west of the Grand Canyon area. The smaller-scaled **regional map** *(right)* delimits the Colorado conjecturally with a dotted line, but with the confluence of *Red R.* (Little Colorado) much farther east; in fact, about where it should be with respect to the Grand Canyon. Note that *Rio de Zuñi* (Zuni River) is shown as a headwater of *Salt R.* (it is in fact a tributary to the Little Colorado).◈



Early Example 3 — 1856

FIGURE 54. Detail from **"A New Map of the United States of America by J. H. Young. Philadelphia Published by Charles Desilver 253 Market St." In: *Mitchell's New Traveller's Guide Through the United States and Canadas . . . .* (Charles Desilver, Philadelphia, 1856).** (Digitally enhanced and in grayscale to allow easier reading of the labels and stream courses.)

MAP NOTES: *Colorado R.* is divided in its northern sections into *Green R. Fork of the Gt. Colorado* and *Grand R. Fork of the Gt. Colorado*. Both rivers flow around *Sierra de la Lanterna* [see *Note 56* with **FIGURE 52**] before joining in the Grand Canyon area. *Little Colorado R.* has its confluence with the "Grand River Fork" not far upstream from the confluence of the two supposed forks, an arrangement that hints at the general composition of Egloffstein's rivers on his Grand Canyon map. *Virgin R.* again displays its Colorado confluence too far south, below the Nevada boundary angle. ◈



Early Example 4 — 1858

FIGURE 55. Detail from **"Karte zu Balduin Möllhausen's Reise vom Mississippi nach der Küste der Südsee im Jahre 1853-1854. Entworfen und gezeichnet von Dr. Henry Lange."** *In:* Balduin Möllhausen, *Tagebuch einer Reise vom Mississippi nach den Küsten der Südsee* (Hermann Mendelssohn, Leipzig, 1858).

Ives expedition artist and naturalist's assistant Balduin Möllhausen accompanied the 1854 survey route under the command of Lt. Amiel Weeks Whipple, to which this map pertains. "Designed and drawn" by Henry Lange; compare to the maps in **FIGURE 53**.

MAP NOTES: The red line delineates the route of the Whipple party, with the topography of the nearby lands sketched in. As he would do with the Ives expedition in publishing his *Reisen*, he also had published his own account of the Whipple expedition, which was published at the time when he was accompanying the Ives expedition. The arrangement of the stream courses, partly delineated conjecturally with dashed lines, reflects the contemporary perspective of the Green and Grand Rivers running in parallel into the Grand Canyon area. The *Colorado Chiquito*, its lower course also shown conjecturally, meets the Grand River stem much farther east than where Egloffstein would position his Little Colorado–Colorado confluence; ironically, its position here is closer to the actual confluence location in what would be the eastern Grand Canyon. Given that both Ives and Möllhausen were on the Whipple expedition together, their earlier perspectives on the courses of the rivers of the region may have had some influence on Egloffstein's thinking for those regions he had not himself surveyed or seen from a distance. ◈

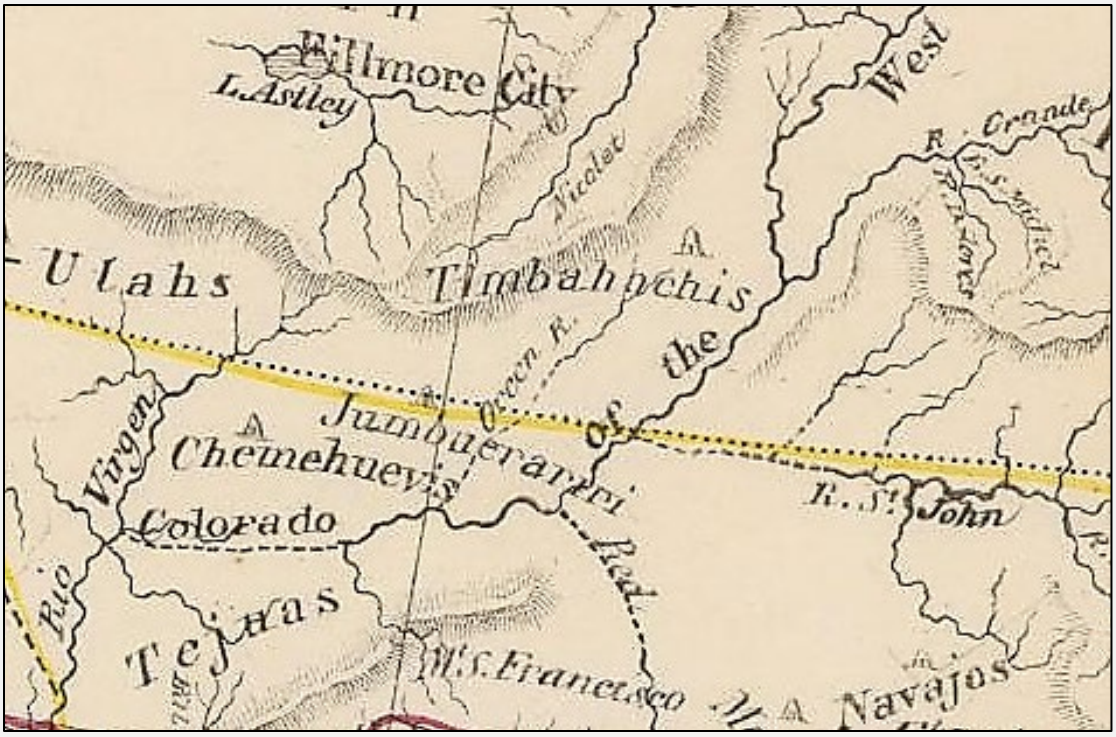
Early Example 5 — 1859

FIGURE 56. Detail from **"Sketch of the Different Roads Embraced in the Itineraries."** *In:* Randolph B. Marcy, *The Prairie Traveler. A Hand-Book for Overland Expeditions. With maps, illustrations, and itineraries of the principal routes between the Mississippi and the Pacific* (Harper and Brothers, New York, 1859).

Army Capt. Marcy was recalled from the military Department of Utah in order to compile a guidebook for travelers in the western movement. While his map was only meant to be diagrammatic and probably had no influence on Egloffstein, it preserves the general perception of the courses of the major rivers of the Southwest at the time when the baron was in the field and later working on his Ives expedition maps.

MAP NOTES: *Green R.* and *Grand R* (their labels transposed in error) come together, but they do not connect to the *Rio Colorado*, simply a lapsus of engraving. What could constitute the San Juan River is shown as the principal contributing stream to the Colorado in that area. The course through the Grand Canyon region is effectively straight, a presentational device only; similarly, an effectively straight *Colorado Chiquito* is a tributary to it somewhere in the eastern to central Grand Canyon. An unlabeled Virgin–Muddy River system arrives at the Great Bend area of the Colorado. Thus, the basic elements of the Egloffstein map are conceptually in place and are approximately in the positions that Egloffstein would map.

The bold line passing across the lower part of this detail is the route of the Whipple expedition in 1854, much of which was followed by the Beale wagon road in 1857. These were discussed in specific sections of *The Prairie Traveler*. ◈



Early Example 6— 1860

FIGURE 57. Detail from **"Map Drawn to illustrate the travels & from the Documents of the Abbe Domenech showing the actual situation of the Indian Tribes of North America and the road described by the author[.] P. Bineteau geographer del 1860."** *In:* Abbé Em. Domenech [Emmanuel Henri Dieudonne Domenech], *Seven Years' Residence in the Great Deserts of North America* (Longman, Green, Longman, and Roberts, London, 1860).

This map of course came too late for Egloffstein to have seen it for his Ives expedition maps, but it was published before his. On the eve of the publication of Egloffstein's map of the Grand Canyon region, cartographical perspectives for the region were beginning to change. While still holding to earlier perspectives, this map combines elements of more modern placements of stream confluences with those that were shown by Egloffstein and by earlier maps; an interesting mix.

MAP NOTES: *Rio Colorado of the West* is labeled along the course of what is the true Green River and, following convention, the Colorado River below the confluence of the Green and Grand Rivers (the latter being labeled here *R. Grande*). *Red Riv.* (label partly seen here), which is the Little Colorado River, is conjecturally shown with its confluence in the eastern Grand Canyon. Note as well the unlabeled Cataract Creek flowing from *Mt. S. Francisco* to the Colorado. Peculiarly, *Green R.*, a remnant of the parallel Green–Grand displays on other maps, still exists conjecturally, reaching the Colorado downstream from the Little Colorado confluence. This would, on Egloffstein's map, correspond to his unlabeled upper reach of the Colorado River, coming southwestwardly from Utah, although farther upstream with respect to Cataract Creek. ◈

5.2 ◈ Egloffstein's Grand Canyon Map Influences Later Geographies

[FIGURES 58–76]

This section examines the influence that features on Egloffstein's "Map No. 2" had as cartographical suggestions for available courses of the Colorado River from Utah into New Mexico Territory (later Arizona). His delineation of the Colorado and its tributaries in the Grand Canyon region became the standard model for years. (Diagrams of Egloffstein's original model and the two basic alternates appear in **FIGURES 61 and 62**. Following them are examples of the alternate routings from various sources.)

Various reinterpretations of these relationships also appeared on maps even stubbornly long after the authoritative explorations made by John Wesley Powell on the Colorado River in 1869 and 1871–1872. Powell's river expeditions produced no separately published maps for the river course, but his years-long geological and geographical surveys on the High Plateaus to the north of the Grand Canyon did make accurate area maps at least at small scales (generally 1:250,000). The course of the Colorado was firmly established by Powell's surveys, as was also the geographical position of the Little Colorado confluence (though as yet still not astronometrically fixed), facts that were not always conveyed on newer, commercially produced maps—and sometimes neither on government maps. The definitive *Tertiary History of the Grand Cañon District* by Clarence E. Dutton, with its double-folio *Atlas*—a Powell Survey production published in 1882—more or less finally authenticated the regional geography as we know it today.[57]

Prior to the Powell survey's improvements, the course of the Colorado River into the eastern Grand Canyon area had by 1864 in fact been mapped at the same scale but with better certainty than that represented by Egloffstein's "Map No. 2"—and with Egloffstein's help, no less. This was the magnificent Four Corners map from the Macomb expedition of 1859 sent to determine the location of the confluence of the Green and Grand Rivers (where until 1921 began the nomenclatural Colorado River). The map is dated 1860 and was engraved by Egloffstein in 1864.[58] As shown in **FIGURE 58**, the course of the Colorado River from the Green–

[57] Clarence E. Dutton, *Tertiary History of the Grand Cañon District; with Atlas* (U.S. Geological Survey Monograph 2, 1882). (For a review of contemporary maps, see in Earle E. Spamer, *THE GRAND CANON. Volume 2. Cartobibliography of the Grand Canyon and Lower Colorado River Regions in the United States and Mexico, a Chorographical Study, 16th to 21st Centuries. Third Edition* [Raven's Perch Media, 2025]; specifically, the chronological listing in Section 3 therein.)

[58] "Map of Explorations and Surveys in New Mexico and Utah made under the direction of the Secretary of War by Capt. J. N. Macomb Topl. Engrs. assisted by C. H. Dimmock, C. Engr. [Civil Engineer] 1860." (Scale 1:760,320. Engraver's credit on map: "Geographical Institute, Baron F. W. von Egloffstein, No. 164 Broadway, N. York. 1864.") It was published, greatly delayed, with J. N. Macomb, *Report of the Exploring Expedition from Santa Fé, New Mexico, to the Junction of the Grand and Green Rivers of the Great Colorado of the West, in 1859, Under the*

Grand confluence to that of the Little Colorado River, receiving from the southeast the San Juan River en route, is not accurate compared to modern maps (see comparisons in **FIGURE 59**). But the take-away here is that the Colorado River arrives at the "Supposed junction" of the Little Colorado River (**FIGURE 58a**) on a course more true than by the available courses to the Grand Canyon intimated by Egloffstein's own "Map No. 2" from the Ives expedition just a few years earlier—except that the information was not yet widely known.

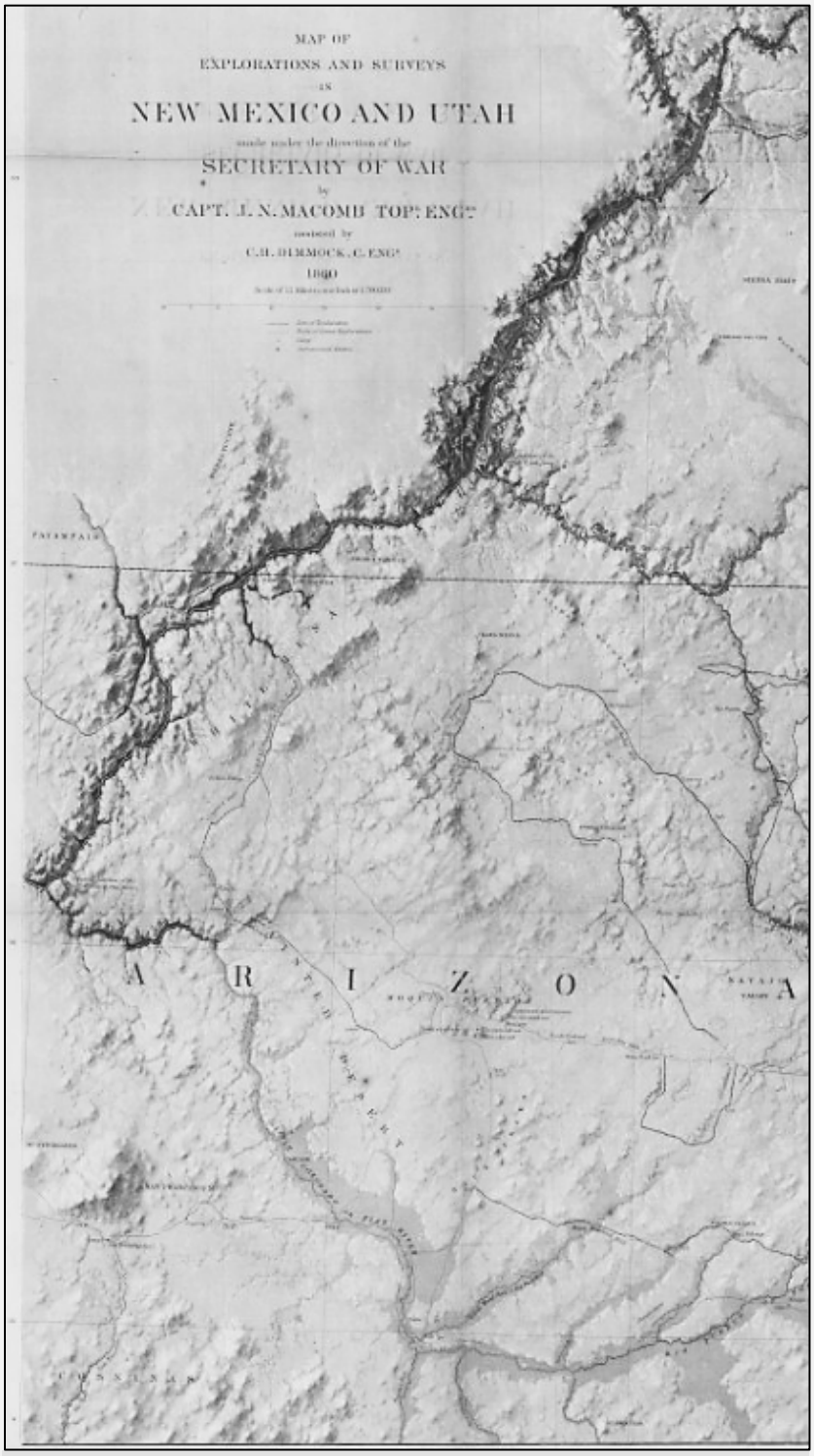
The Macomb–Dimmock map is mentioned here because its publication was delayed until 1876. So, while it improved on the results from the Ives expedition it was in the unusual situation of having been outdated by the Powell surveys when it did appear. And even this map, with Egloffstein's cartographical improvements, did not fully resolve the topographical issues that attended to "Map No. 2." The implication now was that the Little Colorado confluence was at the eastern end of the Grand Canyon ("Big Cañon" as it was still called when Egloffstein engraved the Macomb–Dimmock map [*see text of* **FIGURE 14** *in Chapter 2*])—and that the Colorado there turned westward to proceed through the canyon on the course formerly held by Egloffstein's 1858 "Little Colorado River." That, even in advance of the first Powell expedition of 1869, was an improvement over "Map No. 2," doing away with the Colorado's arrival in the middle of the Grand Canyon directly from the northeast. Even so, the entire lower Little Colorado River valley, including its encanyoned reach approaching the confluence, was essentially copied from "Map No. 2" (**FIGURES 58a and 60**).

A comparison is made here to ascertain the accuracy of maps in the area of the Little Colorado River gorge, between present-day Cameron, Arizona, and the river's confluence with the main Colorado (**FIGURE 60a**). Little new information contributed to Egloffstein's depiction of the gorge on the 1864 engraving even though it is a convincing physiographical portrayal of the canyon there. It reveals that while the results of the Macomb expedition provided better awareness of the location of the Little Colorado River confluence, information about the gorge was lacking, so Egloffstein simply resculpted the general landscape of that area from his 1858 map, and thus it does not at all depict the true course and form of the gorge.

In 1860–1864 the Macomb–Dimmock map did set cartographers (including Egloffstein) straight as to the more likely relationships of the Colorado and Little Colorado—and it showed the expected location of that confluence in advance of J. W. Powell's 1869 river expedition. But the delay in its publication allowed the years between 1861, when Egloffstein's "Map No. 2" was published, and 1876 (notably ignoring Powell's results of the early

Command of Capt. J. N. Macomb, Corps of Topographical Engineers (now Colonel of Engineers) (Government Printing Office, Washington, 1876).

1870s) to host a cohort of map makers who unwittingly turned the Colorado River this way and that, to fit it into the Grand Canyon along Egloffstein's inferentially authoritative courses in that unsurveyed territory north of the canyon (see the general models in **FIGURES 61 and 62**). Some used his implied Colorado course from the northeast; others drove the river around to enter the Parashant Wash course, finally reaching the supposed Little Colorado confluence from the northwest—with numerous variations of these two alternative models. It is quite curious that, even Egloffstein himself now better understanding the geographic relationships of the Colorado and Little Colorado, no serious attempt was made to discourage these wilder interpretations. ◈



▲ **FIGURE 58.** Detail from **the 1860 Macomb–Dimmock map (engraved by Egloffstein in 1864, published in 1876), showing the course of the Colorado River from the Green–Grand confluence to the "Supposed" confluence of the Little Colorado River.** See also FIGURES 58a, 58b, 59. ◈

(American Philosophical Society; photo by the author)

FIGURE 58a *(next page)* ▶

Closer details of the 1860 Macomb–Dimmock map.

Shown here is the idea that Egloffstein reconsidered the "Supposed" confluence of the Little Colorado River to be at the eastern end of the Grand Canyon *(just below left-center)*, although the canyon is off the western margin of the map. Note that while the Colorado River is restyled, and that the lower end of the Little Colorado is more decisively shown as encanyoned, the general presentation of the lower half of this detail remains like that of the Ives report's "Map No. 2," even including the Ives expedition route south and east of San Francisco Mountain as it appeared on that map. (See also FIGURE 60.) ◈

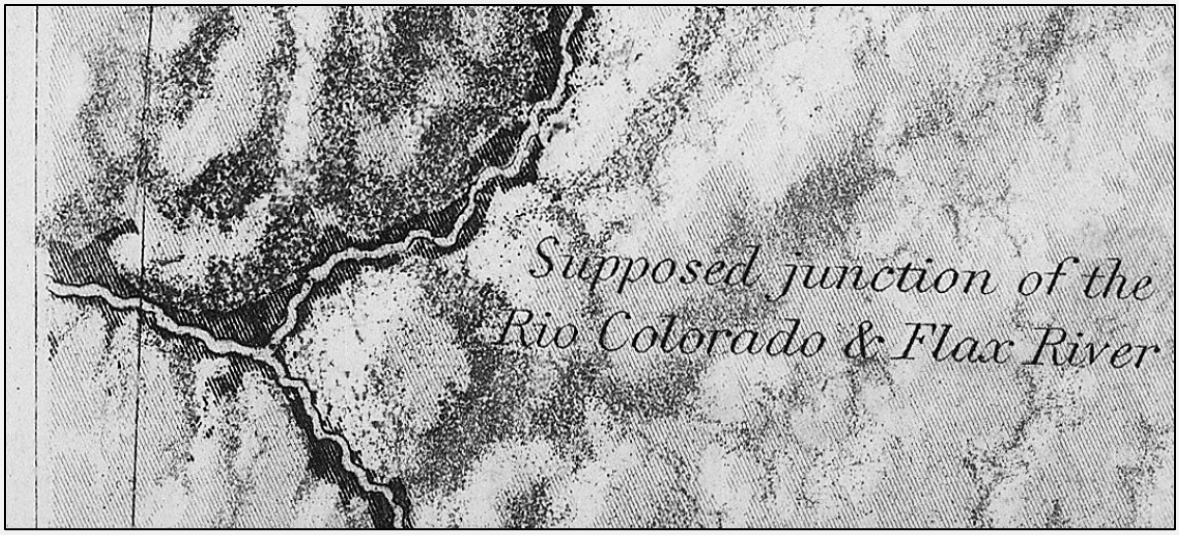


Figure 58a. Legend on previous page ◄

FIGURE 58b. Close detail from the Macomb–Dimmock map displaying the reach of the Colorado River from the Utah boundary to the "supposed" Little Colorado confluence. Despite its implied precision, which Egloffstein probably was gratified to learn as a correction to his 1858 "Map No. 2," the Colorado's course and topography still deviate from ground truth (**FIGURE 59**). The exploratory route followed by the Domínguez–Escalante expedition of 1776 is delineated *(dashed line)*, including their Colorado River crossing, "El Vado de los Padres," that here is mispositioned south of the Utah boundary. Their known route around the Vermilion Cliffs *(upper left)* is also out of order, in that the locale known today as Lee's Ferry would be positioned too far south. ◈

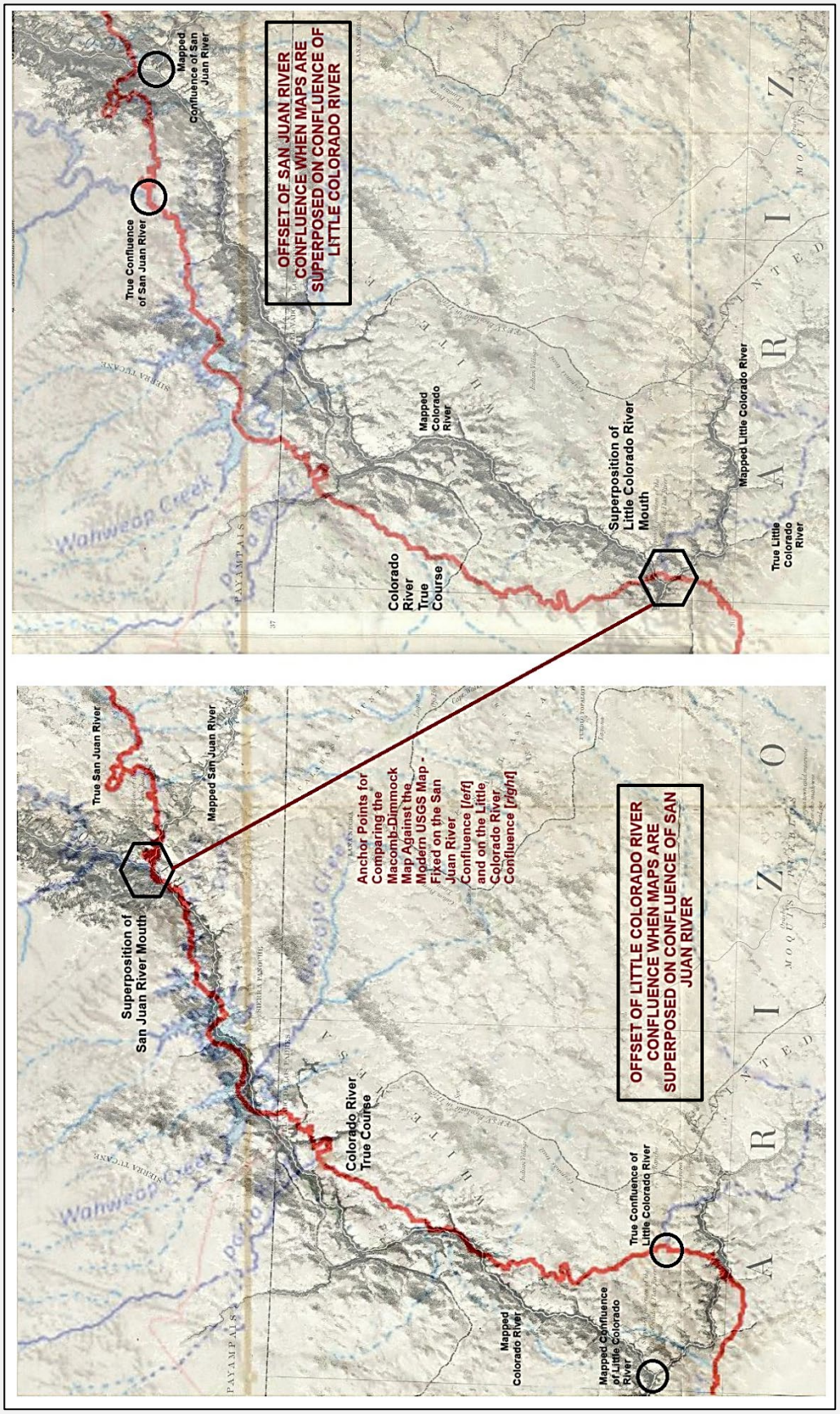


FIGURE 59. Analysis of USGS Streamer river courses superposed on the Macomb–Dimmock map. Offsets of the Utah–Arizona boundary are due to different map projections.

These two illustrations depict how the mapped true courses of the San Juan, Colorado, and Little Colorado Rivers shift compared to those on the Macomb–Dimmock map, depending upon whether the San Juan confluences or the Little Colorado confluences are superposed. (San Juan and Colorado Rivers from USGS Streamer are colored ***red***; Little Colorado River and other tributaries from Streamer are ***pale blue***.) ◈

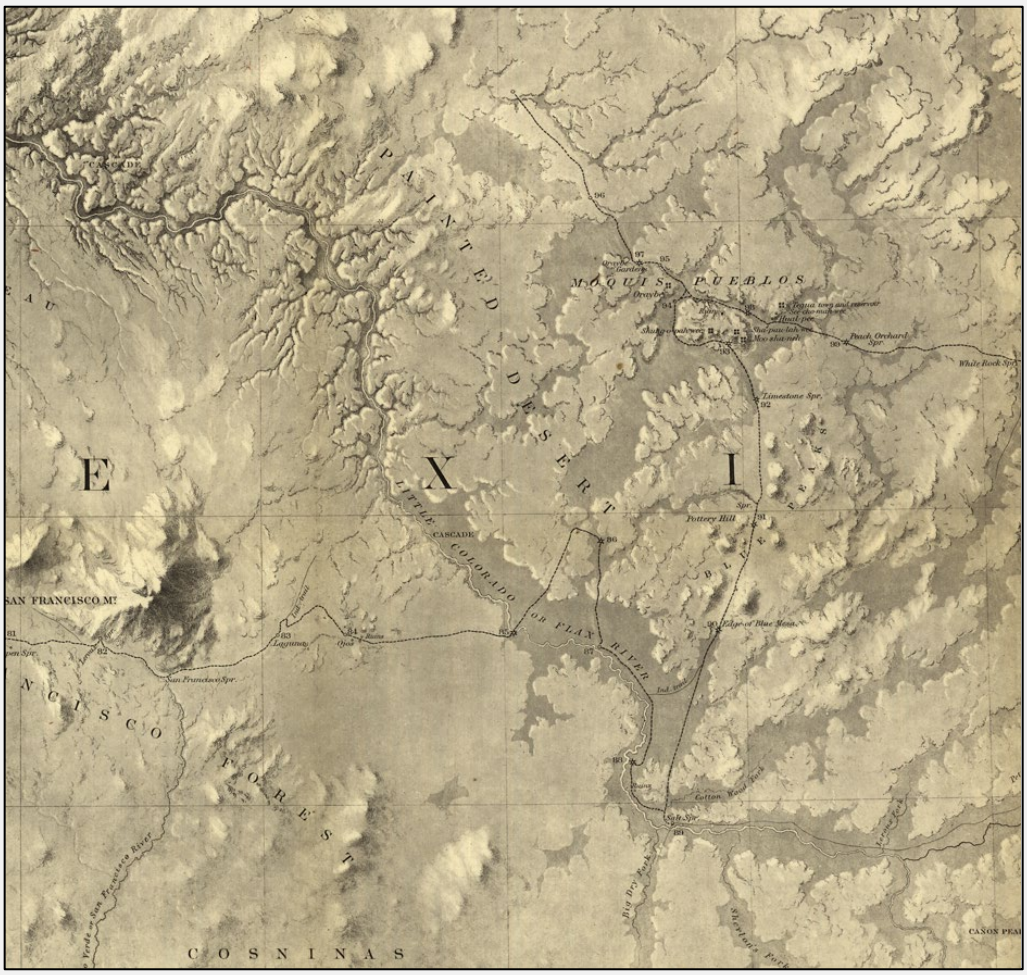


FIGURE 60.
Comparison of the lower end of the Little Colorado River valley in Egloffstein's 1858 "Map No. 2" *(top)* and as he engraved it in 1864 on the Macomb–Dimmock map *(bottom)*.
This demonstrates that Egloffstein had reproduced this area almost identically between the two maps—even the Little Colorado's final approach to the new confluence—the principal difference being that on the Macomb–Dimmock map the Colorado River approaches the "Supposed junction" of the Little Colorado River here *(upper left on that map)* before turning off the map to the west. (As noticed elsewhere in the present publication, the shaded relief shown at the *upper left* of the detail from "Map No. 2," in the same position as which appears the Colorado River in the Macomb–Dimmock map detail, is apparently only a coincidental feature in the manufacturing of shaded relief — but *see also an analysis in* **FIGURE 30** in *Chapter 3*.) Egloffstein marked the Ives expedition's route on both maps, while adding the routes of other exploring parties to the Macomb–Dimmock map. ◈

FIGURE 60a *(next two pages)* ▶

Comparative details of four physiographical portrayals of the Little Colorado River gorge between present-day Cameron, Arizona, and the river's confluence with the main Colorado. All figures depict the same reach of the river at varied scales.

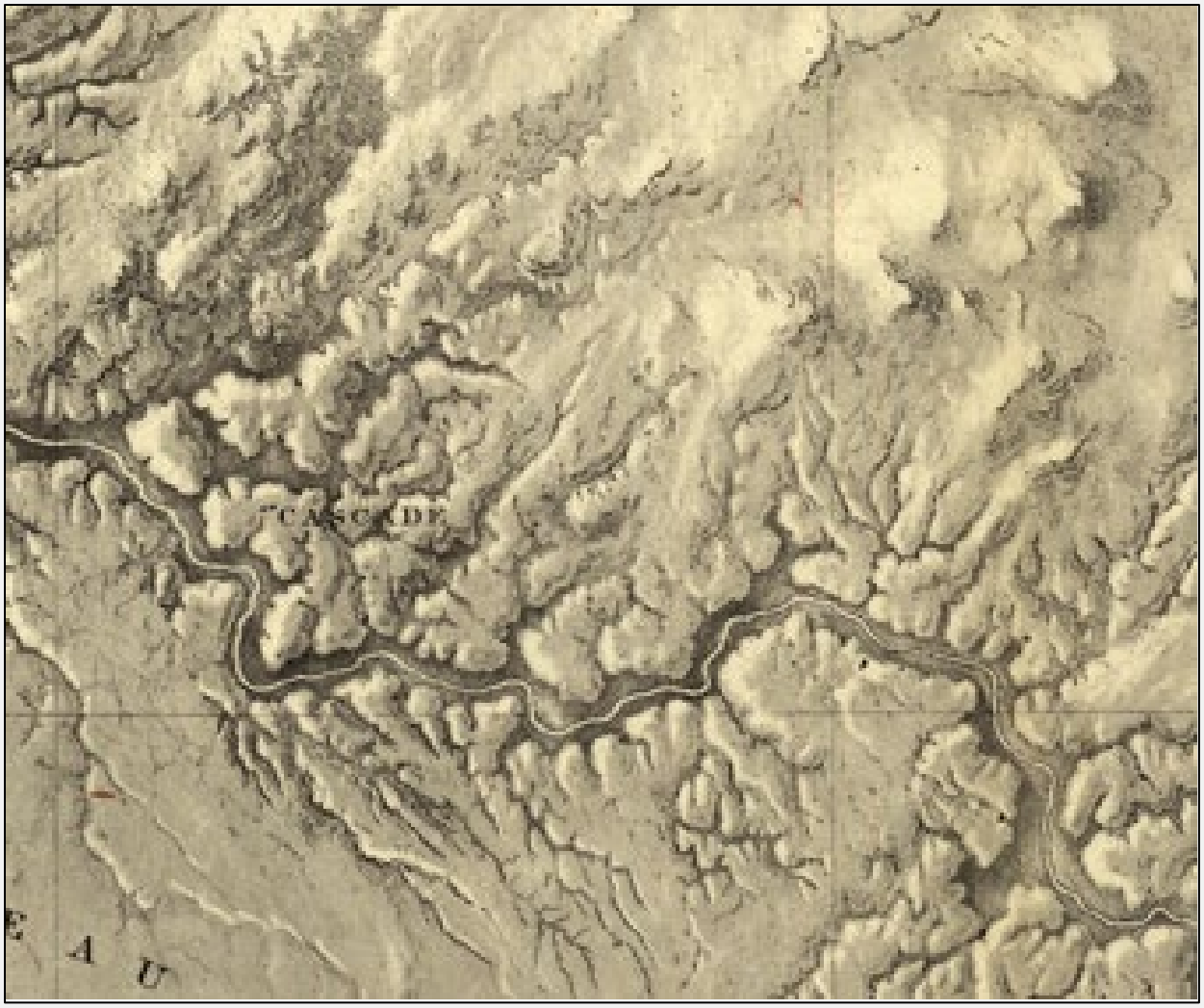
1. General area, wholly contrived, from Egloffstein's 1858 "Map No. 2," scale 1:760,320. (Label "cascade" apparently written in error; see FIGURE 26.)

2. General area, recopied by Egloffstein in 1864 for the Macomb–Dimmock Map (dated 1860) with input from the 1859 Macomb expedition (published 1876), scale 1:760,320.

3. USGS "Experimental Digital Shaded-Relief Maps of Arizona," (Edwards and Batson, 1990, USGS Miscellaneous Investigations Series Map I-1821), Sheet 2, scale 1:1,000,000. (Compiled by Kathleen Edwards and E. M. Sanchez, 1983–4.)

4. "Physiographic Rim of the Grand Canyon" (Billingsley and Hampton, 1999, USGS Open-File Report 99-30), scale 1:250,000. (Topographic.)

A comparison is made here to ascertain the accuracy of maps along the course of the Little Colorado River gorge. Little new information contributed to Egloffstein's depiction of the gorge on the 1864 engraving even though it is a convincing physiographical portrayal of the canyon there. It reveals that while the results of the Macomb expedition provided a better awareness of the location of the Little Colorado River confluence, information about the gorge was lacking, so Egloffstein simply resculpted the general landscape of that area from his 1858 map, and thus it does not at all depict the true course and form of the gorge.



1

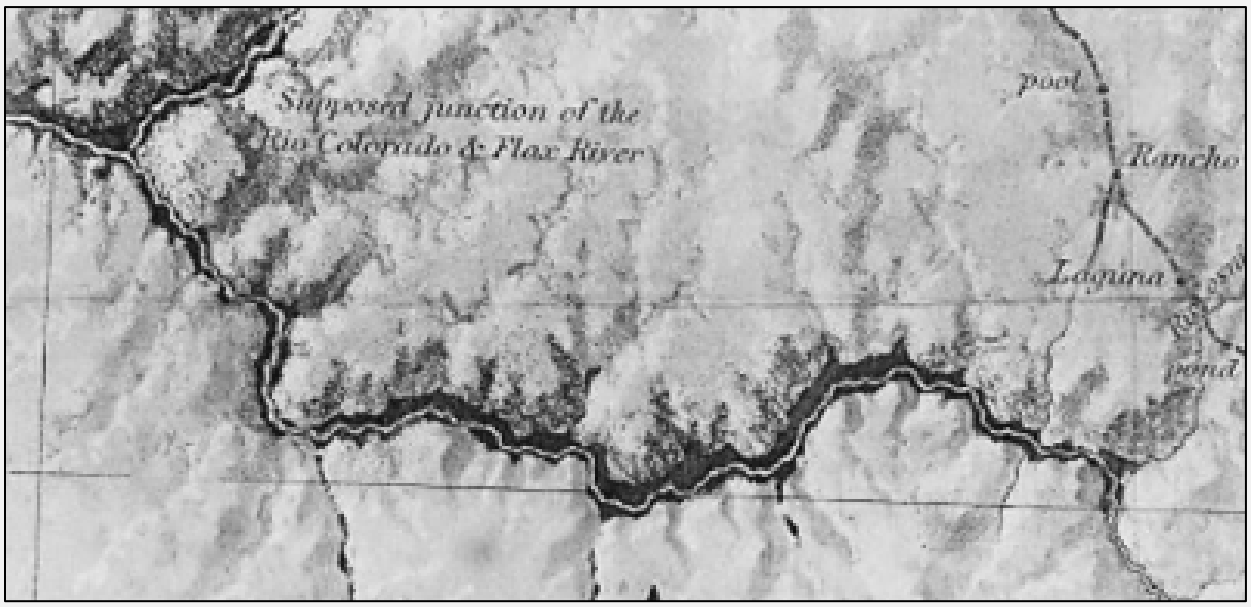


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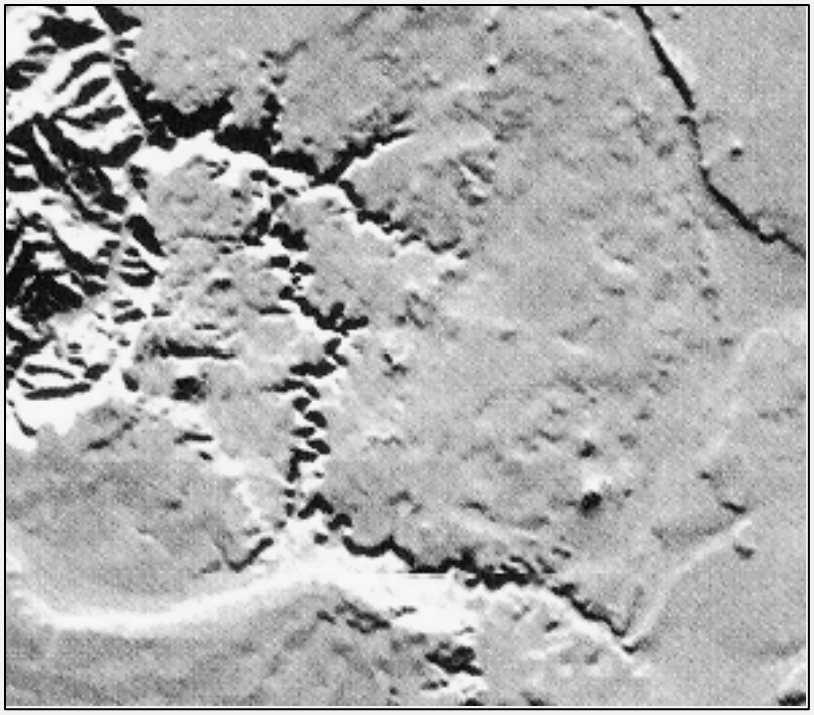
FIGURE 60a (part; legend on p. 151)



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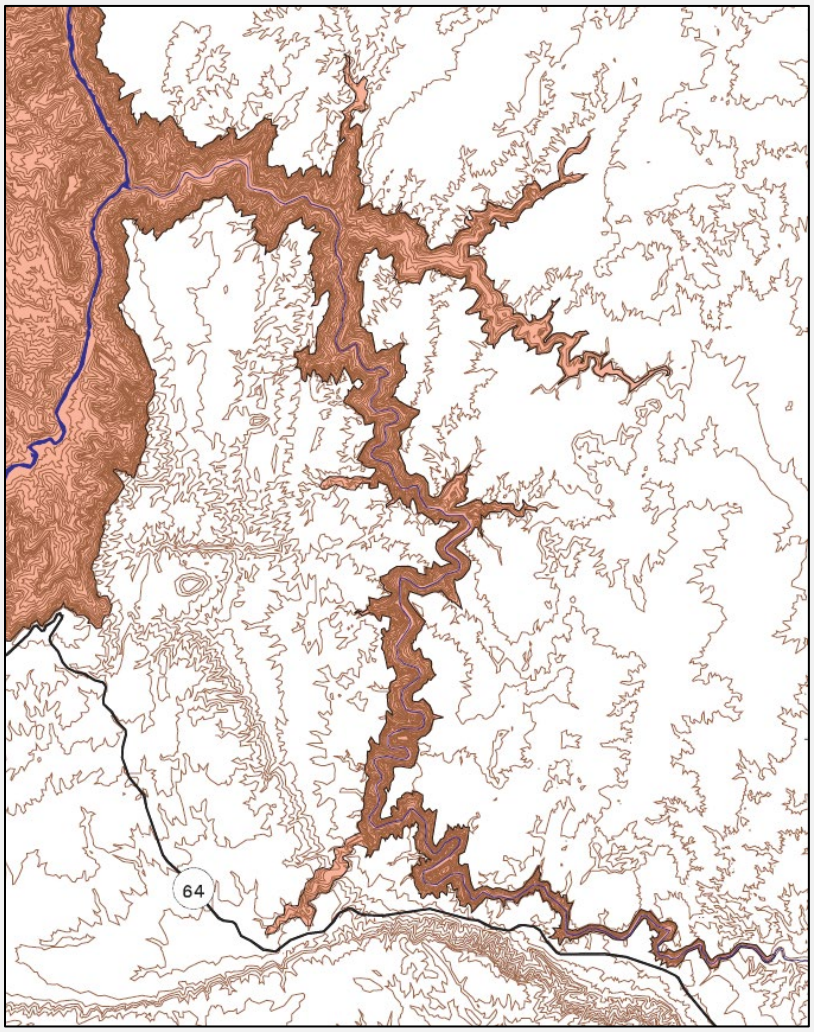
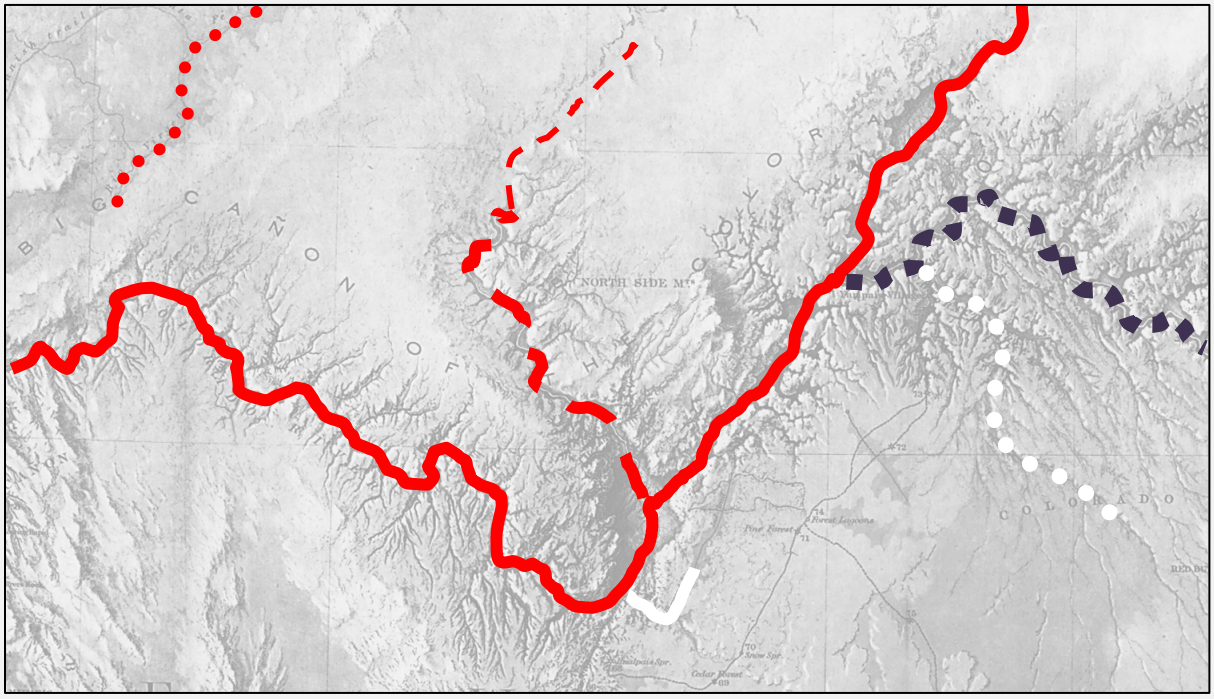


4

FIGURE 60a (part; legend on p. 151)

◈ DIAGRAMS OF THE EGLOFFSTEIN MODEL ◈



Earle Spamer

FIGURE 61. ORIGINAL EGLOFFSTEIN MODEL (1858)

Solid red line = Colorado River

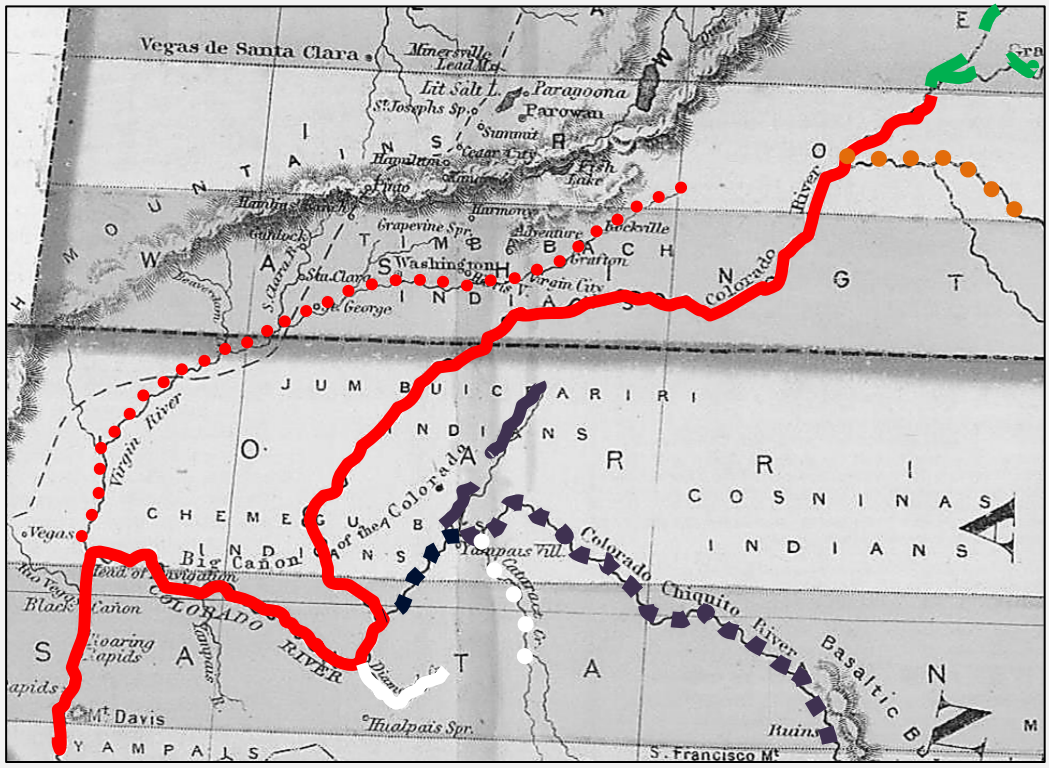
Long–dashed red line = Parashant Wash tributary (not labeled on Egloffstein's map). On some map variants this is implied to be the course of the Colorado River, omitted or modified on others. (The dashed line is made narrower where Egloffstein's projected course is more conjectural.)

Short–dashed dark purple line = Little Colorado River

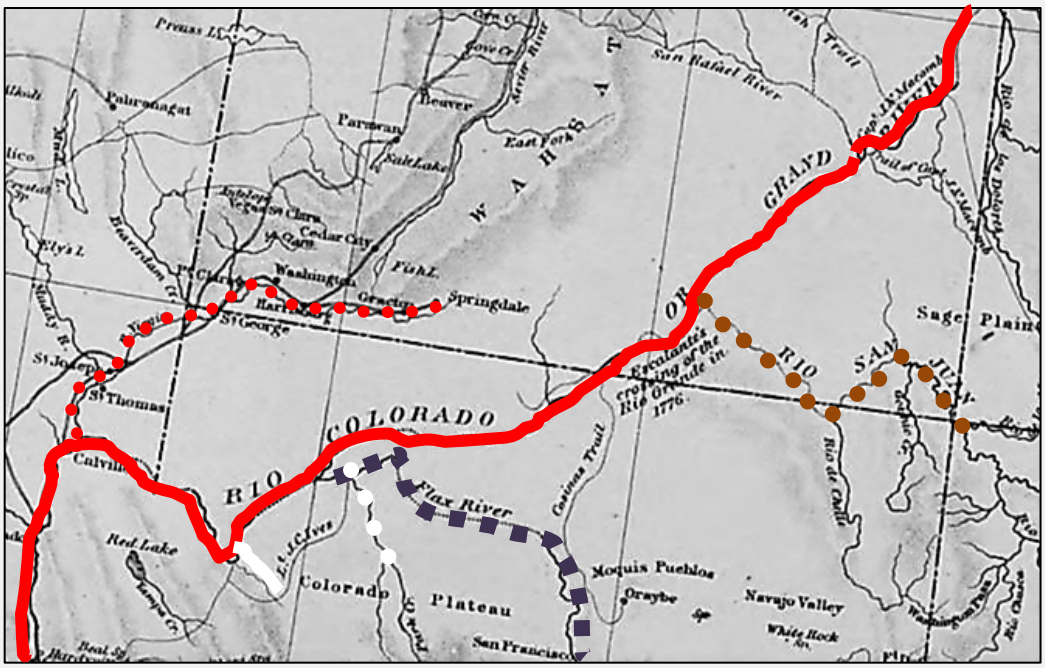
Large–dotted white line = Cataract Creek

Solid white line = Diamond Creek

Small–dotted red line = Virgin River (The confluence area was not interpreted by Egloffstein because the Ives Expedition had not reached that part of the river.)



1865



1869

FIGURE 62. PRINCIPAL VARIANT STYLES OF THE EGLOFFSTEIN MODEL

***(top)* Parashant Wash Route**

***(bottom)* Through-flowing Upper Colorado River Route**

Key and base map sources are given on the next page

Key to the Egloffstein variant maps (FIGURE 62)

Solid red line = Colorado River

UPPER FIGURE: the Colorado follows the Parashant Wash route. The **DARK PURPLE LINE OF EXTRA-LONG DASHES** delineates an ambiguous tributary downstream from which presumably is a continuation of the Little Colorado River, to its confluence with the great Colorado.

LOWER FIGURE: the Colorado is through-flowing and is labeled "Rio Colorado or Grand River." The small, unlabeled tributary from the north between the San Juan and Little Colorado is the Paria River.

Long–dashed green lines = Green and Grand Rivers

Large–dotted deep orange line = San Juan River

Short–dashed dark purple line = Little Colorado River

Small–dotted red line = Virgin River

Large–dotted white line = Cataract Creek

Solid white line = Diamond Creek

Base map sources for the Egloffstein variant maps (FIGURE 62)

The Egloffstein model variants here depict the two main examples—Colorado River in the Parashant Wash route and as a through-flowing stream. Other maps exhibit modifications to both of these general styles.

(top) **"Colton's Map of California, Nevada, Utah, Colorado, Arizona & New Mexico. Published by J.H. Colton 172 William St. New York."** In: *Colton's general atlas, containing one hundred and eighty steel plate maps and plans, on one hundred and eight imperial folio sheets, drawn by G. Woolworth Colton* (J. H. Colton Co., New York, and Bacon and Co., London, 1865). [Parallel bands delineate counties in Arizona and Utah.] *This map is shown in color and without overlays in* **FIGURE 63**.

(bottom) **"Office of the Chief of Engineers War Department Military Map of the United States compiled and drawn by E. Freyhold 1869."** ("Engraved & printed by Julius Bien, N.Y.") ("Note. In the compilation of this map the Authorities designated on the map of the Western Territories as well as others of more recent date have been used.") *This map is*

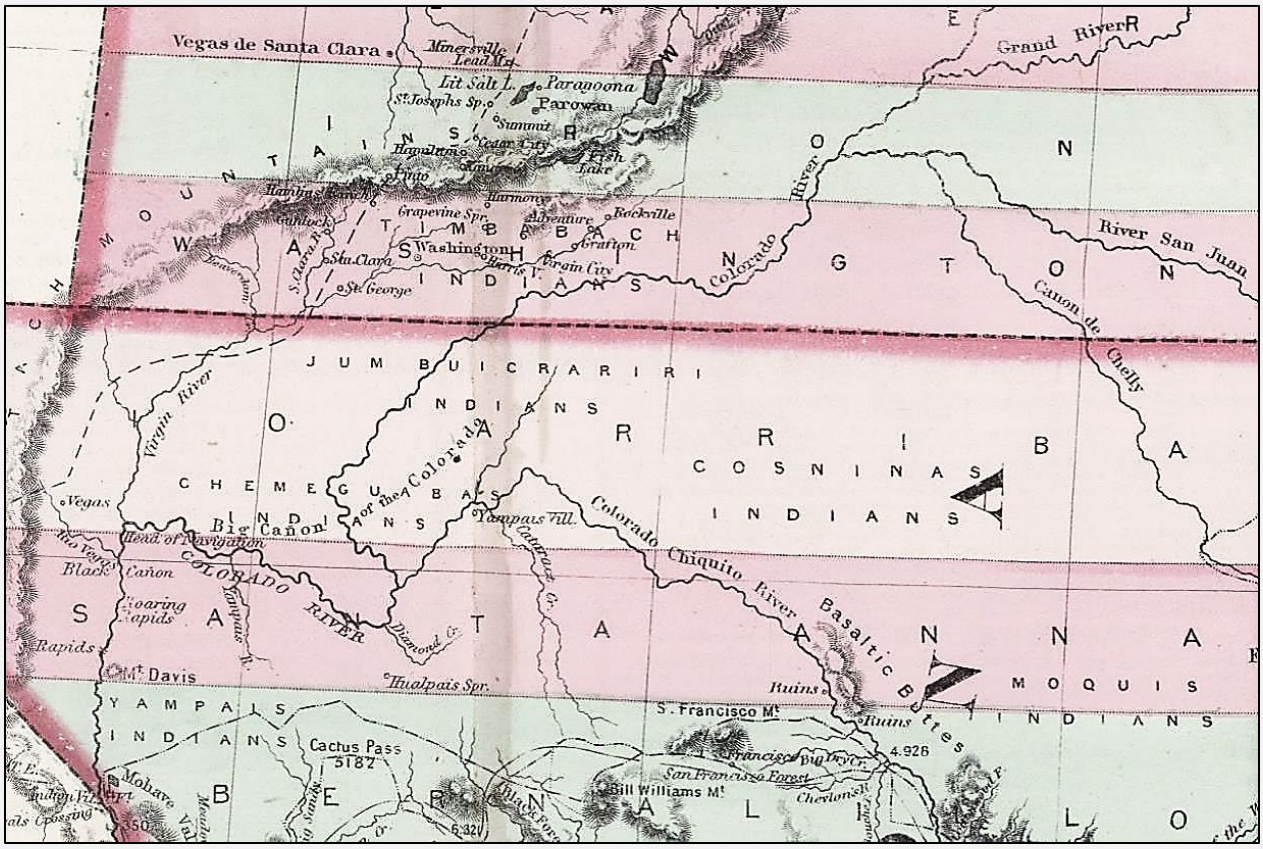
◈ EXAMPLES OF VARIANTS OF THE EGLOFFSTEIN MODEL ◈

[FIGURES 63–76]

Most of the examples illustrated on the following pages are adapted from Spamer, *Cartobibliography of the Grand Canyon*;[59] **FIGURES 63a, 69b**, and **72a** are newly added here.

To bring attention to specific geographical names within the "Map Notes" text in the figure legends, names are as printed on the maps; they appear in *italics* rather than inside quotation marks.

[59] Earle E. Spamer, *THE GRAND CANON. Volume 2. Cartobibliography of the Grand Canyon and Lower Colorado River Regions in the United States and Mexico, a Chorographical Study, 16th to 21st Centuries. Third Edition* (Raven's Perch Media, 2025, pp. 257-277. (https://ravensperch.org/wp-content/uploads/2025/01/TGC-Vol2_CARTOBIBLIOGRAPHY_3rd_ed.pdf).



Later Example 1 — 1865

FIGURES 63▲, 63a►. Details from **"Colton's Map of California, Nevada, Utah, Colorado, Arizona & New Mexico. Published by J.H. Colton 172 William St. New York."** In: *Colton's General Atlas, containing one hundred and eighty steel plate maps and plans, on one hundred and eight imperial folio sheets, drawn by G. Woolworth Colton* (J. H. Colton Co., New York, and Bacon and Co., London, 1865).

MAP NOTES: *Colorado River* follows the **Parashant Wash route** (see also overlay on **FIGURE 63a**). Other aspects of this map in the Grand Canyon area are taken directly from Egloffstein's map. Note how the cartographer has the Colorado River follow its reasonably accurate southwesterly course from the Green–Grand confluence before turning it due west in southern Utah, thence gradually turning it southwesterly to reach the Parashant Wash route. Egloffstein's own **upper Colorado course** is reduced to a tributary to the *Colorado Chiquito River*, and the Little Colorado is shown continuing to the confluence point that had been the Parashant Wash confluence on Egloffstein's map. (Parallel colored bands delineate counties in Arizona and Utah.) ◈

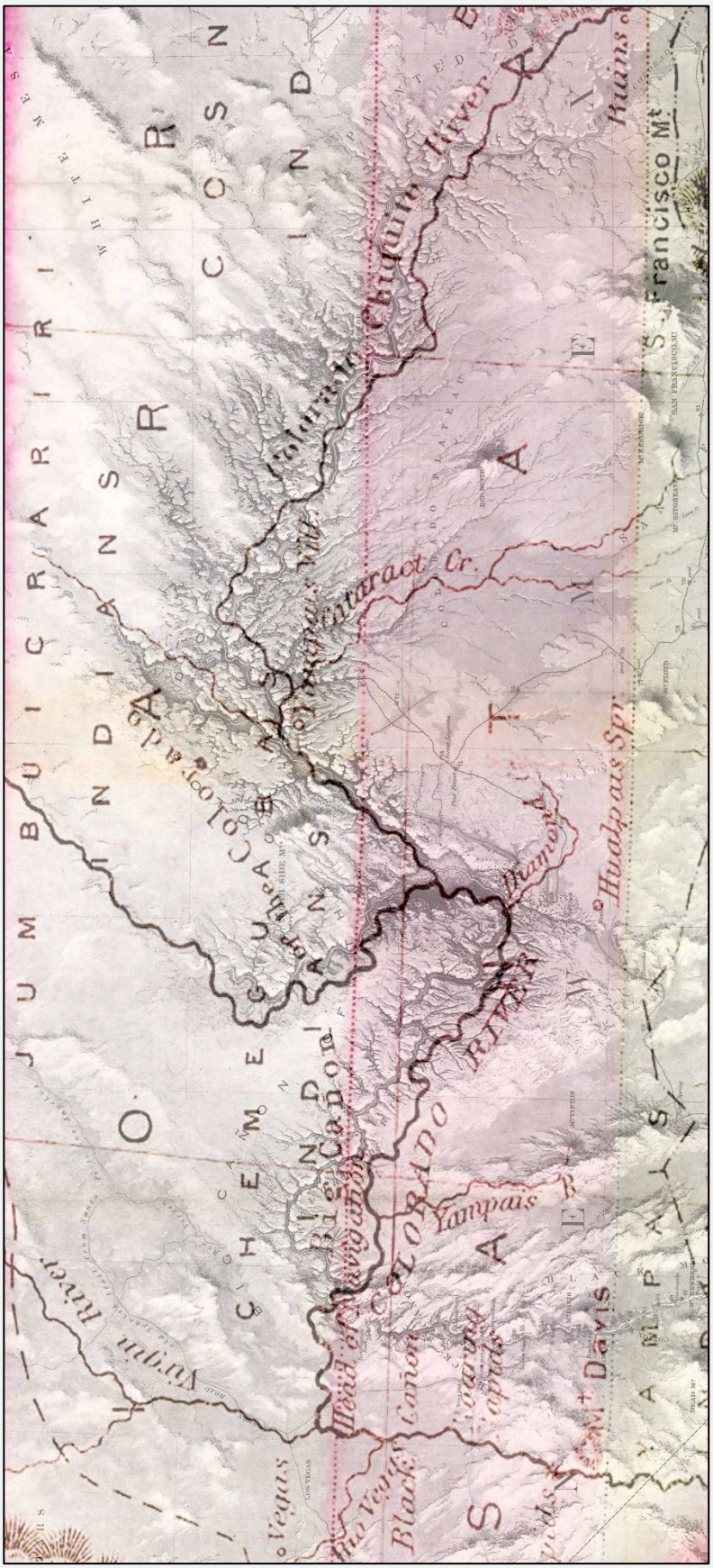
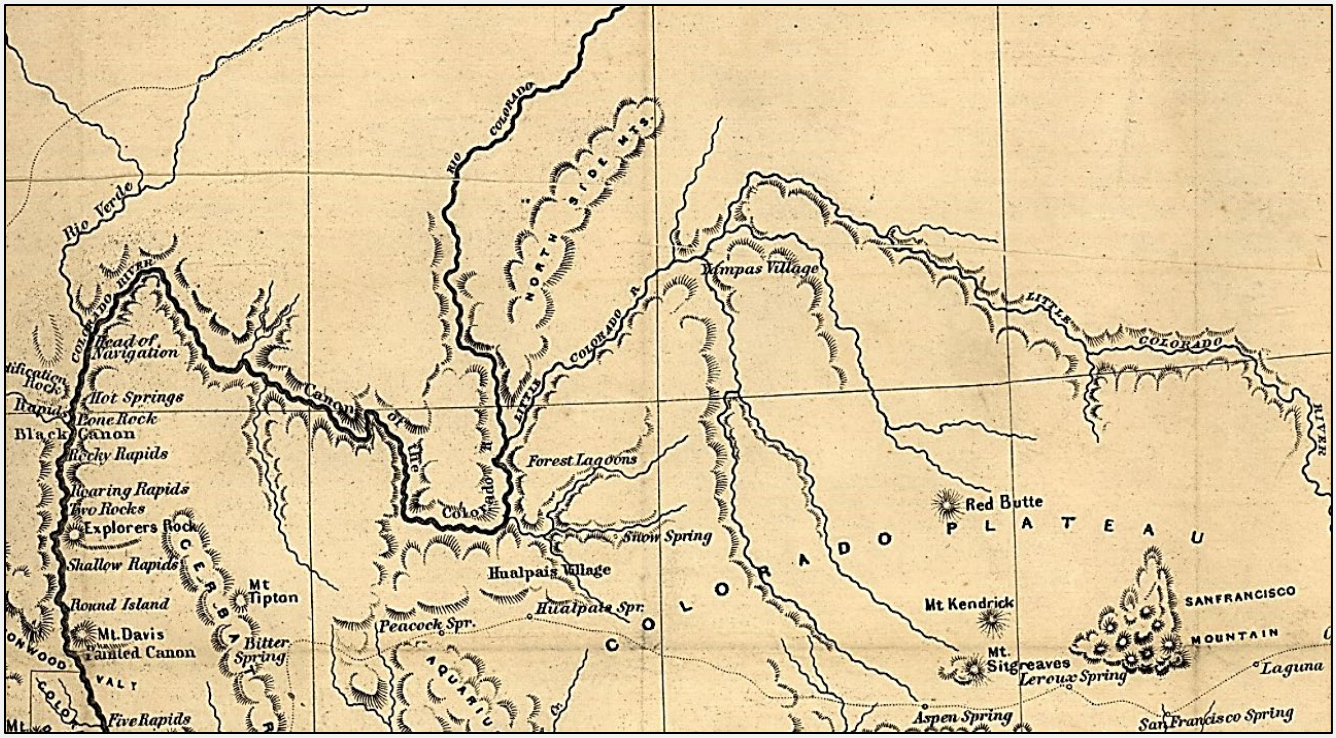


FIGURE 63a. Detail from the Colton map superposed on the Egloffstein map. Note the decisive alignment of the Colorado River arriving through the **Parashant Wash route**. The remaining courses of streams on the Colton map fairly, if not perfectly, follow the alignments of the Egloffstein map, demonstrating the use of the baron's map as a model. Only along upstream portions of the Little Colorado and the Colorado River west of Diamond Creek are there noticeable deviations. ◈



Later Example 2 — 1865?

FIGURES 64 ▲, 64a ►. Details from **"Hartley's map of Arizona from official documents. Office 32 Pine St. N.Y."** [No imprint, 1865?]

MAP NOTES: *Little Colorado River* is run all the way through Grand Canyonmore or less on Egloffstein's course to reach a confluence with the great Colorado just upstream from Diamond Creek. *Rio Colorado* comes into Arizona following the **Parashant Wash route**, labeled *Canon of the Colorado R*. about where Egloffstein placed his "Big Cañon" banner label. The Colorado passes to the west of the *North Side Mts.* to reach the confluence of *Little Colorado R*. Egloffstein's own interpreted Colorado River course, coming from the northeast to the confluence of the Little Colorado River near *Yampas Village* on the unlabeled Cataract Creek, repeats Egloffstein's meagerly delineated reach and could be an interpretation of the lower part of Kanab Creek. Cataract Creek seems to have been erroneously duplicated; there are two forked-tributary streams that head in the vicinity of the San Francisco Peaks, both of which have confluences with the Little Colorado. The location of "Yampas Village" is the "Yampais Village" (Supai) of the Ives–Egloffstein map. Farther downstream on the Colorado, still on a southerly course before turning westward, is the confluence of Diamond Creek (not labeled) and the notation *Hualpais Village* (Peach Springs), although Diamond Creek peculiarly shows non-existent forked headwaters extending nearly to Cataract Creek. What likely is Peach Springs Wash is oddly shown as a northwest-trending tributary to Diamond Creek.

(continued)

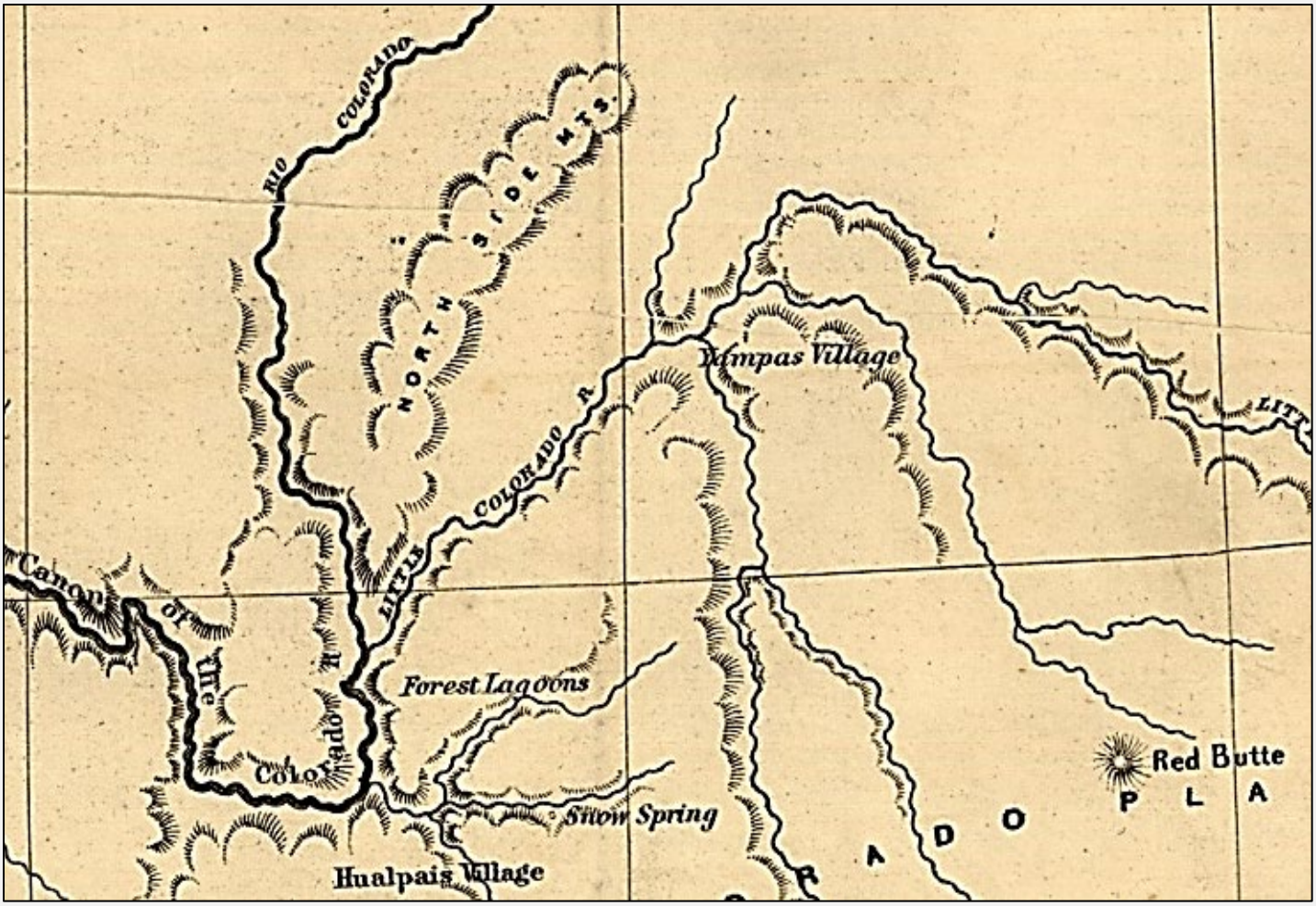


FIGURE 64a ***(closer detail of Figure 64)***

Locales are all from the Ives expedition map. The extensions of what seem to be headwaters of Diamond Creek (near the "Hualpais Village", *bottom center*) are inventions. The *North Side Mts.* have been greatly elongated, presenting a difference appearance than that shown by the individual mounts of the Uinkaret volcanic field that had been noticed by Egloffstein. ◈

Later Example 3 — 1865

FIGURES 65▲, 65a ►, 65b ►►. Details from **"Lloyd's Topographical Railway Map of North America, or the United States Continent in 1900 J.T. Lloyd, Publisher {New York 23 Cortland St. {London, 83 Fleet Street 1868."** ("Entered according to Act of Congress in the Year 1865 by J. T. Lloyd, in the Clerks Office of the District Court of the U. S. for the Southern District of New York.") ("Scale of Map 83¼ Miles to an inch or 1:5,274,720 of Nature.") [Two sections digitally combined here.]

Regarding the date in the title, Phillips notes, "Giving 1900 as the possible date for the completion of certain railroads, etc." (P. Lee Phillips, *A list of maps of America in the Library of Congress preceded by a list of works relating to cartography* [Government Printing Office, Washington, 1901], p. 610).

MAP NOTES: *Rio Colorado* is delineated from the confluence of *Green Riv.* and *Grand R.* En route it receives (not shown in this detail) *Rio San Juan* from the east and shortly later *Rio de Chelly* from the southeast before turning to run westwardly north of the Arizona-Utah boundary. It eventually turns southwest and southeast along the **Parashant Wash route** to reach the confluence of *Colorado Chiquito or Flax* (Little Colorado River). The Little Colorado, as with Egloffstein's interpretation, receives *Cataract Cr.* shortly before reaching the main Colorado.

(continued)

FIGURE 65a *(closer detail of Figure 65)*. Detail is in grayscale to better read the labeling.

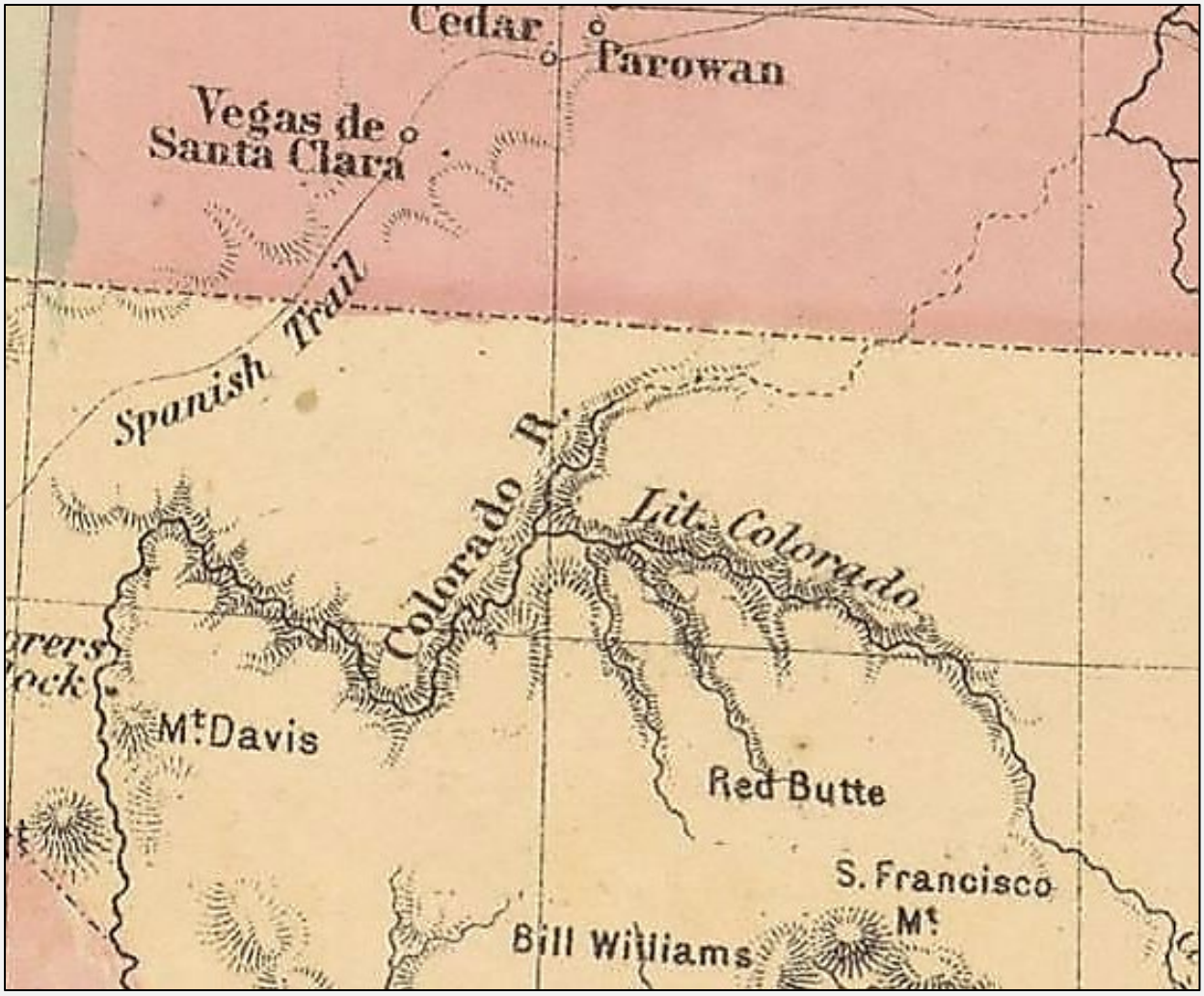
MAP NOTES *(continued)*: Note that *Head of Navigation* is placed at the Virgin River confluence. The *Yampais Village* place marker is mispositioned downstream from the Cataract–Little Colorado confluence. Opposite that point an unlabeled tributary from the northeast, which is on **Egloffstein's projected course of the Colorado** from Utah, may be a misinterpreted extension of Kanab Creek.

Just downstream from the supposed Colorado–Little Colorado confluence is the confluence of another tributary from the southeast (*lower left*, not labeled, Diamond Creek), where *Hualpais Vil* (Peach Springs) is misplaced at that confluence (Diamond Creek's course is virtually occluded by the "Hualpais Vil" label). In the western Grand Canyon another tributary (*lower left*, not labeled) arrives from the south, which would be the "Yampais Creek" (or similar name) of other contemporary maps. Interestingly, Egloffstein's **upper Colorado course** is a tributary to the "Little Colorado" on a course that perfectly parallels the **Parashant Wash route**.

See **FIGURE 65b** *for part of this detail superposed on Egloffstein's map.* ◈

FIGURE 65b. Detail of FIGURE 65a *(digitally rotated to align North headings)* superposed on Egloffstein's map.

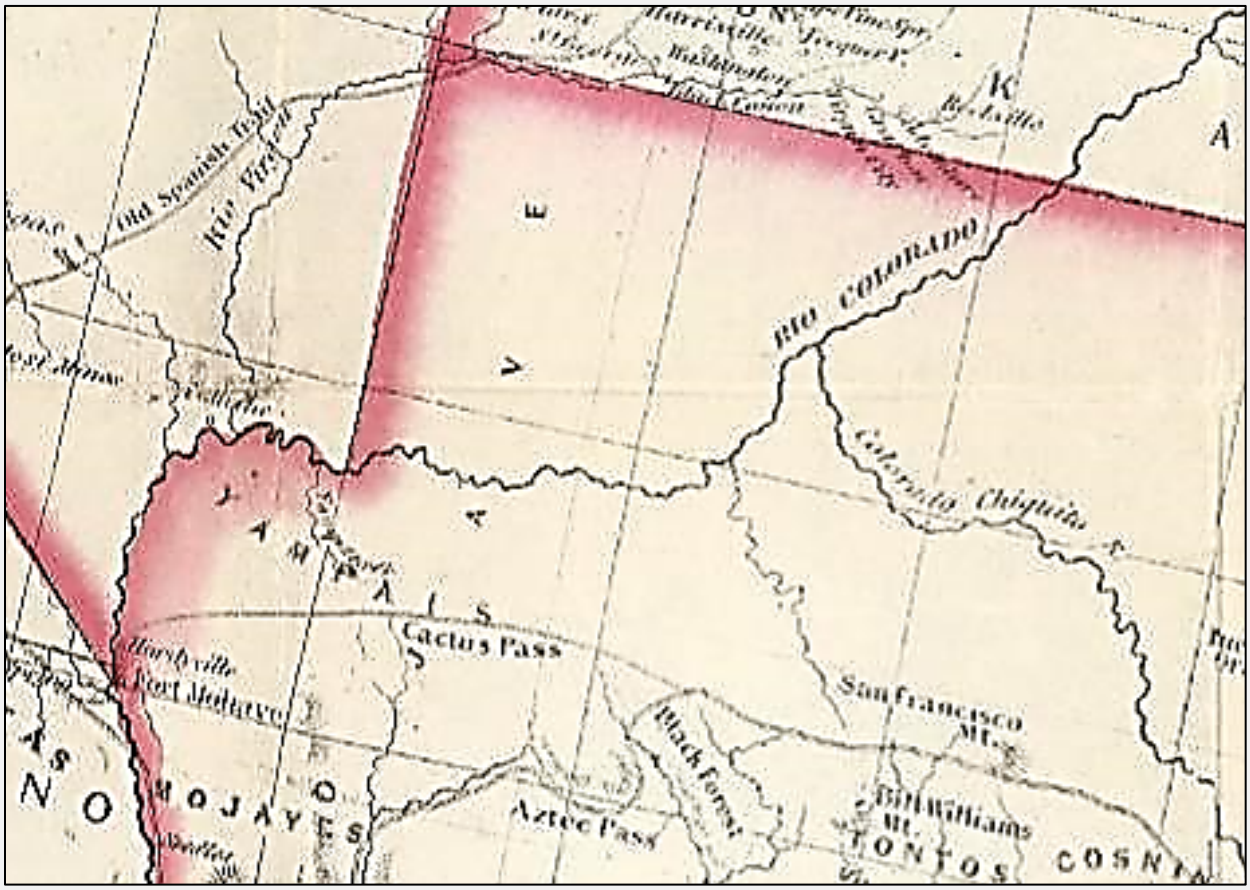
From Utah the Colorado River follows the Parashant Wash route, which fairly follows the course mapped by Egloffstein. Similarly, the portion of Egloffstein's upper Colorado course (now an unlabeled tributary to the "Little Colorado River" from the northeast) fairly aligns with Lloyd's, but its lower part is turned inexplicably to the southeast to reach a likewise disorganized "Little Colorado," thus also affecting the presentation of Cataract Creek. From the Lloyd confluence of the Colorado and Little Colorado the river follows the course mapped by Egloffstein only in a most generalized fashion. ◈



Later Example 4 — 1865

FIGURE 66. Detail from **"Map of the Territories & Pacific States to accompany 'Across the Continent' by Samuel Bowles."** (map by J. H. Goldthwaite). *In:* Samuel Bowles, *Across the continent: A summer's journey to the Rocky Mountains, the Mormons, and the Pacific States, with Speaker Colfax. By Samuel Bowles, Editor of The Springfield (Mass.) Republican* (Samuel Bowles and Co., Springfield, Massachusetts, and Hurd and Houghton, New York, 1865). [Except for the map, this book is extralimital to this study.]

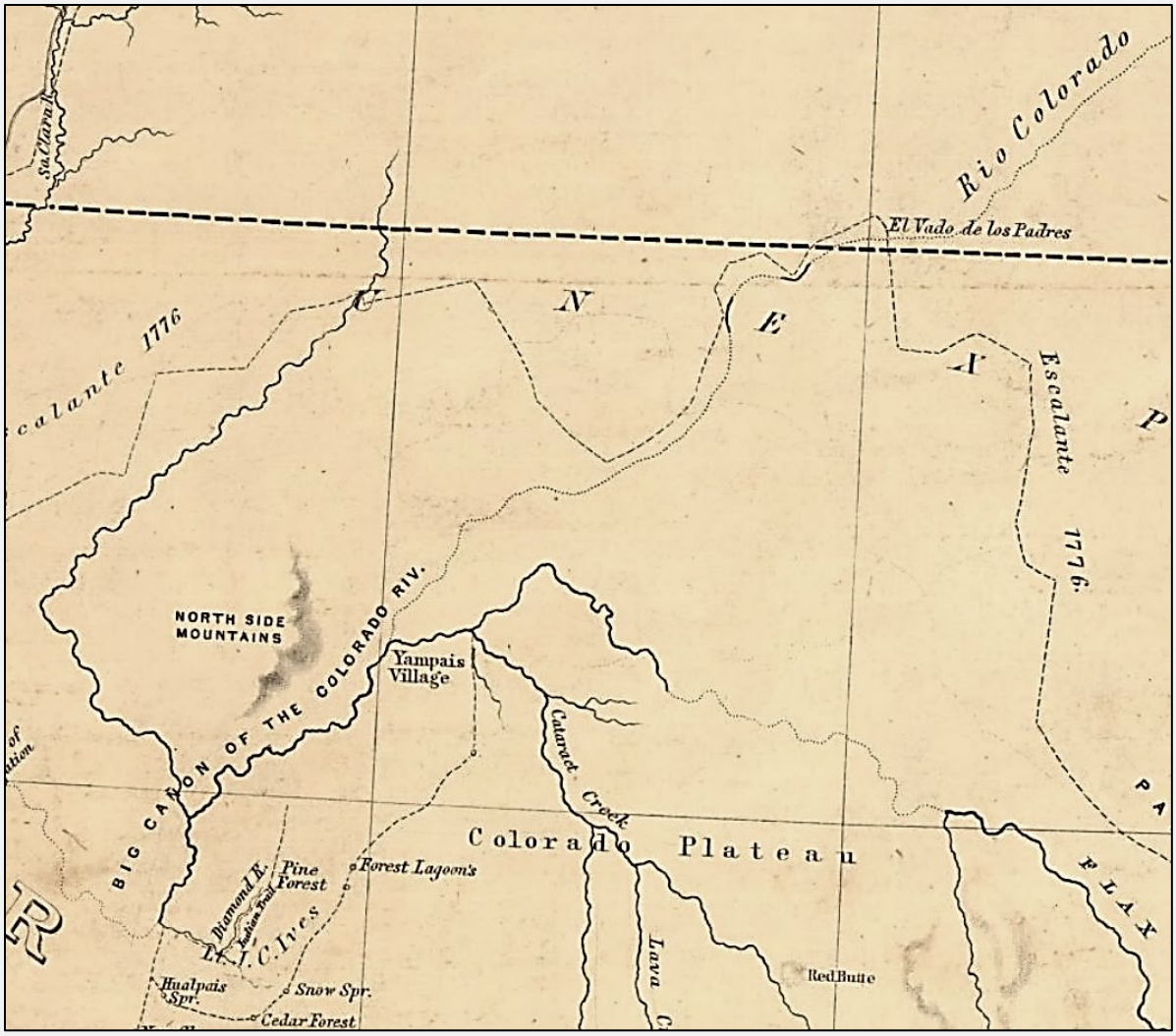
MAP NOTES: Below the confluence of Green and Grand Rivers (not seen in this detail) *Colorado R.* follows a southwestward course to the confluence of what probably is the San Juan River *(upper right)*. Beyond this juncture the Colorado's course is delimited conjecturally by a dashed line, turning westward once the Utah–Arizona boundary is crossed. It then **aligns on Egloffstein's upper Colorado course** that comes to the confluence of *Lit. Colorad* (also labeled *Colorado Chiquito* elsewhere on this map) in the central Grand Canyon. The Colorado, between a point north of the Little Colorado confluence and the Great Bend, as well as the lower course of the Little Colorado and unlabeled tributaries to it, is demarcated by hachures to indicate encanyoned reaches. ◈



Later Example 5 — 1866

FIGURE 67. Detail from **"New Map of the U.S. Territories and Pacific States Published by H. H. Lloyd and Co. 21 John St. New York. 1866."**

MAP NOTES: The Colorado River is labeled *Colorado River* in its lower reach (not shown in this detail) and *Rio Colorado* in its upper reach. Its course is drawn somewhat fancifully southwest from the confluence of *Green River* and *Grand River* to the confluence of *Colorado Chiquito R.*, which arrives directly from the southeast as does an unlabeled tributary farther downstream (Cataract Creek). Only in the broadest sense can any part of this map be said to have been influenced by Egloffstein's map, only on **Egloffstein's through-flowing course** and disposing of the idea that Cataract Creek was a tributary to the mislabeled Little Colorado. In slight measure it may adapt the Macomb–Dimmock map (see **FIGURE 58**), if it had been known somehow to the atelier Lloyd. After the Cataract Creek confluence, the Colorado turns directly west to the confluence of *Rio Virgen*, strikingly oblivious to even Egloffstein's 1858 course between Diamond Creek and the Virgin River. Also noticeable in this reach is the carelessly jittery course lines that show that no real intention was had to display precise streamways; and the faintly drawn trace of the Beale Wagon Road or the surveyed 35th parallel railway route is so smooth as to beggar realism. ◈



Later Example 6 — 1867

FIGURE 68. Detail from **"Old Territory and Military Department of New Mexico compiled in the Bureau of Topogl. Engrs of the War Dept. chiefly for military purposes under the authority of the Secretary of War 1859 Partially revised and corrected to 1867."**

MAP NOTES: The principal streams and other elements of this map are those of Egloffstein's "Map No. 2." With some embellishment, the wholly conjectural course of *Rio Colorado* is southwest along a lightly dotted line from Utah to strike the confluence of *Flax River* (Little Colorado River) according to Egloffstein's **upper Colorado River course** and conjectured confluence area. Egloffstein's **Parashant Wash tributary** is extended with implied certainty into Utah, its upper course paralleling the Colorado. *Big Cañon of the Colorado Riv.* is labeled just about where Egloffstein's prominent banner label is placed on his map. From *Diamond R.* (Diamond Creek, *lower left*) the Colorado's course continues conjecturally as a lightly dotted line. Beyond this detail, the Colorado is labeled *Colorado River* and continues conjecturally to the *Rio Virgen* (Virgin River) confluence, after which the course becomes a definitive solid line. (The route of the Escalante–Domínguez expedition of 1776 is inexplicably plotted greatly in error west of *El Vado de los Padres* and across the entirety of today's Arizona Strip, perhaps partly confused by the Old Spanish Trail.) ◈

Later Example 7 — 1867

FIGURES 69▲ and 69a, b ►►. Details from **"War Department Engineer Bureau Map of the Territory of the United States from the Mississippi River to the Pacific Ocean: Originally prepared to accompany the Reports of the Explorations for a Pacific Railroad Route; Made in accordance with the 10th & 11th sections of the Army Appropriation, Act of March 3rd 1853. Compiled from authorized explorations and other reliable data by Lieut. G. K. Warren, Top'l. Eng'rs. In the Office of Pacific R.R. Surveys, War Dept. under the direction of B'v't. Maj. W. H. Emory Top'l. Eng'rs. in 1854. Capt. A. A. Humphreys, Top'l. Eng'rs. in 1854-1858. And partly recompiled and redrawn under the direction of the Engineer Bureau in 1865-66-67."** ("Engraved on stone by Julius Bien, New York.")

This map was printed as four sheets. Shown here are details from the upper left and lower left sheets, digitally stitched together. Note the imperfect match of the terrain especially at *far left*.

The map includes a very extensive list of adopted "Authorities," which include: "Capt.L.Sitgreaves, Top. Engs., *Zuñi and Colorado Rivers* 1851", "Lt.A.W.Whipple, Top. Eng., *Survey of R.R.Route near 35th Parallel* 1853–4" and "Lt.J.C.Ives, Top Eng., *Colorado River Survey and Reconnce. to Ft. Defiance* 1858".

(continued)

FIGURE 69a (closer detail of Figure 69). (Digitally realigned to better match the terrains on the adjoining sheets.)

MAP NOTES [**FIGURES 69 and 69a**]: Mapped at a scale of 1:3,000,000, the Grand Canyon region is clearly fashioned from Egloffstein's map of 1858, though reengraved into a fantastic, overcompensated, and imaginatively confused web of relief. *Rio Colorado* has been directed conjecturally from Utah, having been turned due west to fit into **Egloffstein's suggested upper course of the Colorado**. The **Parashant Wash** tributary *(lower left in* FIGURE 69*)* has been reduced to an indecisive canyon now reaching the Colorado on a due-south course. This was a short-lived presentation, as another War Department map a year later eliminated the canyon altogether **[**FIGURE 70**]**.

(continued)


MOQUIS PUEBLOS
Painted Desert
Little Colorado
Rio Colorado
Red Butte
Rio Virgen
Rock Spring

▲ **FIGURE 69b. Unedited relationship of the two sheets shown in Figures 69 and 69a.**

FIGURES 69 and 69a were realigned and digitally stitched from the upper-left and lower-left of four separate sheets of this map in the Library of Congress. Here in FIGURE 69b the separate sheets are shown in juxtaposition and as originally aligned, demonstrating errors in engraving. It seems that the map had been scribbled on to call for the removal of the Grand Canyon. It also incorporates a redrawn and misdirected course for the *Rio Virgen* so as to allow it to reach a revised Colorado River course. Whether or not this was a War Department alteration in the office is undetermined. Also penciled in the lower margin of of the upper-left sheet (but not shown in this detail) is the date "1870". ◈

Later Example 8 — 1868

FIGURES 70▲, 70a ►. Details from **"Head Quarters Corps of Engineers. War Department. Territory of the United States from the Mississippi River to the Pacific Ocean: Originally prepared to accompany the Reports of the explorations for a Pacific Railroad Route; Made in accordance with the 10th and 11th sections of the Army Appropriation Act of March 3rd 1853; Compiled from authorized explorations and other reliable data by Lieut. G. K. Warren, Top'l. Eng'rs, In the Office of Pacific R.R. Surveys, War Dept. under the direction of Bvt. Maj. W. H. Emory, Topl. Eng'rs, in 1854. Capt. A. A. Humphreys, Top'l. Eng'rs. in 1854-1858. Recompiled and redrawn under the direction of the Chief of Corps of Engineers by Edward Freyhold 1865-66-67-68."** ("Engraved & printed by Julius Bien, N.Y.") 1868.

MAP NOTES: This display is dramatically different from the War Department map of 1867 [**FIGURE 69**], having removed the Grand Canyon and redrawn the course of the Colorado. *Rio Colorado*'s course is depicted from the confluence of *Green River* and *Bunkara River* (Grand River); in its upper reach the Colorado is labeled *Rio Colorado Grande* (not shown in this detail). From the *Supposed junction of the Rio Colorado & Flax Riv.* [Little Colorado River] to near *Wallapi Valley* (Hualapai Valley) the Colorado is depicted conjecturally by a dashed line (seen very faintly in this detail but better in **FIGURE 70a**), north of which to *Rio Virgin* is blank. It clearly borrows from Egloffstein's map by including the route followed by *Lt. Ives* but it noticeably **departs from the Egloffstein model** by plotting the Little Colorado confluence closer to where it should be and eliminating Egloffstein's Parashant Wash tributary—in fact eliminating the entire landscape north of the Ives expedition track, much like the suggested edit shown in **FIGURE 69**.

(continued)

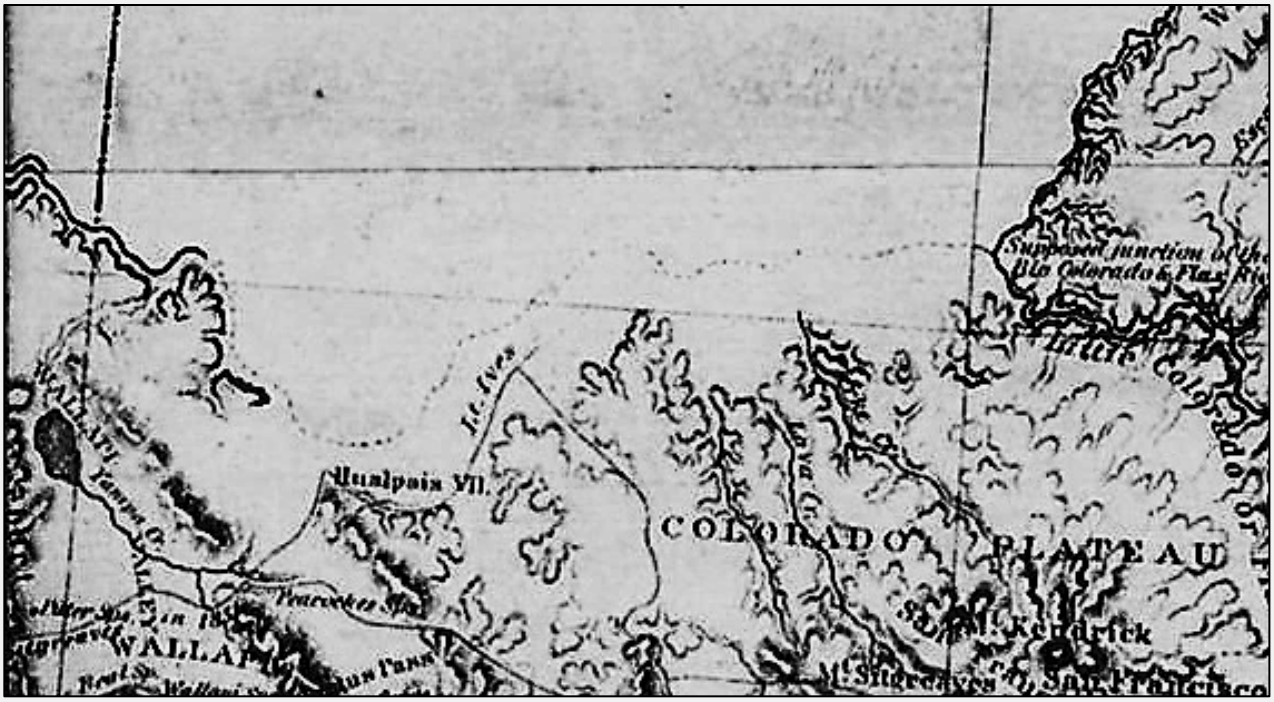


FIGURE 70a *(closer and enhanced detail from Figure 70)*. Digitally enhanced to accentuate the faintly suggested dotted-line course of the Colorado River *(meandering along bottom of blank area)*.

MAP NOTES *(continued)*: The information about the Little Colorado confluence copies that which was presented on the Macomb–Dimmock map engraved by Egloffstein in 1864 but not published until 1876 (*see* **FIGURE 58)**, making clear that the unpublished map may have been in use within the military agencies. The Little Colorado River confluence is closer where it should be, as plotted on the Macomb–Dimmock map; and the label is identical ("Supposed junction of the Rio Colorado & Flax River").

Westward from there, in an area not depicted by the Macomb expedition map, *Lava Cr.* and *Parke Cr.* (the latter read with difficulty above the end of the word "COLORADO" in "COLORADO PLATEAU") are misplaced west of the Little Colorado confluence and northwest of San Francisco Mountain; these tributary streams usually show on contemporary maps as variously drawn headwater forks to Cataract Creek, though here they seem to parallel an unlabeled Cataract Creek. Diamond Creek is absent, and the Colorado's course from where that confluence would be to the Great Bend is like that on Egloffstein's map. *Rio Virgin* meets the Colorado immediately upstream from the mouth of Las Vegas Wash (not labeled) (*see* **FIGURE 70**).

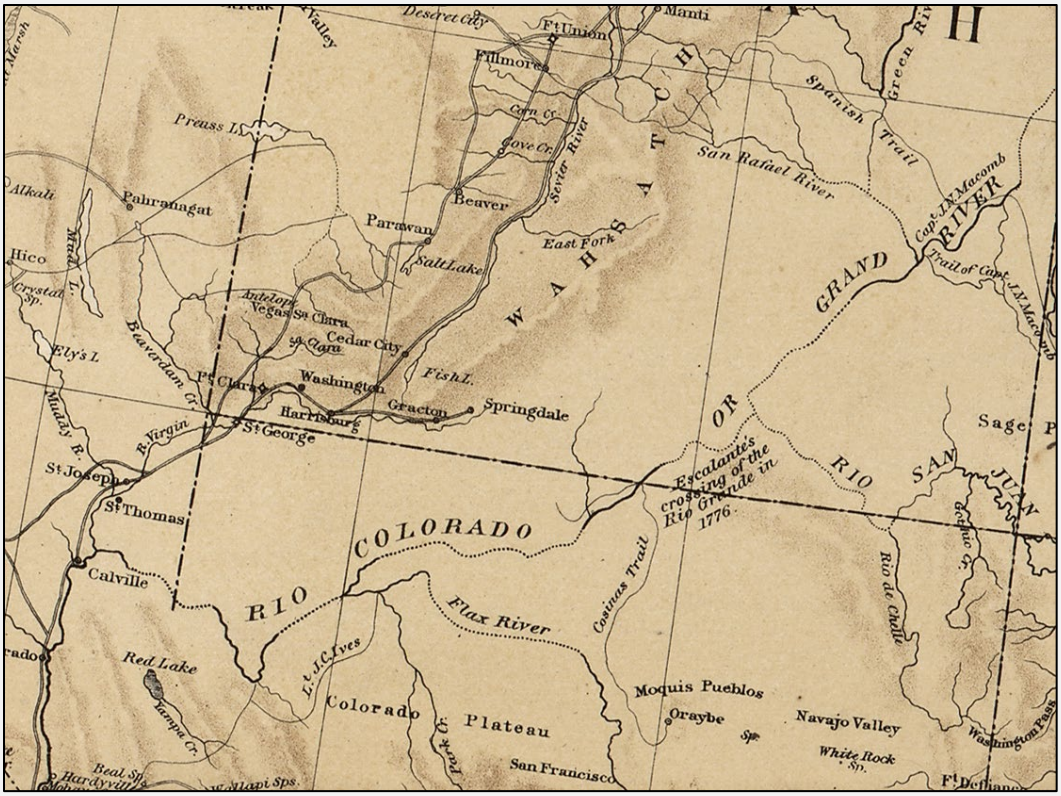
It is this map that John Wesley Powell likely had available prior to his 1869 Colorado River expedition (*fide* Richard Quartaroli). It suggests a reasonable course for the Colorado through the Grand Canyon, straddling the 36th parallel as it does in fact. ◈

Later Example 9 — 1868

FIGURES ◀ 71, 71a ▲. Details from **"Map of the Route of the Southern Continental R.R. with connections from Kansas City Mo.[,] Ft. Smith Ark. and Shreveport La. Giving a general View of the Recent Surveys of the Kansas Pacific Railway Co[.], across the Continent Made in 1867 & 1868. under the direction of Gen. Wm. J. Palmer. On the Routes of the 32nd and 35th Parallels."** [First state.] *In: Report of Surveys Across the Continent, in 1867-'68 , on the thirty-fifth and thirty-second parallels, for a route extending the Kansas Pacific Railway to the Pacific Ocean at San Francisco and San Diego. By Gen. Wm. J. Palmer. December 1st, 1868.* ("J. F. Gedney Lith, Washington. D.C.") [First state of this map. Even though the volume has been indicated to have been first available in 1869, it is clear that the map had already been produced by 1868. Regarding the two states, see annotated citations in Earle E. Spamer, *Mapping Grand Canyon: A Chronological Cartobibliography and Chorographical Study* (Raven's Perch Media, 2025, https://ravensperch.org/wp-content/uploads/2025/01/MAPPING-GRAND-CANYON_2nd-ed.pdf), pp. 183-186.]

This is the first map to display the "Grand Canyon" name, specifically as *Grand Cañon of the Colorado River* (labeled between the confluences of *Rio San Juan* and *Rio Virgen*). The Colorado River is labeled *Rio Colorado* on its lower course and as *Colorado River* between the confluence of the Virgin River and the confluence of the *Green River* and *Grand River* upstream.

MAP NOTES: The labeling on this map, and its general appearance, show haste and economy. The course of the Colorado is that of **Egloffstein's upper Colorado course** from Utah to the Little Colorado River confluence, with *Cataract Cr.* a tributary to the Little Colorado. Downstream from there, in the western Grand Canyon, is a tributary from the north (not labeled), which is another interpretation of the **Parashant Wash** from Egloffstein's map, here thinly delineated and heading in Utah. ◈



Later Example 10 — 1869

FIGURES 72▲, 72a►. Details from **"Office of the Chief of Engineers War Department Military Map of the United States compiled and drawn by E. Freyhold 1869."** ("Engraved & printed by Julius Bien, N.Y.") ("Note. In the compilation of this map the Authorities designated on the map of the Western Territories as well as others of more recent date have been used.")

The course of *Rio Colorado or Grand River* is labeled on the area that is the canyon regions of northern Arizona and southeastern Utah. The course is depicted conjecturally by dotted lines, except for 1) a reach around the confluence of *Green River* and what actually is the Grand River (labeled farther upstream *Grande River*), 2) around the confluence of the Paria River (not labeled), 3) a reach around the confluence of *Flax River* (Little Colorado River), and 4) a reach around the confluence of Diamond Creek (not labeled)—more clearly seen in **FIGURE 72a**.

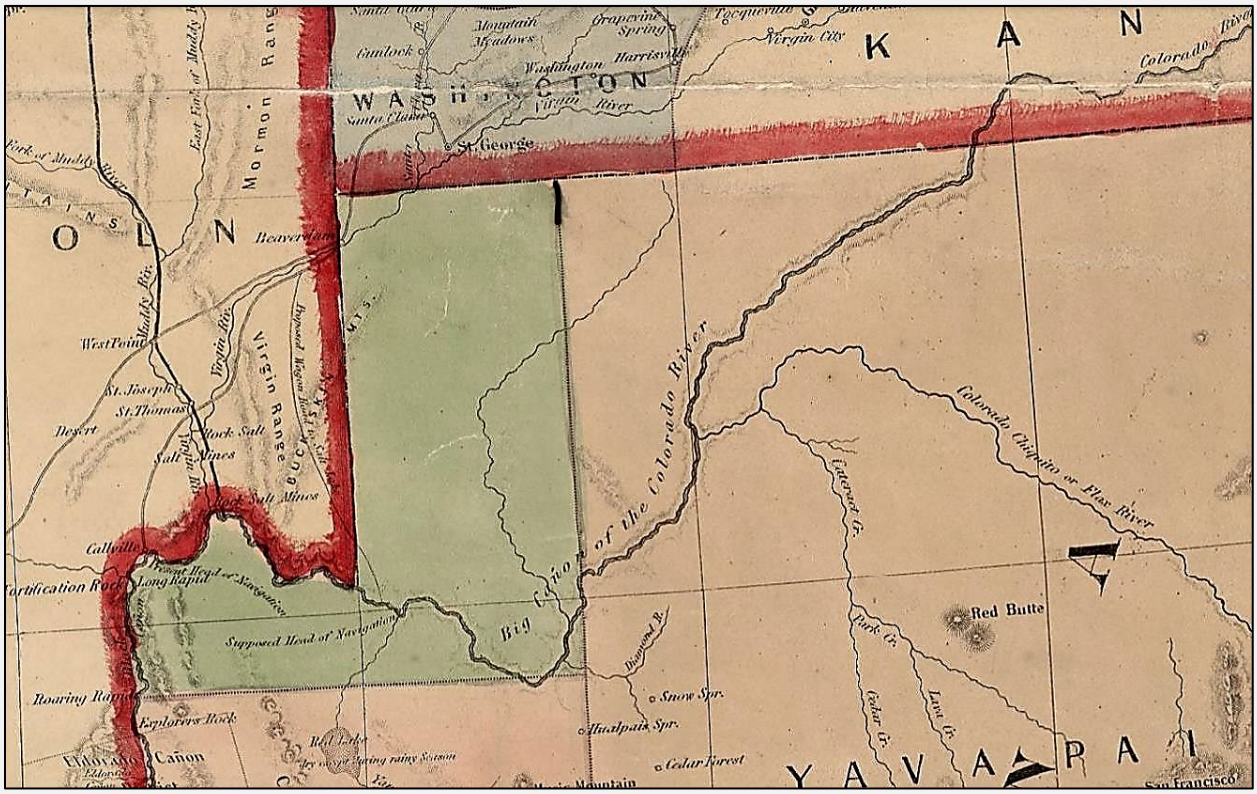
MAP NOTES:The Little Colorado (part of its lower course marked by a dotted line) reflects Egloffstein's geography. It meets the Colorado that comes in along **Egloffstein's conceptual route** *(see also overlay on* FIGURE 72a*)*. Shortly before it meets the Colorado it receives from the southeast Cataract Creek (not labeled, but on one of its headwater forks is labeled *Park Cr*. The **Parashant Wash** tributary of Egloffstein is absent.

Between the San Juan and Little Colorado River, the unlabeled small tributary is the Paria River. Crossing the Paria is part of an Indian route, *Cosinas Trail,* also confusingly labeled and mispositioned as *Escalante's crossing of the Rio Grande in 1776*, which refers to the Domínguez–Escalante expedition that found a Colorado River ford utilized by Native Americans in Utah and later called El Vado de los Padres.

(continued)

FIGURE 72a. Detail from FIGURE 72 superposed on the Egloffstein map. Freyhold map rotated to align with North of "Map No. 2."

Note the routing of the Colorado River through **Egloffstein's interpreted upper Colorado course** and the elimination of the **Parashant Wash** course. Portions of the courses of the Colorado and Flax (Little Colorado) Rivers are made hypothetical by the use of dotted lines. What is quite ironic is that the river reach between Egloffstein's "Little Colorado"–Colorado confluence and where his unlabeled Parashant Wash confluence would be is marked as hypothetical—which happens to be one of Egloffstein's best surveyed courses based on the observations made at Diamond Creek and on the plateau between there and Cataract Creek. The other hypothetical reaches correlate with the areas that Egloffstein had not been able to survey (as discussed more fully in the text herein). ◈



Later Example 11 — 1871

FIGURE 73. Detail from **"Bancroft's, Map of California, Nevada, Utah and Arizona, Published By A. L. Bancroft, & Compy. Booksellers & Stationers San Francisco Cal. 1871."** ("Engraved & printed by Julius Bien, N.Y.") ("Note. In the compilation of this map the Authorities designated on the map of the Western Territories as well as others of more recent date have been used.")

MAP NOTES: *Colorado River* comes from off the map on the east (not shown in this detail), coming to the Grand Canyon region along **Egloffstein's projected upper Colorado course**. *Big Cañon of the Colorado River* is labeled between the confluences of *Colorado Chiquito or Flax River* and *Virgin River*. *Cataract Cr* is a tributary to the Little Colorado, as like the Egloffstein model, with headwaters labeled as *Park Cr.*, *Lava Cr.*, and *Cedar Cr.* The **Parashant Wash** tributary remains, although with its headwater extended nearly to the Utah boundary and which parallels Egloffstein's upper Colorado course. ◈

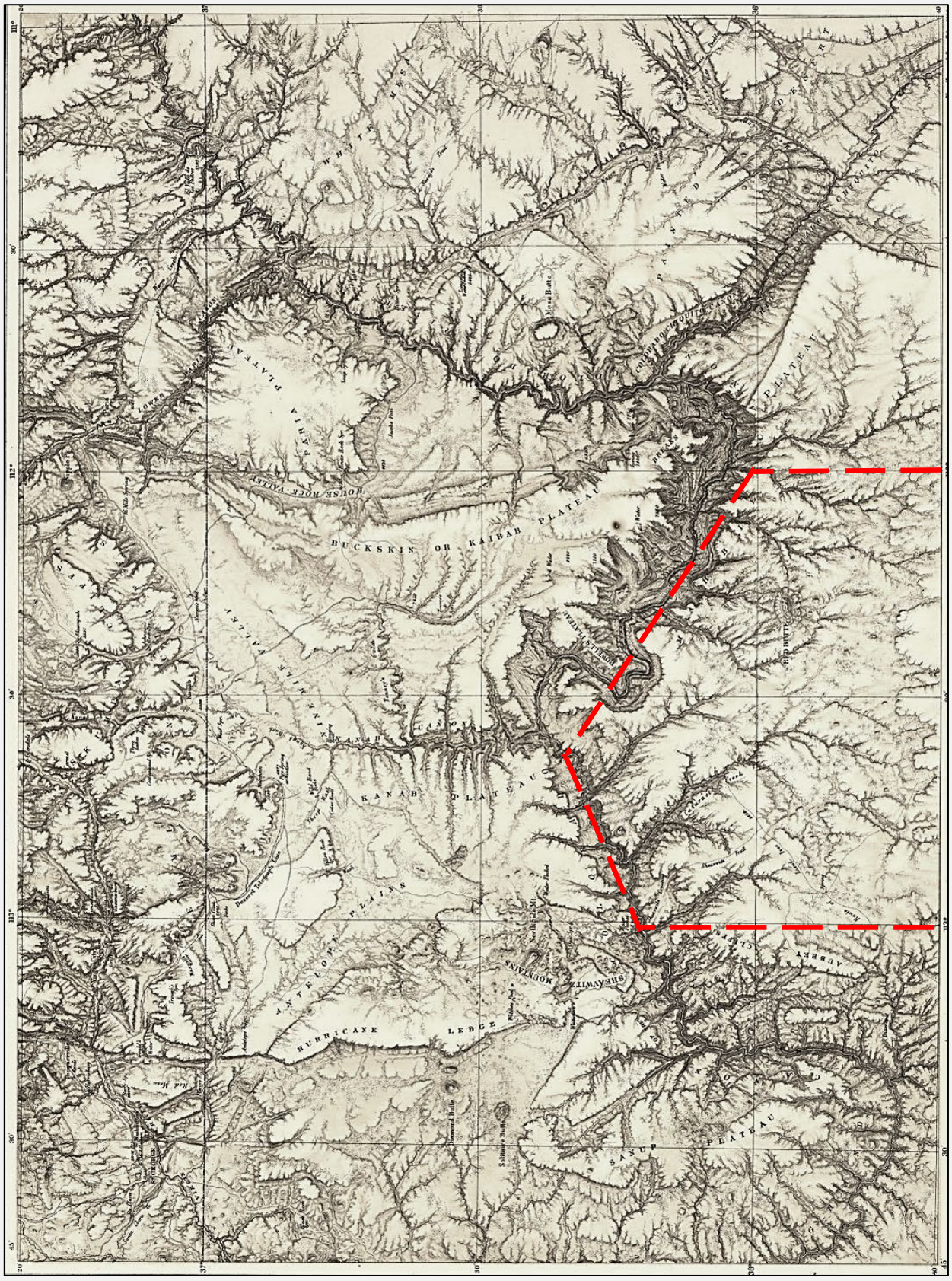


FIGURE 74
legend is on the next page ▶

◀ **FIGURE 74** *(previous page)*. **"U.S. Geographical Surveys West of the 100th Meridian. Parts of Northern and North Western Arizona and Southern Utah. Atlas Sheet No. 67. Expeditions of 1871, 1872 and 1873, Under the Command of 1st Lieut. Geo. M. Wheeler, Corps of Engineers, U.S. Army."** In: *Geological atlas projected to illustrate geographical explorations and surveys west of the 100th meridian of longitude, under the command of First Lieut. Geo. M. Wheeler* (New York, 1876), scale 1:506,880.

MAP NOTES: The following explanation is printed on the map (**bold** emphasis added here):

"NOTE: material furnished through the courtesy of Mr. J. W. Powell in charge of the Colorado River Exploring Expedition, has been incorporated with the work of this survey in the area bounded approximately as follows: northward by Vermillion [*sic*] Cliffs eastward and southward by the Colorado River, and westward by Hurricane Ledge.

"The topography south of the Colorado River, between Longitude 112° and 113° W from Greenwich has been taken principally from the maps of the Colorado River Exploring Expedition under Lt. Ives, Top'l. Eng'rs. in order that the entire sheet might be published without delay."

This approximate area is delimited on Figure 74 by the ***bold red dashed line***. The course of the Colorado is that as ascertained by the Powell expedition, including a proper positioning of the Little Colorado River confluence, though as noted the topography south of it in this area is adapted from Egloffstein's "Map No. 2." The corresponding areas from these two maps are shown in **FIGURE 74a** *below* ▼. Yet despite the statement just quoted, there are noticeably different adaptations on the plateau on the 1876 map *(left)* compared to Egloffstein's 1858 map *(right)*.]

Compare this, too, to the Macomb–Dimmock map (**FIGURE 58** and narratives there). ◈

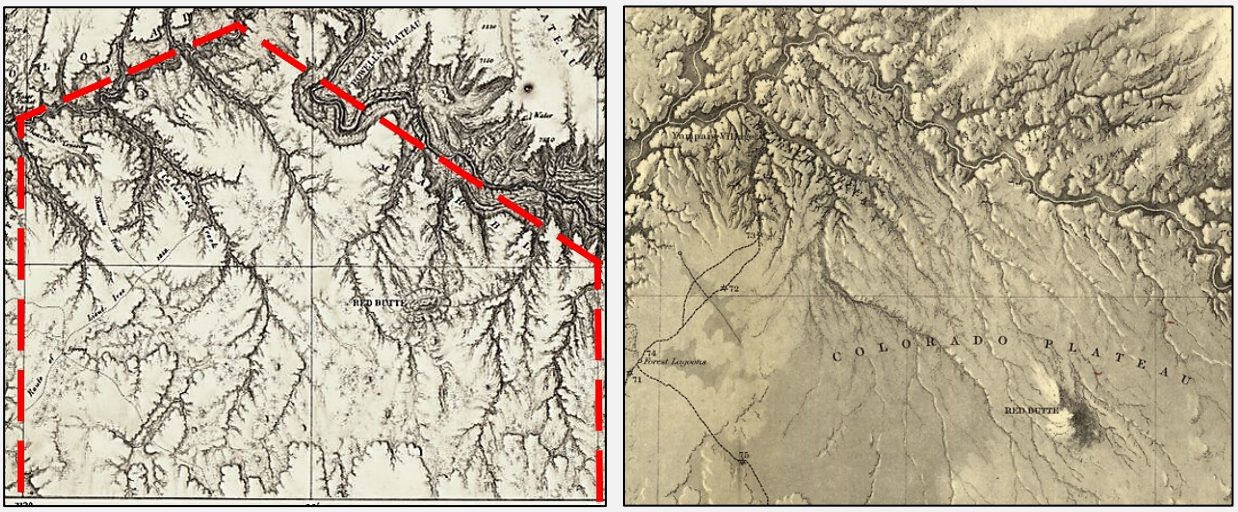


FIGURE 74a

Later Example 13 — 1878

FIGURE 75. Detail from **"Department of the Interior[,] U.S. Geographical and Geological Survey of the Rocky Mountain Region[,] J. W. Powell, in charge. Map of the United States exhibiting the grants of lands made by the general government to aid in the construction of railroads and wagon roads. 1878[.] For explanation see chapter on 'Land Grants in aid of Internal Improvements'[.] (The base chart was engraved for the Statistical Atlas of the United States.)"** *In:* Powell, J. W., Report on the lands of the arid region of the United States, with a more detailed account of the lands of Utah. *U.S. 45th Congress, 2nd Session, House Executive Document 73*. (U.S. Geographical and Geological Survey of the Rocky Mountain Region.)

MAP NOTES: Despite the qualified note about the "base chart" that is written into the map's full title, this is a shocking choice by Powell. It is used years after his own explorations on the Colorado River and mapping the adjacent parts of the Colorado Plateau put to rest all ambiguities of the Egloffstein map. This chosen map depicts portions of the course of the *Rio Colorado or Grand River* [sic] with hypothetical dots. The Colorado certainly follows **Egloffstein's projected upper Colorado course** and retains Cataract Creek and the Little Colorado River as they were mapped by Egloffstein. It is a very poor choice for the modern assessments that were the subject of Powell's report. The only possible reason for Powell's use of this map is that it was an available plate which was in the context of his arid lands report that offered warnings about settlement and land apportionments in the federal West; specifically, it illustrated the land-grant area for the Atlantic & Pacific Railroad with its 40- and 50-mile boundaries approximately paralleling the route. ◈

Later Example 14 — 1885

FIGURES 76▲ and 76a▶. Details from **"America Settentrionale 1885 Stabto. dell' Editore Ant. Vallardi Via Sta. Margherita, 9. Milano G. B. Paravia e C. Torino-Roma-Milano-Firenze. 1885."** Two pieces of this map have been digitally stitched together (vertical line).

MAP NOTES: This astonishingly outdated, confused and imaginative Italian map is considered with the Egloffstein variants only by reason of a vague correlation to that geographical style; but beyond that, it is peculiarly unique, a contributing source thus far not identified for this presentation.

It would seem that the courses of the principal rivers mix the old-style parallel Green and Grand Rivers, even though farther upstream (not shown in this detail) *R. Colorado* is confusingly shown to begin at the confluence of *Green R.* and a short *Bear R.* and that it really means to continue the Green now called *R. Colorado* on this map. What thus would be the Colorado, running parallel to the Green, follows a southwestward course that, some distance into what today is Arizona, turns westward, at which point is the confluence of a tributary from the east, which seems to be a dramatically misaligned San Juan River (*R. S. Gió.*). Just a short distance to the east along this tributary is the place-name *Oribe* (*i.e.* Oraibi, one of the Hopi pueblos), seemingly badly positioned at the confluence of *R. S. Gió.* and an unlabeled river from the southeast (*bottom center*, surely the Little Colorado River, partly hidden in this detail where it is situated directly on the digitally stitched pieces of the map (between the words "Ind." and "Moquis" and through the place-name symbol for "Gualpi").

(continued)

FIGURE 76a. Closer detail of Figure 76

MAP NOTES *(continued)*: The reach of the Colorado tributary between *Oribe* and the Colorado is not separately labeled and thus is ambiguous. It seems reasonable that it is a continuation of the Little Colorado, in the same fashion by which Egloffstein continued his Little Colorado to the great Colorado's confluence.

The entire region northeast of the confluence at *Oribe* is labeled *Grande Deserto* (Great Desert), an additional peculiarity given that the one-time Great American Desert label was applied to the sparingly watered western plains of the United States.

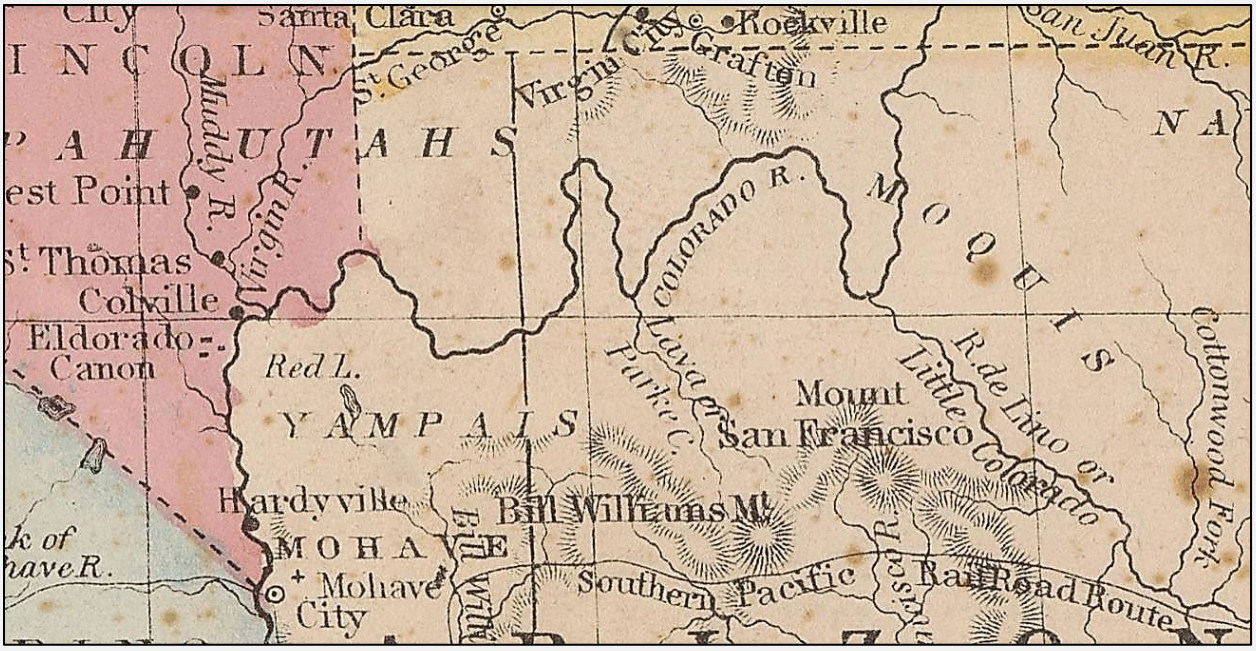
Inexplicably, the already reasonably-mapped course of the Colorado in the western Grand Canyon is wholly ignored (see in **FIGURE 76**). Neither Diamond Creek nor the Virgin River appear on the map. From where the Diamond Creek tributary would be, the Colorado does not follow Egloffstein's mapped course but arcs from west to southwest, continuing without much deviation from that arc in order to turn to its southward course to the gulf. ◈

5.3 ◈ No One's Colorado River: The Bactrian Course Through the Grand Canyon [60] [FIGURES 77–82]

One of the visually peculiar and short-lived styles of mapping the Colorado River is a wildly serpentine course through the Grand Canyon region—a "bactrian" course, so called for the resemblance to the two humps of bactrian camels. The style has no obvious preexisting mode even though in inconsistent ways it merges elements of the Egloffstein map with more reliable and modernly recognizable courses and feature names mapped from John Wesley Powell's river expeditions of 1869 and 1871–2. But first coming as it does before the Powell expeditions, the form apparently adapts to the Powell geographies despite badly misplacing some features.

The style is first noticed in 1868. Yet already the Colorado River is reaching the Grand Canyon and the Little Colorado River confluence on a course that more resembles its modern one, indicating that Egloffstein's misrouted Little Colorado was less favored. The correction may have come from the as-yet unpublished Macomb–Dimmock map of the Four Corners area (dated 1860, engraved by Egloffstein in 1864, but not publicly printed until 1876) that mapped the Colorado's approach to a more reasonably placed Little Colorado River confluence (*see* **FIGURE 58**). But the origins of the Colorado's aberrant course through the Grand Canyon, an area not covered by the Macomb map, remains a mystery. Only one clear bactrian depiction, from 1873 (**FIGURE 78a**), suggests that there are influences on the bactrian form derived from the Egloffstein map though in a corrupted or a fantastically inattentive fashion; but there are other forms, too. Again, how the bactrian form came about in the first place seems to be unknown; and how much may be attributed to simple copying is undetermined. ◈

[60] The examples in this section are adapted from Earle E. Spamer, *The Colorado River of the West: Cartographic Styles of the 16th to 19th Centuries* (Raven's Perch Media, 2023, https://ravensperch.org/wp-content/uploads/2023/05/CRWest.pdf).

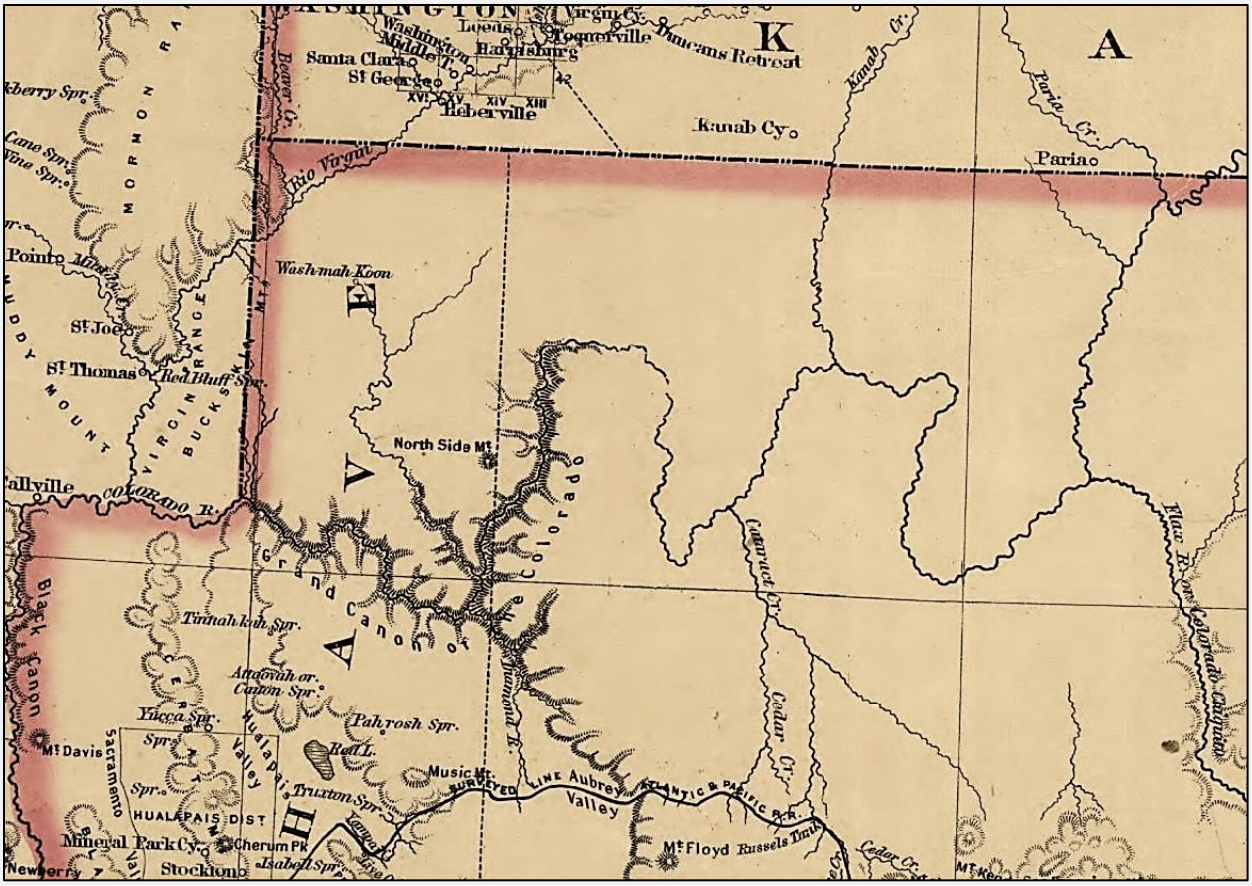


Bactrian Example 1 — 1868

FIGURE 77. Detail from **"California, Oregon, Idaho, Utah, Nevada, Arizona and Washington."** In: *Mitchell's new general atlas : containing maps of the various countries of the world, plans of cities, etc., embraced in sixty-three quarto maps, forming a series of one hundred maps and plans, together with valuable statistical tables* (S. Augustus Mitchell, Jr., Philadelphia, 1868), Map XIX.

MAP NOTES: The key confluence of *R. de Lino or Little Colorado* meets a southward-trending *Colorado R.* at a point due north of *Mount San Francisco*, perhaps mirroring the presentation on the as yet unpublished Macomb–Dimmock map (which did not continue its coverage westward into Grand Canyon; see **FIGURE 58**).

The bactrian course of the Colorado River through the Grand Canyon departs from the Little Colorado River confluence sharply north, before arcing southwestward to arrive at the confluence of Cataract Creek (here labeled *Lava or Parke C.*, though these individual names appear on most other contemporary maps as headwater forks of Cataract Creek). This arrival in some way matches Egloffstein's **upper Colorado River course** on his 1858 Grand Canyon map. But here, the Colorado, inexplicably, again turns sharply northward, then doubles back sharply south before turning to the southwest toward where Diamond Creek would be but which does not appear on this map. In some way it conflates Egloffstein's **Parashant Wash route**, though it does so peculiarly. More normally, the Colorado afterward turns northwestward to reach the Great Bend area and the Virgin River confluence. ◈



Bactrian Example 2 — 1873

FIGURES ▲ 78 and 78a▶. Details from **"Colton's New Mexico and Arizona Published by G. W. and C. B. Colton & Co. No. 172 William St. New York."**

MAP NOTES: *Colorado R.* in the western part of *Grand Canon of the Colorado* is depicted as encanyoned, as also is the tributary *Diamond R.* (Diamond Creek, which as shown here is geographically awry, on a south-to-north course that may be conflated with an unlabeled Peach Springs Wash). This general area has the appearance of borrowing upon the Egloffstein model, including the **Parashant Wash** tributary, but east of that area the portrayal differs. The Colorado's course in central and eastern Grand Canyon is wildly conjectural with its two bactrian "humps" and is noticeably not encanyoned. Egloffstein's **upper Colorado River course** might be inferred on the approach to the Cataract Creek confluence, but the remainder of the river's course on this map is peculiar.

Cataract Cr. is very approximately in a proper location. *Kanab Cr.*, by this time a known geographical feature thanks to the Powell surveys, meets the Colorado from the north midway in the Colorado's first bactrian "hump." *Flax R. or Colorado Chiquito* (Little Colorado River) reaches the Colorado in eastern Grand Canyon about where it would be expected and as discerned by the Powell expeditions. It is curious that the Grand Canyon area in general, with some correctly positioned elements, largely overlooks Powell's own observations regarding the Colorado River at large.

Compare also **FIGURE 79**, from the same publisher and year.

(continued)

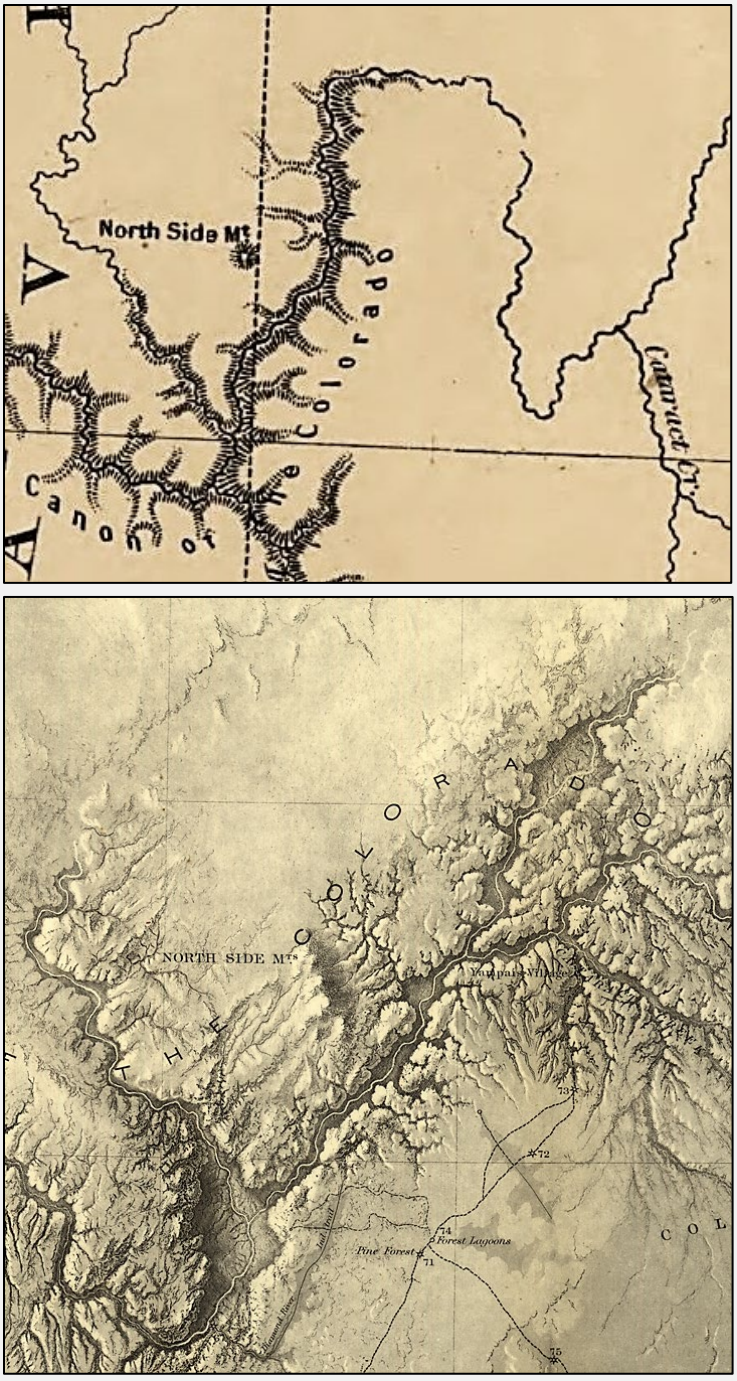
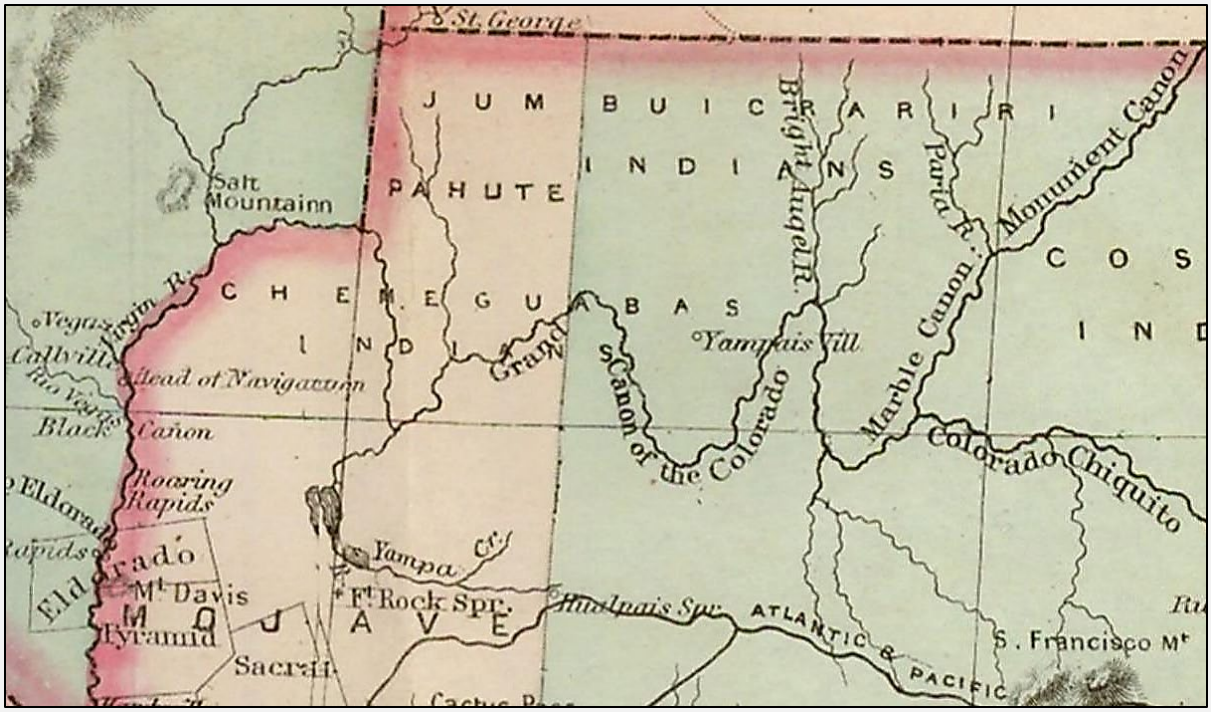


FIGURE 78a. Greater detail of Figure 78 and comparison to approximately the same area of Egloffstein's "Map No. 2." This demonstrates that the peculiarity of one of the bactrian meanders of the Colorado River's course could not have been copied from Egloffstein's map. But there are a few forms that suggest that they were transferred from that map—the course of **Parashant Wash** and the course of the Colorado west of Diamond Creek *(left and lower left)* feature some of the same bends in the stream courses. In a puzzling way the Colton map allows for the confluence of Cataract Creek, but then, looping far on the nonexistent bactrian curve, brings the Colorado around to what on the Egloffstein map is his own **Colorado River course, including the suggested upper part** *(from the upper right)*. Colton also published the same year a bactrian map that intimates some influence of the results of the Powell expeditions (*see* **FIGURE 79**). ◈



Bactrian Example 3 — 1873

FIGURES ▲ 79 and 79a ▶. Details from **"Colton's California, Nevada, Utah, Colorado, Arizona & New Mexico. Published by G.W. and C.B. Colton & Co., No. 172 William St. New York. 1873."**

MAP NOTES: This map adopts many of the canyon names along the Colorado River that were given by John Wesley Powell, but otherwise it ignores Powell's correct geography and is a curious mix of the Egloffstein style and the contrived bactrian course. In the detail above, Powell's *Monument Canon* (Glen Canyon today) appears first after the Colorado crosses into Arizona, where it receives *Paria R.* It passes into *Marble Canon* where it receives *Colorado Chiquito* (Little Colorado River) but that confluence is much too far to the west (compare the longitude of *S. Francisco Mt*. Thereafter the map devolves into the Egloffstein and bactrian styles, with other peculiarities *(see detail* **FIGURE 79a***)*.

At the western end of the Grand Canyon the Colorado follows a westerly course, arcing eventually to its southerly course, receiving a tributary from the north that is not labeled except for the presence of *Salt Mountainn* [*sic*] that confirms it is the Virgin River. However, the reach of the Colorado between that confluence and the confluence of *Rio Vegas* (Las Vegas Wash), passing by *Callville* and *Head of Navigation*, is labeled *Virgin R.*, surely an engraver's error.

Compare also **FIGURE 78**, from the same publisher and year.

(continued)

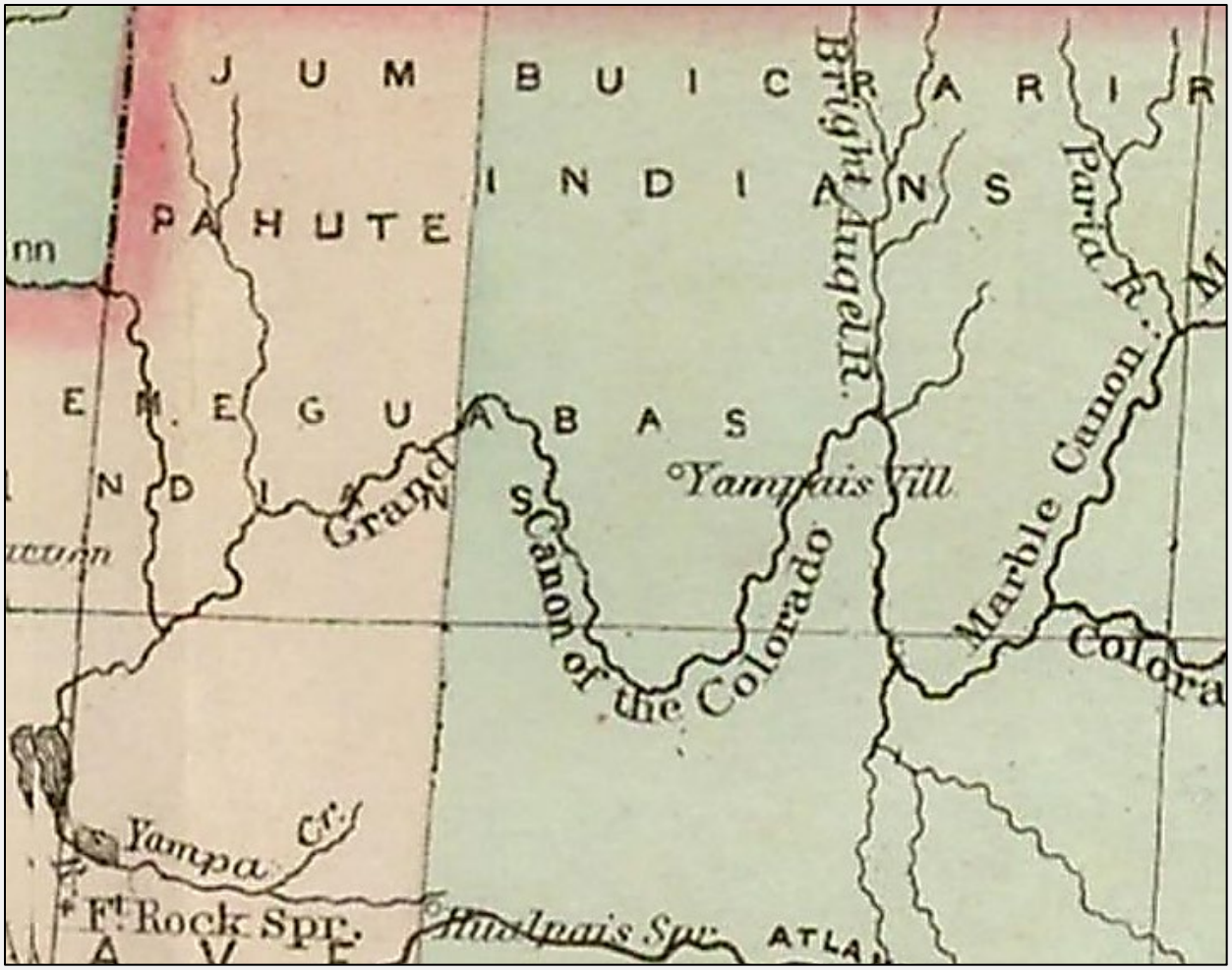
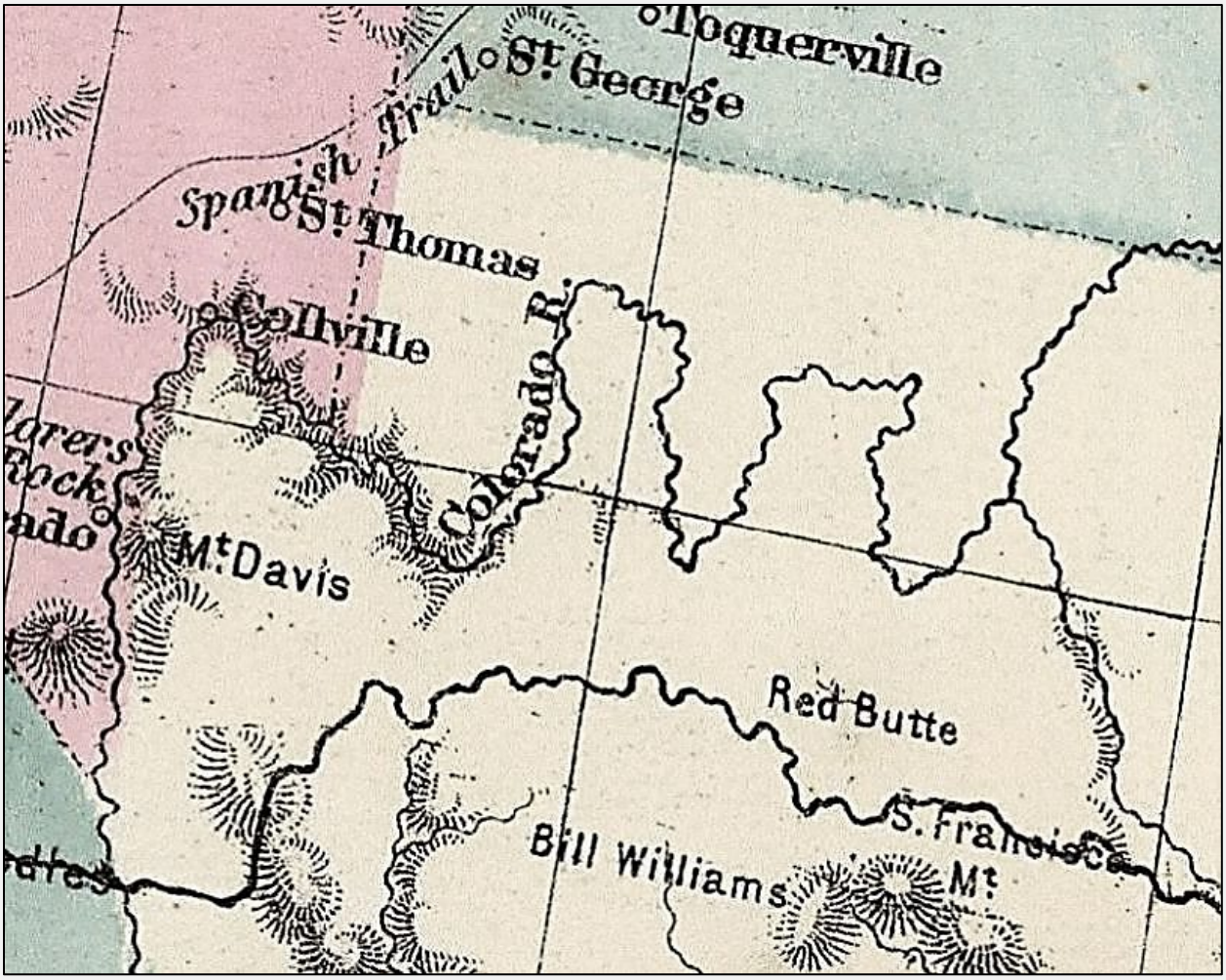


FIGURE 79a. Greater detail of Figure 79

This detail demonstrates the scope of intermixing the cartographies of Egloffstein and Powell.

MAP NOTES *(continued)*: Entering its wildly conjectural bactrian course through *Grand Canon of the Colorado*, the river first receives a tributary (not labeled) from the south that must be meant Cataract Creek (though its confluence is seriously misplaced too far upstream on the Colorado). The Colorado turns due north to receive at the northern apex *Bright Angel R.* (Bright Angel Creek, reflecting a Powell contribution, though confused with Kanab Creek). In the western part of the Grand Canyon, the Colorado, along a southwesterly course, receives a tributary (not labeled) from the north (but which corresponds to the **Parashant Wash** of the Egloffstein model). Thereafter the river receives *Yampa Cr.* from the southwest, where it then turns abruptly north-northwestward. The mapped Yampa has at its head *Hualpais Spr.*, which actually is on Peach Springs Wash, a tributary that, with Diamond Creek too, is absent from this map although the Yampa confluence seems to correlate to where Diamond Creek should be. *Yampais Vill* [Supai] of Cataract Creek, from the Egloffstein map, is inexplicably misplaced well to the north side of the Grand Canyon. ◈



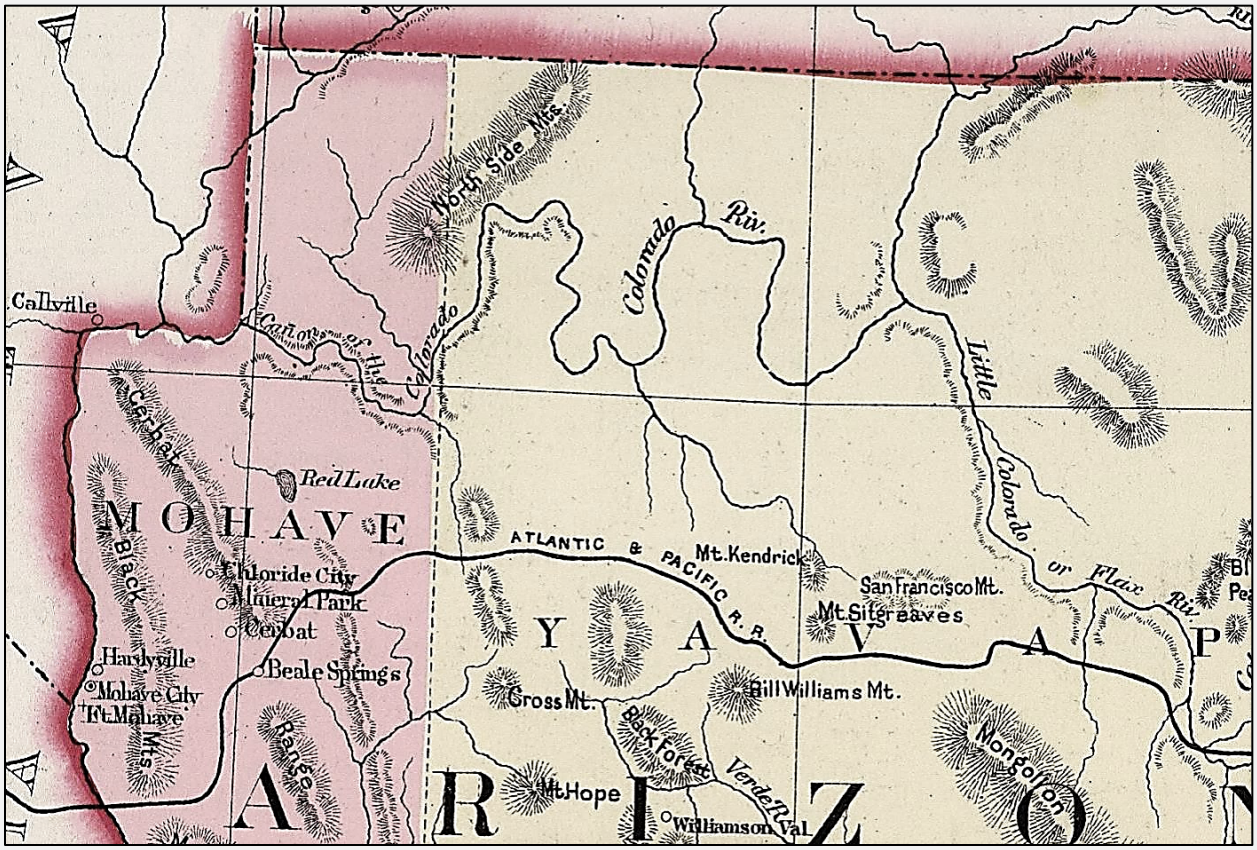
Bactrian Example 4 — 1873

FIGURE 80. Detail from **"Gray's Atlas Map of the United States of America 1873."** In: *Gray's atlas of the United States, with general maps of the world* (Stedman, Brown and Lyon, Philadelphia).

MAP NOTES: From the confluence of the Green and Grand Rivers *(not shown in this detail)* the course of *Colorado R.* arcs from southwest to south, reaching the confluence of *Colorado Chiquito* (Little Colorado River, label not shown here). Through the area that is the eastern and central Grand Canyon the Colorado's course is in the bactrian style before proceeding directly northwest on the Egloffstein course to the Great Bend at *Callville* (the Virgin River is not on the map), before turning southward. Only the western Grand Canyon is depicted as encanyoned. Other than the Little Colorado, no tributaries are shown. (On the lower Colorado River, "Explorers Rock" is retained as a place marker, retrieved from the Egloffstein map.)

[The heavy, irregular line striking east–west rather erratically delineates the route of the Beale Wagon Road, while *S. Francisco Mt.* and *Bill Williams* are plotted too far to the south.]

Compare also **FIGURE 81**, from the same publication. ◈

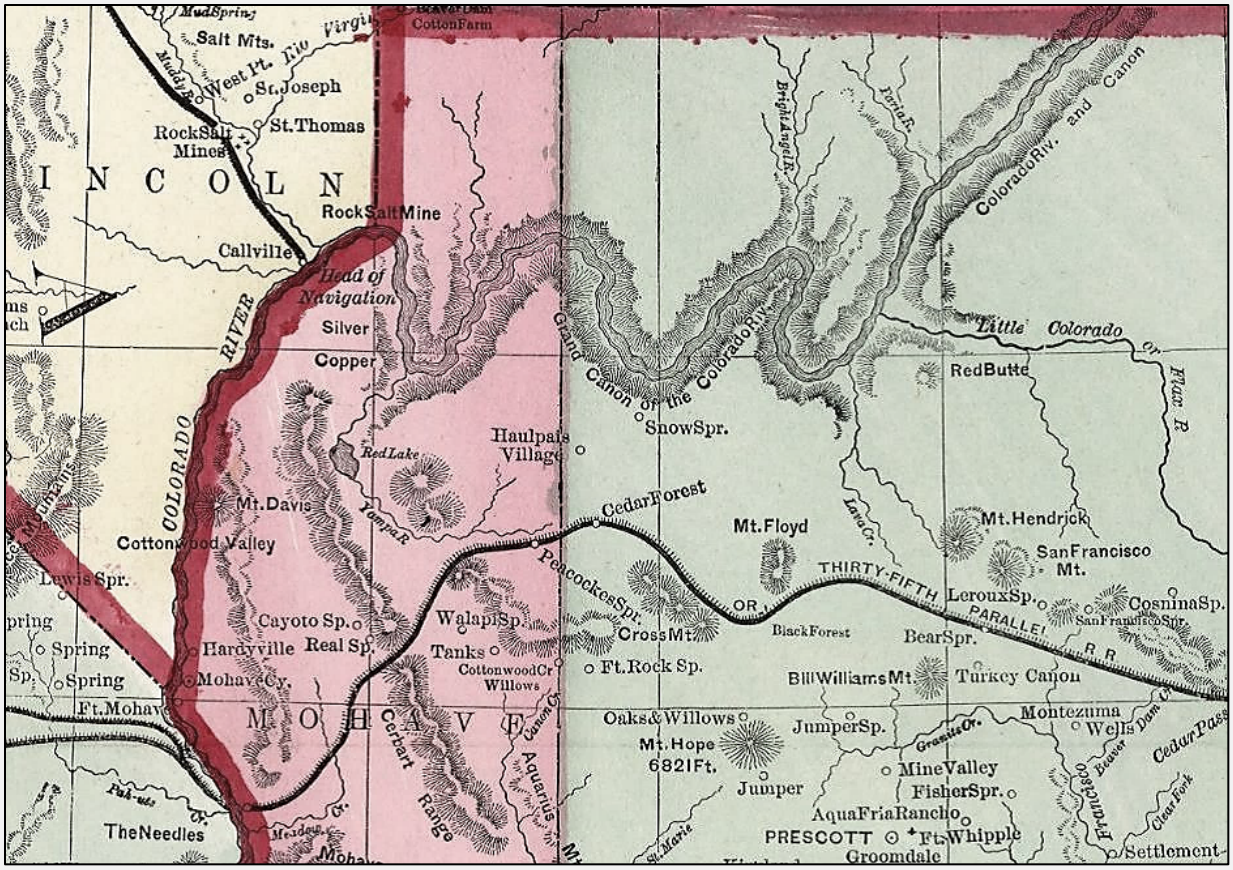


Bactrian Example 5 — 1873

FIGURE 81. Detail from **"Gray's Atlas Map New Mexico and Arizona."** In: *Gray's atlas of the United States, with general maps of the world* (Stedman, Brown and Lyon, Philadelphia).

MAP NOTES: In Arizona, *Colorado Riv.* is depicted in the bactrian style. It appears that the Paria River (not labeled) is displayed close to its proper location near the Utah–Arizona boundary. The confluence of *Little Colorado or Flax Riv.* is positioned about where it should be with respect to *San Francisco Mt*. Several tributaries are shown but not labeled: Kanab Creek from the north; Cataract Creek from the southeast; an undetermined stream that is apparently the **Parashant Wash** tributary as represented on the Egloffstein map, which rounds a greatly enlarged and mispositioned *North Side Mts.*; and Diamond Creek (not labeled) from the south, which by its extension to the railroad suggests that Peach Springs Wash is incorporated. Although elements of the Egloffstein map are noticeable, the general arrangement presents the revised courses and confluences as established by Powell, though with the bactrian peculiarities.

Compare also **FIGURE 80**, from the same publication. ◈



Bactrian Example 6 — 1875

FIGURES ▲ 82 and 82a ▶. Details from **"Watson's new county and railroad map of the Pacific States and Territories. Published by Gaylord Watson, 16 Beekman Street, N.Y. 1875."** In: *Watson's new commercial county and railroad atlas of the United States and Dominion of Canada. Compiled from the latest official sources* (Perry and Spaulding, Boston).

MAP NOTES: The *Grand Canon of the Colorado Riv.* is labeled in the central Grand Canyon, with an additional label, *Colorado Riv. and Canon* upstream from the confluence of *Paria R*.

[The vertical colored bandings are Arizona counties.]

(continued)

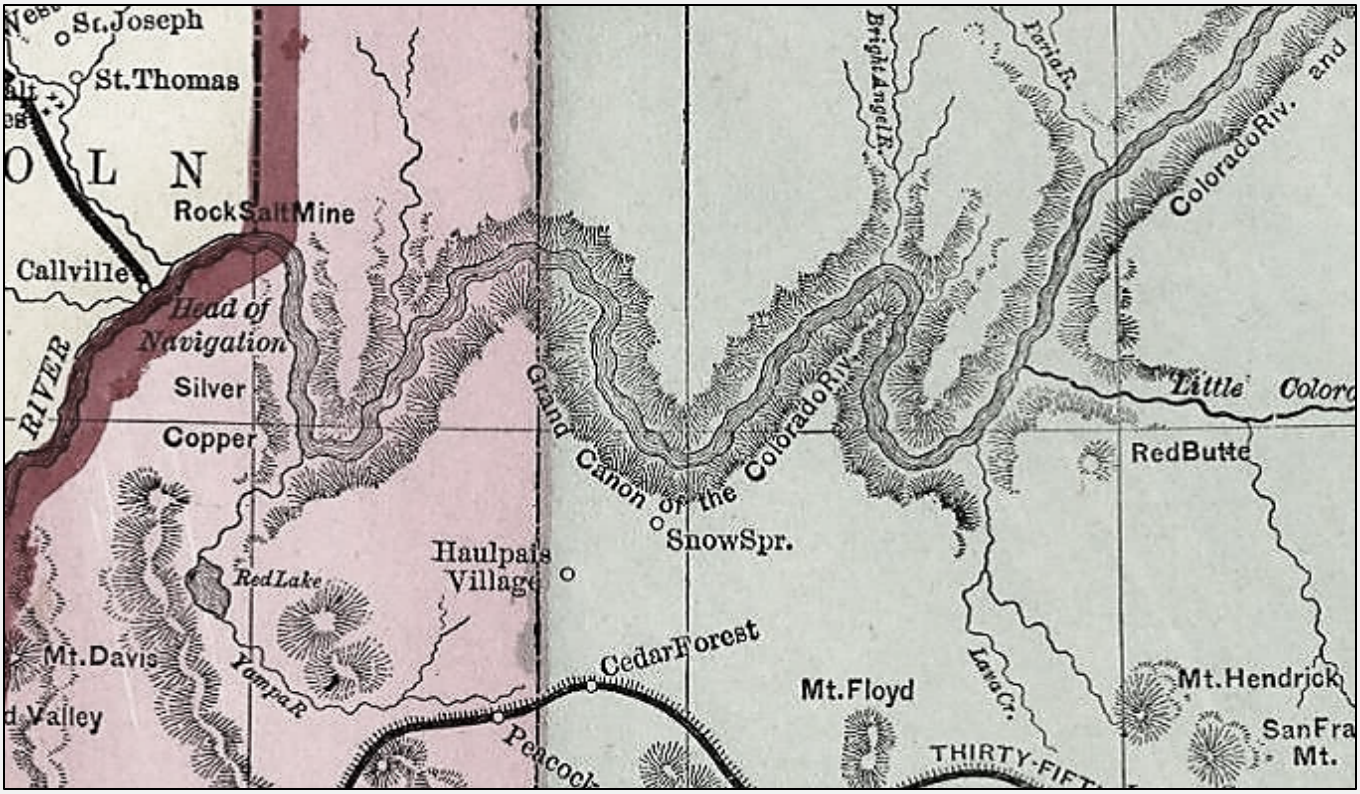


FIGURE 82a. Greater detail of Figure 82.

MAP NOTES *(continued)*: The confluence of *Little Colorado or Flax R.* is again too far west, compared to the longitude of *San Francisco Mt.* From there nearly to the confluence of *Rio Virgin*, the *Colorado Riv. and Canon* is decidedly encanyoned; some of its curvings can be attributed to the results of Powell's survey. *Lava Cr.* is labeled on a fork of the unlabeled Cataract Creek, heading as expected on the west side of the San Francisco Peaks but with a Colorado River confluence much too far east; an interesting mix-up. Note, too, that *Red Butte* is shown between the Little Colorado and Cataract confluences, also seriously mispositioned, at least with respect to the Little Colorado confluence. *Bright Angel R.* (Bright Angel Creek, a Powell name) is more probably meant to be Kanab Creek. An unlabeled tributary from the north in western Grand Canyon resembles the **Parashant Wash** interpretation from the Egloffstein map. Diamond Creek does not appear on this map, although "Haulpais [*sic*] Village" is positioned alone, about where one might expect the head of Peach Springs Wash. *Snow Spr.*, another one of the features from Egloffstein's map, is much too close to the canyon. Note as well an imaginary tributary (not labeled) to the Little Colorado coming from the east side of *San Francisco Mt.* ◈


U T A H
RIO COLORADO OF THE WEST.
N E W M E X I C O

CONCLUSION

BARON F. W. VON EGLOFFSTEIN'S "Map No. 2" of the Rio Colorado of the West, depicting the "Big Cañon" region, is a classic of cartographical technique in shaded relief. The physiography it presents has, however, been misunderstood by contemporaries and later observers alike.

Topographer Egloffstein has been criticized for geographical oddities on this map. Most notably, the Little Colorado River was insistently run farther west than it needed to be. This particular element of the map, more than any other, is scorned in the same light of the baron's odd landscape illustrations of the canyons that appear in the Colorado Exploring Expedition's final report in 1861. Such opinions were unfairly extended to the overall artistic expression of the map, unaware that Egloffstein had needed to present a sense for landscapes that he had not seen, surrounded as they were by better known and more accurately mapped terrains.

In mapping the courses of rivers and tributaries, Egloffstein's survey work was on the whole quite close to ground truth. But in threading the Colorado River onto his map directly from the northeast into the central Grand Canyon—to reach his assumed Little Colorado River that came far from the southeast—he might have been misled by the regional notions of preexisting maps. His interpretations of those poorly or unsurveyed landscapes is nonetheless explicable. The limits of distant visual observation that Egloffstein faced during the land expedition were a routine encumbrance of field work, perhaps frustratingly so at the Grand Canyon, that was relieved by occasional vantages from higher elevations where oblique views over a dozen—even scores—of miles were possible. He was a veteran of other surveys in the West and he did come to the Grand Canyon with quite a lot of experience in his methods both in the field and studio.

The unsurveyed Little Colorado River between its lower valley and the Grand Canyon, and the Colorado River between Diamond Creek and Black Canyon, were tied to the surveyed portions of the map by conjectural landscaping. These areas of the map communicated generalized ideas about the lay of the land and the routes that the principal streams should follow across it. More broadly, the map also showed that intuitively there are many encanyoned tributaries, though few of them were actually plotted and their courses only suggested regional slopes.

"Map No. 2" presented feasible courses for the Little Colorado and Colorado Rivers across the unexplored tier south of the Utah–New Mexico (Arizona) boundary, in the process revealing the Grand Canyon. However, it did not positively connect the Colorado to its course in Utah, only suggesting that it approached the canyon from the northeast. He and his fellow explorers instead saw the "Little Colorado River" in what actually is the main Colorado's canyon—after all, it came from the direction toward which the Little Colorado valley was known, to meet a Colorado that was coming from the northeast.

This enabled other cartographers to inventively draw in courses for the Colorado from the confluence of the Grand and Green Rivers, in Utah, to the Grand Canyon. Egloffstein's open receptacles on the north side of his map—his interpreted Colorado River entryway and the limited course of Parashant Wash—were arbitrarily adopted by the cartographic inventors who routed the river in assorted ways through Utah and northern Arizona to arrive in the Grand Canyon through one or the other passage. Were it not for quirky main Colorado courses already on earlier maps allowing Egloffstein a way to imply the river's arrival onto his map from the northeast, Grand Canyon's cartographic history would have been very different.

The more accurate, but still geographically imprecise, course of the Colorado on the 1860 Macomb–Dimmock map that Egloffstein himself engraved in 1864 did not publicly appear in time (in fact, not until 1876) to deter the truly weird portrayals of the Colorado. And the bactrian courses that were devised for the Colorado River's path through the Grand Canyon itself during the late 1860s and early 1870s defy comprehension. One may compare parts of that course to Egloffstein's map, though while elements seem to selectively borrow from it other components were layered on from other surveys that had done a better job—but the end result delivered gross distortions.

All things considered, "Map No. 2" is a *tour de force* of cartography of a monumentally rugged land that had not been before seen by topographers on the ground. Until then, mappers only suggested the courses of rivers, oftentimes quite erratically, based on bad information or contrived with no information. The extent of the impassable terrains may have surprised the expedition when it arrived, defeating them at some of their objectives. Even so, from his notes and measurements Egloffstein managed to reasonably sculpt in the studio a 75,000 square-mile landscape in plaster.

Not all of the baron's plaster sculpturing was meant to be ground truth, though the principal stream courses are generally correct. Egloffstein's presentations of poorly or unsurveyed outlying and interposed portions of their courses, postulating unseen landscapes, and adding from the observations of other expeditions and perhaps from some hearsay, are odd

only from the perspective of our modern vision. If this was a map intended for potential use by military planners—as it well may have been at least at the time of the expedition, with the prospect of a civil war with the Utah government—blank areas would have been strikingly deficient intelligence and a breakdown of the expedition's purpose. The implied topographies of the unsurveyed regions, and the lining-in of the Little Colorado and Colorado rivers onto the Grand Canyon landscape through unsurveyed areas, offered cautiously useful geographic information. Unlike the reckless certainty of stream courses and topographies that some cartographers might express in the absence of data, Egloffstein's sculptured landforms in these poorly seen areas are noticeably subdued. This indefinite filling-in may have been dictated by expedition commander Ives in order to present a more strategically useful map.

No detailed study of "Map No. 2" has ever been done, thus the evidence and deductions presented here are novel and open to reinterpretation. Still, the principal argument stands, that Baron von Egloffstein's unquestionably practical methods of shaded relief allowed him to present a comfortably interpretable landscape of the greater Grand Canyon region—that he did not do as peculiar a job as he has been charged with over the past century or so. His most egregious "offence," that of running the Little Colorado into the middle of the Grand Canyon, is excusable, a reading in the field conspicuously agreed to by equally practiced veterans of exploring expeditions and a geologist—Lt. Ives and Dr. Newberry; perhaps Herr Möllhausen as well. The rest of Egloffstein's interpretations, as has been shown herein, were not disordered inventions but followed contemporary customs in cartography. Such routines were helped along by artistic touches in the "bird's eye" landscape sculpted in plaster before moving along to photography and engraving. What we receive today is a historic map that, from our modern glance, is peculiar, but which upon close examination reveals quite a lot of industry and well-considered study. ◈

REVISITING EGLOFFSTEIN

THE TOPOGRAPHER'S VIEW, 2058

In 2057–2058 the bicentennial of the Ives expedition will appear on the calendar. The memory of this expedition carries with it no especially egregious activities against Native peoples, though some of the condescending cultural remarks about non-White peoples here and there through Lt. J. C. Ives' *Report Upon the Colorado River of the West* can be ascribed to contemporarly biases. Revisiting the expedition two centuries later, with the interest of Native tribes who had been involved at the time, might be a beneficial undertaking for the historical perspectives it can provide from Native and non-Native views alike. One has only to read Ives' "General Report" and Balduin Möllhausen's *Reisen in die Felsengebirge Nord-Amerikas* to reexperience their opinions and to reacknowledge from today's prevailing views the importance that Native Americans had in the expedition. A bicentennial review should engage the peoples who live in the lower Colorado River country and those of the southern plateaus. The expedition is a historic one, as historians and other writers have retold in many venues throughout the twentieth century, continuing to today. In the context of the present study of F. W. von Egloffstein's Grand Canyon map, there are additional opportunities for reflection and inquiry that go beyond the stories from the trail.

As the present volume testifies, Egloffstein's production of the first physiographical map of the Grand Canyon, and likewise J. S. Newberry's first geological map, were efforts that incorporated on-the-spot surveillances. Yet some of those observations were awry, based as they were upon distant diagonal views from the rim of the canyon or from atop high elevation points. Egloffstein emphasized that his map was that of a "bird's eye view," but that view was straight down; in those days that perspective, from such an implied altitude, was impossible to achieve. Most of the observations were slanting, sometimes over scores of miles, which had to be estimated in order to place them, eventually, on paper. This volume has tried to reimagine how those views were translated to Egloffstein's plaster model that preceded the engraved map. *But what did the expedition surveyors really see?* We need to regain their vantage points to understand.

The land expedition's itinerary and the routes that the men and their mules traced across the plateau and into the canyon are reasonably well recorded; they should be rather

easily retraceable. The lands across which they traveled are mainly those of the Hualapai and Havasupai tribes, so any project to reinvestigate—and reoccupy the positions of—the expedition's travels is possible only with their agreement and, hopefully, their participation through contributing their understandings of the landscape and their traditional knowledges of the scenes.

A project to return to the places where the principal landscape surveyors and interpreters stood—Lt. Ives, Dr. Newberry, and Herren Egloffstein and Möllhausen—can resolve some of the issues presented here. But it can also offer ways by which to visit the Grand Canyon again as if for the first time, this time with the benefit of the knowledges of those who have lived and continue to live on these very lands. Of course, such a project will not need to repopulate the entire expedition's roster, nor will it need the hundred and fifty pack and riding mules that had to be fed and watered. It will, however, need the means to get to the places on the rim that the explorers had ridden and walked to, often with Native American guides, now alongside modern day Native guides.

The published journals of the expedition take note of the accompaniment of certain Native individuals on sojourns from camp or during the column's march toward the next campsite. It is noted as well that the surveyors were assured by those guides of the close placements and directions of some of the locations they sought, such as the confluence of Cataract Creek with the river. But what else might have those Native guides offered? Perhaps modern guides can help understand questions like that. To accommodate such inquiries we need to be on the spot again, where we might hope to witness what *can* be seen at great distances, and interpret how some of the confused elements of Egloffstein's map came to be.

The publication of *A Great Misunderstanding* may be the proper place to encourage a field review of Egloffstein's "Map No. 2." This can be done at any time, of course, but it seems that commemorative time frames, like that of the Ives bicentennial, tend to more easily inspire engagement. A part of that commemoration can be a new narration for how this map came to be, told on the ground by historians and cartographers, naturally, but more critically alongside Native knowledge keepers. *Viewing* the canyon is not the same as *seeing* the canyon, yet at the present time all that we have in Egloffstein's "Map No. 2" are the views. ◈

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Spamer, Earle E. (comp., ed.). 2022. *"My God, there it is!" The World Encounters the Grand Canyon, 1540–1926* (Raven's Perch Media, https://ravensperch.org/wp-content/uploads/2022/10/ENCOUNTERS_PD_1540-1926.pdf [17 MB, 902 pp.]).

Spamer, Earle E. 2023. *Art of the Grand Canyon: An Introduction and Annotated Bibliography* (Raven's Perch Media, 2023, https://ravensperch.org/wp-content/uploads/2023/05/Artwork.pdf [21 MB, 356 pp.]).

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Wheat, Carl L. 1960. *Mapping the Transmississippi West, Volume Four, From the Pacific Railroad Surveys to the Onset of the Civil War, 1955–1860* (The Institute of Historical Cartography, San Francisco).

Wheeler, George M. No date. *Photographs showing landscapes, geological and other features, of portions of the western territory of the United States, obtained in connection with Geographical and Geological Explorations and Surveys West of the 100th Meridian : season of 1871.* [No imprint], [Caption and seal] U.S. War Department, U.S. Army, Corps of Engineers, [U.S. Geographical and Geological Survey West of the 100th Meridian, Washington], [albumen prints, hand-assembled on heavy stock, in folio].

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Cartobibliography of Contemporary Maps Used for Detail Images in this Publication

List is arranged chronologically by year. Unsequential variations in figure numbers locating these maps are due to their use in the different thematically arranged chapters of this herein. In the PDF publication the figure numbers are hyperlinks. (Maps from recent years are listed in the Bibliography, *above*.)

1850 James Reynolds, James. **"Geological Map of the World."** ("Drawn & Engraved by John Emslie.") In: *Introduction to natural philosophy, comprising a popular acount of the properties of bodies; mechanical powers; motion and machinery. The sciences of hydrostatics; hydraulics; pneumatics; acoustics; optics; electricity; magnetism; and chemistry. A companion to Reynolds's series of popular diagrams of natural philosophy, comprising two hundred and fifty illustrations.* (James Reynolds, London). **.....FIGURE 41g**

1851 Richard H. Kern. "**Map of the Territory of New Mexico** compiled by Bvt. 2nd Lt. Jno. G. Parke, U.S.T.E. assisted by Mr. Richard H. Kern. by order of Bvt. Col. Jno. Munroe. U.S.A. comdg. 9th Mil. Dept, drawn by R. H. Kern. Santa Fé, N.M. 1851. Constructed under general orders from Col. J. J. Abert, Chief of Topogl. Engrs." (J. and D. Major, New York) ..... **FIGURE 52**

1854 Henry Lange. *Atlas von Nord-Amerika* ['Atlas of North America'] (Verlag von George Westermann, Braunschweig). [Details from two maps: "**Nord Amerika**" ['North America'] (Blatt I); "**Oregon, Californien, Utah, Neu Mexico, etc.**" ['Oregon, California, Utah, New Mexico, etc.'] (Blatt XIII).] ..... **FIGURE 53**

1856 J. H. Young. "**A New Map of the United States of America by J. H. Young**. Philadelphia Published by Charles Desilver 253 Market St." In: *Mitchell's New Traveller's Guide Through the United States and Canadas . . .* (Charles Desilver, Philadelphia) ..... **FIGURE 54**

1858 Henry Lange. "**Karte zu Balduin Möllhausen's Reise vom Mississippi nach der Küste der Südsee im Jahre 1853-1854.** Entworfen und gezeichnet von Dr. Henry Lange." *In:* Balduin Möllhausen, *Tagebuch einer Reise vom Mississippi nach den Küsten der Südsee* (Hermann Mendelssohn, Leipzig).

['Map of Balduin Möllhausen's journey from the Mississippi to the coast of the South Sea [Pacific Ocean] in 1853-1854. Designed and drawn by Dr. Henry Lange." *In:* Balduin Möllhausen, Diary of a Journey from the Mississippi to the Coast of the South Sea']

..... **FIGURE 55**

1858 F. W. von Egloffstein. "**Map No. 1. Rio Colorado of the West**, Explored by 1st. Lieut. Joseph C. Ives, Topl. Engrs. under the direction of the Office of Explorations and Surveys, A. A. Humphreys, Capt. Topl. Engrs. in charge, by order of Hon. John B. Floyd, Secretary of War. 1858. drawn by Frhr. F. W. v. Egloffstein. Topographer to the Expedition." *In* Joseph C. Ives, *Report Upon the Colorado River of the West, Explored in 1857 and 1858 by Lieutenant Joseph C. Ives, Corps of Topographical Engineers, Under*

the Direction of the Office of Explorations and Surveys, A. A. Humphreys, Captain Topographical Engineers, in Charge. By order of the Secretary of War" (Government Printing Office, Washington, **1861**; U.S. 30th Congress, 1st Session, House Executive Document 90 [concurrently produced as a scarcer unnumbered Senate Executive Document]) ..... **FIGURES 11a–e, 16**

1858 F. W. von Egloffstein. "**Map No. 2. Rio Colorado of the West**, Explored by 1st. Lieut. Joseph C. Ives, Topl. Engrs. under the direction of the Office of Explorations and Surveys, A. A. Humphreys, Capt. Topl. Engrs. in charge, by order of Hon. John B. Floyd, Secretary of War. 1858. drawn by Frhr. F. W. v. Egloffstein. Topographer to the Expedition." *In* Joseph C. Ives, *Report Upon the Colorado River of the West, Explored in 1857 and 1858 by Lieutenant Joseph C. Ives, Corps of Topographical Engineers, Under the Direction of the Office of Explorations and Surveys, A. A. Humphreys, Captain Topographical Engineers, in Charge. By order of the Secretary of War* (Government Printing Office, Washington, **1861**; U.S. 30th Congress, 1st Session, House Executive Document 90 [concurrently produced as a scarcer unnumbered Senate Executive Document]) ..... **FIGURES 10, 18; and details throughout**

1859 "**Sketch of the Different Roads Embraced in the Itineraries."** *In:* Randolph B. Marcy, *The Prairie Traveler. A Hand-Book for Overland Expeditions. With maps, illustrations, and itineraries of the principal routes between the Mississippi and the Pacific* (Harper and Brothers, New York) ..... **FIGURE 56**

1860 P. Bineteau. "**Map Drawn to illustrate the travels & from the Documents of the Abbe Domenech** showing the actual situation of the Indian Tribes of North America and the road described by the author[.] P. Bineteau geographer del 1860." *In:* Abbé Em. Domenech [Emmanuel Henri Dieudonne Domenech], *Seven Years' Residence in the Great Deserts of North America* (Longman, Green, Longman, and Roberts, London, **1860**) ..... **FIGURE 57**

1861 J. S. Newberry. "**Geological Map No. 2** : prepared by J. S. Newberry M.D. geologist of the expedition." *In*: Joseph C. Ives, *Report Upon the Colorado River of the West, Explored in 1857 and 1858 by Lieutenant Joseph C. Ives, Corps of Topographical Engineers, Under the Direction of the Office of Explorations and Surveys, A. A. Humphreys, Captain Topographical Engineers, in Charge. By order of the Secretary of War*" (Government Printing Office, Washington, **1861**; U.S. 30th Congress, 1st Session, Senate Executive Document [unnumbered]). [The "Geological Report" is separately dated **1861**. The geological map uses Egloffstein's "Map No. 2" as a base. The geological maps accompany only the Senate variant of Ives' *Report*.] ..... **FIGURE 41**

[Detail of "Geological Map No. 2"] **Decisive, though notional, geological boundary along the supposed "Little Colorado River," eastern Grand Canyon area** ..... **FIGURE 41a**

[Detail of "Geological Map No. 2"] **Detail of the area around the Grand Canyon that was most closely examined by geologist Newberry** ..... **FIGURE 41d**

[Detail of "Geological Map No. 2"] **Detail of the Painted Desert–San Francisco Mountain–Colorado Plateau area, illustrating the four principal time-stratigraphic geologic units used on "Geological Map No. 2."** ..... **FIGURE 41e**

1861 J. S. Newberry. **"Geological Map No. 1** : prepared by J. S. Newberry M.D. geologist of the expedition." *In*: Joseph C. Ives, *Report Upon the Colorado River of the West, Explored in 1857 and 1858*

by Lieutenant Joseph C. Ives, Corps of Topographical Engineers, Under the Direction of the Office of Explorations and Surveys, A. A. Humphreys, Captain Topographical Engineers, in Charge. By order of the Secretary of War" (Government Printing Office, Washington, **1861**; U.S. 30th Congress, 1st Session, Senate Executive Document [unnumbered]). [The "Geological Report" is separately dated **1861**. The geological map uses Egloffstein's "Map No. 2" as a base. The geological maps accompany only the Senate variant of Ives' *Report*.] ..... **FIGURE 41i**

1864 J. N. Macomb and C. H. Dimmock. "**Map of Explorations and Surveys in New Mexico and Utah** made under the direction of the Secretary of War by Capt. J. N. Macomb Topl. Engrs. assisted by C. H. Dimmock, C. Engr. [Civil Engineer] 1860." (Engraver's credit on map: "Geographical Institute, Baron F. W. von Egloffstein, No. 164 Broadway, N. York. 1864.") [This map was published, greatly delayed, with J. N. Macomb, *Report of the Exploring Expedition from Santa Fé, New Mexico, to the Junction of the Grand and Green Rivers of the Great Colorado of the West, in 1859, Under the Command of Capt. J. N. Macomb, Corps of Topographical Engineers (now Colonel of Engineers)* (Government Printing Office, Washington, **1876**) ..... **FIGURE 58**

1865 G. Woolworth Colton. "**Colton's Map of California, Nevada, Utah, Colorado, Arizona & New Mexico.** Published by J.H. Colton 172 William St. New York." In: *Colton's General Atlas, containing one hundred and eighty steel plate maps and plans, on one hundred and eight imperial folio sheets, drawn by G. Woolworth Colton* (J. H. Colton Co., New York, and Bacon and Co., London) ..... **FIGURE 63**

1865? "**Hartley's Map of Arizona** from Official Documents. Office 32 Pine St. N.Y." [No imprint.] ..... **FIGURE 64**

1865 "**Lloyd's Topographical Railway Map of North America, or the United States Continent in 1900** J.T. Lloyd, Publisher {New York 23 Cortland St. {London, 83 Fleet Street **1868**." ("Entered according to Act of Congress in the Year **1865** by J. T. Lloyd, in the Clerks Office of the District Court of the U. S. for the Southern District of New York.") [See legend for explanation of "1900".] ..... **FIGURE 65**

1865 J. H. Goldthwaite. "**Map of the Territories & Pacific States** to accompany 'Across the Continent' by Samuel Bowles." *In:* Samuel Bowles, *Across the Continent: A summer's journey to the Rocky Mountains, the Mormons, and the Pacific States, with Speaker Colfax. By Samuel Bowles, Editor of The Springfield (Mass.) Republican* (Samuel Bowles and Co., Springfield, Massachusetts, and Hurd and Houghton, New York) ..... **FIGURE 66**

1866 "**New Map of the U.S. Territories and Pacific States** Published by H. H. Lloyd and Co. 21 John St. New York. 1866." ..... **FIGURE 67**

1867 "**Old Territory and Military Department of New Mexico** compiled in the Bureau of Topogl. Engrs of the War Dept. chiefly for military purposes under the authority of the Secretary of War 1859 Partially revised and corrected to 1867." ..... **FIGURE 68**

1867 "War Department Engineer Bureau **Map of the Territory of the United States from the Mississippi River to the Pacific Ocean**: Originally prepared to accompany the Reports of the Explorations for a Pacific Railroad Route; Made in accordance with the 10th & 11th sections of the Army Appropriation, Act of March 3rd 1853. Compiled from authorized explorations and other reliable data by Lieut. G. K. Warren, Top'l. Eng'rs. In the Office of Pacific R.R. Surveys, War Dept. under

the direction of B'v't. Maj. W. H. Emory Top'l. Eng'rs. in 1854. Capt. A. A. Humphreys, Top'l. Eng'rs. in 1854-1858. And partly recompiled and redrawn under the direction of the Engineer Bureau in 1865-66-67." ("Engraved on stone by Julius Bien, New York.") ..... **FIGURE 69**

1868 "Head Quarters Corps of Engineers. War Department. **Territory of the United States from the Mississippi River to the Pacific Ocean**: Originally prepared to accompany the Reports of the explorations for a Pacific Railroad Route; Made in accordance with the 10th and 11th sections of the Army Appropriation Act of March 3rd 1853; Compiled from authorized explorations and other reliable data by Lieut. G. K. Warren, Top'l. Eng'rs, In the Office of Pacific R.R. Surveys, War Dept. under the direction of Bvt. Maj. W. H. Emory, Topl. Eng'rs, in 1854. Capt. A. A. Humphreys, Top'l. Eng'rs. in 1854-1858. Recompiled and redrawn under the direction of the Chief of Corps of Engineers by Edward Freyhold 1865-66-67-68." ("Engraved & printed by Julius Bien, N.Y.") ..... **FIGURE 70**

1868 "**Map of the Route of the Southern Continental R.R.** with connections from Kansas City Mo.[,] Ft. Smith Ark. and Shreveport La. Giving a general View of the Recent Surveys of the Kansas Pacific Railway Co[.], across the Continent Made in 1867 & 1868. under the direction of Gen. Wm. J. Palmer. On the Routes of the 32nd and 35th Parallels." [First state.] In: *Report of Surveys Across the Continent, in 1867-'68 , on the thirty-fifth and thirty-second parallels, for a route extending the Kansas Pacific Railway to the Pacific Ocean at San Francisco and San Diego. By Gen. Wm. J. Palmer. December 1st, 1868.* ("J. F. Gedney Lith, Washington. D.C.") ..... **FIGURE 71**

1868 "**California, Oregon, Idaho, Utah, Nevada, Arizona and Washington.**" In*: Mitchell's new general atlas : containing maps of the various countries of the world, plans of cities, etc., embraced in sixty-three quarto maps, forming a series of one hundred maps and plans, together with valuable statistical tables* (S. Augustus Mitchell, Jr., Philadelphia), Map XIX ..... **FIGURE 77**

1869 "Office of the Chief of Engineers War Department **Military Map of the United States** compiled and drawn by E. Freyhold 1869." ("Engraved & printed by Julius Bien, N.Y.") ..... **FIGURE 72**

1871 "Bancroft's, **Map of California, Nevada, Utah and Arizona**, Published By A. L. Bancroft, & Compy. Booksellers & Stationers San Francisco Cal. 1871." ("Engraved & printed by Julius Bien, N.Y.") ..... **FIGURE 73**

1873 "**Colton's New Mexico and Arizona** Published by G. W. and C. B. Colton & Co. No. 172 William St. New York." ..... **FIGURE 78**

1873 "**Colton's California, Nevada, Utah, Colorado, Arizona & New Mexico.** Published by G.W. and C.B. Colton & Co., No. 172 William St. New York. 1873." ..... **FIGURE 79**

1873 *Gray's Atlas of the United States, with general maps of the world* (Stedman, Brown and Lyon, Philadelphia). [Details from two maps: "**Gray's Atlas Map of the United States of America 1873**." and "**Gray's Atlas Map New Mexico and Arizona**." ..... **FIGURES 80, 81**

1875 "**Watson's new county and railroad map of the Pacific States and Territories.** Published by Gaylord Watson, 16 Beekman Street, N.Y. 1875." In: *Watson's new commercial county and railroad atlas of the United States and Dominion of Canada. Compiled from the latest official sources* (Perry and Spaulding, Boston) ..... **FIGURE 82**

1875 **"Carte géologique de la terre par Jules Marcou. Construite par J. M. Ziegler. / Geological map of the world by Jules Marcou. Constructed by J. M. Ziegler."** Second edition. J. Wurster & Cie. Editeurs, Zurich; Edward Stanford, London; F. Savy, Paris; Ulrico Hoepli, Milano, Napoli, Pisa), 8 sheets with accompanying text. [In French and English.] [Also various later reproductions in reduced format on one sheet under other imprints.] ..... **FIGURE 41h**

1876 "U.S. Geographical Surveys West of the 100th Meridian. **Parts of Northern and North Western Arizona and Southern Utah**. Atlas Sheet No. 67. Expeditions of 1871, 1872 and 1873, Under the Command of 1st Lieut. Geo. M. Wheeler, Corps of Engineers, U.S. Army." In: *Geological atlas projected to illustrate geographical explorations and surveys west of the 100th meridian of longitude, under the command of First Lieut. Geo. M. Wheeler* (New York, 1876), scale 1:506,880. "The topography south of the Colorado River, between Longitude 112° and 113° W from Greenwich has been taken principally from the maps of the Colorado River Exploring Expedition under Lt. Ives, Top'l. Eng'rs. in order that the entire sheet might be published without delay." ..... **FIGURES 74, 74a**

1878 "Department of the Interior[,] U.S. Geographical and Geological Survey of the Rocky Mountain Region[,] J. W. Powell, in charge. **Map of the United States exhibiting the grants of lands made by the general government to aid in the construction of railroads and wagon roads**. 1878[.] For explanation see chapter on 'Land Grants in aid of Internal Improvements'[.] (The base chart was engraved for the Statistical Atlas of the United States.)" *In:* J. W. Powell, Report on the lands of the arid region of the United States, with a more detailed account of the lands of Utah (*U.S. 45th Congress, 2nd Session, House Executive Document 73*) ..... **FIGURE 75**

1882 Detail of **"Geological Map of the Western Part of the Plateau Province," C. E. Dutton, *Tertiary History of the Grand Cañon District* (1882), Atlas Sheet II, published scale "1:1,000,000 nearly."** This detail, shown here for comparison, delimits most of the area of interest to the present study of Egloffstein's 1858 "Map No. 2." ..... **FIGURE 41f**

1885 Ant. Vallardi. "**America Settentrionale** 1885 Stabto. dell' Editore Ant. Vallardi Via Sta. Margherita, 9. Milano G. B. Paravia e C. Torino-Roma-Milano-Firenze. 1885."
['North America 1885 Publishing Establishment of Antonio Vallardi']
..... **FIGURE 76**

Credits

Except where indicated otherwise, original materials illustrated herein are in the public domain. Detail images from contemporary maps are digitally enhanced and adapted from Earle E. Spamer, *THE GRAND CANON. Volume 2. Cartobibliography of the Grand Canyon and Lower Colorado River Regions in the United States and Mexico, a Chorographical Study, 16th to 21st Centuries. Third Edition* (Raven's Perch Media, 2025, https://ravensperch.org/wp-content/uploads/2025/01/TGC-Vol2_CARTOBIBLIOGRAPHY_3rd_ed.pdf).

All detail and annotated images of F. W. von Egloffstein's maps prepared for the Ives expedition report were made by the author from digital copies: "Map No. 1" from the American Philosophical Society Library, Philadelphia, and from the David Rumsey Map Collection *(see farther below)*; "Map No. 2" from the Library of Congress, Washington, D.C. (https://www.loc.gov/resource/g4302c.np000062/). Digital overlays were created by the author with the use of Adobe Photoshop. (The American Philosophical Society Library is also acknowledged for the use of its remarkable holdings, where the author had been the Reference Archivist there during 2005–2018.)

Detail from the Samuel Woodhouse Washington diary courtesy of the Archives, Academy of Natural Sciences of Drexel University, Philadelphia. (This institution's library and archives are also acknowledged for the use of their remarkable holdings. The author had been Archivist of what then was the Academy of Natural Sciences of Philadelphia during 2001–2005 and was in collections management and editorial positions there during 1986–2000, preceded by student and volunteer associations 1973–1986.)

The use of Google Maps where so credited follows Google's "Terms of Service" (https://www.google.com/intl/en_us/help/terms_maps/).

Illustrations from Balduin Möllhausen's *Reisen in die Felsengebirge Nord-Americas* are courtesy of The Linda Hall Library of Science, Engineering & Technology through a Creative Commons License (https://catalog.lindahall.org/discovery/delivery/01LINDAHALL_INST:LHL/1286502690005961).

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List of Figures in This Publication

This publication contains a total of 161 illustrations. Most legends listed here are accompanied on their respective pages by more detailed information. In the PDF version of this publication, the chapter and section heads in **bold** in the list below are hyperlinks to those chapters and sections; and figure numbers are also hyperlinks to those figures.

***** Figures denoted by an asterisk are delimited in the graphic index (pp. viii–xi) that locates these selected detail views on Egloffstein's "Map No. 2."

Frontispiece

(top) "An approximation to a bird's eye view . . ."Digital rendering by the author, creating the same oblique perspective of the part of Egloffstein's "Map No. 2" encompassed by the space view below. Stylistic representation only. ***(bottom)*** Astronaut photograph ISS039-E-5258; taken by the Expedition 39 crew of the International Space Station. An outstanding northwestward space view of the eastern Grand Canyon region.

page iv [legend on p. iii; also used for rear cover]

Experiments in shaded relief, then and now—edges encompass approximately the same area. ***(top)*** 1858: Shaded relief "Map No. 2. Rio Colorado of the West," by F. W. von Egloffstein *(detail)*. ***(bottom)*** 1990: "Experimental Digital Shaded-Relief Maps of Arizona," by Kathleen Edwards and R. M. Batson (USGS Miscellaneous Investigations Series Map I-1821), Sheet 2 *(detail)* (compiled by Kathleen Edwards and E. M. Sanchez, 1983–4).

Chapter 1. F. W. von Egloffstein and the Ives Expedition

1 Friedrich Wilhelm von Egloffstein in colonel's uniform, 103rd New York Infantry, *ca.* 1861–1863. [Crop also used for cover and title-page.]

2 "Chimney Peak. J. J. Young, from a sketch by H. B. Mollhausen."

3 Title page and spine of an often-consulted copy of the scarce Senate Executive Document variant of Joseph C. Ives' *Report Upon the Colorado River of the West*, a presentation copy from the expedition geologist, John Strong Newberry.

4 Title-page of Volume 2 of Balduin Möllhausen's *Reisen in die Felsengebirge Nord-Americas* (the undated [1860] Otto Purfürst imprint, published months in advance of Lt. Ives' official *Report*).

5 Panoramic View No. 5, "Big Cañon from Near Hualpais Spring. Drawn by Freihr. F. W. v. Egloffstein."

5a "Big Cañon at Mouth of Diamond River; J. J. Young, from a sketch by F. W. Egloffstein." (General Plate 6 *in* J. C. Ives' "General Report.")

5b The Colorado River corridor as viewed from the river, approaching Diamond Creek. (Author's photo, 15 July 1995)

6 "Der Rio Colorado nahe der Mündung des Diamant-Baches" [The Rio Colorado near the Mouth of Diamond Creek]. Chromolithograph by A. Edelmann (from original artwork by Balduin Möllhausen) of the view *upstream* from below the mouth of Diamond Creek.

7 "Big Cañon; J. J. Young, from a sketch by F. W. Egloffstein." (General Plate 9 *in* J. C. Ives' "General Report.")

8 Panoramic views from Ives' *Report*, drawn by Egloffstein and only reproducing camera obscura sketches, which have been shown by more recent research, documented photographically, to in fact portray scenes in the Black Canyon of the Gunnison River in the state of Colorado. ***(top)*** Panoramic View No. 6, "Big Cañon near Diamond River. Drawn by Freihr. F. W. v. Egloffstein." ***(bottom)*** Panoramic View No. 7, "Big Cañon from Colorado Plateau. Drawn by Freihr. F. W. v. Egloffstein.")

9* Comparison of mapping and shaded relief at two scales, the differences between which clearly demonstrate that there were different plaster models. Illustrated is the "Beales Crossing" area as seen on Map Nos. 1 and 2. (Black Mountains at right.) ***(top)*** "Map No. 2" (the Grand Canyon map), scale 1:760,320, or 12 miles to the inch on the original sheet. ***(bottom)*** "Map No. 1" (lower Colorado map), scale 1:380,160, or 6 miles to the inch on the original sheet.

Chapter 2. The Ives Expedition Maps

10 "Rio Colorado of the West," Map Nos. 1 and 2, by F. W. von Egloffstein, 1858, from J. C. Ives' *Report Upon the Colorado River of the West* (1861).

11a-e "Map No. 1. Rio Colorado of the West." (Figure 11a with four plates in contiguous arrangment with overlays for the course of *Explorer* and reaches not surveyed by Egloffstein. Figures 11b–e, four separate plates on one sheet.)

12 "Black Cañon. F. W. Egloffstein, from a sketch by Lieut. Ives." (General Plate 5 *in* J. C. Ives' "General Report"; *with detail*.)

12a-e Black Cañon reach of the Colorado River as delineated on "Map No. 1" (FIGURE 12a) and "Map No. 2" (FIGURE 12b). Closer details of the Black Cañon reach on "Map No. 1 (FIGURES 12c–e).

13 One-page "Appendix D" from Ives' *Report*. [Facsimile reproduction.]

14 Text box by Egloffstein on the 1860 Four Corners map by J. N. Macomb and C. H. Dimmock (engraved 1864, not published until 1876), from the 1859 expedition to ascertain the location of the confluence of the Green and Grand Rivers.

15 "Castellated sand bluffs, Fortification Rock, Colorado River." Fortification Rock as seen from the Colorado River, photographed by Timothy H. O'Sullivan, 1871. From a glass negative.

16 "Map No. 1" from J. C. Ives' *Report*, by F. W. von Egloffstein. ***(top)*** Title plate. ***(bottom)*** Contiguous arrangement of the four plates, illustrating the course of the Colorado River between the Gulf of California and the "Head of Navigation" near present-day Las Vegas Wash.

17 Detail from the northernmost plate (no. 4) of "Map No. 1." It displays the reach of the Colorado River along which Ives and two men traveled in a skiff, between "Explorers Rock," the boulder where the steamboat *Explorer* was damaged, and "Fortification Rock," a significant geographical feature that was climbed to gain a view of the terrain nearby.

18-18c* Details from "Map No. 2" displaying the big bend area of the Colorado River.

18a Detail from "Map No. 2" displaying the Virgin River confluence area.

18b Very close detail of the end of the mapped course of "Rio Virgen" and the lack of a certain confluence with the Colorado River, with the presumed Las Vegas Wash near "Fortification Rock."

18c Annotated close-up view of Figure 18b, Egloffstein's Virgin River confluence area, with his "Rio Virgen" in *purple* (the dotted purple line is his course for the tributary Muddy River) and his mapped unlabeled course of what is Las Vegas Wash in *green*. USGS Streamer information for Colorado and Virgin Rivers is superposed.

Chapter 3. "Map No. 2": Reexamining a Classic

19 "Map No. 2. Rio Colorado of the West, Explored by 1st. Lieut. Joseph C. Ives, Topl. Engrs."

20a Egloffstein's "Map No. 2" ***(top)*** compared to the same area on present-day Google Maps ***(bottom)***.

20b Egloffstein's "Map No. 2" ***(top)*** compared to the satellite view of the same area ***(bottom)***.

21* The greatest area of dendrification on "Map No. 2" is shown in the region where surveys were made over long, oblique vistas or could not be made at all *(eastern half of this detail)*.

3.1 Making the Map: Details

22* Hachuring and very fine criss-crossed ruling are seen side-by-side.

23* Very close detail of hachuring on the southeastern slopes of San Francisco Mountain.

24 Very close detail showing parallel ruling as the result of using the very-fine–ruled glass screen, here showing the delicate headwater tendrils of shallowly excavated stream courses.

25* Systems of contrived dendritic tributaries probably scored in the original plaster model.

26* Very close detail of tiny strands of tributaries. [Also a probably mistaken label, "CASCADE".]

26a* [The correctly labeled "CASCADE" identifying the location of the Grand Falls on the Little Colorado River.]

27 Close details from the Macomb expedition map engraved by Egloffstein in 1864 (published 1876), displaying the more expedient technique of very fine ruling that

supplanted the usual hachuring. The technique had improved since his 1858 maps from the Ives expedition.

3.2 Principal Stream Courses

27A Principal stream courses on "Map No. 2." Stream names in [square brackets] were not labeled by Egloffstein.

28 U.S. Geological Survey Streamer base map ***(top)*** with stream courses superposed on Egloffstein's "Map No. 2" ***(bottom)***.

28a* Details of Figure 28 focus on the Grand Canyon itself, the eastern part of which is surely the most contentious part of Egloffstein's map.

29* The greatest topographical deviation between Egloffstein's and modern maps is arrestingly illustrated by these same-area views shown to the same scale ***(Google Maps satellite view at right)***.

30* Very close detail of the prominent north–south shaded relief area that coincidentally correlates to the true course of the Colorado River's approach to the true Little Colorado confluence; in an area that Egloffstein had not been able to survey during the Ives expedition. This area measures more than 20 miles in length on the map.

31* Detail of the USGS Streamer overlay for the western Grand Canyon, Great Bend, and northern portion of the lower Colorado River—between Parashant Wash/Diamond Creek and Explorers Rock. Anchor points for this map are Las Vegas and Diamond Creek.

32* USGS Streamer river and tributary courses superposed on Egloffstein's map of the Grand Canyon.

33* Comparison of Egloffstein's eastern Grand Canyon region with USGS Streamer stream courses superposed. [Annotated.]

34* Area of greatest discrepancies between Egloffstein's map and true stream courses. [USGS Streamer courses superposed.]

3.3 Parashant Wash and Cataract Creek

35* Comparison of the Diamond Creek–Cataract Creek area, embracing Parashant Wash and Cataract Creek. USGS Streamer map ***(top)*** and Egloffstein's "Map No. 2" ***(bottom)***.

36* This bulbous topographical peculiarity is mapped at the confluence of Egloffstein's Parashant Wash (from the northwest and not labeled by him) with the Colorado River (from the northeast, also not labeled).

37* Egloffstein map overlaid with true stream courses from USGS Streamer, with attention to the tributaries Cataract Creek and Parashant Wash. [Annotated.]

38* The Cataract Creek area on the Egloffstein map is superposed with USGS Streamer stream courses.

3.4 Upper Reach of the Colorado River

39* Comparing Egloffstein's upper reach of the Colorado River. [Modern physiography compared to Egloffstein's map.]

40 Egloffstein's courses of streamways from the north implied to join with the assertively mapped topography of "Map No. 2." ***(Left)*** Projected Parashant Wash course; ***(right)*** projected upper Colorado River course.

3.5 Putting "Map No. 2" to Work: The First Grand Canyon Geological Map

41 Cropped view of "Geological Map No. 2 : prepared by J. S. Newberry M.D. geologist of the expedition."

41a Decisive, though notional, geological boundary along the supposed "Little Colorado River," eastern Grand Canyon area.

41b "Section of the Cañon of the Colorado on High Mesa West of the Little Colorado." J. S. Newberry's stratigraphic section for the western Grand Canyon, from the plateau surface to the Colorado River at the mouth of Diamond Creek.

41c "Cross-section of the Colorado Canyons at the mouth of Diamond Creek taken by Dr. Newberry, the geologist of the Colorado expedition." ***(top)*** Balduin Möllhausen's stratigraphic section in endnote no. 6, p. 395 in Vol. 2 of *Reisen in die Felsengebirge Nord-Amerikas*, published (in German) months in advance of Newberry's "Geological Report" in Ives' 1861 report of the expedition. ***(bottom)*** Translation of Möllhausen's table from Spamer, *Balduin Möllhausen's Grand Canyon*, p. 76.

41d Detail of the area around the Grand Canyon that was most closely examined by geologist Newberry.

41e Detail of the Painted Desert–San Francisco Mountain–Colorado Plateau area, illustrating the four principal time-stratigraphic geologic units used on "Geological Map No. 2."

41f Detail of "Geological Map of the Western Part of the Plateau Province," C. E. Dutton, *Tertiary History of the Grand Cañon District* (1882), Atlas Sheet II, published scale "1:1,000,000 nearly." This detail, shown here for comparison, delimits most of the area of interest to the present study of Egloffstein's 1858 "Map No. 2."

41g Close detail from "Geological Map of the World." ("Drawn & Engraved by John Emslie"). In: *Introduction to natural philosophy, comprising a popular acount of the properties of bodies; mechanical powers; motion and machinery* (James Reynolds, London, 1850).

41h Close detail from "Carte géologique de la terre par Jules Marcou. Construite par J. M. Ziegler. / Geological map of the world by Jules Marcou Constructed by J. M. Ziegler. 2nd edition. (J. Wurster & Cie. Editeurs, Zurich; Edward Stanford, London; F. Savy, Paris; Ulrico Hoepli, Milano, Napoli, Pisa, 1875).

41i "Geological Map No. 1 : prepared by J. S. Newberry M.D. geologist of the expedition."

Chapter 4. Vantages: Egloffstein in the Field

42* Areas of clear vantages on F. W. von Egloffstein's route of travel across the northern part of the lower Colorado River and across the northern part of New Mexico Territory to Fort Defiance.

43* Expedition route *(dashed line hidden in the fine shaded-relief ruling of the depths of the side canyon)* into Hualapai Canyon, a tributary to Cataract Creek.

43a Google Maps satellite view of the vicinity of Egloffstein's adventure in Havasu Canyon.

44* Excursion en route to Camp 74.

45* "Upper Cataract Creek, near Big Cañon. J. J. Young, from a sketch by F. W. Egloffstein." (Ives, General Report Plate VIII.)

46 Excursion from the "Forest Lagoons" (Camp 74).

47 What Egloffstein missed. "View Looking West, from Camp 16" (Plate 13 in L. Sitgreaves, *Report of an Expedition Down the Zuñi and Colorado Rivers* (U.S. 32nd Congress, 2nd Session, Senate Executive Document 59), 1853. (With detail at top, added here.)

47a [Detail from the diary of Samuel Washington Woodhouse, 11 October 1851, upon viewing the North Rim from an elevation on the San Francisco Peaks.]

48* The exploratory routes of the Ives expedition on the plateau between Peach Springs Wash and Cataract Creek.

48a Detail from "Physiographic Rim of the Grand Canyon, Arizona," by George H. Billingsley and Haydee M. Hampton (*U.S. Geological Survey, Open-File Report 99-30*, 1999, scale 1:250,000, contour intervals 25 and 50 m).

49* The "Colorado Plateau" area between the San Francisco Peaks and the Grand Canyon.

Chapter 5. Influences

50* Egloffstein's courses of streamways from the north implied to join with the assertively mapped topography of "Map No. 2."

51* ***(top)*** Detailed enlargement of *upper-right corner of* Figure 50, the location on Egloffstein's map where the Colorado River may have been postulated to pass southward from Utah, perhaps influenced by historical geographical reports. This is not to say that the depiction is correctly located, only that he understood the area to be somewhere in the vicinity. ***(bottom)*** Detail from USGS 1:500,000 shaded relief map of "State of Arizona" (1981) showing the general vicinity where the Vermilion and Echo Cliffs converge.

5.1 Egloffstein's Grand Canyon Map Influenced By Earlier Geographies?

52 Detail from "Map of the Territory of New Mexico compiled by Bvt. 2nd Lt. Jno. G. Parke, U.S.T.E. assisted by Mr. Richard H. Kern. by order of Bvt. Col. Jno. Munroe. U.S.A. comdg. 9th Mil. Dept, drawn by R. H. Kern. Santa Fé, N.M. 1851.

Constructed under general orders from Col. J. J. Abert, Chief of Topogl. Engrs." (J. and D. Major, New York).

53 Details from two different maps published in Henry Lange, *Atlas von Nord-Amerika* (Verlag von George Westermann, Braunschweig, 1854). ***(Left)*** "Nord Amerika" (Blatt I). ***(Right)*** "Oregon, Californien, Utah, Neu Mexico, etc." (Blatt XIII).

54 Detail from "A New Map of the United States of America by J. H. Young. Philadelphia Published by Charles Desilver 253 Market St." In: *Mitchell's New Traveller's Guide Through the United States and Canadas . . . .* (Charles Desilver, Philadelphia, 1856).

55 Detail from "Karte zu Balduin Möllhausen's Reise vom Mississippi nach der Küste der Südsee im Jahre 1853-1854. Entworfen und gezeichnet von Dr. Henry Lange." *In:* Balduin Möllhausen, *Tagebuch einer Reise vom Mississippi nach den Küsten der Südsee* (Hermann Mendelssohn, Leipzig, 1858).

56 Detail from "Sketch of the Different Roads Embraced in the Itineraries." *In:* Randolph B. Marcy, *The Prairie Traveler. A Hand-Book for Overland Expeditions. With maps, illustrations, and itineraries of the principal routes between the Mississippi and the Pacific* (Harper and Brothers, New York, 1859).

57 Detail from "Map Drawn to illustrate the travels & from the Documents of the Abbe Domenech showing the actual situation of the Indian Tribes of North America and the road described by the author[.] P. Bineteau geographer del 1860." *In:* Abbé Em. Domenech [Emmanuel Henri Dieudonne Domenech], *Seven Years' Residence in the Great Deserts of North America* (Longman, Green, Longman, and Roberts, London, 1860).

5.2 Egloffstein's Grand Canyon Map Influences Later Geographies

58 Detail from the 1860 Macomb–Dimmock map (engraved by Egloffstein in 1864, published in 1876), showing the course of the Colorado River from the Green–Grand confluence to the "Supposed" confluence of the Little Colorado River.

58a Closer details of the 1860 Macomb–Dimmock map.

58b Close detail from the Macomb–Dimmock map displaying the reach of the Colorado River from the Utah boundary to the "supposed" Little Colorado confluence.

59 Analysis of USGS Streamer river courses superposed on the Macomb–Dimmock map. [Annotated.]

60* Comparison of the lower end of the Little Colorado River valley in Egloffstein's 1858 "Map No. 2" ***(top)*** and as he engraved it in 1864 on the Macomb–Dimmock map ***(bottom)***.

60a Comparative details of four physiographical portrayals of the Little Colorado River gorge between present-day Cameron, Arizona, and the river's confluence with the main Colorado. All figures depict the same reach of the river at varied scales.

61* Original Egloffstein Model (1858). [Streams highlighted.]

62 Principal Variant Styles of the Egloffstein Model. ***(top)*** Parashant Wash Route. ***(bottom)*** Through-flowing Upper Colorado River Route. [Streams highlighted.]

63 Detail from "Colton's Map of California, Nevada, Utah, Colorado, Arizona & New Mexico. Published by J.H. Colton 172 William St. New York." In: *Colton's General Atlas, containing one hundred and eighty steel plate maps and plans, on one hundred and eight imperial folio sheets, drawn by G. Woolworth Colton* (J. H. Colton Co., New York, and Bacon and Co., London, 1865).

63a Detail from the Colton map superposed on the Egloffstein map.

64, 64a Details from "Hartley's map of Arizona from official documents. Office 32 Pine St. N.Y." [No imprint, 1865?]

65, 65a Details from "Lloyd's Topographical Railway Map of North America, or the United States Continent in 1900 J.T. Lloyd, Publisher {New York 23 Cortland St. {London, 83 Fleet Street 1868."

65b Detail of Figure 65a (digitally rotated to align North headings) superposed on Egloffstein's map.

66 Detail from "Map of the Territories & Pacific States to accompany 'Across the Continent' by Samuel Bowles." (map by J. H. Goldthwaite). *In:* Samuel Bowles, *Across the continent: A summer's journey to the Rocky Mountains, the Mormons, and the Pacific States, with Speaker Colfax. By Samuel Bowles, Editor of The Springfield (Mass.) Republican* (Samuel Bowles and Co., Springfield, Massachusetts, and Hurd and Houghton, New York, 1865).

67 Detail from "New Map of the U.S. Territories and Pacific States Published by H. H. Lloyd and Co. 21 John St. New York. 1866."

68 Detail from "Old Territory and Military Department of New Mexico compiled in the Bureau of Topogl. Engrs of the War Dept. chiefly for military purposes under the authority of the Secretary of War 1859 Partially revised and corrected to 1867."

69-69b Details from "War Department Engineer Bureau Map of the Territory of the United States from the Mississippi River to the Pacific Ocean: Originally prepared to accompany the Reports of the Explorations for a Pacific Railroad Route; Made in accordance with the 10th & 11th sections of the Army Appropriation, Act of March 3rd 1853. Compiled from authorized explorations and other reliable data by Lieut. G. K. Warren, Top'l. Eng'rs. In the Office of Pacific R.R. Surveys, War Dept. under the direction of B'v't. Maj. W. H. Emory Top'l. Eng'rs. in 1854. Capt. A. A. Humphreys, Top'l. Eng'rs. in 1854-1858. And partly recompiled and redrawn under the direction of the Engineer Bureau in 1865-66-67." ("Engraved on stone by Julius Bien, New York.")

69a Closer detail of Figure 69. (Digitally realigned to better match the terrains on the adjoining sheets.)

69b Unedited relationship of the two sheets shown in Figures 69 and 69a.

70, 70a Details from "Head Quarters Corps of Engineers. War Department. Territory of the United States from the Mississippi River to the Pacific Ocean: Originally prepared to accompany the Reports of the explorations for a Pacific Railroad Route; Made in accordance with the 10th and 11th sections of the Army Appropriation Act of March 3rd 1853; Compiled from authorized explorations and other reliable data by Lieut. G. K. Warren, Top'l. Eng'rs, In the Office of Pacific R.R. Surveys, War Dept.

under the direction of Bvt. Maj. W. H. Emory, Topl. Eng'rs, in 1854. Capt. A. A. Humphreys, Top'l. Eng'rs. in 1854-1858. Recompiled and redrawn under the direction of the Chief of Corps of Engineers by Edward Freyhold 1865-66-67-68." ("Engraved & printed by Julius Bien, N.Y.") 1868.

70a Closer and enhanced detail from Figure 70.

71, 71a Details from "Map of the Route of the Southern Continental R.R. with connections from Kansas City Mo.[,] Ft. Smith Ark. and Shreveport La. Giving a general View of the Recent Surveys of the Kansas Pacific Railway Co[.], across the Continent Made in 1867 & 1868. under the direction of Gen. Wm. J. Palmer. On the Routes of the 32nd and 35th Parallels." [First state.] *In: Report of Surveys Across the Continent, in 1867-'68 , on the thirty-fifth and thirty-second parallels, for a route extending the Kansas Pacific Railway to the Pacific Ocean at San Francisco and San Diego. By Gen. Wm. J. Palmer. December 1st, 1868.*

72, 72a Details from "Office of the Chief of Engineers War Department Military Map of the United States compiled and drawn by E. Freyhold 1869." ("Engraved & printed by Julius Bien, N.Y.")

72a Detail of Figure 72 superposed on the Egloffstein map.

73 Detail from "Bancroft's, Map of California, Nevada, Utah and Arizona, Published By A. L. Bancroft, & Compy. Booksellers & Stationers San Francisco Cal. 1871." ("Engraved & printed by Julius Bien, N.Y.")

74 "U.S. Geographical Surveys West of the 100th Meridian. Parts of Northern and North Western Arizona and Southern Utah. Atlas Sheet No. 67. Expeditions of 1871, 1872 and 1873, Under the Command of 1st Lieut. Geo. M. Wheeler, Corps of Engineers, U.S. Army." In: *Geological atlas projected to illustrate geographical explorations and surveys west of the 100th meridian of longitude, under the command of First Lieut. Geo. M. Wheeler* (New York, 1876), scale 1:506,880. "The topography south of the Colorado River, between Longitude 112° and 113° W from Greenwich has been taken principally from the maps of the Colorado River Exploring Expedition under Lt. Ives, Top'l. Eng'rs. in order that the entire sheet might be published without delay."

74a [Details compared from Wheeler (1876) and Egloffstein (1858).]

75 Detail from "Department of the Interior[,] U.S. Geographical and Geological Survey of the Rocky Mountain Region[,] J. W. Powell, in charge. Map of the United States exhibiting the grants of lands made by the general government to aid in the construction of railroads and wagon roads. 1878[.] For explanation see chapter on 'Land Grants in aid of Internal Improvements'[.] (The base chart was engraved for the Statistical Atlas of the United States.)" *In:* Powell, J. W., Report on the lands of the arid region of the United States, with a more detailed account of the lands of Utah. *U.S. 45th Congress, 2nd Session, House Executive Document 73*.

76, 76a Details from "America Settentrionale 1885 Stabto. dell' Editore Ant. Vallardi Via Sta. Margherita, 9. Milano G. B. Paravia e C. Torino-Roma-Milano-Firenze. 1885."

5.3 No One's Colorado River: The Bactrian Course Through Grand Canyon

77 Detail from "California, Oregon, Idaho, Utah, Nevada, Arizona and Washington." In*: Mitchell's new general atlas* (S. Augustus Mitchell, Jr., Philadelphia, 1868), Map XIX.

78, 78a Details from "Colton's New Mexico and Arizona Published by G. W. and C. B. Colton & Co. No. 172 William St. New York."

78a Greater detail of Figure 78 and comparison to approximately the same area of Egloffstein's "Map No. 2."

79, 79a Details from "Colton's California, Nevada, Utah, Colorado, Arizona & New Mexico. Published by G.W. and C.B. Colton & Co., No. 172 William St. New York. 1873."

80 Detail from "Gray's Atlas Map of the United States of America 1873." In: *Gray's atlas of the United States, with general maps of the world* (Stedman, Brown and Lyon, Philadelphia).

81 Detail from "Gray's Atlas Map New Mexico and Arizona." In: *Gray's atlas of the United States, with general maps of the world* (Stedman, Brown and Lyon, Philadelphia).

82, 82a Details from "Watson's new county and railroad map of the Pacific States and Territories. Published by Gaylord Watson, 16 Beekman Street, N.Y. 1875." In: *Watson's new commercial county and railroad atlas of the United States and Dominion of Canada. Compiled from the latest official sources* (Perry and Spaulding, Boston).

Appendix II

A1-A22 Twenty-two general detail images of "Map No. 2."

APPENDIX I

Augmented Bibliography of the Ives Expedition from Contemporary Sources [61]

I. Contemporary Reports Regarding the Expedition

II. Contemporary Publications Regarding Egloffstein's Maps

I. Contemporary Reports Regarding the Expedition

Anonymous

1857 Latest intelligence. By telegraph to the N. Y. Daily Times. [. . .] From Washington. Another batch of appointments—Survey of the River Colorado—Decisions of the Secretary of the Treasury, &c. *The New York Times*, (August 28): 1.

> "The Secretary of War has organized an expedition for the exploration and survey of the river Colorado. The command has been assigned to First Lieutenant J. C. Ives, of the Corps of Topographical Engineers, with directions to traverse the entire unexplored region." (ENTIRE ITEM)

1857 [Notice of Ives expedition, in news from Germany.] *In:* Berigten ['Messages'] [SECTION]. *Algemeene Konst- en Letterbode* (Haarlem and 's Gravenhage), 1857(35) (August 29): 274. [In Dutch.]

> "Dr. Heinrich Kiepert heeft in de Berlijnsche dagbladen bekend gemaakt, dat door de regering van de Vereenigde Staten eene expeditie is uitgerust tot het doen van onderzoekingen aan den stroom Rio Colorado, welke onder de leiding van den luitenant-ingenieur Ives van New-York naar San Francisco, vandaar naar de haven van San Diego zal gaan en voorts den genoemden stroom en zijnen zijtak Rio Gila zal onderzoeken en opnemen." (ENTIRE ITEM)
>
> [*transl.* 'Dr. Heinrich Kiepert has announced in the Berlin newspapers that the United States government has equipped an expedition to make investigations on the Rio Colorado, which will go under the direction of Lieutenant Engineer Ives from New York to San Francisco, from there to the port of San Diego and will further investigate and record the said river and its tributary, the Rio Gila.']

[61] Citations are collated and edited from Earle E. Spamer, *THE GRAND CANON: A Worldwide Bibliography of the Grand Canyon and Lower Colorado River Regions of the United States and Mexico, 16th to 21st Centuries. Volume 1, Part B: Bibliography. Fifth Edition.* (Raven's Perch Media, 2025, https://ravensperch.org/wp-content/uploads/2025/01/TGC-Vol-1_Pt-B-BIBLIOGRAPHY__5th-ed.pdf). Newspaper selections are mostly only those from *The New York Times*, in as much as that paper has a devoted section in *THE GRAND CANON*, a comprehensive outgrowth from the first edition (1981) of the Grand Canyon–Lower Colorado River bibliography because it is a nationally-scoped paper with coverage spanning the entire breadth of contemporary Grand Canyon news, and that in earlier days it was accessible only through hardcopies in libraries or through microfilm collections.

1857 Latest intelligence. By telegraph to the N. Y. Daily Times. [. . .] From Washington. The alleged detention of American citizens in Costa Rica—Importance of the Colorado expedition, &c. *The New York Times*, (September 5): 1.

1857 [Notice of Ives expedition.] *In:* Monthly Record of Current Events [SECTION]. *Harper's New Monthly Magazine*, 15(89) (October): 688.

"An expedition to explore the Rio Colorado has just been dispatched, under command of Lieutenant Ives. The country traversed by this river is reported to possess great agricultural and mineral wealth." (ENTIRE NOTE)

1858 Exploration of the Colorado River. *Deseret News*, (January 27): 5 [issue pagination]. (From *Los Angeles Star*, December 5, 1857.)

1858 Miscellaneous items. (p. 2) *The New York Times*, (March 6): 2.

"The information received from Lieut. Ives' Colorado Expedition is highly satisfactory. The steamer taken out proves to be admirably adapted for the exploration of the Colorado." (ENTIRE ITEM)

1858 Miscellaneous news. From the Colorado surveying expedition. *The New York Times*, (March 16): 2.

From a letter to "a gentleman of this city" dated January; in context, apparently a letter from John Strong Newberry.

1858 Latest intelligence. By telegraph to the New-York Times. [. . .] Interesting from Washington. [. . .] (From the reporter for the Associated Press.) *The New York Times*, (April 3): 1.

Note of a letter received from Joseph C. Ives, dated February 11.

1858 News of the day. *The New York Times*, (April 16).

"News has been received from Lieutenant Ive's [*sic*] expedition, sent out to explore the River Colorado. The expedition, it is said, will demonstrate the practicability of navigating this river by light draught steamers, to within one day's march of the great Salt Lake country." (ENTIRE NOTE)

1858 Latest intelligence. By telegraph to the New-York Times. Interesting from Washington. [. . .] (From the reporter for the Associated Press.) *The New York Times*, (April 20): 1.

Note of a letter received from Joseph C. Ives, dated February 19. Square brackets are part of title.]

1858 Progress of the United States survey of the Colorado. *The New York Times*, (May 14): 2.

Excerpt from a letter from Joseph C. Ives, dated March 14.

1858 Lieut. Ives' expedition. *Deseret News*, (June 9): 3 [issue pagination]. (From the *San Francisco Bulletin*, March 14).

1858 Bursting of Lieut. Ives' expedition. *Deseret News*, (June 9): 3 [issue pagination]. [From an undated clipping from the *San Diego Herald*.]

The Ives expedition, supposedly in the steamer *Jessup* [*sic*], turned back by hostile Indians; and note of the "iron steamer" sunk in the river. Also the sinking of the *General Jesup* above Yuma.

1858 Latest by telegraph. From Washington. Arrival of Colonel Kane—Governor Cumming's Dispatches. Intended resignation of Minister Reed—Success of the Colorado Expedition—The Overland California Mail. *The New York Times*, (June 21): 1.

"A report has been received by the War Department from Lieutenant Ives, setting forth the entire success of his exploration so far as he has gone. The navigation of the Colorado is entirely safe for large steamers. The health of his men is good." (ENTIRE ITEM)

1858 Latest by telegraph. Important from Washington. [. . .] First news from the Colorado expedition—Lieut. Ives' report. *The New York Times*, (June 24): 5.

1858 Die Erforschung des obern Colorado [*transl.* 'The exploration of the upper Colorado']. *Das Ausland*, 31(28) (July 9): 669-670. [In German.]

1858 A brief history of Lieut. Ives' exploration of the Colorado. *Deseret News*, (July 21): 2 [issue pagination]. (From *Alta Californian*, May 20.)

1858 The Colorado expedition. *The New York Times*, (August 4): 3.

Signed "Randolph." Filed from Lawrence, Kansas, July 21. Obviously from an expedition member en route to the East after the expedition dispersed at Fort Defiance.

1858 [Balduin Möllhausen.] *In:* Mannigfaltigkeiten [*transl.* 'Manifold'] [SECTION]. *Erheiterungen* (Beiblatt zur „Aschaffenburger Zeitung") (Aschaffenburg, Germany), 1858(216) (September 10): 863. [In German.]

Note of Möllhausen and the Ives expedition, with mention of travel to the mouth of "Big Canon".

1858 Colorado Exploring Expedition. Preliminary report of Lieut. Ives. *The New York Times*, (December 27): 3.

Abridged but mostly complete text of Ives's preliminary report in U.S. Army year-end summary reports.

1858 Der Reisende Möllhausen [*transl.* 'The Traveler Möllhausen']. *In:* Aus allen Reichen ['From All Realms'] [SECTION]. *Aus der Fremde!* (Wochenschrift für Natur- und Menschenkunde der autzereuropäischen Welt) (Leipzig), 1858(38): 304. [In German.]

Note of Möllhausen and the Ives expedition, with mention of travel to the mouth of "Big Canon".

1859 [Notice of Lt. J. C. Ives' preliminary report on the Colorado River expedition.] *In:* Miscellaneous Intelligence [SECTION]. *American Journal of Science and Arts*, Series 2, 27(80) (March): 304.

Notice of a separate from A. A. Humphreys' annual report: "Lieut. J. C. Ives: Colorado Exploring Expedition, Preliminary Report to Captain A. A. Humphreys, Topograph. Engineers. 12 pp. 8vo." (ENTIRE NOTE)

1859 Balduin Möllhausen, über den Rio Colorado des westens. (Aus der Zeitschrift für Erdkunde.) [*transl.* 'Balduin Möllhausen, on the Rio Colorado of the West. (From the *Zeitschrift für Erdkunde*.)'] *Das Ausland*, 32(10) (March 5): 238-240. [In German.]

Notice of the item by Möllhausen in *Zeitschrift für Allgemeine Erdkunde* (1858).

1859 Capt. Humphreys's report on the progress of U.S. explorations and surveys [ABSTRACT]. *In:* Geographical Notices [SECTION]. *American Journal of Science and Arts*, Series 2, 27(81) (May): 381.

Includes: "The field work of the exploration of the Rio Colorado of the West has been completed, and the report and maps are now in preparation. The river as ascended by steamboat to a point nearly 500 miles from its mouth (lat. 36° 06'), beyond which it was impracticable to proceed in boats. The ascent occupied about 70 days, but is said to be practicable in ten or twenty days by steamboats of suitable construction and two feet draft. The head of navigation is 220 miles from the first Mormon settlement in the Great Lake Basin [*sic*], and 500 from the Great Salt Lake." (ENTIRE NOTE) [*Refers to*: Humphreys, A. A., Report on explorations and surveys. *U.S. 35th Congress, 2nd Session, Senate Executive Document 1, Serial 975*, pp. 608-619 (1858), which includes report on the Colorado River by Joseph C. Ives.]

1859 The far West. From the Colorado River to Utah. *The Friend* (Philadelphia), 32(45) ("Seventh-day, Seventh month 16, 1859" [Saturday, July 16]): 357.

Written in the first person but without by-line, "For 'The Friend.'" Seems to be an excerpt from Joseph C. Ives' preliminary report on the exploration of the Colorado River.

1859 Exploration du Colorado par le lieutenant américain Yves [*sic*], du corps des ingénieurs topographes [*transl.* 'Exploration of the Colorado by American Lieutenant Yves, of the Corps of Topographical Engineers']. *In:* Mélanges et Nouvelles Géographiques ['Geographical Mixes and News'] [SECTION]. *Nouvelles Annales des Voyages, de la Géographie, de l'Histoire et de l'Archéologie* (Paris), [Series 6], Année 1859, Tome Premier, pp. 227-234. [In French.]

Regarding Joseph C. Ives' explorations of the lower Colorado River only.

1861 Report of the Council. *Royal Geographical Society of London, Journal*, 31: v-xii.

See in "Map Rooms", p. vi, notice of receipt of "Rio Colorado of the West, by J. C. Ives".]

1861 Accessions [to the Library and Map Rooms]. *Royal Geographical Society of London, Proceedings*, 5(3): 112-113.

See p. 113, "Map of the Rio Colorado of the West".]

1861 Accessions to the library and map-rooms, to May, 1861. *Royal Geographical Society of London, Journal*, 31: lxvi-cii.

See p. xcvii, "Rio Colorado of the West. Explored by Lieut. J. C. Ives, Top. Engrs.", received from Secretary of War, Washington.]

1861 Kunden aus der Ferne. I. Balduin Möllhausen. [*transl.* 'Customers from afar. I. Balduin Möllhausen.'] *Unterhaltungen am häuslichen Herd* (Leipzig), Series 3, 1(3): 54-55. [In German.]

Part of a serialized article regarding the Colorado Exploring Expedition. (Note: Part II, "Möllhausen und Louis, der Neger" ['Möllhausen and Louis, the Negro'], 1(4): 75-76, pertains to the Beale expedition.)

1861 Kunden aus der Ferne. III. Möllhausen und die Töchter der Wildniß. [*transl.* 'Customers from afar. III. Möllhausen and the daughters of the wilderness.'] *Unterhaltungen am häuslichen Herd* (Leipzig), Series 3, 1(5): 93-95. [In German.]

1862 Kapitän Marcy und Balduin Möllhausen [*transl.* 'Captain Marcy and Balduin Möllhausen']. *In:* Gelehrten-Kalender ['Scholars' Calendar'] [SECTION]. *Illustrirter Kalender für 1861* (Jahrbuch der Ereignisse, Bestrebungen und Fortschritte im Völkerleben und im Gebiete der Wissenschaften, Künste und Gewerbe) (Leipzig), 16: 115. [In German.]

Notes Möllhausen's expedition with Lt. Ives in 1857.

1862 Colorado River of the West. *American Journal of Science and Arts*, Series 2, 33 (May): 387-403.

Abridged from Ives' "General Report" and Newberry's "Geological Report", both in Ives' *Report upon the Colorado River of the West* (1861).

1862 Colorado River of the West. *The Friend* (Philadelphia), 35(41) (Seventh-day, Sixth month 14 [Saturday, June 14]): 326-327; (42) (Seventh-day, Sixth month 21 [Saturday, June 21]): 330-331; (43) (Seventh-day, Sixth month 28 [Saturday, June 28]): 339-340. ("From 'Silliman's Journal'" [*American Journal of Science and Arts*].)

Abridged from Ives' "General Report" and Newberry's "Geological Report", both in Ives' *Report upon the Colorado River of the West* (1861).

1863 The Colorada River [*sic*]. *Saturday Review of Politics, Literature, Science, and Art*, 15(387) (March 28): 417-418.

Regarding Ives' report (1861). "Colorado" is spelled correctly in the text.

1863 The Rio Colorado. *West Philadelphia Hospital Register* (Philadelphia), 1(8) (April 4): 29-30.

Lower Colorado River; third-person account.

1863 [Joseph C. Ives' report on the exploration of the Colorado River of the West.] *In:* Revue Géographique de l'Année 1862 [*transl.* 'Geographical Review of the Year 1862'] [SECTION]. *Revue Maritime et Coloniale* (France, Ministère de la Marine et des Colonies), 7 [January/April]: 705. [In French.]

Note, *in passing*: "Nous devons citer ici deux ouvrages du premier ordre . . . ; l'un sur *le Rio-Colorado de l'Ouest*, exploré en 1858 et 1850 [*sic*] par le lieutenant Joseph E. [*sic*] Ives, du corps des ingénieurs topographes . . . ." (ENTIRE NOTE)

[*transl.* 'We must here cite two works of the first order . . . ; one on the Rio Colorado of the West, explored in 1858 and 1850 [*sic*] by Lieutenant Joseph E. [*sic*] Ives, of the corps of topographical engineers . . . .']

Abert, J. J. [Abert, John James]

1858 Report of the Chief Topographical Engineer. *From:* Floyd, John B., Report of the Secretary of War. *In:* Buchanan, James, Message of the president of the United States, to the two houses of Congress at the commencement of the first session of the Thirty-fifth Congress. Vol. II. *U.S. 35th Congress, 1st Session, Senate Executive Document 11*, pp. 283-295.

> See p. 285: "First Lieutenant Ives is in charge of the exploration and survey of the Rio Colorado of the West." (ENTIRE NOTE)

Alexander, B. S.

1881 [Correspondence to Brig. Gen. J. G. Barnard, dated Washington, D.C., October 13, 1861.] *In:* Scott, Robert N. (preparer), *The War of the Rebellion: A compilation of the official records of the Union and Confederate armies. Series I—Volume V.* Washington, D.C.: U.S. Government Printing Office, pp. 617-619. [Entire volume comprises Chapter XIV, "Operations in Maryland, Northern Virginia, and West Virginia. August 1, 1861-March 17, 1862."]

> Alexander notes (p. 618), regarding pontoons for bridges: "I made the canvas boats that Lieutenant Ives, of the Topographical Engineers, used in his expedition on the Colorado River. Before letting them go out of my hands I used them on several occasions. I was much pleased with them, and Lieutenant Ives afterwards informed me that they answered his purpose admirably. I confess myself favorably impressed with this boat. A bridge train with these boats for pontoons could be very rapidly made." (ENTIRE NOTE)] [*NOTE*: See Ives' "General Report" (1861), p. 116, for his brief remarks on the "Buchanan" boat.

Baird, Spencer F.

1859 Appendix to the Report of the Secretary. *Smithsonian Institution, Annual Report for 1858*, pp. 44-62. (*U.S. 35th Congress, 2nd Session, Senate Miscellaneous Document 49*.)

> See in "Explorations Under the War Department": "2. *Exploration of the Colorado river of California, under Lieutenant J. C. Ives, U. S. A.*—Dr. J. S. Newberry, geologist and botanist, Mr. B. Mollhausen, artist and zoologist. Large collections were made in all departments on the Colorado and across to Albuquerque" (p. 50). (ENTIRE NOTE)

1861 Zoology. *In:* Ives, Joseph C., *Report upon the Colorado River of the West, explored in 1857 and 1858 by Lieutenant Joseph C. Ives, Corps of Topographical Engineers, under the direction of the Office of Explorations and Surveys, A. A. Humphreys, Captain Topographical Engineers, in charge. By order of the Secretary of War.* Washington, D.C.: U.S. Government Printing Office, Part 5, 31 pp. [separately paginated].

> This is specifically only a "List of Birds Collected on the Colorado Expedition".

Berton, Francis

1864 Voyage d'exploration du Colorado, par le lieutenant Ives, en 1857 et 1858 [*transl.* 'Lieutenant Ives's voyage of exploration of the Colorado, 1857-58']. *Société de Géographie de Gèneve, Bulletin*, 4: 5-28. [In French.]

> Without byline but with an introductory paragraph signed collectively, "Le Bureau", which credits "M[onsieur]. Berton" as the source.

Bond, G. P.

1861 Remarks upon the astronomical observations. *In:* Ives, Joseph C., *Report upon the Colorado River of the West, explored in 1857 and 1858 by Lieutenant Joseph C. Ives, Corps of Topographical Engineers, under the direction of the Office of Explorations and Surveys, A. A. Humphreys, Captain Topographical Engineers, in charge. By order of the Secretary of War.* Washington, D.C.: U.S. Government Printing Office, Appendix, pp. 3-4 [the Appendices section is separately paginated].

Capellini, Giovanni

1867 *Ricordi di un viaggio scientifico nell'America Settentrionale nel MDCCCLXIII* [*transl.* 'Memories of a scientific trip to North America in 1863']. Bologna: Tipografia di Giuseppe Vitali, 283 pp. [In Italian.]

See p. 235, brief note of meeting John Strong Newberry in Louisville, Kentucky, and that Newberry was affiliated with the Ives Expedition.

Cope, Edward D.

1875 On the remains of population observed on and near the Eocene plateau of north-western New Mexico. *American Philosophical Society, Proceedings*, 14: 475-482. [See p. 481.] [Preprint issued July 22, 1875, 8 pp.]

Includes brief references to the Ives expedition's visit to the Hopi mesas (p. 479) and, also from Ives' report, J. S. Newberry's remark on past wetter conditions and canyon formation (p. 481).

Cullum, George W.

1868 *Biographical register of the officers and graduates of the U.S. Military Academy at West Point, N.Y., from its establishment, March 16, 1802 to the Army re-organization of 1866-67. Second edition. Vol. II. 1841-1867.* New York: D. Van Nostrand.

See pp. 306-307, no. 1540, Joseph C. Ives.

De Gubernatis, Angelo

1879 (ED.) *Dizionario biografico degli scrittori contemporanei* [*transl.* 'Biographical dictionary of contemporary writers']. Firenze: Coi tipi dei successori Le Monnier, 1276 pp. [In Italian.]

See p. 724, "Moellhausen (Balduino)", which notes, "Un novo viaggio nell'America del Nord (1857-58) la condusse, coll' ingegnere Ives, nelle regioni ancora sconosciute sul medio Colorado." [*transl.* 'A new voyage to North America (1857-58) took him, with the engineer Ives, to the still unknown regions on the middle Colorado']. (The titles of publications by Möllhausen cited in this item were translated into Italian; they are not Italian eds. of those works, which do not exist.)

Gray, Asa; Torrey, John; Thurber, George; AND Engelmann, George

1861 Botany. *In:* Ives, Joseph C., *Report upon the Colorado River of the West, explored in 1857 and 1858 by Lieutenant Joseph C. Ives, Corps of Topographical Engineers, under the direction of the Office of Explorations and Surveys, A. A. Humphreys, Captain Topographical Engineers, in charge. By order of the Secretary of War.* Washington, D.C.: U.S. Government Printing Office, Part 4, 30 pp. [separately paginated]. ("By Professors Gray, Torrey, Thurber, and Dr Engelmann". With 1860 date.)

Botany section apparently arranged or edited by John Strong Newberry; see p. 20, footnote.

Humboldt, Alexander von

1858 Balduin Möllhausen. *Berlinische Nachrichten von Staats- und gelehrten Sachen* (Berlin), 1858(201) (August 29): [4]. [Item signed "A. v. H—t."] [In German.]

Regarding correspondence from Möllhausen, about the Whipple and Ives expeditions. Notes "Big Canon".

1858 Balduin Möllhausen. *Allgemeine Zeitung* (Augsburg), (249) (September 6): 4033. [Item signed "A. v. H—t."] [In German.]

"Das Ausland hat aus dem Werke von Möllhausen von seiner frübern Reise mehrere Auszuüge geliefert." [*transl.* 'Foreign sources have provided several extracts from Möllhausen's work from his earlier journey.'] [Refers to various items from *Das Ausland*, regarding correspondence from Möllhausen about the Whipple and Ives expeditions. Notes "Big Canon".]

Ives, Joseph C.

1858 Colorado Exploring Expedition. Preliminary report of 1st Lieutenant J. C. Ives, Topographical Engineers, to Captain A. A. Humphreys, Topographical Engineers, in charge of Office of Explorations and Surveys, War Department, November, 1858. *As a part of:* Humphreys, A. A., [Annual report to the Secretary of War, December 6, 1858]. *From:* Floyd, John B., Report of the Secretary of War. *In: Message of the President of the United States to the two houses of Congress at the commencement of the Second Session of the Thirty-fifth Congress : December 6, 1858.* Washington, D.C.: William A. Harris, Printer, pp. 608-619. (President's message: *U.S. 35th Congress, 2nd Session, Senate Executive Document 1, Serial 975.*)

Ives' report to Humphreys is dated "Washington, November 1, 1858." See also Ives (1859).

1859 Colorado exploring expedition. Preliminary report of First Lieut. J. C. Ives, Topographical Engineers, to Captain A. A. Humphreys, Topographical Engineers, in charge of the Office of Explorations and Surveys, War Department, November 1858. *In: Annual report of Captain A. A. Humphreys, Topographical Engineers, in charge of Office of Explorations and Surveys, War Department. December, 1858.* "Washington: 1859" [no imprint], pp. 31-42.

This is in a separate of Humphreys' annual report (171 pp.). Also apparently released as a separate [not seen], 12 pp., as cited in Miscellaneous Intelligence [SECTION], *American Journal of Science and Arts*, Series 2, 27(80) (March 1859): 304: "Lieut. J. C. Ives: Colorado Exploring Expedition, Preliminary Report to Captain A. A. Humphreys, Topograph. Engineers. 12 pp. 8vo." (ENTIRE NOTE)

1859 The *Colorado* Exploring Expedition. *The Friend* (Philadelphia), 32(18) ("Seventh-day, First month 8, 1859" [Saturday, January 8]): 142-143, (19) ("Seventh-day, First month 15" [Saturday, January 15]): 149.

Without by-line. This is a quotation of part of Ives' preliminary report (1858).

1859 The Colorado expedition. The Colorado of the West and the country bordering it—the Grand Canon. *American Geographical and Statistical Society, Journal*, 1(2) (February): 41-45.

Without by-line. This is a quotation of most of Ives' preliminary report (1858) with an unsigned, one-paragraph editorial introduction. This reprinting omits only some remarks pertaining to Native Americans. Ives' title is emended.

1861 *Report upon the Colorado River of the West, explored in 1857 and 1858 by Lieutenant Joseph C. Ives, Corps of Topographical Engineers, under the direction of the Office of Explorations and Surveys, A. A. Humphreys, Captain Topographical Engineers, in charge. By order of the Secretary of War.* Washington, D.C.: U.S. Government Printing Office, 5 parts and four appendices in 1 volume, 2 maps. (Volume: *U.S. 30th Congress, 1st Session, House Document 90.) (Serial 1058, Volume 14.*) [HOUSE OF REPRESENTATIVES VARIANT.]

Sabin cites this publication only with the imprint, "*Washington.* 1861.", without notice of either the House or Senate variants that exist. Other than the inclusion of two extra maps in the Senate variant, and the banner on the title-page, there is no difference between the printings. In addition, Sabin indicates only "Map." (Joseph Sabin, *A Dictionary of Books Relating to America, from Its Discovery to the Present Time. Volume IX.* (J. Sabin and Son, New York, 1877), p. 167.)

Poore likewise, but by design (p. iii), does not differentiate between the two Congressional variants, although it is listed as "Ex. docs., No. 90 36th Cong., 1st sess., Vol. XIV" (p. 780). Poore gives the pagination as 333 pp., with "map", and a publication date of June 5, 1860, which likely is the date ordered to be printed. (Poore, Benjamin Perley, *A Descriptive Catalogue of the Government Publications of the United States, September 5, 1774-March 4, 1881* (Washington, D.C.: U.S. Government Printing Office, 1885. U.S. 48th Congress, 2nd Session, Senate Miscellaneous Document 67.)

Parts and appendices paginated as follows: title-page, p. [1]; resolution of the U.S. Senate regarding printing information, attested by Asbury Dickins, Secretary, p. [2]; letter of transmittal from John B. Floyd, Secretary of War, p. [3]; letter of transmittal from Ives, pp. [5]-6; Part I, "General Report", by J. C. Ives, pp. [9]-131; Part II, "Hydrographic Report" , pp. 1-14

(*NOTE*: hydrographical work was conducted by Casimir Bielawski); Part III, "Geological Report", by J. S. Newberry, pp. 1-154; Part IV, "Botany", by "Professors Gray, Torrey, Thurber, and Dr Engelmann", pp. 1-30 (Asa Gray, John Torrey, George Thurber, George Engelmann); Part V, "Zoology", by S. F. Baird, pp. 1-31 (specifically only "List of Birds Collected on the Colorado Expedition"); Appendices cover sheet, p. [1]; Appendix A, "Remarks upon the Astronomical Observations", by G. P. Bond, pp. 3-4 (*NOTE*: astronomical work was conducted by Paul H. Taylor); "Remarks upon the Barometric Observations", pp. 4-5; Appendix B, "List of Camps, with Distances, Latitudes and Longitudes, Altitudes, etc.", pp. 6-8; Appendix C, "Barometric and Meteorological Observations", pp. 9-31 (*NOTE*: meteorological work was conducted by C. K. Booker); Appendix D, "Remarks upon the Construction of the Maps", p. 33. With two maps: "Map No. 1. Rio Colorado of the West", drawn by Frhr. F. W. v. Egloffstein, scale 1:380,160, shaded relief (from mouth of Colorado River to head of navigation); "Map No. 2. Rio Colorado of the West", drawn by Frhr. F. W. v. Egloffstein, scale 1:760,320, shaded relief (from head of navigation to Fort Defiance, including Grand Canyon).

1861 *Report upon the Colorado River of the West, explored in 1857 and 1858 by Lieutenant Joseph C. Ives, Corps of Topographical Engineers, under the direction of the Office of Explorations and Surveys, A. A. Humphreys, Captain Topographical Engineers, in charge. By order of the Secretary of War.* Washington, D.C.: U.S. Government Printing Office, 5 parts and four appendices in 1 volume, 4 maps [see note on collation of maps, below]. (Volume: *U.S. 30th Congress, 1st Session, Senate Executive* Document *[no number].*) [SENATE VARIANT.]

See remarks and notes on collation with the House variant (above); but accompanied by four maps. The four maps are: "*Map No. 1. Rio Colorado of the West*", drawn by Frhr. F. W. v. Egloffstein, scale 1:380,160, shaded relief (from mouth of Colorado River to head of navigation); "*Map No. 2. Rio Colorado of the West*", drawn by Frhr. F. W. v. Egloffstein, scale 1:760,320, shaded relief (from head of navigation to Fort Defiance, including Grand Canyon); "*Geological map no. 1.*", *by J. S. Newberry*, scale 1:760,320; "*Geological Map no. 2.*", *by J. S. Newberry*, scale 1:760,320 (the base maps of the geological maps are the Egloffstein shaded relief maps). The two geological maps are the Egloffstein topographic maps with color washed geology portrayed by Newberry. They accompany only the Senate variant (*fide* WAGNER–CAMP 375, p. 648)

NOTE on collation of maps. Although some sources indicate that the maps are laid in loose, the copy of the Senate variant held in the American Philosophical Society, presented by J. S. Newberry, is in its original binding. The two Egloffstein topographic maps are fold-outs following the second free leaf of the volume, preceding the plate titled "General Report; Profile" and the frontispiece. The two Newberry geological maps are fold-outs following Part III ("Geological Report") of the volume.

NOTE on binding. The original binding of the Senate variant has a unique spine, embossed and stamped as follows (gilt): [ornamental rule] / SENATE. / [ornamental rule] / COLORADO / EXPLORING / EXPEDITION / [rule] / J. C. IVES, / TOP^{L}. ENGINEER / [rule] / 1857-8. / [ornamental rule] / [ornament, 8-pointed star in symmetrical design] / [ornamental rule] / WAR / DEPARTMENT. / [ornamental rule]. [Illustrated in the present volume; see FIGURE 3 in Chapter 1.]

1861 General report. *In:* Ives, Joseph C., *Report upon the Colorado River of the West,* explored *in 1857 and 1858 by Lieutenant Joseph C. Ives, Corps of Topographical Engineers, under the direction of the Office of Explorations and Surveys, A. A. Humphreys, Captain Topographical Engineers, in charge. By order of the Secretary of War.* Washington, D.C.: U.S. Government Printing Office, pp. [9]-131 [separately paginated].

Kohl, J. G.

1864 [Review of] "Report upon the Colorado River of the West, explored in 1857 and 1858 by Lieutenant Joseph C. Ives, Corps of topographical engineers, under the direction of the office of explorations and surveys, A. A. Humphreys, Captain topographical engineers in charge. By order of the Secretary of War. Washington 1861." *Göttingische Gelehrte Anzeigen*, 2(41) (October 12): 1622-1636. [In German.]

Le Hardy De Beaulieu, Camille

1868 Expédition du fleuve Colorado [*transl.* 'Colorado River expedition']. *Société des Sciences, des Arts et des Lettres du Hainaut, Mémoires et Publications*, Series 3, 2: 393-405. [In French.]

A curious review and summary of the Ives expedition of "1857", a decade afterward, mentioning the steamboat "*Explorateur*" (Explorer) but not Ives or any other person by name. Brief reference to Grand Canyon, also not by name.

Maury, Alfred

1860 Rapport sur les travaux de la Société de Géographie, et sur les progrès des sciences géographiques pendant l'année 1859 [*transl.* 'Report on the work of the Geographical Society, and on the progress of geographical sciences during the year 1859']. *Société de Géographie, Bulletin* (Paris), Series 4, 19 (January/February): 5-190. [In French.]

Remarks on the Ives expedition on the Colorado River, pp. 65-67.

Möllhausen, Balduin

NO DATE *Reisen in die Felsengebirge Nord-Amerikas bis zum Hoch-Plateau von Neu-Mexico, unternommen als Mitglied der im Auftrage der Regierung der Vereinigten Staaten ausgesandten Colorado-Expedition.* Leipzig: Otto Purfürst, 2 volumes, 455, 406 pp. [1860.] [In German.]

[*transl.* 'Travels in the Rocky Mountains of North America up to the High Plateau of New Mexico, undertaken as a member of the Colorado Expedition sent on behalf of the United States Government']

1858 Der Rio Colorado des Westens ['The Rio Colorado of the West']. *Zeitschrift für Allgemeine Erdkunde*, New Series, 5: 438-443. [In German.]

1861 *Reisen in die Felsengebirge Nord-Amerikas bis zum Hoch-Plateau von Neu-Mexico, unternommen als Mitglied der im Auftrage der Regierung der Vereinigten Staaten ausgesandten Colorado-Expedition.* Leipzig: Hermann Costenoble, 2 volumes, 455, 406 pp. [In German.]

1867 *Resor i Norra Amerikas klippberg till Ny-Mexicos högslätt, företagna af Colorado-Expeditionen, enligt uppdrag af Förenta Staternas regering, och beskrifna af Balduin Möllhausen, Medlem af expeditionen.* (C. E. Möller, translator.) Stockholm: Tryckt hos R. G. Berg, 2 volumes (*Förra Delen*, 355 [359] pp.; *Sednare Delen*, 313 [314] pp.). [In Swedish.]

Translation of *Reisen in die Felsengebirge Nord Amerikas . . . .*

Murchison, Roderick Impey

1859 Address to the Royal Geographical Society of London; delivered at the anniversary meeting on the 23rd May, 1859, by Sir Roderick Impey Murchison, G.C.St.S., D.C.L., M.A., F.R.S., &c., President. *Royal Geographical Society of London, Proceedings*, 3(5): 224-346.

See p. 329, *note*; passing reference to exploration of the Colorado River (*i.e.*, Ives expedition).

1859 Address to the Royal Geographical Society of London; delivered at the anniversary meeting on the 23rd May, 1859, by Sir Roderick Impey Murchison, G.C.St.S., D.C.L., M.A., F.R.S., &c., President. *Royal Geographical Society of London, Journal*, 29: cii-ccxxiv.

See p. ccvii, *note*; passing reference to exploration of the Colorado River (*i.e.*, Ives expedition).

Newberry, John Strong

1861 Geological report. *In:* Ives, J. C., Report upon the Colorado River of the West, explored in 1857 and 1858. *U.S. 36th Congress, 1st Session, Senate Executive Document [no number], Serial 1058*, Part 3, 154 pp. [separately paginated part in volume]. [With two geological maps.]

1862 Exploration of the Colorado. *Mining and Scientific Press*, 5: 1. [Without by-line.]

Roberts, George E.

1863 The great cañons of the Colorado River. *The Intellectual Observer* (London), 4(5) (December): frontispiece, 309-316.

The frontispiece, "Face of Big Canon, on the Colorado River", signed "G.E.R.", is an awkward and peculiarly colored reproduction, not credited, of the lithograph, "Big Cañon", by J. J. Young, from

a sketch by F. W. von Egloffstein, *in* Joseph C. Ives, *Report Upon the Colorado River of the West, Explored in 1857 and 1858....* (U.S. Government Printing Office, Washington, 1861), Part I (General Report), Plate IX.

Snow, Jerry, AND Ives, Ken

2022 Letters from the Colorado River Ives expedition of 1857-1858. *In: Proceedings of the Colorado River Basin History Symposium, 2021, hosted by The Grand Canyon Historical Society.* Grand Canyon, Arizona: Grand Canyon Historical Society, pp. 54-59.

Expedition correspondence of Joseph C. Ives to his wife, Cora.

Ule, Otto

1874 *Die Erde und die Erscheinunge ihrer Oberfläche in ihrer Bezeihung zur Geschichte derselben und zum Leben ihrer Bewohner. Eine physische Erdbeschreibung nach E. Reclus von Dr. Otto Ule. I. Theil.—Das feste Land.* [*transl.* 'The earth and the phenomena of its surface in their relation to its history and to the life of its inhabitants. A physical description of the earth according to E. Reclus by Dr. Otto Ule. Part I.—The solid land.'] Leipzig: Verlag von Paul Frohberg, 512 pp. [In German.]

Colorado River, see p. 83. Regarding "Cañons" (pp. 111-112), remarks include the Ives expedition and the James White affair; John Wesley Powell is not mentioned.

Veatch, John A.

1860 Boracic acid in the sea-water of the Pacific on the coast of California. *Pacific Medical and Surgical Journal*, 3: 158-159.

Includes notice, p. 159, of J. S. Newberry "on his way to join Lieutenant Ives' Colorado Exploring Expedition" (ENTIRE NOTE).

1860 Boracic acid in the sea-water of the Pacific on the coast of California. *Franklin Institute, Journal* (Philadelphia), Series 3, 39 (February): 113-115.

Includes notice, p. 115, of J. S. Newberry "on his way to join Lieut. Ives' Colorado Exploring Expedition" (ENTIRE NOTE).

1860 Boracic acid in the sea-water of the Pacific on the coast of California. *London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science*, Series 4, 19: 323-324. ("*Journal of the Franklin Institute* for February 1860.")

Includes notice, p. 324, of J. S. Newberry "on his way to join Lieut. Ives's Colorado Exploring Expedition" (ENTIRE NOTE).

1860 Boracic acid in the sea-water of the Pacific on the coast of California. *American Journal of Pharmacy*, (July): 330-332. (From "*Pacific Med. and Sur. Journ. April*, 1860, *from Proc. Cal. Acad. Nat. Sci.*")

Includes notice, p. 332, of J. S. Newberry "on his way to join Lieutenant Ives' Colorado Exploring Expedition" (ENTIRE NOTE).

1861 Boracic acid in the sea-water of the Pacific on the coast of California. *Chemical News* (London), 4(84) (July 13): 16. (From "*Proc. Cal. Acad. Nat. Sci.*")

Includes notice of J. S. Newberry "on his way to join Lieutenant Ives' Colorado Exploring Expedition" (ENTIRE NOTE).

Whitney, Josiah D.

1875 Geographical and geological surveys. *North American Review*, 121: 37-85.

Colorado River noted, *in passing*, pp. 54, 55; Ives expedition, p. 6.

II. Contemporary Notices Regarding Egloffstein's Maps

Anonymous

1860 [Notice of maps by F. W. von Egloffstein from the Ives expedition.] *In:* Journal of Proceedings [SECTION]. *Academy of Science of St. Louis, Transactions*, 1: 712.

1861 Report of the Council. *Royal Geographical Society of London, Journal*, 31: v-xii.

See in "Map Rooms", p. vi, notice of receipt of "Rio Colorado of the West, by J. C. Ives".

1861 Accessions [to the Library and Map Rooms]. *Royal Geographical Society of London, Proceedings*, 5(3): 112-113.

See p. 113, "Map of the Rio Colorado of the West".

1861 Accessions to the library and map-rooms, to May, 1861. *Royal Geographical Society of London, Journal*, 31: lxvi-cii.

See p. xcvii, "Rio Colorado of the West. Explored by Lieut. J. C. Ives, Top. Engrs.", received from Secretary of War, Washington.

1861 Списокъ книгамъ, картамъ и рукописямъ, поступившимъ въ Императорсков Русское Географическое общество съ 15 апрѣля по 2 мая 1861 г. *In:* Дѣйствія Общества [SECTION]. *Императорскаго Русскаго Географическаго Обіества, Записки*, 1861(3): 18-19. [In Russian.]

Transliteration: Spisok' knigam', kartam' i rukopisyam', postupivshim' v' Imperatorskov Russkoye Geograficheskoye obshchestvo s' 15 aprilya po 2 maya 1861 g. *In:* Deystvíya Obshchestva [SECTION]. *Imperatorskago Russkago Geografícheskago Obítsestva, Zapiski*, 1861(3): 18-19.

Translation: List of books, maps and manuscripts received by the Imperial Russian Geographical Society from April 15 to May 2, 1861. *In:* Proceedings of the Society [SECTION]. *Imperial Russian Geographical Society, Notes*, 1861(3): 18-19.

Includes (p. 19), under "Карты" [Karty] ['Maps'], "Оть Военнаго Министерства Соединенных Штатовъ. Rio Colorado of the West. 2 c. f." [Ot' Voyennago Ministerstva Soyedinennykh Shtatov'. Rio Colorado of the West. 2 s. f.] ['From the Military Department of the United States. Rio Colorado of the West. 2 s. f.']. This refers to the maps by Friedrich W. von Egloffstein, published with J. C. Ives' *Report Upon the Colorado River of the West*. [The Cyrillic "c. f." (*sic*) may stand for сложенный фолио (slozhennyye folio) (folded folio; *i.e.*, double folio).]

1862 [Notice of maps by F. W. von Egloffstein from the Ives expedition.] *In:* Proceedings of the Stated Monthly Meeting, May 15, 1862. *Franklin Institute, Journal* (Philadelphia), Series 3, 43 (June): 414-415.

1862 New mode of map engraving. *Mechanics' Magazine* (London), New Series, 8 (July 25): 49.

1863 New mode of map-engraving. *In:* Timbs, John, *The year-book of facts in science and art* [for 1862]. London: Lockwood and Co.

1863 New method of map construction. *In:* Wells, David A. (ed.), *Annual of scientific discovery: or, Year-book of facts in science and art for 1863*. Boston: Gould and Lincoln, pp. 185-186.

Delesse, AND Laugel (Messieurs) [Delesse, Achille, AND Laugel, Auguste]

1862 Extraits de géologie pour l'année 1861 [*transl.* 'Excerpts from geology for the year 1861']. *Annales des Mines* (Paris), Series 6, Mémoires, 2: 427-590. [In French.]

See pp. 431-432, "Cartes topographiques" ['topographic maps']; maps by F. W. von Egloffstein from the Ives expedition.

1862 *Revue de géologie pour l'année 1861* [*transl.* 'Review of geology for the year 1861']. Paris: Dunod. [In French.]

See pp. 5-6, "Cartes topographiques" ['topographic maps']; maps by F. W. von Egloffstein from the Ives expedition.

Ives, Joseph C.

1861 *Report upon the Colorado River of the West, explored in 1857 and 1858 by Lieutenant Joseph C. Ives, Corps of Topographical Engineers, under the direction of the Office of Explorations and Surveys, A. A. Humphreys, Captain Topographical Engineers, in charge. By order of the Secretary of War.* Washington, D.C.: U.S. Government Printing Office, 5 parts and four appendices in 1 volume, 4 maps [see note on collation of maps, below]. (Volume: *U.S. 30th Congress, 1st Session, Senate Executive* Document *[no number].*) [SENATE VARIANT.]

The four maps are: "*Map No. 1. Rio Colorado of the West*", drawn by Frhr. F. W. v. Egloffstein, scale 1:380,160, shaded relief (from mouth of Colorado River to head of navigation); "*Map No. 2. Rio Colorado of the West*", drawn by Frhr. F. W. v. Egloffstein, scale 1:760,320, shaded relief (from head of navigation to Fort Defiance, including Grand Canyon); *"Geological Map no. 1.", by J. S. Newberry*, scale 1:760,320; *"Geological Map no. 2.", by J. S. Newberry*, scale 1:760,320 (the base maps of the geological maps are the Egloffstein shaded relief maps). The two geological maps are the Egloffstein topographic maps with color washed geology portrayed by Newberry. They accompany only the Senate variant (*fide* WAGNER–CAMP 375, p. 648).

NOTE on collation of maps. Although some sources indicate that the maps are laid in loose, the copy of the Senate variant held in the American Philosophical Society, presented by J. S. Newberry, is in its original binding, wherein the two Egloffstein topographic maps are fold-outs following the second free leaf of the volume, preceding the plate titled "General Report; Profile" and the frontispiece. The two Newberry geological maps are fold-outs following Part III ("Geological Report") of the volume.

L—w [Loew, Oscar?]

1861 "Rio Colorado of the West, explored by Lieut. Jos. C. Ives, under the Direction of the Office of Explorations and Surveys A. A. Humphreys, by order of the Hon. John B. Floyd, Secretary of War 1858, drawn by Frhr. F. W. v. Egloffstein. Map. No. 1. M. 1: 380,160. Map. No. 2. M. 1: 760,320. New-York. gr. fol." *Zeitschrift für Allegemeine Erdkunde*, New Series, 10: 477-478. [In German.]

Review of the two Egloffstein shaded-relief maps. ["M." = Maßstab ('scale'); "gr. fol." = *grosse folio* ('large folio').]

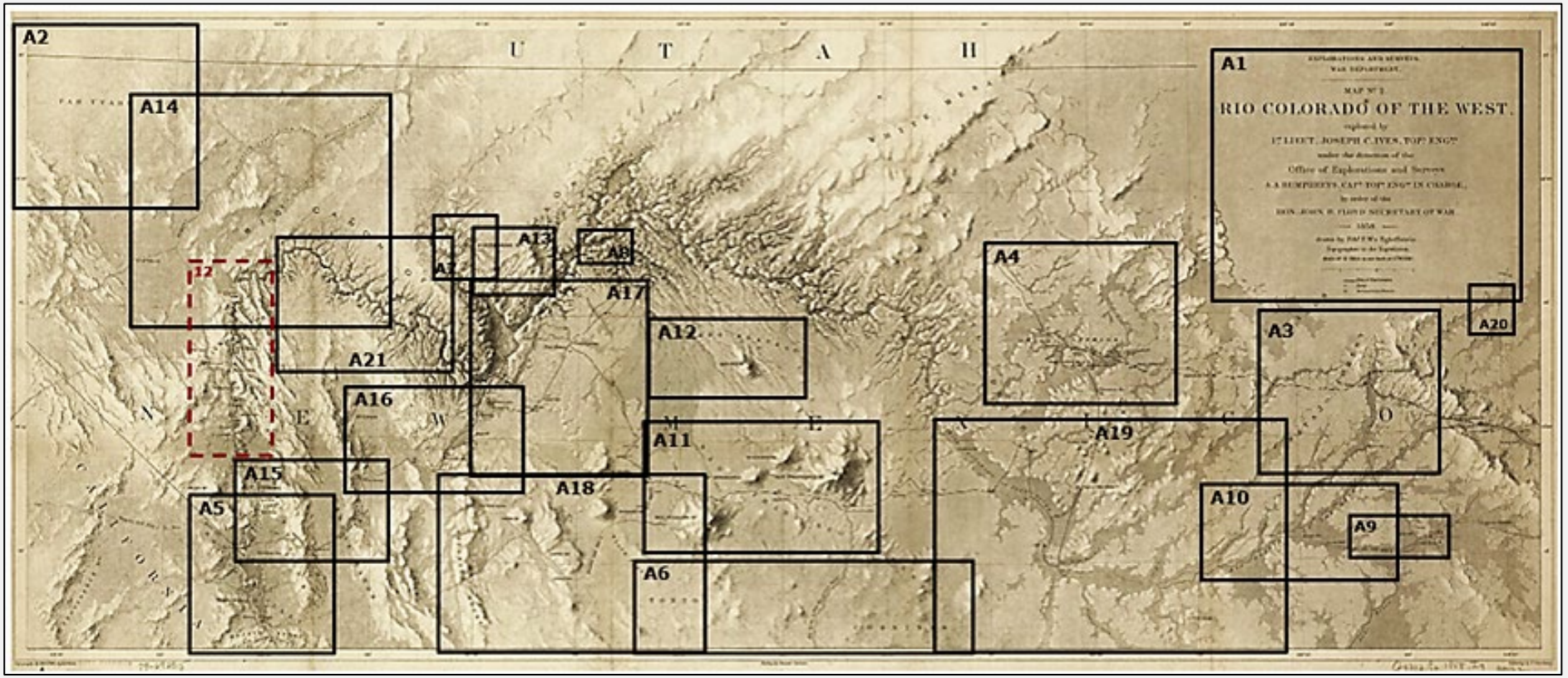
APPENDIX II

Additional Details from "Map No. 2"

UPON INSPECTION, F. W. von Egloffstein's "Map No. 2" holds many more general areas of interest than are examined in the main text of this study. They bring forward things that may not be of special pertinence to the analysis of this map but which otherwise might never be noticed for their special historical or creative insights.

The text that follows here describes each detailed view, placing them in the perspectives of the expedition in the field or in Egloffstein's work in the studio. On the following page is a graphic index to the location of each detail on the whole map.

Refer also the Analytical Charts for this study (pp. xii–xv).



GRAPHIC INDEX TO DETAILS FROM "MAP NO. 2" IN APPENDIX II

The dashed red-lined quadrangle (No. 12) refers to a series of images in the main text that pertain to the Colorado River reach in Black Canyon (see FIGURE 12a).

See also graphic index to detail views for illustrations that appear in the main text (pp. viii–ix).

Descriptions and Remarks for the Detail Views in this Appendix

[in the PDF document, FIGURE NUMBER call-outs in this appendix are hyperlinks to the figures]

[a hyperlinked Appendix Figure call-out in the main text directs first to this remarks section]

FIGURE A1. The title block for "Map No. 2. Lettering was done by F. Courtenay.

FIGURES A2–A9. Users of maps of the North American Southwest created especially during the first half of the 19th century will observe that many areas are labeled with the names of Native American tribes, in contemporary and usually inconsistent spellings. The labels are applied broadly, usually, without boundaries, intending to indicate the land areas occupied by these peoples but without any other elaboration. They do not show the names or the locations with any implied precision. This exhibition of cultural geography continued the practice begun by the explorer–geographer Baron Alexander von Humboldt, who first employed this form of recognition of Native occupancy on his magnificent map of New Spain (Nueva España), collated in 1803 when he was finishing his geographical explorations and studies in South and Central America. The map was first published in 1808 though it is better known through its 1811 printing.[62] The style seems to have originated with the manuscript maps of northern New Spain drawn and illustrated by Bernardo Miera y Pacheco in the latter part of the 18th century.[63] Although Miera had labeled these regions specially as "provinces," Humboldt used only the tribal names though prefixed usually by "Indiens" (the map was published in French). Later cartographers simply copied these names without prefixes, repositioning them as needed or whimsically, without explanation. The names are strewn on contemporary maps for decades even though the charts are devoted to political geographies.

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[62] "Carte Générale du Royaume de la Nouvelle Espagne depuis la Parallele de 16° jusqu'au Parellele de 38° (Latitude Nord) Dressée Sur des Observations Astronomiques et sur l'ensemble des Matériaux qui existoient à Mexico, au commencement l'anée 1804. Par Alexandre de Humboldt." [2 sheets] *In: Atlas géographique et physique du Royaume de la Nouvelle-Espagne, fondé sur des observations astronomiques, des mesures trigonométriques et des nivellemens barométriques* (Chez Fr. Schoell, Paris; and chez J. G. Cotta, libraire, Tübingue, **1808**), *folio*. (It was first published in French because after returning from his American explorations Humboldt had returned to his preferred residence in France.) ● Reprinted with the same map and atlas titles, Chez F. Schoell, Paris, **1811**, folio. [For an overview pertaining to Humboldt's map of New Spain, see in Earle E. Spamer, *Mapping Grand Canyon: A Chronological Cartobibliography and Chorographical Study* (Raven's Perch Media, 2025, https://ravensperch.org/wp-content/uploads/2025/01/MAPPING-GRAND-CANYON_2nd-ed.pdf), pp. 40-42.]

[63] See more concerning Miera's mapping of this region in Spamer, *Mapping Grand Canyon*, specifically in the "Introduction to the 'Puerto de Bucareli' Section," p. 31 *ff*.

Egloffstein did not particularly continue Humboldt's labeling schemes, though he does include a few Native names on "Map No. 2" that could indicate borrowings from earlier maps available to him, maps that had in turn copied from Humboldt's New Spain map. It is the map reader, though, who has to infer the purpose of the labels and the identities of the Native people; they are hardly ever explained.

On "Map No. 2," the label "Pah Utahs" appears alone at upper left (**FIGURE A2**), positioning the actually very broadly dispersed Paiute people, whose many tribes and bands traditionally occupied a vast area that covered larger areas of Map Nos. 1 and 2 and beyond. Similarly, the "Navajos" (Navaho, **FIGURE A3**) are restricted to a smaller area than that which they traditionally occupied. Elsewhere on "Map No. 2," Egloffstein parenthetically indicated adjacent areas for the "Tontos" and "Cosninas" (**FIGURE A6**). The "Tontos' are likely the Tonto Apaches and probably others; "Cosninas" seems to be misplaced or misidentified since the contemporary term, variously spelled, is one used by other Native peoples in reference to the Havasupai, a term acquired and sometimes more broadly applied to other Native groups by early Western explorers and writers.

Ironically, the Native peoples whom the expedition mostly closely encountered are not labeled on the map in specially designated fashion in the Humboldtian style but are associated with specific locales where they were encountered. This may be another indication that Egloffstein borrowed terms from existing maps but had no need to apply provincial labels to groups he had himself met. The "Moqui" (Hopi) were encountered at their mesa homelands east of the Grand Canyon (**FIGURE A4**). On the lower Colorado River, the "Mojave," who not only were encountered there but individuals played significant roles in guiding the expedition during the overland venture. Along the river is a simple label for "Mojave Villages" (**FIGURE A5**), though strikingly their name is also applied, in close juxtaposition, to "Mojave Cañon," "Mojave Range," and "Mojave Valley." The Hualapai, of whom individuals also played roles in the expedition, are noted on the map only by "Hualpais Spr[ing]."[64] that identifies the area of present-day Peach Springs (**FIGURE A7**; it was here, too, that the expedition had had its memorable first views of the Grand Canyon). The Havasupai appear on the map solely by the name of their Cataract Creek habitation ("Yampais Village," recognized today as Supai in Havasu Canyon; **FIGURE A8**; and see also **Figure 43a** in the main text herein). Another Native American group, though one apparently not personally met by Egloffstein, is acknowledged on the map only by the locations of their traditional and more contemporary pueblos, "Old Zuni" [*sic*] and "Zuñi" (**FIGURE A9**).

[64] Throughout Lt. Ives' *Report* he referred to the Hualapai people as "Hualpais" in both the singular and plural, to individuals and the tribe alike. Möllhausen had referred to them in his *Reisen* as "Walpay," a mispelled "Walapai" that is in turn a phonetic rendition of "Hualapai."

FIGURE A10. This detail shows the area along the "Rio Puerco of the West" (Puerco River, not to be confused with the Rio Puerco tributary to the Rio Grande). The expedition route of Lt. Amiel W. Whipple's railroad route-surveying expedition of 1853–4 is traced along this river. It also specially locates an area of "Petrifactions" along "Lithodendron Cr." (Lithodendron Wash) that is the location of the famous Petrified Forest of Arizona (not visited by Egloffstein but the label is taken from earlier expedition reports).

FIGURE A11. The San Francisco Peaks area is delimited, showing the Ives expedition's route. "Leroux Spr[ing]." is specifically noted in the present study *(Chapter 4)* as the location where Lt. Ives denied Egloffstein's request to stay another day so that the baron could reconnoiter the region's landscape from a high altitude—which had he been able to do would surely have greatly changed "Map No. 2" (refer to Figure 47 in the main text). Note also in this detail the heavy use of hachuring on the southeastern slopes of the mountains, further belying the notice in Ives' "Appendix D" that the method was not used on this map (see Figure 13 in the main text and other remarks in *Chapter 2*).

FIGURE A12. Red Butte, a prominent geographical feature north of the San Francisco Peaks, is mapped from information garnered from other sources. As is frequently noted by writers who comment upon this map, the butte is shown both mispositioned and much too prominent. The shallow stream courses that surround it are among Egloffstein's conjectural sculptings in the plaster model.

FIGURE A13. The "North Side Mts." were named during the Ives expedition. These were the sighting of the Uinkaret volcanic field from the south side of the canyon. Their depiction on the map as a heavily hachured range is a result of that distant, oblique view; and the drainages emanating from them are only intuitive constructions.

FIGURE A14. Although the Great Bend area of the Colorado River is given much attention in the present study, this focused detail is shown in order to better illustrate the mapped physiography in juxtaposition with the "Rio Virgen" (Virgin River) and the important routes of land communication of the area. The confluence of the Virgin River was not ascertained by the Ives expedition. The lieutenant considered what actually is Las Vegas Wash to be the Virgin, though Egloffstein demurred by omitting the lowest reach of the Virgin from his maps. "Map No. 2" displays the close association of these areas and the "Mormon Road" that follows the "old Spanish trail from Santa Fé to Los Angeles," passing through "Los Vegas" (Las Vegas), "the meadows," which was at the time a spring and wetland area on the Old Spanish Trail intermittently colonized by non-Natives but of course long known to Native people. This would have been the most expedient route to transport troops and materiel brought upriver by steamer to more inland locations in Utah. An existing spur is also partly shown on the

map, which led to the Colorado below Black Canyon (see this spur where it reaches the river on **Figures 12a, b** in the main text). Of course any route on the eastern side of the Grand Canyon would have been impractical for such purposes.

FIGURES A15–A17. These details are provided here in order to delineate the entire route of the land expedition from the Colorado River to the point where they left the Grand Canyon area. **FIGURE A15** shows the route from "Beales Crossing" through "Sitgreaves Pass" (well known to aficionados of historic Route 66) through the "Black Mountains" and "Rail road Pass" [*sic*] through the "Cerbat Range." **FIGURE A16** shows the route from the "Cerbat Range" to the head of the then-unnamed Peach Springs Wash (at "New Creek" on the map). **FIGURE A17** shows the entire Grand Canyon tour, from Peach Springs Wash and "Diamond River" (Diamond Creek) to Hualapai Canyon (not named, the tributary to Cataract Creek down which the attempt was made to reach the mouth of Cataract Creek [see *Chapter 4* herein]), thence the exit to the southeast to join up with the Whipple route west of the San Francisco Peaks.

FIGURE A18. Part of the Whipple route is shown, from "Bill Williams Mt." through Aztec Pass" and on to "Cactus Pass" in the "Aquarius Mounts.", which eventually reached the lower Colorado River downstream from the later Beale's Crossing. Both Lt. Ives and Balduin Möllhausen had accompanied the Whipple expedition, and it is from its findings that Egloffstein would have gotten information to draw this region's landscape.

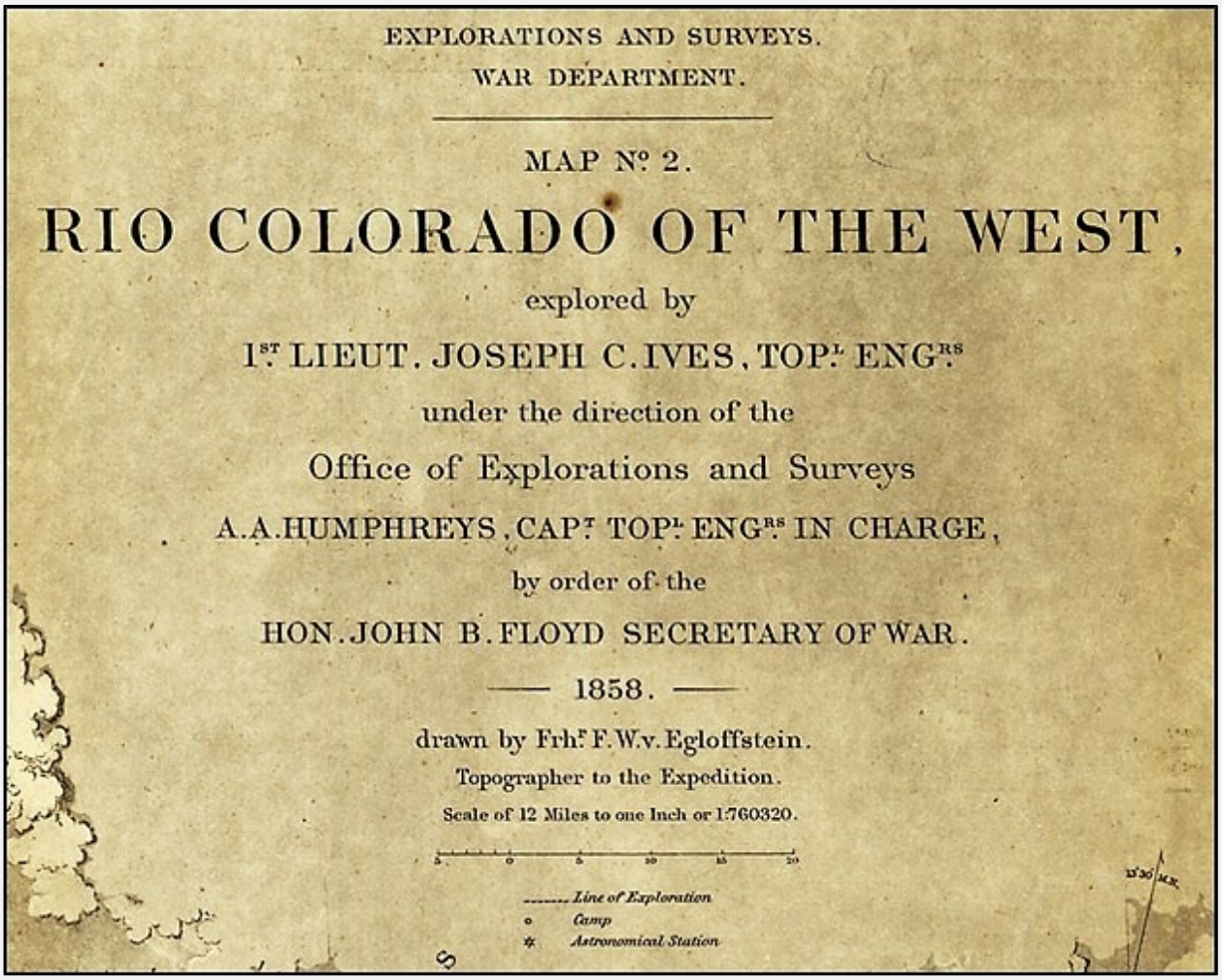
FIGURE A19. This detail shows the entire valley of the "Little Colorado or Flax River" upstream from its mapped encanyoned portion, and the confluence of the "Rio Puerco of the West" (Puerco River). It also delineates the Ives expedition's attempt to head north from Camp 85, the reaching its division point at Camp 89. From there Lt. Ives led a small contingent, including Egloffstein and geologist Newberry, to the Hopi mesas (see **FIGURE A4**) while the main column, with Möllhausen, proceeded along part of the Whipple trail to Zuñi (see **FIGURE A9**) and Fort Defiance.

FIGURE A20. This very close detail is shown to illustrate an area of darker tinting by the use of very fine ruling (right-diagonal, at the limit of resolution in this image). Radial hachuring is also noticed in juxtaposition to this area.

FIGURE A21. This detail illustrates the entirely conjectural course of the Colorado River between the Diamond Creek area (out of view to the right, which was surveyed on the ground), and the Great Bend area (out of view to the left, as surveyed distantly by Lt. Ives from Fortification Rock during the Black Canyon skiff excursion). The partial stream course

seen at upper right is a part of the Parashant Wash as mapped by Egloffstein based on distant views.

FIGURE A22. This detail from the southwestern corner of "Map No. 2" depicts the lower Colorado River (at right) in the areas of "Beales Crossing" and "Whipple's Crossing," with the westbound Whipple trail to the West Coast. This is an area of the map that Egloffstein would have portrayed entirely from the results of the Whipple expedition.



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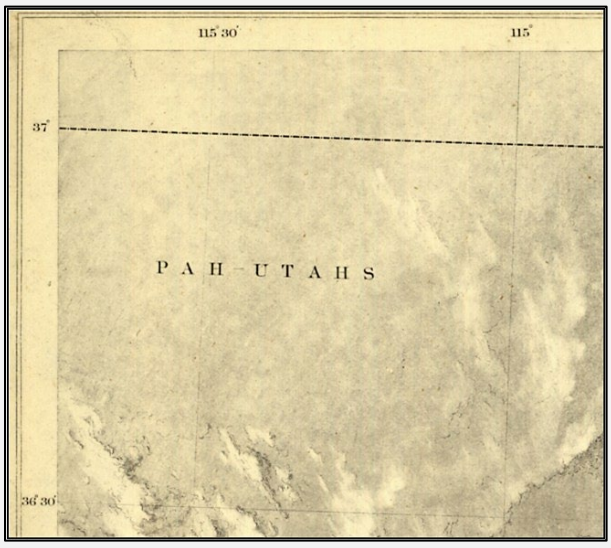
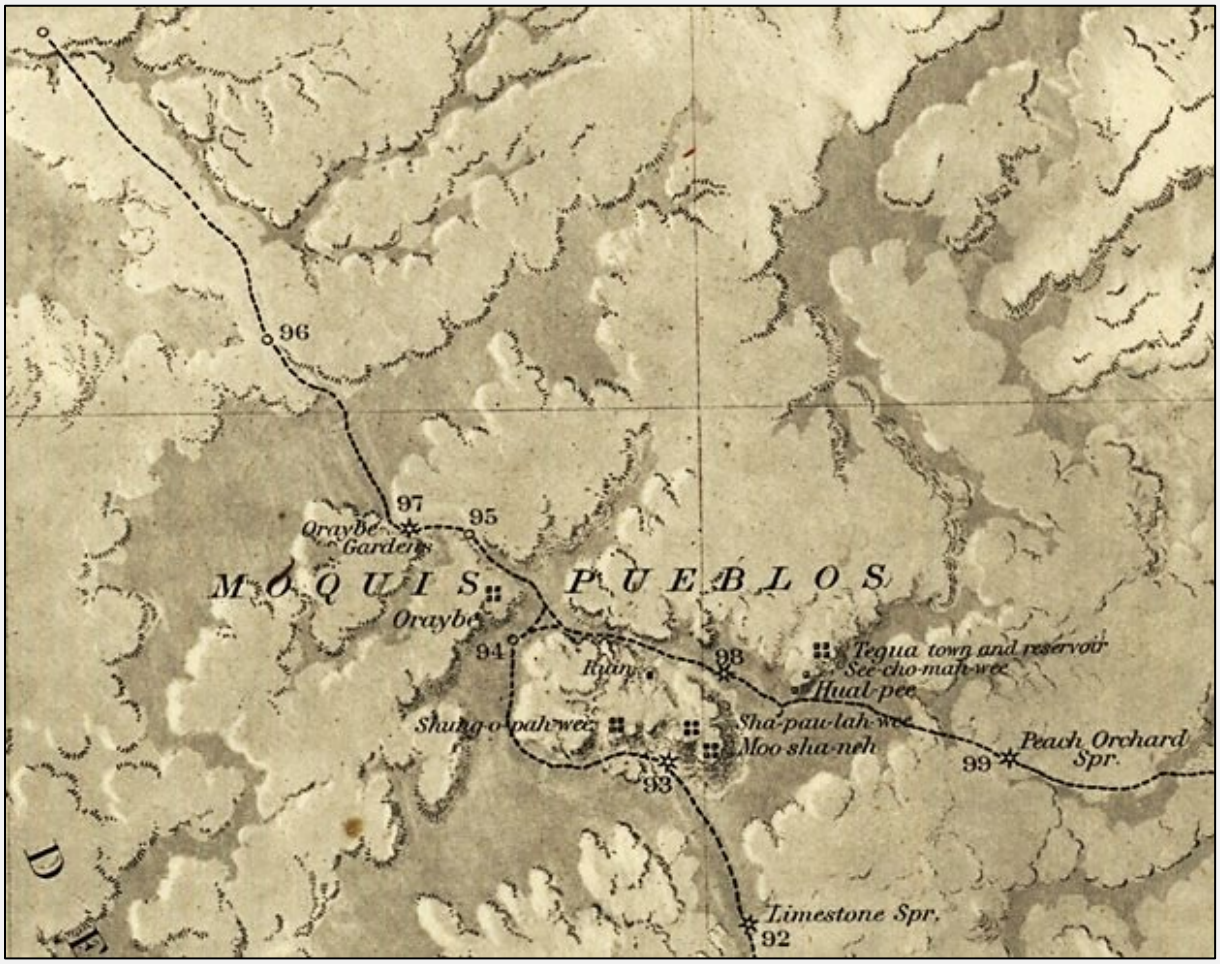

115° 30'
115°
37°
PAH-UTAHS
36° 30'

A2


NAVAJOS
NAVAJO FOREST
FORT DEFIANCE

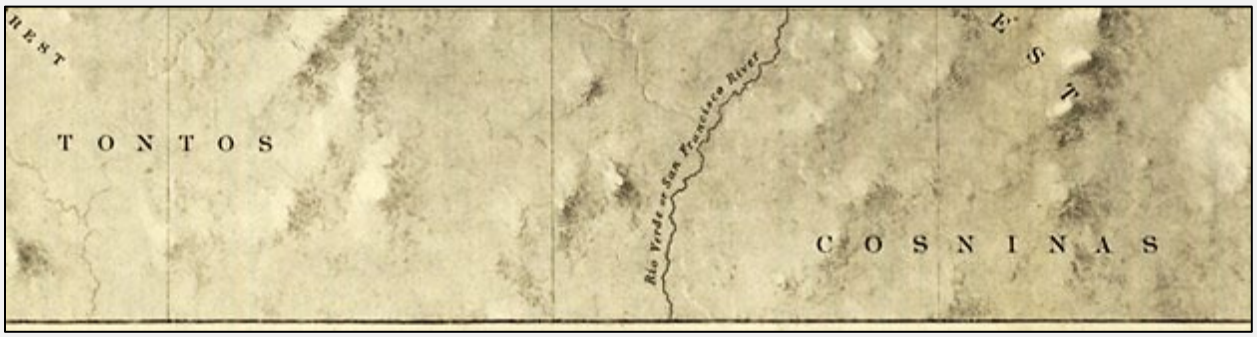
A3


96
97
95
Oraybe Gardens
MOQUIS PUEBLOS
Oraybe
94
Ruins
98
Tegua town and reservoir
See-cho-mah-wee
Hual-pee
Shung-o-pah-wee
Sha-pau-lah-wee
Moo-sha-neh
Peach Orchard Spr.
99
93
Limestone Spr.
92

A4


Loaf Rock
CAÑON
Bulishead
PYRAMID
Beales trail
47
14° M.N.
Sitgreaves
60
MOJAVE
46
Camp 59
Beales Crossing
Boundary Cone
Gl
Meadow Cr.
Pass
45
VALLEY
MOUNTAINS
Spr.
44
43
Whipple's Crossing
42
Mojave
Villages
41
MOJAVE RANGE
MOJAVE CAÑON
40

A5


WEST
TONTOS
Rio Verde or San Francisco River
E. S. T.
COSNINAS

A6


Diamond River
67
Hualpais Spr.
68
66
New Creek

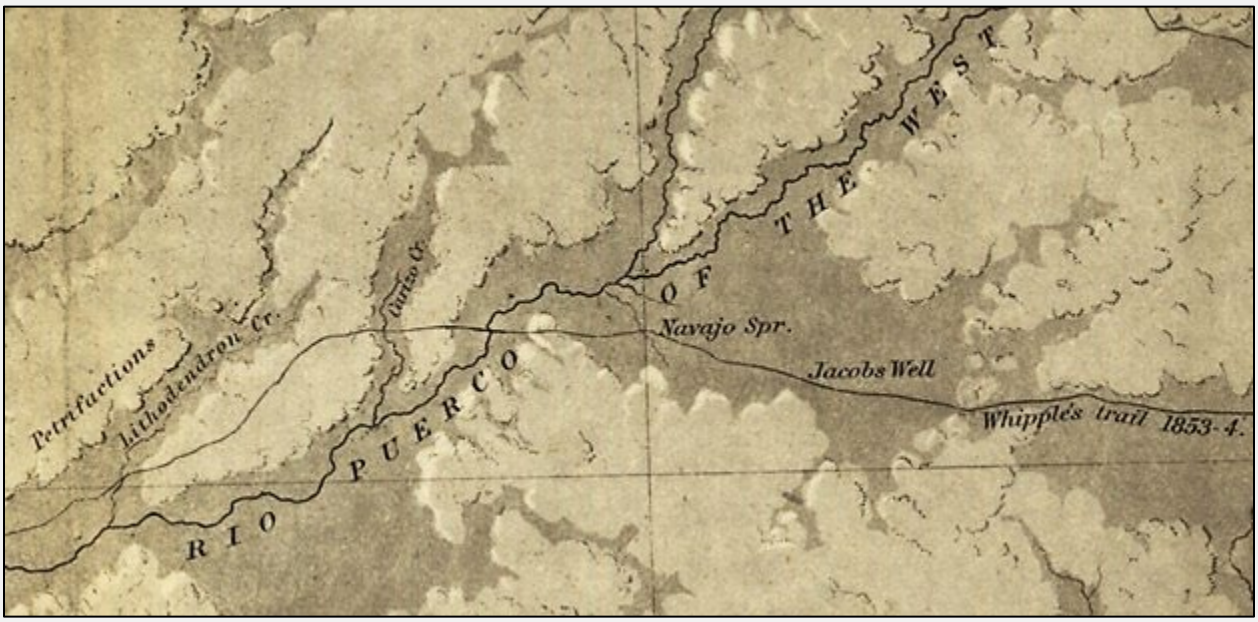
A7


Yampais Village

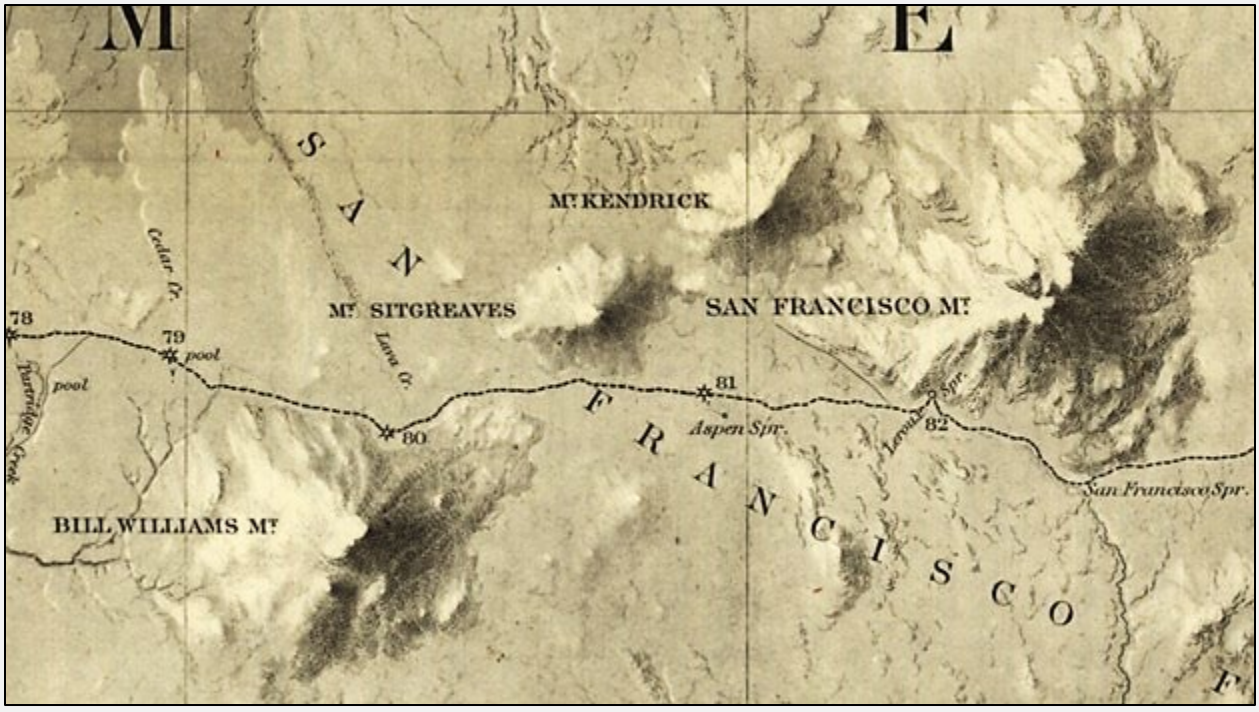
A8


Ruins
Arch Spr.
ZUNI
Old Zuni
Whipple's trail 1853-4.

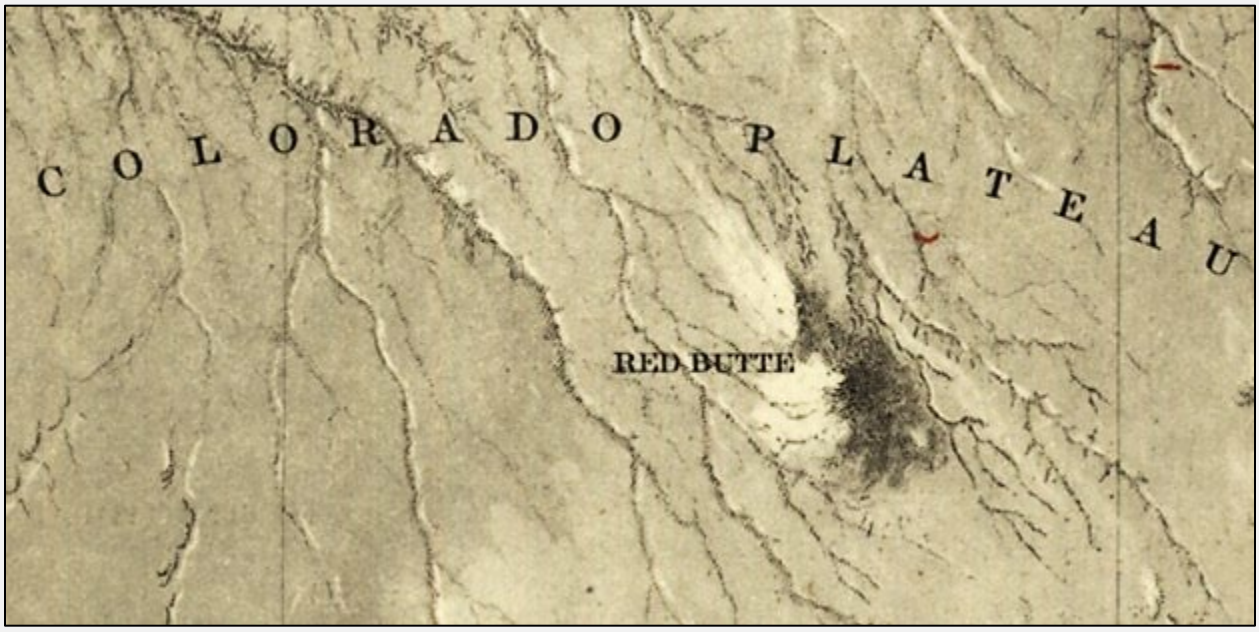
A9


Petrifactions
Lithodendron Cr.
Navajo Spr.
Jacobs Well
Whipples trail 1853-4.
RIO PUERCO
OF THE WEST

A10


Mt KENDRICK
Mt SITGREAVES
SAN FRANCISCO Mt
BILL WILLIAMS Mt
Cedar Cr.
Lava Cr.
Partridge Creek
pool
pool
Aspen Spr.
San Francisco Spr.
78
79
80
81
82
SAN FRANCISCO

A11



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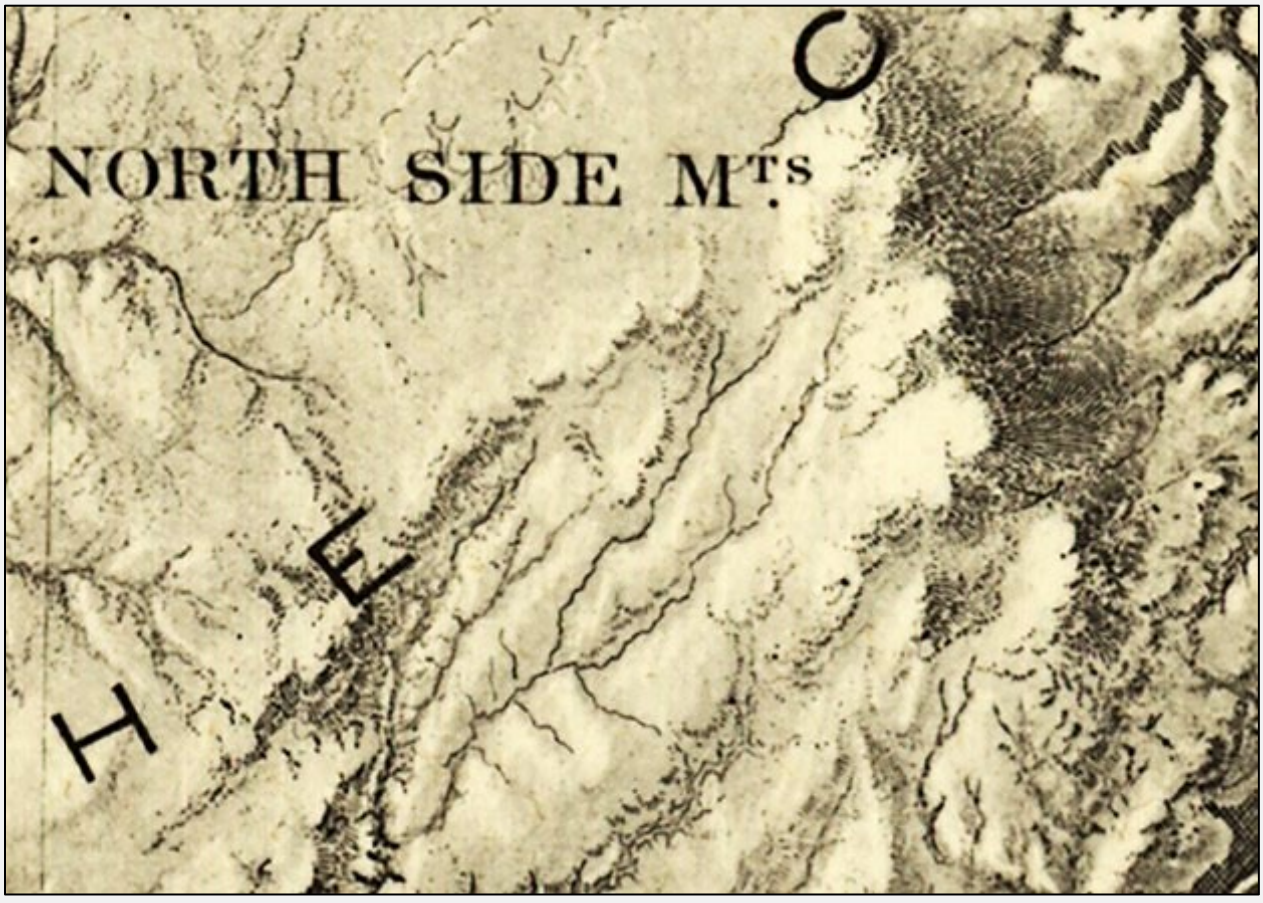

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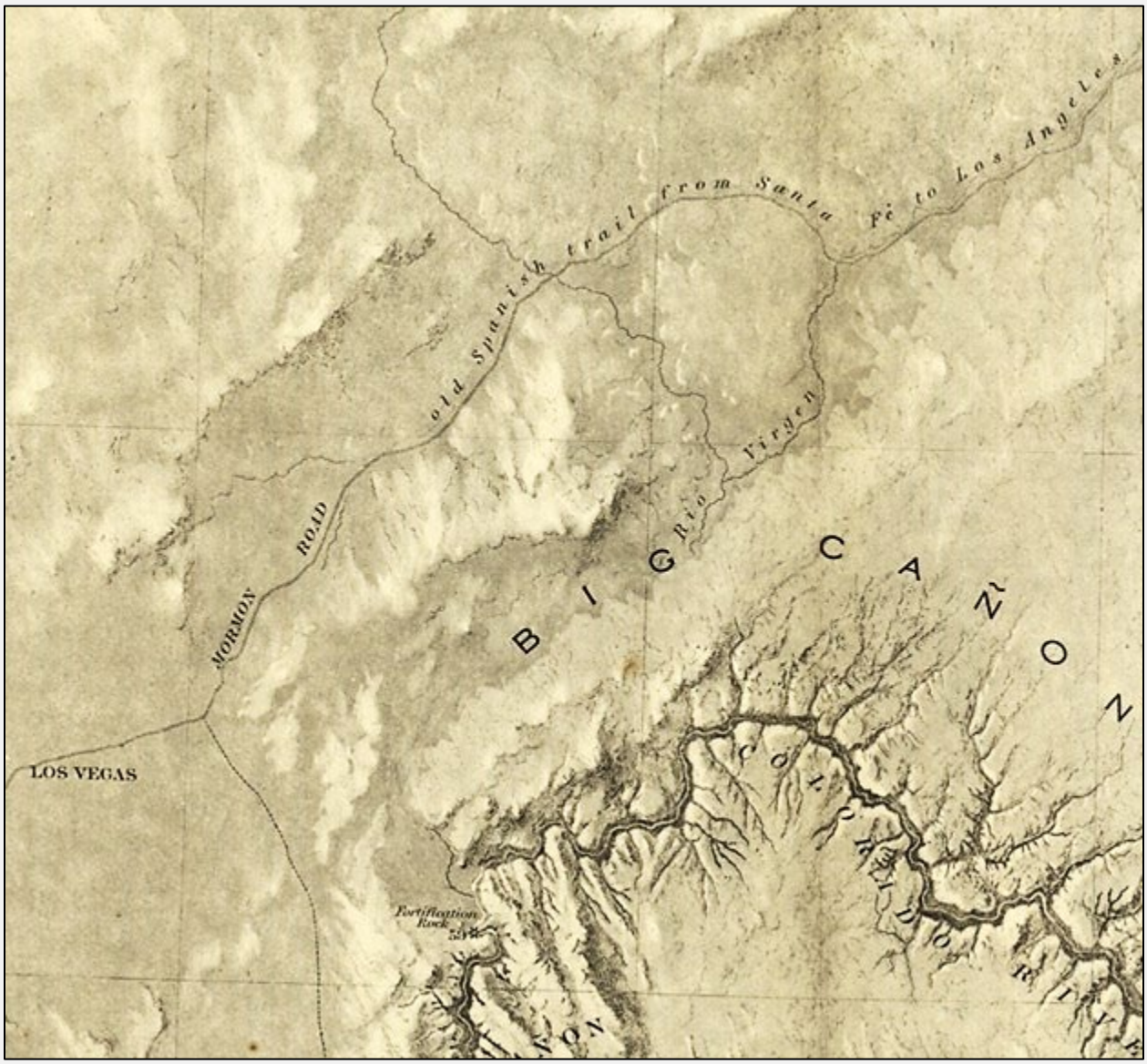
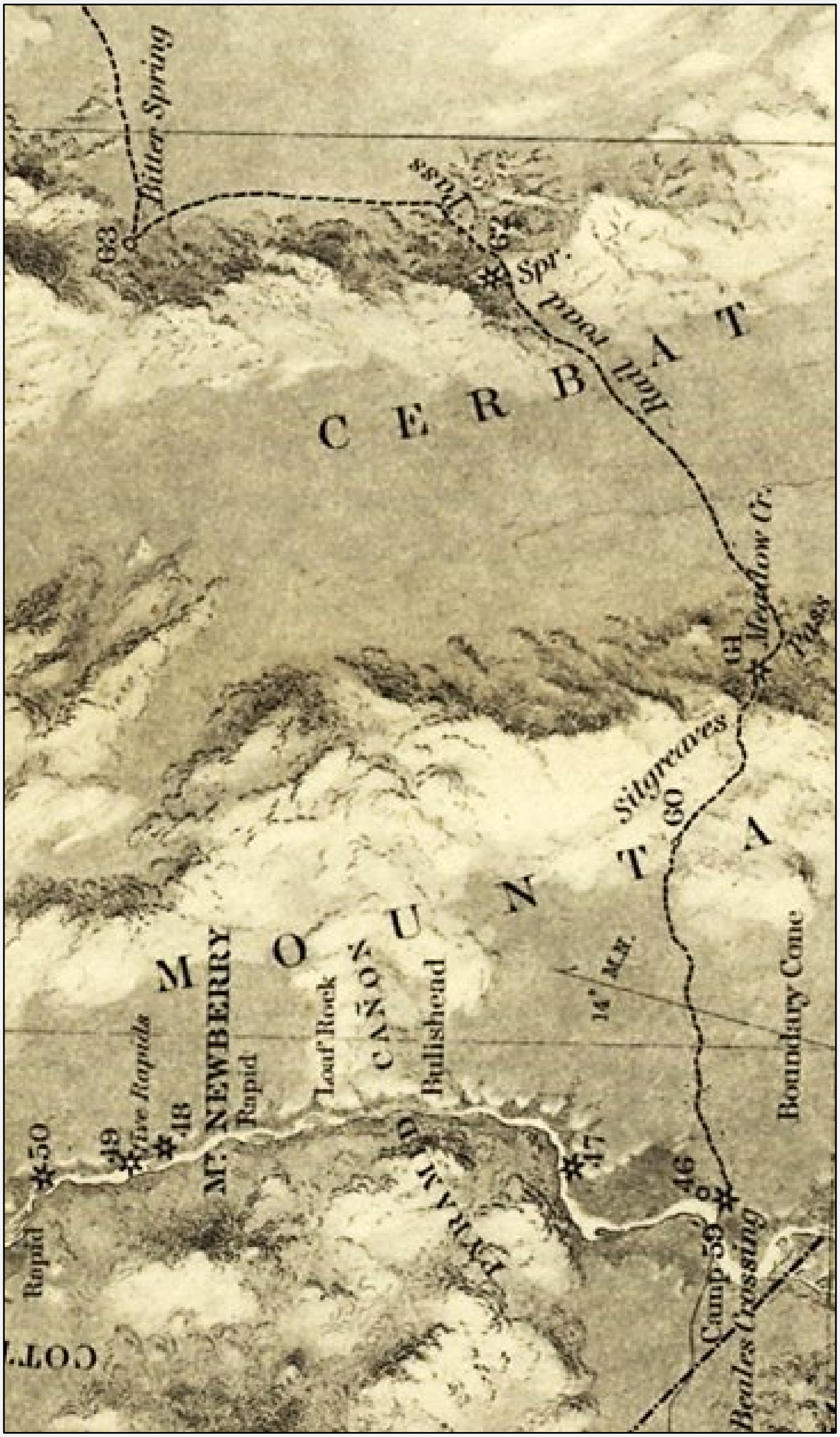
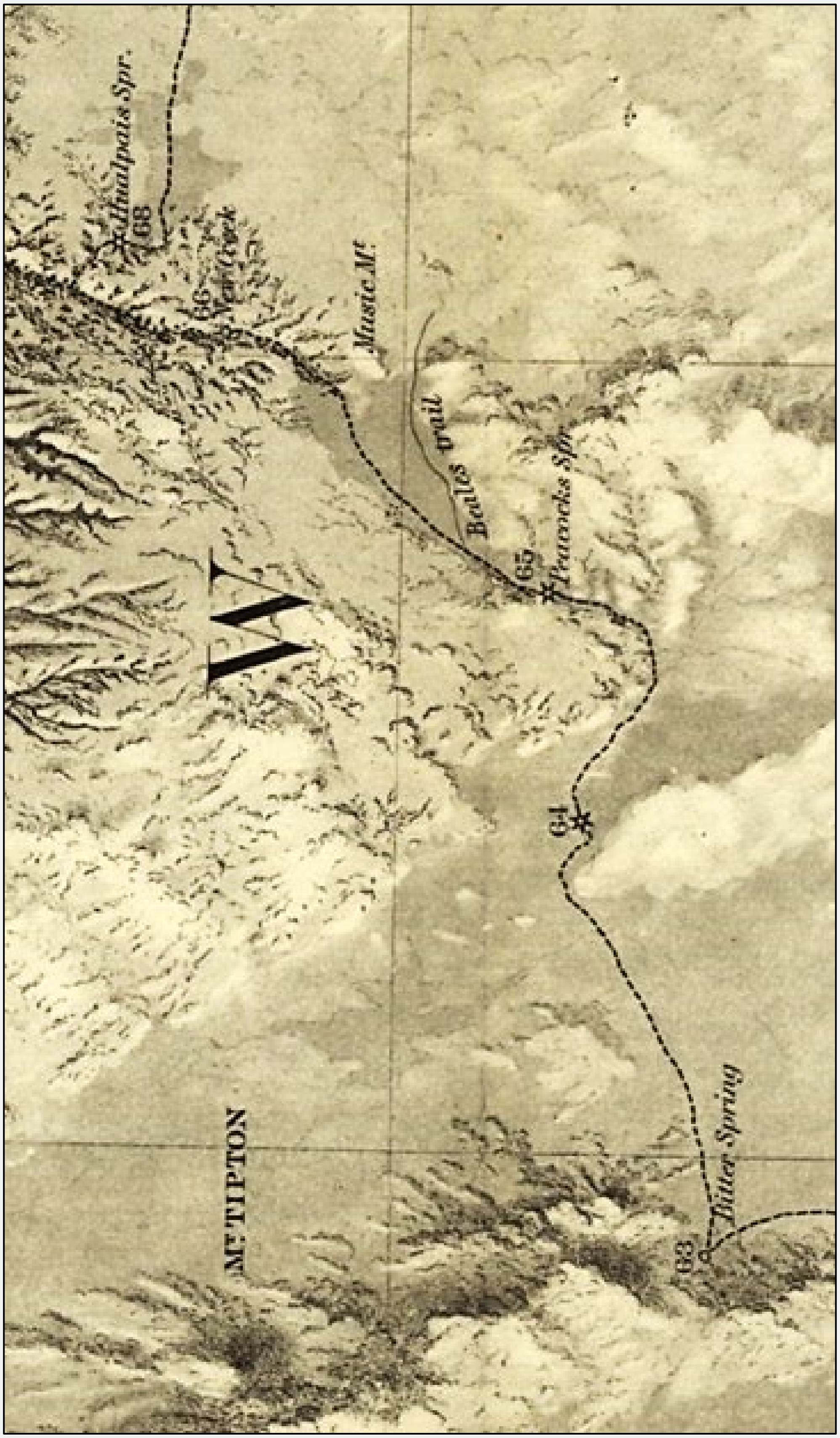

old Spanish trail from Santa Fé to Los Angeles
MORMON ROAD
Rio Virgen
B I G C A Ñ O N
LOS VEGAS
Fortification Rock
C O L O R A D O R I V E R

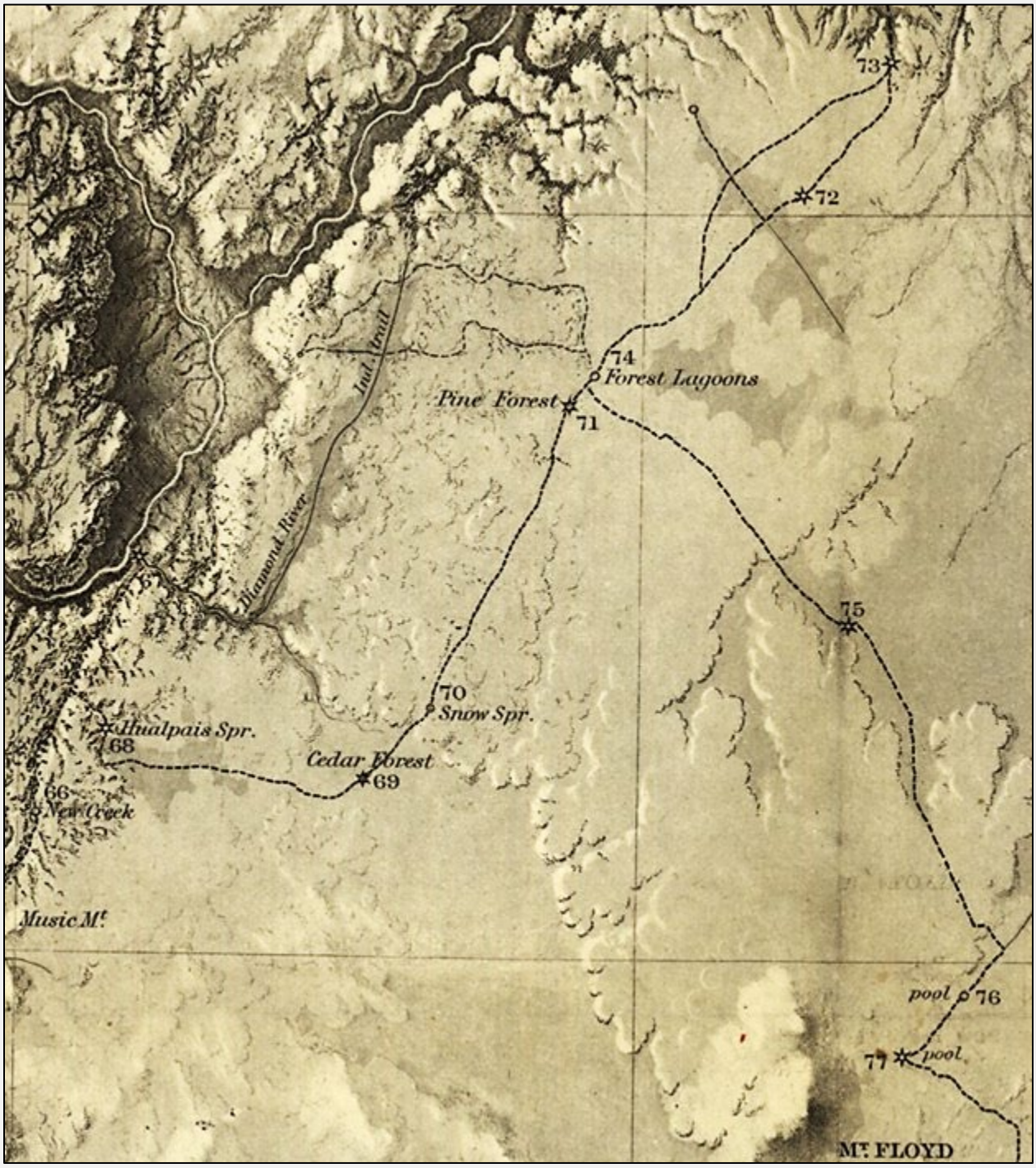
A14


Bitter Spring
63
Pass
62
Spr.
Hull road
CERBAT
Meadow Cr.
Pass
61
Sitgreaves
60
MOUNTA
M.T NEWBERRY
Rapid
Loaf Rock
CAÑON
Bullshead
14° M.E.
Boundary Cone
50
49
48
47
46
Rapid
Camp 53
Beales Crossing
COT

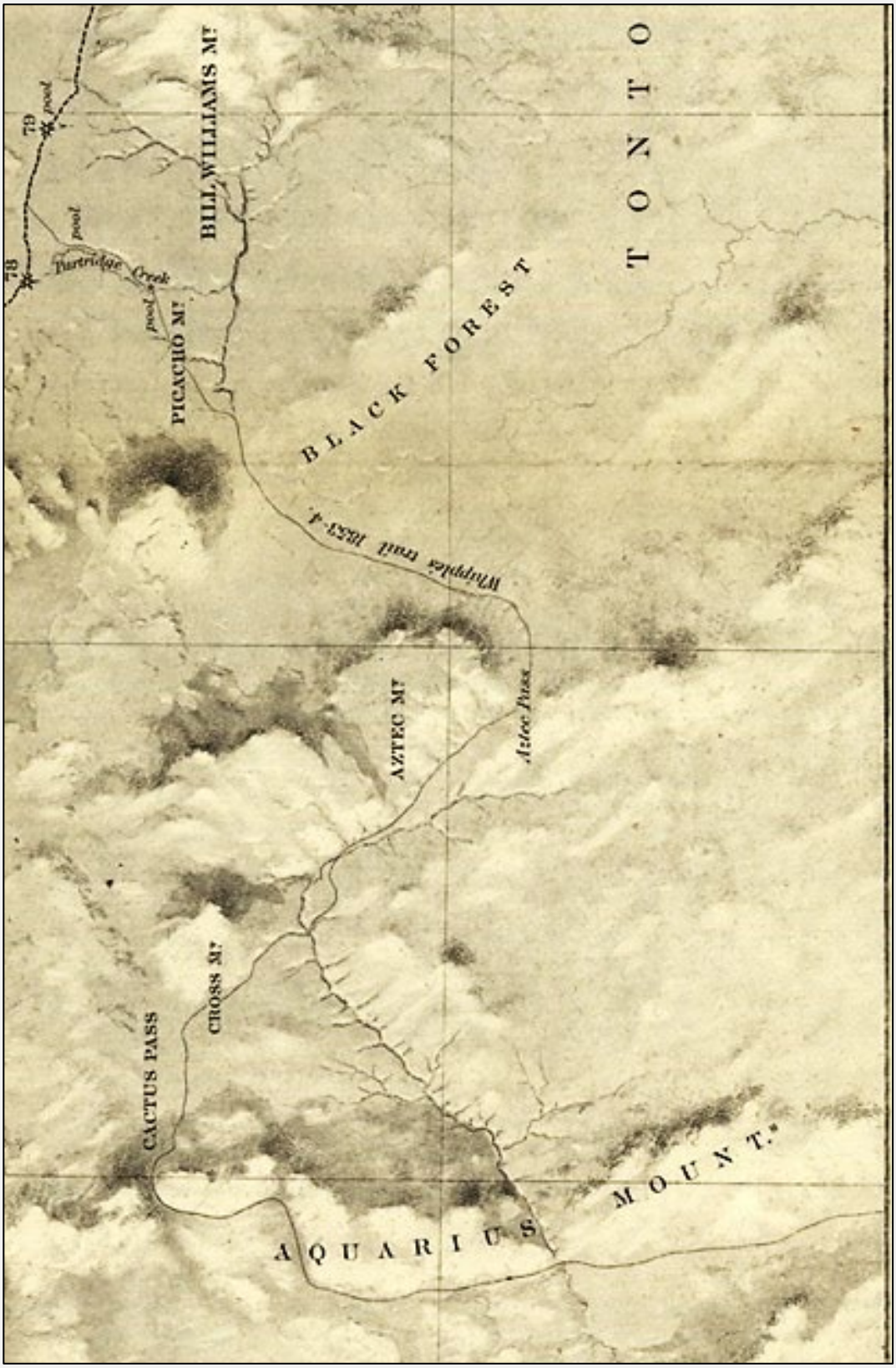
A15


Hualpais Spr.
68
Music Mt
Beales trail
65
Peacocks Spr.
64
Bitter Spring
63
MT TIPTON

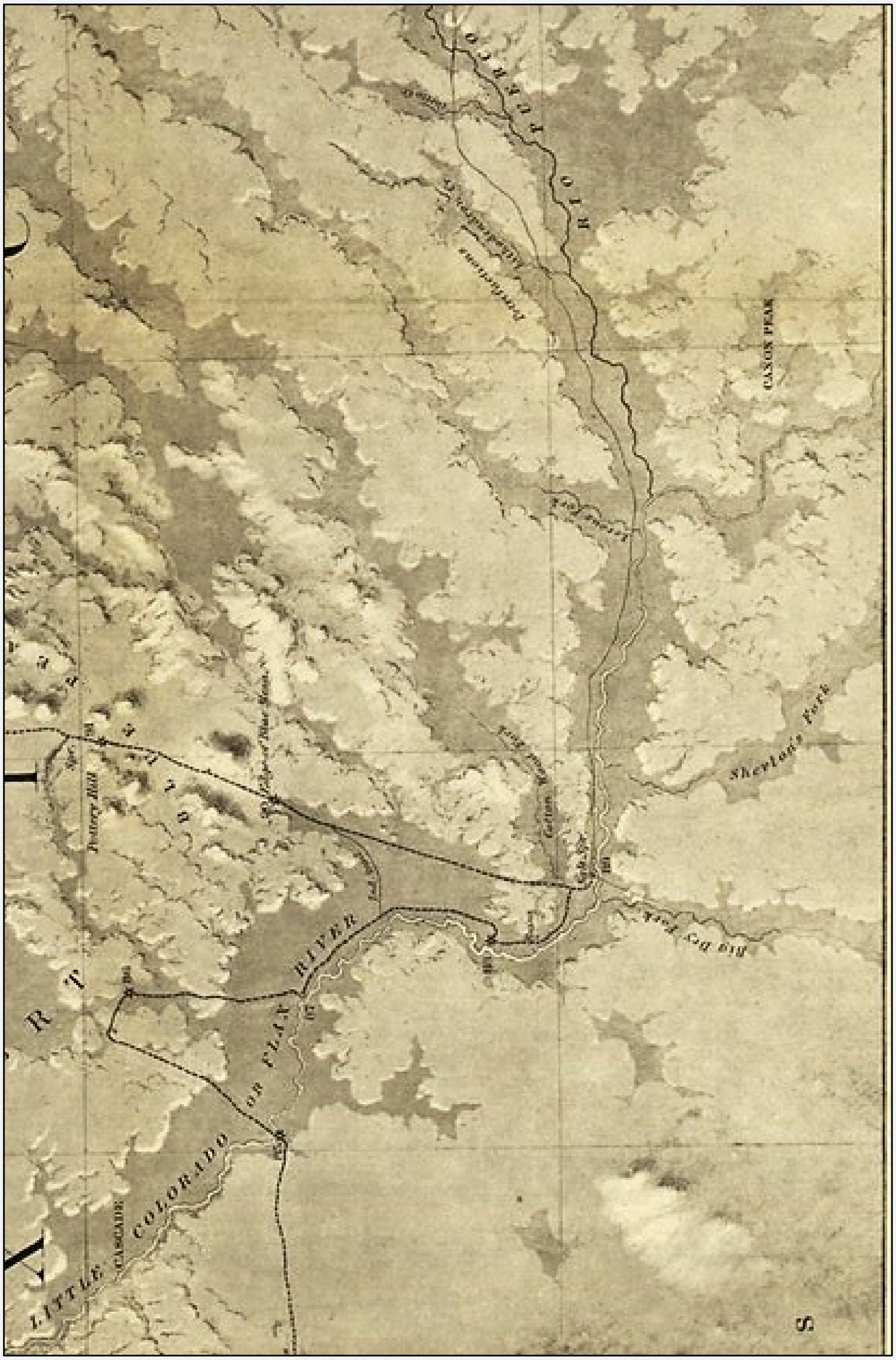
A16


73
72
74
Forest Lagoons
Pine Forest
71
Ind. Trail
Diamond River
75
70
Snow Spr.
Hualpais Spr.
68
Cedar Forest
69
66
Music Mt
pool
76
77
pool
Mt FLOYD

A17

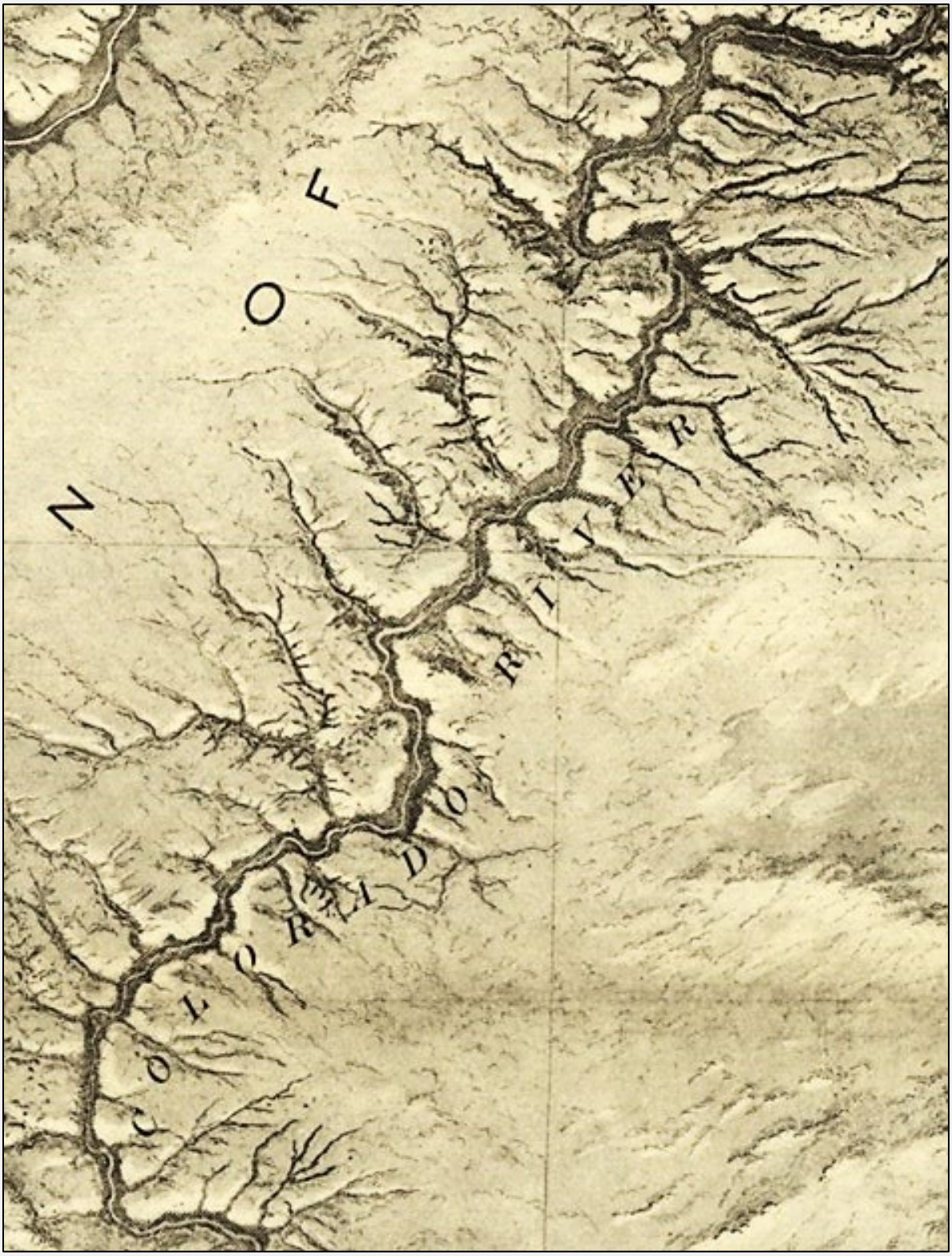

BILL WILLIAMS MT
79
pool
78
pool
Partridge Creek
pool
PICACHO MT
BLACK FOREST
TONTO
Whipples road 1859-4
AZTEC MT
Aztec Pass
CROSS MT
CACTUS PASS
AQUARIUS
MOUNT.

A18

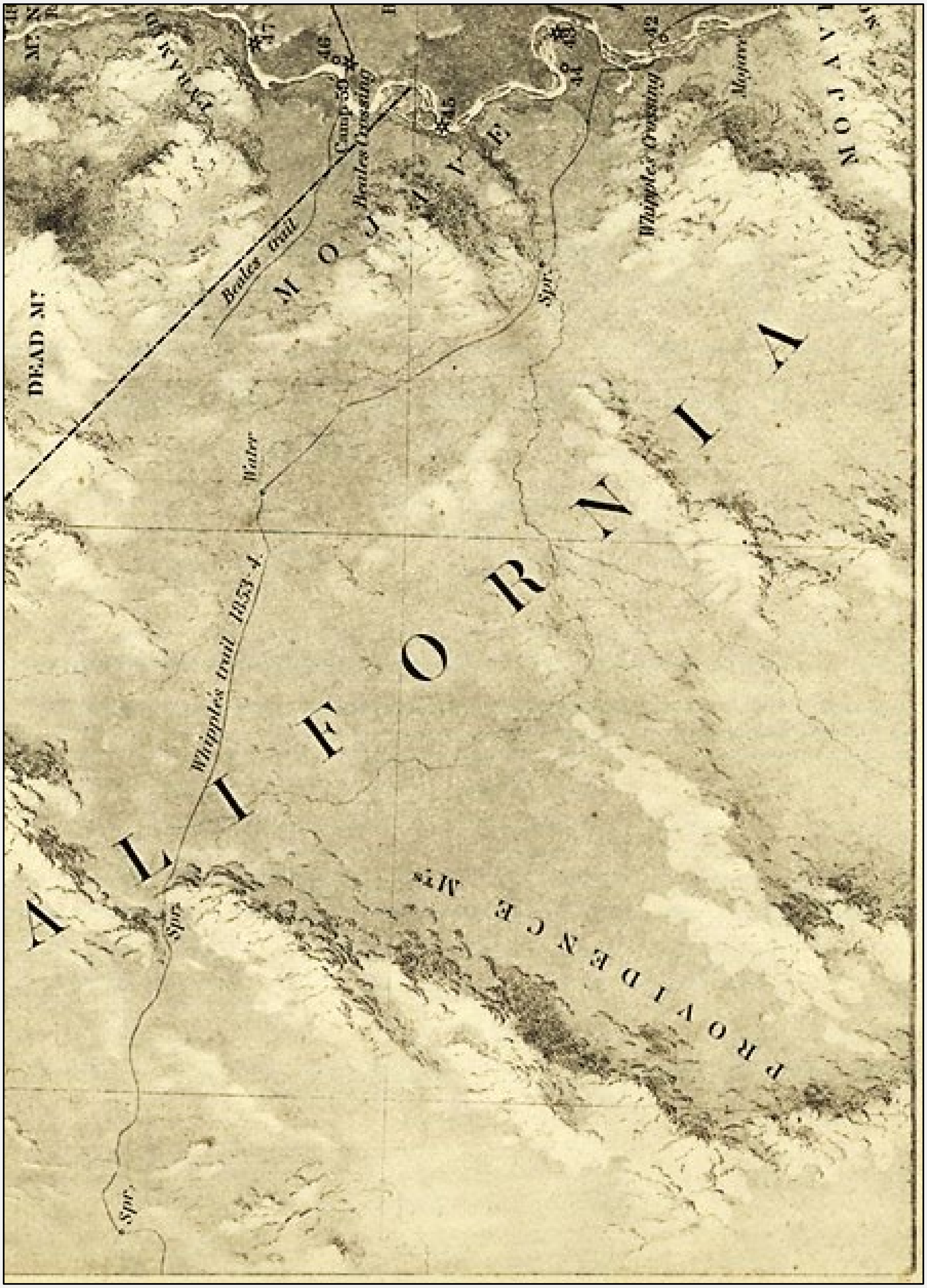

RIO PUERCO
CAÑON PEAK
LITTLE COLORADO
OR FLAX RIVER
CASCADE
Pottery Hill

A19


A20



A21


ALIFORNIA
PROVIDENCE Mts
MOJAVE
DEAD Mt.
Whipple's trail 1853-4
Beales trail
Beales Crossing
Whipples Crossing
Camp 39
Water
Spr.

A22

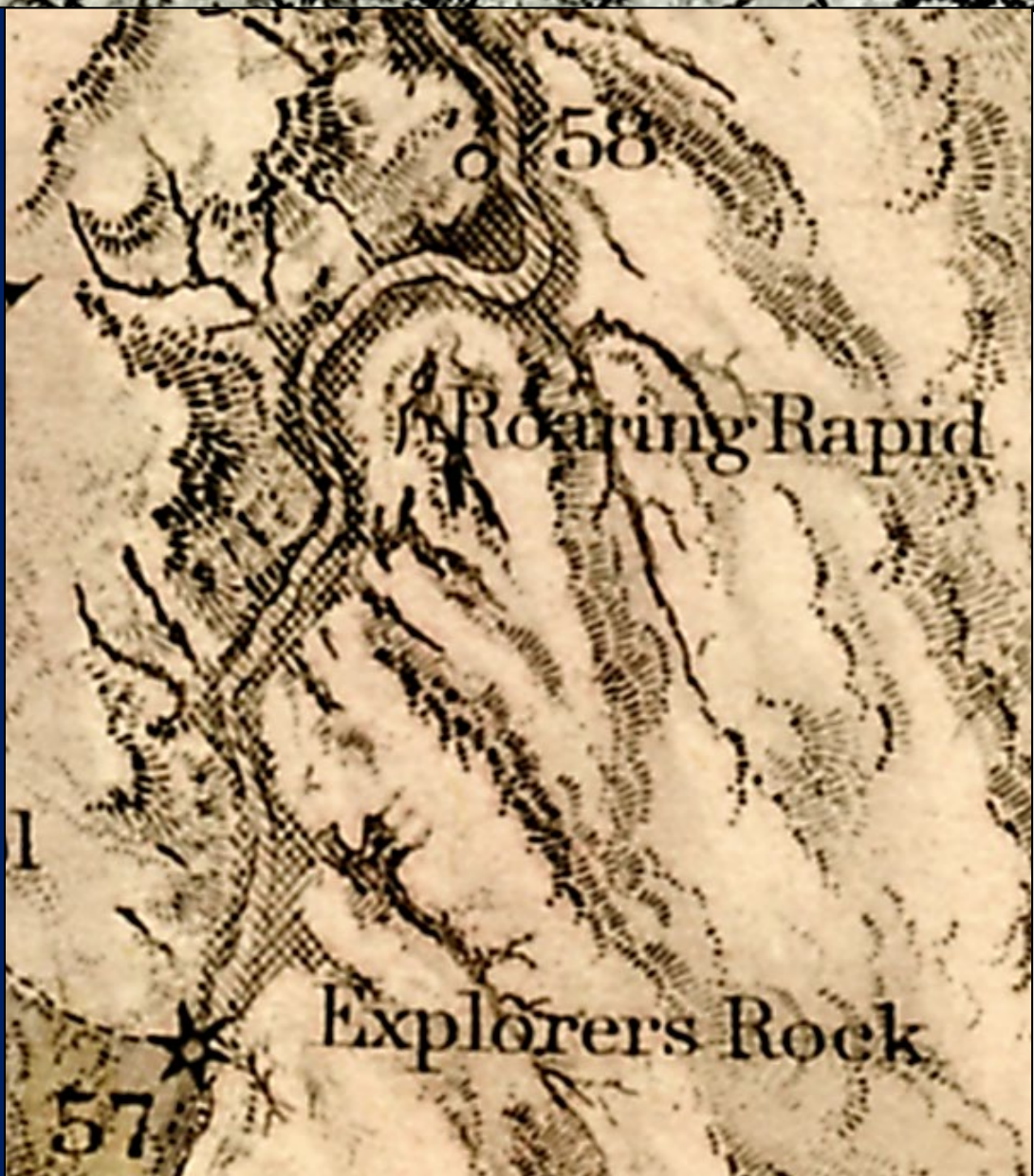
E N D

The RAVEN'S PERCH MEDIA colophon recalls this bird's habit of gathering and caching objects. Derived from original artwork by Balduin Möllhausen, it is a fine detail from the lithograph delineated by J. J. Young that is "General Report Plate VII" in Joseph C. Ives' *Report Upon the Colorado River of the West, Explored in 1857 and 1858* (Washington, 1861), which depicts a wintry camp just south of the Grand Canyon. The scene was sketched and described by Möllhausen on April 10, 1858, while he was perched in a nearby tree. He noted (in translation here), "a couple of ravens [*paar Raben*] croaked morosely on the bare branches of a dried-up fir tree as they waited impatiently for our departure, so that they could scout around the abandoned campsite for fat morsels." (Möllhausen, *Reisen in die Felsengebirge Nord-Amerikas bis zum Hoch-Plateau von Neu-Mexico, unternommen als Mitglied der im Auftrage der Regierung der Vereinigten Staaten ausgesandten Colorado-Expedition*. Hermann Costenoble, Leipzig, 1861, Vol. 2, p. 83.) Möllhausen's original watercolor painting is now in the Amon Carter Museum of American Art (Fort Worth, Texas; https://www.cartermuseum.org/collection/character-high-table-lands-1988146).

The Raven's Perch Media website was created in 2018, but Möllhausen's remarks on this very scene were not discovered until the translation was made for *Balduin Möllhausen's Grand Canyon*, another Raven's Perch Media production (2022).

“The devil is in the details.”

(Numerous attributions)



About the Author

My first field of study was geology at Rutgers University in the 1970s. For several years afterward I was in commercial publishing, writing about computer technology — before personal computers. In the early ’80s I began an established period of employment in natural history study collections, first at the New Jersey State Museum, then in the Academy of Natural Sciences of Philadelphia. My 18 years in the Academy’s employ began in 1986; before that I had been for 12 years a student research assistant and volunteer there. While on staff I was at various times a collection manager in several departments and collections—invertebrate paleontology, paleobotany, mineralogy, malacology, general modern invertebrates (a collection of organisms other than mollusks, insects and arachnids), diatoms, and modern botany; and continued to volunteer in vertebrate paleontology. My publications have embraced each of these fields — as well as historical and bibliographical topics about the Grand Canyon and Colorado River regions. Concurrently, for seven years I was editor and managing editor of the Scientific Publications branch of the Academy, which publishes peer-reviewed articles and monographs from authors around the globe in America’s oldest uninterrupted line of serials on natural history, from 1817. My last five years at the Academy was as its Archivist, for which I had studied in the graduate program of Temple University’s Department of History. On leaving the Academy in 2005 I continued my affiliation as an elected Research Associate. For the next 14 years I was Reference Archivist in the research library of the American Philosophical Society, a polymathic institution in Philadelphia founded in 1743 by Benjamin Franklin, whose staff supports the society’s membership, visiting researchers from around the world, and graduate level researchers on society fellowships. Since November 2018 I am enjoying an active retirement continuing all of these interests.

Following two visits to the Grand Canyon in 1974 that included my first canyon hikes, I began work on a bibliography of the canyon and the lower Colorado River country. In 1981, the Grand Canyon Natural History Association (now the Grand Canyon Conservancy) published the first edition as a part of its new Monograph series of scholarly publications. A second edition appeared in 1990, with a supplement in 1993. In January 2000, a completely revised bibliography was placed on the Association’s website, with its own URL, as a searchable database. Frequently updated, it was discontinued in 2021. In 2012, I privately published the first edition of *THE GRAND CANON*, a much-embellished resurrection of the print monograph, in digital format (PDF) that can be viewed in book layout on-screen or printed to paper. The fifth edition (2025), significantly revised, embraces the 16th to 21st centuries and now cites 111,000 items in 115 languages. (The separate *Cartobibliography* includes citations for maps of this period, with extensive chorographical notations.)

In 1989, the 28th International Geological Congress convened in Washington, D.C., which also offered an ambitious series of field trips across the United States, two of them on the Colorado River through Grand Canyon. My first river trip was with an IGC group. In 1990, I began working as a geology interpreter on yearly summer trips in Grand Canyon with a Colorado River outfitter, continuing this until 2001. I participated in two scientific study trips through the canyon under the Glen Canyon Environmental Studies program administered by the U.S. Bureau of Reclamation, on one of which I prospected for living mollusks, the first such investigation ever to have been made along this canyon river. In 1994, I had attended a Penrose Conference sponsored by the Geological Society of America, “From the Inside and the Outside: Interdisciplinary Perspectives on the History of Earth Science.” This conference for the first time brought earth scientists and historians together to discuss how each group approaches research in these complementary fields; from it I developed new perspectives in my research activities, which extended into revisions of the Grand Canyon–Lower Colorado River bibliography. In 2000, I attended a geology symposium at Grand Canyon on “The Colorado River: Origin and Evolution,” the proceedings of which were edited by Richard A. Young and me. In 2012 I was honored with the annual Pioneer Award from the Grand Canyon Historical Society. Among many affiliations I hold life memberships with the Grand Canyon Conservancy, the Grand Canyon River Guides, and the Arizona–Nevada Academy of Science.

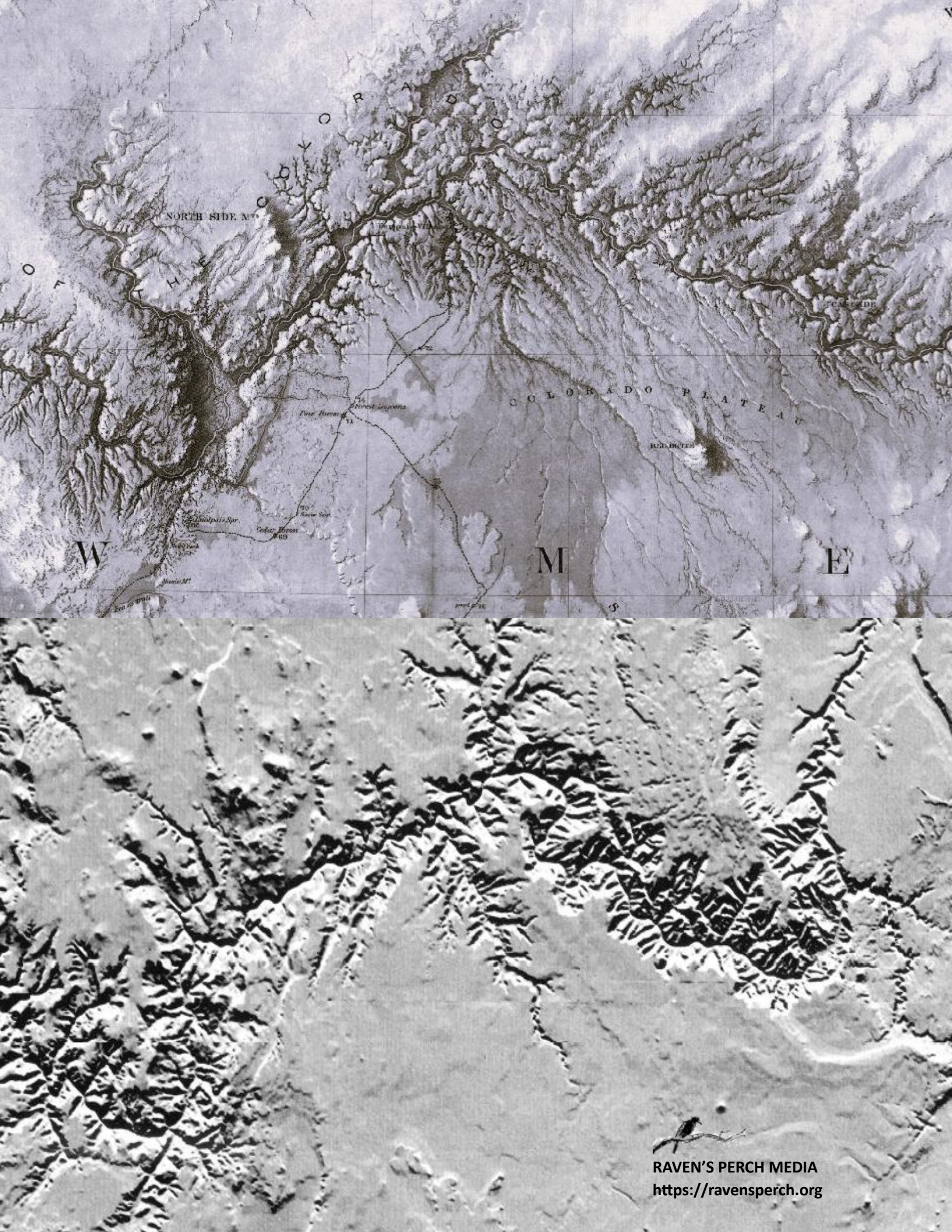
EARLE E. SPAMER
(pronunciation: *Spah*’mer)

Curriculum Vitae available at Raven’s Perch Media and at Academia.edu

BACK COVER — Then and Now.

(Top) 1858: Shaded relief “Map No. 2. Rio Colorado of the West” by F. W. von Egloffstein *(detail)*.

(Bottom) 1990: “Experimental Digital Shaded-Relief Maps of Arizona” by Kathleen Edwards and R. M. Batson (USGS Miscellaneous Investigations Series Map I-1821, Sheet 2) *(detail)*.



RAVEN'S PERCH MEDIA
https://ravensperch.org