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**A DEFINING TIME:  
The California State Geological Survey and its Temperamental Leader, Josiah Dwight Whitney**

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**ABSTRACT**

Josiah Dwight Whitney's accomplishments as California's State Geologist and director of the California State Geological Survey from 1860 to 1874 have been well-recognized. Whitney and his associates brought to the Survey the best science of their era that shaped their exploration, mapping, and collection of plant, fossil and mineral specimens. For the first time, they created a comprehensive physical definition of a state only haphazardly explored and described up to that time. Whitney's self-certainty in his expertise and personal views often led to tumultuous, even self-defeating, relations with California's elected officials. Nevertheless, they appointed him to two state commissions with ground-breaking goals. The first, which he headed, offered advice on what a new state university should do and be. The second oversaw management of the federal lands known as the Yosemite Valley and Mariposa Grove of Big Trees Grant, assigned to California for preservation of their unique scenic landscapes. While previous historians have passed lightly over Whitney's contributions to these defining enterprises, Whitney's grounding in the state's Survey led to his distinctive contributions to these commissions and are worth a closer look.

**Keywords:** University of California history, Yosemite National Park history, California State Geological Survey history, Josiah Dwight Whitney

*California is all the rage now... We are already planning to secure the geological survey of that interesting land, where the farmers can't plough their fields by reason of the huge lumps of gold in the soil.*

Josiah Dwight Whitney to his brother, William D. Whitney, December 11, 1848

By the end of the year 1860, the California State Geological Survey was off to a dashing start. With a generous legislative allocation of \$20,000, the Survey settled into plush headquarters — the Montgomery Block building at 67 Montgomery Street. The building was a wonder in its own right. San Francisco had burned down over and over again during its chaotic growth as the destination for argonauts from around the world seeking to see whether the rumors of gold nuggets in farmers' fields would make their fortunes. In 1853, on a foundation of redwood trees, the city's first fireproof building went up, a marvel of iron framework, brick and Portland cement. San Francisco's businessmen and lawyer elite participated in their own rush to rent offices in the Montgomery Block's pricey space.<sup>1</sup> Among them came the newly arrived State Geologist and Geological Survey director, Josiah Dwight Whitney, whose national prestige as a scientist made him a great catch for California.<sup>2</sup>

He intended to be caught. His education and career inevitably pointed him toward this plum job in the exciting world of 19th century explorer scientists<sup>3</sup>. As early as 1849, he signaled his interest in leading a detailed science-based survey of California, an ambition he kept fresh during California's first rambunctious decade of statehood. The legislature at last passed the Organic Act of 1860, establishing the position of State Geologist in charge of a comprehensive survey "with such assistants as he may appoint, to make an accurate and complete Geological Survey of the State, and to furnish...proper maps and diagrams thereof, with a full and

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scientific description of its rocks, fossils, soils, and minerals, with specimens of the same." When offered the position, Whitney readily accepted it, as well he might, since he had been able to draft the Organic Act language under which he would be working.

The 13 years of the Survey that followed were tumultuous and the results astonishing, given the difficulties that had to be overcome. As William H. Goetzmann has convincingly argued in *Exploration and Empire: the Explorer and the Scientist in the Winning of the American West*, the Survey would point the way for the four great reconnaissances of the American West and ultimately, creation of the U.S. Geological Survey.<sup>4</sup> Whitney proved himself a leader of men, gathering a stellar staff of explorer scientists that matched him in rugged energy and expertise. Many would go on to extraordinary careers of their own. His Survey men were admiring and loyal to their leader. The same could not be said for those on whom the Survey depended for its funding. If the Survey years were tumultuous, the tumult was often of Whitney's own making.

With pride and total certainty in his experience and expertise, Whitney didn't simply refuse to suffer fools gladly: "it was with some obvious effort that he suffered fools at all."<sup>5</sup> Given his views of most elected officials in California, on whom he freely exercised his "gruff manner and whiplash tongue" in private and public, this did not make him an ideal negotiator when difficult fiscal decisions needed to be made.

This said, during the course of the Survey, Whitney would be asked to advise on the future of two institutions that would in different ways define California. However rocky his relations with the governmental powers in Sacramento, men of education were in short supply during California's bumptious early years. The legislature asked him to chair a commission to advise on a new state university. In addition, he was also asked to offer scientific analysis and advice on the disposition of a remarkable and unique gift of land from the federal government to the state of California — the Yosemite Valley and Mariposa Grove of Big Trees Grant. It is a shame, then, that except for his path-breaking contributions with the Survey, Whitney's activities on behalf of a university and the Yosemite Grant have been lightly passed over by historians. These are worthy of a second look in the context of his successes in attempting a comprehensive physical definition of the state of California.

#### **WHITNEY'S EARLY LIFE AND CAREER**

Josiah Dwight Whitney was born on November 23, 1819 in Northampton, Massachusetts, into a wealthy, patrician New England family. As the oldest of 13 children and the first-born son, Whitney had advantages that came with high expectations. He was cultured and well-educated: a skilled musician, immersed in classical literature, and a graduate of Yale University, where his 1839 graduating class of 93 could readily join one another in a \$3 apiece celebratory dinner. Yet he could also be shy and unsociable outside his circle of family and friends.<sup>6</sup>

Like Frederick Law Olmsted and John Muir, whose paths he would cross in California, Whitney was slow to find his vocation. When he graduated from Yale, his family had him marked out for law school at Harvard. He, on the other hand, had a growing interest in chemistry and geology, spurred by hearing, first, Yale's great Benjamin Silliman, Sr. lecture on chemistry and later, the eminent English geologist Sir Charles Lyell. Whitney apprenticed himself to Boston's leading chemist and mineralogist, who was also the New Hampshire State Geologist, Charles T. Jackson. An unpaid volunteer, Whitney worked in Jackson's chemistry laboratory and assisted him in the New Hampshire Survey. Such uncompensated work represented the 19th century version of an internship, and as we will see, others would learn how to do scientific and field work as Whitney had, accepting experience in place of pay.

According to his biographer, the first state surveys, including that in New Hampshire, actually represented a poor training ground for science, though the situation was evolving. Nevertheless, to judge from Whitney's letters from the field to his sister Elizabeth, they offered a lot of experience in camping and wilderness adventure.<sup>7</sup> His early descriptions brim with delight over the natural beauty, wildlife and feasts on game and fish afforded by wilderness life. While his later letters admitted to discomforts such as mud, cold nights and the difficulty of the field work itself, Whitney's sense of humor emerged some years later in his proposed "coat of arms," featuring a tent, field tools crossed, campfire and pot, and other symbols of outdoor living — signs of his embrace of the surveyor's rough life.<sup>8</sup> His stamina in the face of the hardships of outdoor life would stand him in good stead in California, where travel in the unmapped interior, mountain and desert regions presented some of the most difficult and challenging geography in the United States. And his dedication to seeking the best science education honed his own contributions to survey work, culminating in the California State Geological Survey. As director, he not only applied his own scientific understanding, he trained others how to do so as well.

Science education was a desultory business in mid-19th century America. Many who aspired to enter the dynamic world in which the sciences were then being shaped became physicians, the closest approximation to scientific training available in the United States. Charles Jackson had followed this pathway, while Yale's eminent chemistry and natural history professor, Benjamin Silliman, Sr., was trained as a lawyer. An American who was serious about science went to Europe to study, particularly to France

and Germany. Aided by Jackson's good words on his behalf and Whitney's own protestations that scientific training would allow him at last to support himself, he won his father's agreement to underwrite study and travel in Europe, beginning in 1842, for preparation in chemistry and geology. He first attended France's Ecole des Mines in Paris, then in the latter part of his five-year European sojourn, went to Germany to attend the University of Berlin. Notably, Whitney wrote to his sister that Alexander von Humboldt — "the *doyen* of scientific men" — continued to be in residence at the university.<sup>9</sup> The late 18th-early 19th century German explorer and scientific thinker had thrilled Europe and the United States alike with his exploration and discoveries in Latin America. Not only was he an influence on Whitney's future wilderness adventures, John Muir later declared, "I would be a Humboldt" on his way to South America to follow in Humboldt's footsteps. (As it happened, a bout of malaria ended up redirecting him to California.)

Whitney's tentative steps toward a chemistry career changed to geology when Charles Jackson was appointed to head Michigan's Lake Superior Survey of 1847-50. Jackson paid Whitney to be his first assistant while other unpaid volunteers joined the survey for proto-internships. The purpose of the survey was to explore the unexplored Isle Royale and Upper Peninsula wilderness to find new iron ore deposits, collect specimens, catalogue potentially valuable natural resources, make climatological measurements and complete a topographical survey. Before the survey was completed, Michigan legislators became dissatisfied with Jackson, whose work in the field was undercut when he became ill. The upshot was that Whitney and his fellow assistant took charge of completing the survey, which they did in 1850.

As in New Hampshire and Michigan, the state governments were mounting surveys to know what they had, particularly what resources, whether ores or agricultural lands, might be exploited on behalf of attracting settlers and adding to the state coffers. Topographical mapping met the need to know where the resources could be found, and assessments of climate suggested how easy or difficult exploiting those resources might be. For the explorer scientist, discovery and naming of new resources was an exciting by-product of the definition of a state's natural wealth. However, an emphasis on scientific discovery, as Whitney would find in California, made legislators impatient when what they really wanted to know was where the next big strike was located.<sup>10</sup>

Whitney cemented his scientific reputation with the 1854 publication of *Metallic Wealth of the United States*, a standard reference for the next 20 years.<sup>11</sup> As one outcome, he was hired to lead additional surveys in Iowa and Wisconsin. These surveys added an experience that would foreshadow what became his greatest difficulty with the work in California. Charles Jackson had had trouble with both the New Hampshire and Michigan legislatures in receiving timely funding for state survey work. As de facto head of the Iowa Survey in 1856, Whitney had to deal with what his biographer labeled the "happy-go-lucky character of Iowa's finances."<sup>12</sup> Whitney had similar problems with what he called the "wastefully inefficient" Wisconsin legislature.<sup>13</sup>

### **WHITNEY'S CAMPAIGN TO LEAD THE CALIFORNIA STATE GEOLOGICAL SURVEY**

On hearing the first sensational news about the discovery of gold in California, Whitney began formulating a campaign to become the state geologist. In January 1849 he requested that his brother send him "Dufлот de Mofras's books on Oregon, California, etc" and learned that Robert C. Winthrop, U.S. Representative from Massachusetts and Speaker of the House, promised to back his application. Whitney thought about a plan with "full scientific analysis" that he would present to the American Academy of Arts and Sciences, whose support would place Whitney in a strong position. These ideas were premature. However, they were not far from his mind in his *Metallic Wealth* discussion of gold in California: "It is to be regretted that a geological survey of the interesting region has not been instituted, since were such to be carried on by competent men, the results would possess a high degree of practical and scientific interest."<sup>14</sup>

Whitney was hardly alone in his call for a state survey. The year before publication of *Metallic Wealth*, seven amateur scientists founded the California Academy of Natural Sciences, the first scientific society west of the Mississippi. According to its 1853 constitution, the academy's object was to be "the investigation and development of natural science, the collection of a cabinet of specimens and a library...It is due to science, it is due to California, to her sister States, and to the scientific world that early measures be adopted for a thorough systematic survey of every portion of the State and the collection of a cabinet of her rare and rich productions."<sup>15</sup>

Some of this work had indeed been done before Whitney arrived, though in a scattershot way. An 1853 survey report on a route for the proposed transcontinental railway included work by geologist William P. Blake. Also, the California legislature appointed one of the California Academy founders, physician John Boardman Trask, as the first state geologist. He made several official reports between 1853 and 1856, though they were limited to the habitable portion of the state.<sup>16</sup> And under the East Coast aegis of Alexander Bache's United States Coast Survey, George Davidson had directed a survey of the California, Oregon and Washington coasts, beginning in 1859. The sum total of these efforts was limited and fragmentary at best. As Whitney would discover, "there existed no satisfactory base map" on which geological and other discoveries could be recorded.<sup>17</sup>

In 1860, Whitney's chance at last came. Whitney's sister Elizabeth, his favorite correspondent during his early days of field work, had married S. Osgood Putnam of Milwaukee and moved with him to San Francisco when he became the secretary of the California Steam Navigation Company. She was eager to help her brother achieve his California goal and called on her husband to help. A man of influence, Putnam won for the proposed state survey the support of other influential Californians, including state Supreme Court Judge Stephen J. Field, whose East Coast brother was a friend of the Whitney family. State legislator John Conness also provided key support. Upon election to the United States Senate, Conness would come to play a central role in the Yosemite Grant of 1864.

These prominent men helped persuade the California legislature to support a state survey and the search was on for the State Geologist and Survey director. Whitney had assembled a stellar list of supporters of his candidacy drawn from the East Coast scientific pantheon. Among them were the founder of Harvard's Lawrence Scientific School, Louis Agassiz; from Yale, the Benjamin Sillimans, Sr. and Jr., metallurgist George Brush, and America's leading geologist, James Dwight Dana; Alexander Bache of the United States Coast Survey; and Joseph Henry of the Smithsonian Institution. It was a sign of Whitney's prestige as an American scientist that he could draw such support.<sup>18</sup> He did have rivals for the position, including his old boss Charles Jackson and William Blake of the railway survey. But with no more than some political sentiment in the legislature to back Blake, what chance did he — or Jackson — have against Whitney's star-studded list?

Whitney was at last appointed California's State Geologist when the legislature passed the Organic Act of April 21, 1860. Now he faced two considerable chores. The first was to recruit talented and hardy potential explorer scientists for the Survey. The first hire he made before leaving the East Coast proved an auspicious beginning. Upon the advice of Yale's George Brush, he hired William H. Brewer as his Principal Assistant.<sup>19</sup>

Brewer was born on September 14, 1828 and grew up on a farm in upstate New York. In 1852, he received a degree as part of the first class of Yale's School of Applied Chemistry, later named the Sheffield Scientific School, where he specialized in agricultural chemistry. Fellow graduates included George Brush and William P. Blake. Whitney's deputy needed to be "of the strongest fiber, of unflagging energy, the soundest judgment, the utmost tact, and of unequivocal honesty and loyalty. Happily, these were the very qualifications that distinguished the character of Brewer."<sup>20</sup> Their mutual admiration was expressed by Whitney's declaration that Brewer was a "capital assistant"<sup>21</sup> and Brewer's assertion that Whitney was a "capital fellow."<sup>22</sup>

Whitney's second chore was to make his way to California to launch the Survey. Reaching California was no small matter in 1860. He eschewed the multi-month overland journey and the notoriously hazard-ridden six-week sea voyage around Cape Horn in favor of going by way of the Isthmus of Panama. The route had been made quicker by a recently completed rail line between the coasts, but difficulties nevertheless remained, complicated by disease and uncertain ship schedules on the Pacific coast. Whitney left Northampton on October 18, 1860, bringing his wife, Louisa, his young daughter Eleanor, a maid and utility man on what turned out to be a one-month trip. Whitney had sent baggage ahead, including the scientific instruments required for the Survey field work, under William Brewer's supervision. The voyage brought them together face to face for the first time, as they sailed to Panama, crossed the isthmus and traveled up the Pacific coast to San Francisco. According to Brewer, they were greeted with great excitement when their ship docked, their arrival heralded via the Pony Express. Among the prominent citizens looking forward to meeting them were Judge Stephen Field and Governor John Downey.<sup>23</sup>

Whitney's own sharp-tongued first impression was typical: "What struck me most in San Francisco (next to the dirt and fleas) was the restless energy with which people follow the business in which they are engaged."<sup>24</sup> Brewer would later give a much more appealing picture of San Francisco, as seen from the Whitney family home: It stood "several hundred feet above the city...with a most lovely view... [On] lovely moonlight nights the scene is surpassingly beautiful. The city below, basking in the soft light, the myriad gas lights, the bay glittering in the moonbeams, the ships, the opposite shore in the dim light, all form a picture that must be seen to be appreciated."<sup>25</sup>

Only Whitney enjoyed the company of his family. He required his recruits to be unmarried, since in Whitney's judgment, they would not earn enough to support a family on the anticipated salaries of \$1,200-\$1,500, given the high cost of living in California. With a starting salary of \$6,000, Whitney made an exception of himself. Brewer had readily accepted the Principal Assistant offer owing to the sad happenstance that his wife and infant son had just died.

Whitney attracted a group of Survey associates, some of whom would become legendary. Joining the Survey in 1862, topographer Charles Hoffmann possessed extraordinary surveying and mapmaking skills. He "refined [Whitney's use of triangulation and barometers] in ways...used both by the great western surveys of the 1860s and '70s and by the U.S. Geological Survey, begun in

1879.<sup>26</sup> One of the greatest and most influential achievements of the Survey proved to be new higher standards for mapmaking in America.

The Survey's initial field assistant William Ashburner, a relative of Judge Stephen Field, had been trained at the Paris Ecole des Mines as a mining engineer. He had also been a student of Louis Agassiz's Lawrence Scientific School at Harvard. Victim of a bout of scurvy, he proved not up to the hardships of the field. William Brewer has detailed the thousands of miles, covered by foot and mule on bad or no trails, required to do the hard work of exploration, collection and accurate measurement. Moreover, the field assistants endured stretches of meager food and natural dangers that included rattlesnakes and the unpredictable grizzly bear — plus occasional run-ins with human desperados.

That said, there was important work to be done with the results sent in from the field. Ashburner remained in the San Francisco office conducting the necessary analyses of the mineralogical specimens collected by the field party. In 1863 he resigned to manage John C. Fremont's Mariposa gold mine and continued to assist the Survey at a distance. Over the coming decade, he contributed leadership to both the Yosemite Grant commission and planning for the new University of California.<sup>27</sup>

The young paleontologist William Gabb would also go on to a notable professional career. His work produced the first Survey publication in 1864. With Whitney, his discoveries revealed in which strata gold deposits might be found.<sup>28</sup>

Among the unpaid volunteers was the man for whom the Survey did indeed provide a career-shaping internship. An 1863 graduate of Yale's Sheffield Scientific School, Clarence King had been drawn to geology by James Dwight Dana and also by lectures given by Harvard's Louis Agassiz. His excited interest in California was capped when he heard George Brush read a letter from Brewer that described his climb with Whitney to the summit of Mt. Shasta. King persuaded fellow Sheffield graduate James T. Gardiner to join him on the strenuous trek across the United States to be part of the Survey.

With letters of introduction from Brush, Dana and others — lost in an accidental fire en route — King and Gardner bumped into Brewer on a Sacramento steamboat headed to San Francisco. The loss of the letters proved no difficulty, as King regaled Brewer with news of his old friends at Yale. He had news for Whitney, too. Whitney's brother William had launched his own distinguished career on the Yale faculty and was King's teacher of German. Like Brush, William Whitney had taken special interest in the precocious King.

In 1864, King began an adventure that he memorialized in the Sierra classic *Mountaineering in the Sierra Nevada*.<sup>29</sup> At first the explorer scientist King proved somewhat indifferent at least as a surveyor and mapper — his map of Yosemite Valley proved full of errors.<sup>30</sup> However, as a scientist, his initial assessment that a glacier played a role, albeit in his view a limited one, in forming Yosemite Valley proved closer to the truth than did Whitney's theory of cataclysmic subsidence. And as the Survey's explorer mountaineer par excellence, King performed brilliantly. He would go on to head his own Fortieth Parallel Survey and lead the U.S. Geological Survey as its founding director. For Gardiner, who would join King's Fortieth Parallel Survey, the California experience also became an internship that launched a noteworthy career.

By the end of 1860, the work of the Survey had begun. Whitney's first assignment to his assistants entailed a comprehensive statewide survey on which the detailed work of defining state resources would depend. But after a strong start in adequate funding and legislative goodwill, Whitney found that keeping the California Geological Survey in the field was increasingly a losing battle. Sources of difficulty began with the disastrous floods of 1861-2. As Whitney wrote to his brother, California had become "swamped, submerged, inundated, deluged, overwhelmed."<sup>31</sup> Whitney's introduction to the Survey report on geology complained that the 1862 work was delayed by the almost complete destruction of roads and bridges throughout the state and the break-up of what appeared to be all the San Joaquin Valley ferries.<sup>32</sup> According to both Whitney and Brewer, flood damage reduced California taxable property by about a third.<sup>33</sup>

In addition to the loss of state revenues sufficient to continue adequate funding, access to California's vast unknown was much diminished because of the destruction of state infrastructure. Whitney's father urged him to close down the Survey but relented and instead made a loan that kept the Survey at work. The loan allowed Whitney to complete a major portion of the geological and topographical analysis, leading to publication of the Survey's first report on geology in 1865.

Whitney's high-handed attitude toward the legislature, emphasis on scientific findings over practical guides to new sources of mineral wealth and use of East Coast resources for analysis of specimens and publishing did nothing to improve support for the Survey. By 1864, the legislature would cut his salary to \$4,500 and demand that the Survey concentrate on ore-producing regions.

Perhaps he sensed the coming financial blow: When Whitney was asked in 1863 to head a commission to make recommendations on a new state university, he saw a main chance to put the Survey on a stable basis in a manner that would meet his scientific goals.

### **A MUSEUM PLAN FOR A CALIFORNIA STATE UNIVERSITY**

The 1862 Morrill (Land Grant) Act offered the states a chance to use the sale of federal land to establish and endow a "Seminary of Learning:" a state university that would meet certain requirements. These included studies related to agriculture and the "mechanic arts," plus military training. The California legislature appointed a commission to report on "the feasibility of establishing a State University, embracing an Agricultural College, a 'School of Mines,' and a Museum — including the Geological collection of this State."<sup>34</sup> Whitney as State Geologist was named its head. His fellow commissioners were John Swett, State Superintendent of Public Instruction, and State Surveyor-General J. F. Houghton, a graduate in civil engineering from Rensselaer Polytechnic Institute. As with the Survey legislation, Whitney's hand was unmistakable in the concurrent resolution that established the commission. The self-serving nature of the reference to a museum to house the state's (i.e., the Survey's) geological collections suggested the difficulties facing the Survey and Whitney's attempt to use the Morrill Act provisions to solve them.

As head of the commission, Whitney connected the Survey's explorer scientist accomplishments to defining ideas for California's first state university. The arguments he made centered on this assertion:

The establishment of the Geological Survey was in fact the first step towards the production of a State University. Without the information to be obtained by the Survey, no thorough instruction was possible on this coast, either in geography, geology, or natural history; for the student of these branches requires to be taught in that which is about him, and with which he is brought into daily contact, as well as that which is distant and only theoretically important. The student of geology in California demands to be posted on California geology; he wishes to know what formations occur here, what fossils they contain, what ores and minerals characterize them... California should form a School of Science and Art or California Polytechnic School] for professional training of young men in the exact and natural sciences and their application to arts, manufactures, mining and agriculture.<sup>35</sup>

The first step proposed in the report was establishment of a museum to house the Survey's collections — and the permanent Survey itself. The commission recommended locating the state university in San Francisco, a city of 100,000 with the advantages of accessibility, good climate and "the greater probability that persons of wealth would be interested in its success."<sup>36</sup>

The report began with the observation that California's 1849 State Constitution called for establishment of a state university. Next, a brief summary of higher education in Europe and the United States emphasized that "a number of Colleges have added a department of applied science, or a 'Scientific School'" complete with collections of "minerals, fossils, animals, plants." Harvard's "Zoological Museum" — Louis Agassiz' Museum of Comparative Zoology — and Yale's Sheffield Scientific School were specific examples.

The report cited Rensselaer Polytechnic Institute — America's only polytechnic to have "attained much celebrity"<sup>37</sup> — as the most suitable model for California. Classical education should be left to the sectarian colleges. According to the report, given the scarcity of schools that offered preparatory work for college, not many Californians would be wanting a university for a long time. While both Iowa and Wisconsin had opened their own state universities, both had preparatory departments for students not ready for university education. Only the University of Michigan had no such department. According to the commission, with 400 students and 27 faculty, Michigan most resembled a true university.

To explain further why quotation marks were used in the concurrent resolution in reference to a "school of mines," the report noted that mining schools were soon to be established in the United States, following on the model of the Paris Ecoles des Mines. (Columbia University in fact started a mining school in 1864 and Whitney himself would be appointed in 1865 to establish Harvard's school of mines.) California needed a university good enough to graduate students competitive with those from the scientific schools at Yale and Harvard and the mining schools of France and Germany. A state museum, attracting specimens from all over and housing the Survey, lecture halls and laboratories, would be a sufficient basis for creating a scientific school in case the state university did not come about. The report concluded with draft legislation for adoption of the recommendations.

The report included a list of desirable subjects to be taught that tracked closely with what was offered at Rensselaer. By the 1860s, Rensselaer had established four-year courses of study in civil engineering, a field that had been created there; mechanical engineering; and natural history, which included botany, zoology and mineralogy. As a civil engineering graduate of Rensselaer,

commissioner Houghton very likely served as a key resource in devising this list. The table below features the fields recommended by the commission. Notations on relationships with Rensselaer courses have been added.<sup>38</sup> However, the commission also warned that filling positions with these specializations would be expensive.

### Figure 1 - Professorships Recommended by Whitney Commission

- 1--Mathematics\* and Astronomy\*
  - 2--Drawing\* and Design
  - 3--General Physics\* and Meteorology
  - 4--Mechanics and Engineering\* (Rensselaer offered four- year courses in Civil Engineering and Mechanical Engineering)
  - 5--Mining\*and Metallurgy\*
  - 6--General and Agricultural Chemistry
  - 7--Botany\* and Vegetable Physiology
  - 8--Zoology\* and Animal Physiology
  - 9--Geology\*and Mineralogy\*
  - 10--Modern Languages\* (Rensselaer requirements included French and German)
  - 11--English Language and Literature\* (Rensselaer requirements included English composition)
  - 12--Practical Agriculture
- \* Fields taught at Rensselaer Polytechnic Institute

Reminiscent of Whitney's approach of using multiple avenues to position himself to become the California State Geologist, he lost no opportunity to argue his case that the Survey should form the grounding for advanced education in California. In the Survey's 1865 Volume I report on geology, Whitney seized this chance to repeat his commission's recommendations for a new state university. He doubtless surmised that the Survey's first geology report was sure to be pored over by California's elected officials looking for pointers to California's own metallic wealth.

Whitney advocated a stable, permanent Survey, in part, "that educational interests of the State may be advanced — our schools, our colleges, and University furnished with scientific basis for instruction in the different branches of Geology and Natural History, with the text-books in which the necessary information may be found as to the forms of animal and vegetable life occurring on the Pacific Coast."<sup>39</sup> Whitney observed that though by this point William Brewer had left the Survey to take up a professorship at Yale's Sheffield Scientific School, he continued to be in charge of the Botanical Department of the Survey. In that role, Brewer was poised to create a "manual of the botany of California," which would be a "suitable textbook for the use of schools of the Pacific Coast, with [Asa] Gray's *Lessons in Botany*." Repeating an argument made in the state university commission's report, Whitney asserted that "this science cannot be taught in California until such manual as the one proposed has been prepared, since the descriptions of the plants of the state are, at present, scattered through hundreds of volumes, most of which are quite inaccessible to any except the few who are furnished with costly and expensive botanical libraries."<sup>40</sup> (The two Survey volumes on botany, with Brewer as lead author for the first and Harvard's Asa Gray as contributor, would finally appear in 1880, publication paid for by private subscription.)

In the end, the commission recommended that the museum be established and that a follow-up commission plan a polytechnic university or scientific school. Whitney's draft legislation to enact the commission's recommendations went nowhere. A state museum from which a polytechnic or scientific school might arise may have seemed to the state legislature too far a stretch in fulfilling Morrill Act requirements. Instead, to meet a deadline imposed under the Act, the legislature established an Agriculture, Mining and Mechanical Arts College on March 31, 1866, with a hodgepodge of practical, scientific and non-scientific fields that it might offer.<sup>41</sup>

Yet, however self-serving Whitney's effort to preserve the California Geological Survey might have been, the idea of a scientific school was arguably a bold one, since the colleges he knew best, Yale and Harvard, held their scientific schools at arms' length and would continue to do so for many years. Both Yale and Harvard nevertheless had museums that provided specimens for scientific study. Agassiz's pedagogy featured the Museum of Comparative Zoology in a central role; Whitney's reports detailed ways in which the California Geological Survey samples and specimens would hold a similarly central place in scientific instruction at the new university.

In addition, Whitney's arguments implied some telling observations about young Californians and their educational needs. Whitney did not feel obliged to repeat Agassiz's famous dictum to get outside and study nature's book directly — young Californians already

did so. In fact, as Stanford University's founding president David Starr Jordan observed 57 years later, the outdoor life continued to put a unique stamp on Californians: "contact with the facts of nature has taught the Californian something of importance. To have elbow room is to touch nature at more angles. And wherever she is touched she is an insistent teacher."<sup>42</sup> Whitney saw reflected in California's sons the explorer scientist's curiosity as an animating educational force.

The new University of California that the legislature finally authorized, through passage of the Organic Act of 1868, heeded the appeal made by another underfunded entity, the private College of California. The new university was planned as a marriage between the College's liberal arts curriculum and the applied fields required under the Morrill Act — agriculture, engineering ("the mechanic arts") and military instruction — together with mining. The Organic Act also called for the Geological Survey specimens to be housed in the new university. Another marriage of interests was even more compelling: The College offered an attractive parcel of land in the East Bay hills four miles north of Oakland while the state had access to the Morrill Act money. The new campus would rise on the land named in honor of the Irish Bishop George Berkeley.

The earliest university faculty would not have disagreed with Whitney's assessment of the unpreparedness of California youth for university education: Enrollment numbers remained low for many years. Rather than punting on the question of when young Californians would be ready for a university, as Whitney did, the faculty answered the need for preparatory education by promoting development of high schools in the state and sending accrediting teams to assure that sound curricula were offered.<sup>43</sup>

The Organic Act reference to inclusion of the Survey specimens at the new university was not the only sign that the Whitney commission report served as a reference document for university planners. While the inclusion of College of California classicist Martin Kellogg among the new university's initial 10 faculty assured that the letters would be represented, most of the new faculty tracked closely with the Whitney commission's list of desirable fields of study, often with the new arrivals handling two or three academic subjects. With the founding Board of Regents in charge of faculty hiring, their first appointment — physicist John Le Conte from the University of South Carolina — was named acting president with the charge to organize instruction. In subject areas laid out in the Whitney commission report, the following hires were made:

- In the sciences, in addition to John Le Conte, his brother Joseph Le Conte for geology, natural sciences (he would teach zoology) and botany; and Robert A. Fisher, a Sheffield Scientific School product, for chemistry and metallurgy.
- In mathematics, William Welcker and Frank Soule, Jr., from West Point. The two established a civil engineering program in the second year of university instruction, and Soule became professor of civil engineering and astronomy. Welcker also satisfied a Morrill Act requirement by providing the required military training.
- In agriculture, Ezra Carr from the University of Wisconsin for agriculture, agricultural chemistry and horticulture;
- In modern languages, Paul Pioda was responsible for German, French, Spanish and Italian; German would be taught from the first year on.<sup>44</sup>
- In English Language and Literature, William Swinton (also in rhetoric, logic and history).
- In drawing, Robert E. Ogilby.<sup>45</sup>

In 1870, George Davidson of the Pacific Coast Survey was named honorary professor of astronomy and geodesy (another field taught at Rensselaer), together with Judge Stephen Field as honorary professor of law. The California Geological Survey collections formed the base for the initial university museum, under Joseph Le Conte's direction.

Upon the resignation of the university's first president, Henry Durant, the regents offered the position to Daniel Coit Gilman, a veteran of Yale's Sheffield Scientific School. Notably, he had been offered the University of California presidency by the Regents in 1870 but had declined. This time, he accepted.

During his three-year presidency, Gilman hired William Ashburner as professor of mining to plan the mining program and Frederick Hesse to develop mechanical engineering. He also supported Whitney's campaign for state funds to continue the Survey in 1874. By the end of his presidency, disciplines advocated by the Whitney commission continued to outdistance fields in the letters. Gilman reorganized the curriculum into two colleges: Sciences, including applied fields such as agriculture, and Letters. His action proved controversial among advocates for a separate college of agriculture, who took their arguments to the state legislature. Gilman prevailed. Nevertheless, the controversy contributed to his decision to resign in 1874 to accept the founding presidency of Johns Hopkins University.



Gilman's evident interest in science and technical education was not unique in the United States. Besides the scientific schools at Harvard and Yale, many young state universities such as the University of Michigan were adding engineering and other science and technical courses. Notably, the Massachusetts Institute of Technology had been incorporated in 1861. The Whitney commission had pointed the University of California planners in a robust, forward-looking direction.

### OVERSEEING MANAGEMENT OF THE YOSEMITE GRANT

Though William Brewer often described pretty villages and farms as he and his Survey party journeyed through California, the special delight for the explorer scientist, like Brewer, was the state's extensive wilderness yet to be accurately mapped and its mysteries yet to be revealed in the terms valued by the scientific world. In Whitney's second role as member of a special California board of commissioners, he foregrounded arguments for protection of California's unique Sierra wilderness.<sup>46</sup>

In September 1864, Governor Frederick Low formally accepted the Yosemite Valley and Mariposa Big Trees Grant from the federal government, an action confirmed by the state legislature in 1866. As stipulated in the federal act, a commission was established to advise on park management and provide oversight. By-laws for the Yosemite Grant board of commissioners designated California's governor the board president *ex officio*. Eight commissioners were named to the first board. Whitney and Ashburner from the California Geological Survey became commissioners, as did Israel Ward Raymond, whose letter to California's U.S. Senator John Conness began the process of creating the Grant. Additional appointees included Galen Clark, who would be named the Grant's first resident guardian, and Frederick Law Olmsted, who would head the commission and write its first report.

In this effort, Whitney's name would be linked with — and overshadowed by — Olmsted's.<sup>47</sup> Landscape architect Olmsted and Whitney came to California for different purposes, but each, in his own way, came on account of gold. Whitney's California Geological Survey rode on legislative hopes for discovery of new state riches. Olmsted was hired to oversee John Fremont's failing Mariposa Estate gold mine, which William Ashburner had previously managed. California Geological Survey members would variously join both Whitney and Olmsted in a combination of reconnaissance and vacation trips in the Yosemite Grant lands and high country to the east. Often Survey work and sheer camping adventure were hard to tell apart.

Prior to the creation of the commission, Whitney and other Survey members had visited and explored the Yosemite region. The first Whitney to stay in Yosemite Valley — "Gosh Almighty," as Whitney called it — was Josiah's wife Louisa in June and August of 1861: Given the hard travel required to reach Yosemite, multiple week and month stays were not unusual. In a letter to his brother, Whitney commented, "I hope the trip will improve her health."<sup>48</sup> (The health benefits of mountain sojourns were a recurring theme among 19<sup>th</sup> century visitors to the Sierra.) In July 1863, Louisa returned to the Grant — this time, the Mariposa Big Trees — and performed barometer readings over a three-month period.

During the same summer, as part of the California Geological Survey, Whitney, Brewer and Hoffman explored Yosemite Valley and the high-country watersheds of the Tuolumne and San Joaquin rivers.<sup>49</sup> They climbed and named Mt. Dana on the Sierra crest for Yale's James Dwight Dana. Recognizing a higher peak nearby, Brewer and Hoffman climbed it and named it Mt. Lyell for Sir Charles Lyell. Certainly, one of the enjoyable side benefits for an explorer scientist was the naming of prominent landmarks after admired colleagues and friends. As Brewer observed, both America's and England's leading geologists were now memorialized in the Sierra<sup>50</sup> and both expressed their appreciation when notified that they were so honored. Whitney's future Yosemite guidebooks would make a point of linking travel to both Yosemite Valley and adjacent high country as the optimum way to appreciate California's mountain scenery.

In the late summer of 1864, Olmsted and his family joined the William Ashburner family in an extended visit to the Yosemite Grant, a vacation that anticipated the commission to which Olmsted and Ashburner would be appointed later that year. They started in Wawona near the Mariposa Grove, which Olmsted visited several times to see the giant sequoias. In Wawona, Olmsted was then joined by William Brewer, fresh from the California Geological Survey's extensive and memorable summer exploration of the southern Sierra.<sup>51</sup> With the Survey's summer work completed, Brewer went with Olmsted to spend a few days in Yosemite Valley followed by a week in the Sierra high country.

Once the work of the commission began, the work of the Survey began, too. As head of the California Geological Survey, Whitney was authorized "to prepare a full description and accurate statistical report" on the Grant, based on additional exploration.<sup>52</sup> This requirement led to added surveying, mapping and description of resources. The two resulting publications, *The Yosemite Book* of 1868, in a limited edition with Carleton Watkins' photographs, and *The Yosemite Guide-Book* of 1869, aimed at the broader tourist

population, gave full scope to the explorer scientist's deep appreciation of what this wilderness offered and the urgency to protect it from exploitation.

Whitney had anticipated these books in the Survey's 1865 Volume I on geology. In that volume, Whitney stated that the discussion of Yosemite and the mountains to the east would be in a somewhat different format than other parts of the report: "In the hope of directing the attention of travelers and tourists to this grand and yet easily accessible portion of the Sierra Nevada, we shall, in this section, dwell rather more on the scenery and topography of the region than we should otherwise feel authorized to do in a volume devoted to geology."<sup>53</sup> His account of Yosemite Valley and the adjacent High Sierra was thus as much travelogue as geological description. While the report was illustrated with woodcuts throughout, Whitney cited the particular inspiration for the Yosemite images, "what is the next best to the thing itself, the admirable photographs of C.E. Watkins, we give a wood cut."<sup>54</sup> He described the contrasting beauties of Yosemite Valley and the headwaters of the Kings and Kern rivers, and looked forward to a time when thousands would visit the valley.

Nevertheless, he urged visitors not to be content with just the valley. They should go to the heart of the Sierra and climb Mt. Dana above Tuolumne Meadows, which could be done "even by ladies, without danger and almost without difficulty."<sup>55</sup> His linking of a Yosemite Valley visit with a taste of the High Sierra in Tuolumne Meadows foresaw a popular pattern of Yosemite tourism, already evident in the 1863 Survey exploration and the 1864 Olmsted-Brewer excursion. The Sierra classic, *A Journal of Ramblings Through the High Sierras* by Joseph Le Conte, gave further endorsement to this Yosemite Valley-Tuolumne Meadows link.<sup>56</sup> It would be cemented by the Sierra Club when it initiated annual outings in 1901 with a gathering in Yosemite Valley preparatory to a camping trip in Tuolumne Meadows for an extended stay.

As head of the commission, Olmsted wrote the commission's official report on how Yosemite Valley should be managed. The report is now recognized as a visionary document. Olmsted foresaw a future in which he anticipated the coming of millions to visit the valley. Environmental protections should be put in place before the coming of such an onslaught. However, the content of the report did not become widely known until the latter half of the 20<sup>th</sup> century. Olmsted biographer Witold Rybcynski bluntly states that commission members suppressed the report<sup>57</sup> and others have gone so far as to blame Whitney specifically for blocking it, arguing that he viewed the proposed state allocation to manage Yosemite as a rival to his Survey's own funding request. In his history of the Yosemite Grant, Hank Johnston gives a more nuanced interpretation.

With Olmsted's departure to continue work on New York City's Central Park, an informal executive committee of Whitney, Ashburner and Raymond met to decide how to handle the commission report. The sticking point was the request for \$37,000 for valley infrastructure improvements at a time when the state was near bankruptcy. On November 29, 1865, the executive committee wrote to Governor Frederick Low "that it is not expedient at present to lay the report before the legislature, or to call for an appropriation so large as \$37,000." Low accordingly withheld the report.<sup>58</sup>

Johnston goes on to speculate that the executive committee was concerned that the report did not address the private ownership claims in the valley. Whitney would take this issue on in his own Yosemite report. In the end, both the commission and the Survey received the same minimal amount of \$2,000 to carry out their business. William Ashburner became the head of the commission and wrote later reports on its behalf.

In contrast to the Olmsted report, Whitney's Survey report and guidebook were published and the latter in particular reached out to a large audience. The Yosemite Book of 1868 was published by subscription in a limited edition — at \$10 per copy, most likely to reach an audience of means and influence. The limit was imposed by including copies of Carleton Watkins' gorgeous photographs made throughout the Grant and nearby High Sierra. Labeled by historian Jim Snyder "the most beautiful California government publication ever produced," The Yosemite Book made visible Whitney's words.<sup>59</sup> The second publication was intended for the general public. The Yosemite Guide-Book, with maps and woodcuts in place of photographs, went to six editions. The middle editions were "suitable for carrying in the Pocket" and cost a dollar each.<sup>60</sup> As late as 1931, the Department of the Interior published Yosemite guides continued to list Whitney guidebooks among the bibliographical recommendations.<sup>61</sup>

Whitney opened his report and guidebook with an introduction to the natural features of California as a whole and Yosemite Valley and the southern Sierra Nevada in detail. It was very like Whitney to begin by asserting that previous accounts were inaccurate and of no value, implying that he was about to offer the cure. This can be read as a slam at Yosemite's earliest and most tireless promoter, James M. Hutchings, whose 1862 *Scenes of Wonders and Curiosity in California* included the earliest guide to Yosemite Valley. Whitney's passionate argument against private land ownership in the valley was also directed against Hutchings, one of the valley's first settlers. In private, Whitney angrily called the legislature "jackasses" for supporting the valley settlers' property

claims and for overriding Governor Henry Haight's veto of their bill of support. The United States Supreme Court would ultimately deny those claims, a landmark in wilderness protection.<sup>62</sup>

In his Survey report, Whitney's first order of business was to lay the political groundwork for his argument on behalf of protecting the Yosemite wilderness. Opening with the essential elements of the Grant legislation and attendant actions of the California legislature and Grant commission, Whitney offered a very brief historical sketch of California Indian and white occupation of the valley. His account of white settlement carried forward the commission's concern over private property claims made by those settlers. Without strict adherence to the directive in Grant legislation to preserve the valley "inalienable for all time," Whitney argued, "Yosemite Valley instead of being a 'joy forever' will become, like Niagara Falls, a gigantic institution for fleecing the public." "No." Whitney concluded, "the Yosemite Valley is a unique and wonderful locality: it is an exceptional creation, and as such has been exceptionally provided for jointly by the nation and the state — it has been made a National park."<sup>63</sup>

Having suitably chastised the state legislature for its support of the private ownership claims, and instructed it on its duty, Whitney proceeded to take the reader on a finely detailed tour of the scenic landmarks worthy of such defense — a tour bolstered by scientific instruction grounded in the California Geological Survey's work. Whitney weaved descriptions of flora and fauna with geology, making observations about other kinds of natural features as he conducted the prospective visitor from one viewpoint to another. Jim Snyder credits Whitney's divisions of the foothills through high mountains into four vegetation zones as "effectively the first statement of the concept of 'life zones,' showing how living things adapted to changes in elevation and environment."<sup>64</sup> Whitney may well have been inspired by Alexander von Humboldt, who had noted similar divisions of vegetation by elevation during his South American explorations.<sup>65</sup>

Whitney as guide also served as teacher, with an Agassizian echo and a sentiment worthy of John Muir, who had yet to arrive in California: "Besides as a means of mental development, there is nothing which will compare with the study of nature as manifested in her mountain handiwork. Nothing so refines the ideas, purifies the heart and exalts the imagination of the dweller on the plains as an occasional visit to the mountains."<sup>66</sup> However, no Muir he in touting the benefits of the wilderness. Whitney also stated that stays of long duration in the mountains were not advisable: "familiarity breeds contempt." He continued, "The greatest peoples have not been those who lived on the mountains, but near them. One must carry something of culture to them, to receive all the benefits they can bestow in return."

While Whitney's views of Yosemite scenery never rose to John Muir's later rapturous heights, he could be effusive enough. In characterizing the waterfalls "without rival in the world," he visualized the water feeding Yosemite Falls becoming "a mad torrent...in one wild mass of spray-enveloped water...in the winter view[, t]he frozen spray forms a vast conical mass, rising sometimes to the height of a hundred feet or more, from which the falling water, rebounding, is shot off in graceful curves, forming an immense bouquet, each drop of which sparkles like a diamond in the sun." The scenic views he described brought the educator to the fore: "No one can avoid asking, what is the origin of this peculiar type of scenery? How has this unique valley been formed, and what are the geological causes which have produced these wonderful cliffs and all the other features which combine to make this locality so remarkable? These questions we will endeavor to answer."<sup>67</sup>

Here, together with the findings and observations of the California Geological Survey, Whitney introduced his own idea in theorizing valley origins. His discussion recognized the force of erosion on other parts of the Sierra and, later in the book, the glacial origin of Hetch Hetchy Valley, just a few miles to the north of Yosemite Valley and like it in so many ways. The Survey's initial report on geology had included Clarence King's observations of moraines and striations that pointed to the presence of a glacier in Yosemite Valley. King concluded that it was perhaps only 1,000 feet deep, not enough to fill the valley, and he found evidence that a terminal moraine had impounded a lake as the glacier retreated.<sup>68</sup>

But Whitney could not believe that glaciation was responsible for the perfectly sculpted walls before his eyes. Citing the (still viable) theory that a cataclysmic subsidence created Lake Tahoe to the north, Whitney asserted that such a subsidence accounted for Yosemite Valley. In raising this matter, Whitney's pugnacious side once again showed itself. It was not sufficient to repudiate the glaciation argument that had been included in the Survey's geology report: he would stamp it out entirely:

Much less can it be supposed that the peculiar form of the Yosemite is due to the erosive action of ice. A more absurd theory was never advanced, than that by which it was sought to ascribe to glaciers the sawing out of these vertical walls and the rounding of the domes... This theory, based on entire ignorance of the whole subject, may be dropped without wasting any more time upon it.<sup>69</sup>

King, who was certainly the butt of these comments, would himself fall into line with the boss on this question. Not John Muir, however, who, arriving in the early 1870s, would apply his superb observational skills not only in arguing for the glacial origin of the valley, but also in discovering and measuring living glaciers in the Sierra high country — another manifestation that Whitney and his Survey colleagues had dismissed. Whitney famously labeled Muir “a mere shepherd” and King piled on with his own rude epithets.<sup>70</sup> Whitney’s certainty that the earth collapsed beneath the valley floor to leave behind skyscraping walls left a debate over origins that was only definitively resolved almost three-quarters of a century later by François Matthes and his fellow scientists at the United States Geological Survey. They concluded persuasively that a combination of erosive water and deep glacial ice shaped the iconic scenery that inspires visitors today.

Still, as Whitney led the reader to and through the Sierra, he did not forget entirely his case that unprotected, this wild, beautiful land might suffer the fate he saw at Niagara Falls. During the climb out of the foothills into the mountains, he observed that the traveler would exchange “ditches for naturally flowing water, no longer thickened to the consistency of porridge by the red mud of the miner.”<sup>71</sup> Michael Smith’s book *Pacific Visions* has put forward the thesis that California took a leading role in creating the national environmental movement. California scientists were witnessing destruction of natural resources, particularly the forests and the watersheds that depended on them, by unregulated mining, lumbering and sheep and cattle herding. Gold had made California a fantasy island, ripe for exploitation; water made California a state of the Union, a plausible destination for immigrant settlers from the United States and the world. The transformation from the treasury of raw extraction to a home of unparalleled beauty, where a radiant future might be realized, saw early stirrings in Whitney’s Yosemite books. Whatever his stubborn error on the origin of Yosemite Valley, the popularity of his guidebooks brought to the first generations of Yosemite visitors the importance of preserving the region as well as an idea of what made it of scientific interest.

#### **ESTABLISHING A MUSEUM AND THE END OF THE SURVEY**

In the matter of a museum, perhaps Whitney’s consolation prize was his presidency from 1867 to 1868 of the California Academy of Sciences. The early member collections and library formed the first science museum in the West, located at 622 Clay Street, a few steps from the Montgomery Block.<sup>72</sup> The Academy continued to be a center for public education in the sciences throughout its history. It was notable that, when Louis Agassiz spoke to the Academy in 1872, on his way home from his South American expedition, he stressed how essential it was to garner public support for the sciences through education — a repeated theme throughout his American career. He also reiterated his lifelong message: “This is what the world wants — not books to read, but men to learn what is not yet known. These men cannot be educated in the school-room. They must be educated in nature, among specimens, by the teaching of that thing which has not been explored now.”<sup>73</sup> The Academy took his lessons to heart, with not only continued development and improvement of the museum but member participation in notable scientific expeditions, including the Harriman Expedition of 1899 to Alaska and the Galapagos Expedition of 1906.<sup>74</sup>

However, at the time of Whitney’s presidency, according to his own account, his primary role had to be “resuscitation”: this first scientific society in the American West was struggling financially. Having established Harvard’s School of Mines in 1865, Whitney had returned to San Francisco to resume the once-again-funded Survey. His acid tongue did not show him any more enamored of his base of operations than he had been when he first arrived. To his brother he wrote, “Music with me, is a thing of the past.” He went on, “Concerts worth hearing are unknown,” and the opera is “atrocious.” Nevertheless, he applied his inexhaustible energy to the Academy’s problems at hand, guiding the organization toward a more stable future. He noted among his accomplishments “a pleasant reading room with a goodly number of scientific periodicals; [we] are fitting up our meeting-room and collections in a respectable manner.”<sup>75</sup> Whitney proposed a legislatively-funded state museum once again, this time under the aegis of the Academy. Its purpose was to house the bulk of Survey collections.<sup>76</sup> But this proposal also failed to win state funding. As noted earlier, the Survey collections went largely to the University of California and became the basis of its museums.

While the Survey enjoyed a brief revival of legislative funding during the early 1870s, by 1874, it was over, its work unfinished. However in 1892, its considerable accomplishments would be recognized. Founded in 1892, the Sierra Club bore in its earliest years a resemblance to the California Academy of Sciences — not surprising, given the number of Academy-affiliated scientists in leadership roles. Like the Academy, the Club offered honorary memberships to distinguished men whose accomplishments matched the aims of the Club. Josiah Whitney and Clarence King were among the first group offered such memberships; William Brewer would later become a regular member.<sup>77</sup>

However tart Whitney’s and King’s dismissal of John Muir’s observations of how Yosemite Valley had been formed, by the time Muir became the first president of the Sierra Club, he was a nationally recognized writer, author of articles introducing the Sierra to the public and effective in rallying American support for the protection of Yosemite by means of national park status. In publishing

the Whitney and King letters of acceptance of the honorary memberships, the *Sierra Club Bulletin* noted their claims to be so honored: Whitney “whose work as State Geologist was of such great value to the State” and King, mountain explorer, “whose book, *Mountaineering in the Sierra Nevadas*, first made known to the world in general the beauties of our mountains.” King’s reply was a brief, gracious acceptance, but Whitney could not resist including in his acceptance letter a final prickly jab at the elected officials of California: “Anything indicating a desire on the part of the Californians to keep intact the grand scenery of the Sierra Nevada is to me a pleasure; but oh! How sad the thought that so much valuable work...should have been lost by the negligence of the Legislature to provide for the completion of a task on which so many thousands had been expended!” He went on to note his largely unreimbursed expenditure to save the Survey’s results and enclosed an account of work completed since the Survey’s cessation.<sup>78</sup> At age 73, Whitney showed no signs of mellowing.

Though the work of the Survey had not been completed by the time it was brought to an end in 1874, the Sierra Club rightly recognized its monumental achievements in defining California’s vast treasure trove of natural resources through accurate maps, publications and the field collections that the University of California inherited. Whitney embedded the Survey’s application of the era’s scientific understanding, both in his contributions to what a California state university might become and in his ideas about how California’s unique scenery should be protected, preserved and made accessible to all American citizens.

William Goetzmann summarizes the larger national contribution of the Survey to the history of the American West: “Extending in time from 1860 to 1874, it embodied perfectly the techniques and conflicts of the new era of exploration and exploitation, and it produced many of the men, such as Clarence King, who went on to future greatness in the national surveys. Often overlooked by Western historians and governmental historians alike, the California Survey was not only a model for the later federal surveys. In scope and importance it deserves to be ranked as the first in the series of great surveys that characterized post-Civil War exploration in the Far West.”<sup>79</sup>

Lacking William Brewer’s bluff good nature or Clarence King’s ability to turn the Survey’s field work into exciting yarns, Whitney was not an easy person to like, outside his admiring circle of family and professional peers. The qualities that his associates most valued — his scientific rigor, unflinching integrity and boundless energy — made him a uniquely situated observer of what might best define California’s future. This is a legacy worth remembering.

## ENDNOTES

<sup>1</sup> See Gary Kamiya, “SF’s swankiest building was made to survive if city burned.” *San Francisco Chronicle*, 10-12-2018. [https://www.sfchronicle.com/chronicle\\_vault/article/SF-s-swankiest-building-was-made-to-survive-if-13303579.php](https://www.sfchronicle.com/chronicle_vault/article/SF-s-swankiest-building-was-made-to-survive-if-13303579.php)

<sup>2</sup> Edwin Brewster. *Life and Letters of Joseiah Dwight Whitney*. (Boston, MA; New York, NY: Houghton Mifflin, 1909), 27. Brewster’s compilation of biographical information and letters is the primary source of information for the paragraphs on Whitney’s background and career. <http://babel.hathitrust.org/cgi/pt?id=uc1.b4168170;view=1up;seq=13> A contemporary biography is sorely needed.

<sup>3</sup> At the end of the eighteenth century, Germany’s Alexander von Humboldt created the model for the explorer scientist through his travels and discoveries in Latin America. The Lewis and Clark Corps of Discovery Expedition into the newly acquired Louisiana Purchase provided the American model. Their reconnaissance provided maps, specimens of flora and fauna, and descriptions of the indigenous people they encountered and scenes and topography along their routes. Whitney’s experience with the subsequent state surveys in which he was involved led him to put a high value on the explorer who could apply the latest scientific thinking to work in the field.

<sup>4</sup>William H. Goetzmann, *Exploration and Empire: the Explorer and the Scientist in the Winning of the American West* (History Book Club, 1993), <http://quod.lib.umich.edu/cgi/t/text/text-idx?c=acls;idno=heb00645> Goetzmann is a principal source for the history of the Whitney Survey, complemented by contemporary accounts by Josiah Whitney and William Brewer.

<sup>5</sup> Brewster, 293. One California governor said of Whitney “that by no other man had he been so insulted in all his life.” See also Goetzmann 361.

<sup>6</sup> Brewster, 27. See also Robert V. Bruce. *The Launching of American Science, 1846-1876*. (Ithaca, NY: Cornell University Press, 1988), 19.: [Whitney was] “a short, tough-fibered New Englander...hardened by childhood discipline into a brusque self-sufficient man he would always be.” <http://quod.lib.umich.edu/cgi/t/text/text-idx?c=acls;cc=acls;idno=heb00622.0001.001;node=heb00622.0001.001%3A6;view=toc>

<sup>7</sup> *Ibid.*, 42-46.

<sup>8</sup> *Ibid.*, 179-80. Brewster includes this translation of the inscription on the coat of arms: “He seeks among the rocks for the traces of primeval monsters.”



<sup>9</sup> Ibid., 71.

<sup>10</sup> For an extended analysis of the tension between the material interests of elected officials versus the scientific priorities that Whitney represented, see Gary Nash, "The Conflict between Pure and Applied Science in Nineteenth-Century Public Policy: The California State Geological Survey, 1860-1874." *Isis* 54, no. 2 (June, 1963), 217-228. <https://doi.org/10.1086/349702>

<sup>11</sup> Josiah Whitney. *The Metallic Wealth of the United States described and compared with that of other countries*. (Philadelphia: Lippincott, Grambo & Co. 1854), 138.

<sup>12</sup> Brewster, 151.

<sup>13</sup> Ibid., 153.

<sup>14</sup> Whitney, *Metallic Wealth*, 738.

<sup>15</sup> Alan E. Leviton and Michele L. Aldrich, eds. *Theodore Henry Hittell's The California Academy of Sciences — a Narrative History: 1853-1906*. (San Francisco, CA: California Academy of Sciences, 1997), 490, 13. The name of the society was shortened to the California Academy of Sciences.

<sup>16</sup> Brewster, 183-6. See also Nash, 219-20 and Michael L. Smith. *Pacific Visions: California Scientists and the Environment 1850-1915*. (New Haven, CT: Yale University Press, 1987), 140.

<sup>17</sup> Goetzmann, 463.

<sup>18</sup> Brewster, 186.

<sup>19</sup> Brewer has given us our best view of the Survey's most productive years through his letters and journal entries published under the title, *Up and Down California in 1860-1864: The Journal of William H. Brewer*. Edited with a biographical introduction by Francis P. Farquhar. (New Haven, CT: Yale University Press, 1930). [http://www.yosemite.ca.us/library/up\\_and\\_down\\_california/](http://www.yosemite.ca.us/library/up_and_down_california/)

<sup>20</sup> Farquhar introduction in Brewer, x.

<sup>21</sup> Brewster, 214.

<sup>22</sup> Brewer, 18.

<sup>23</sup> Ibid., 9.

<sup>24</sup> Brewster 196.

<sup>25</sup> Brewer 119.

<sup>26</sup> Robert Wilson. *The Explorer King*. (New York, NY: Scribner, 2006), 80. Wilson's biography of King is a primary source used in this paper.

<sup>27</sup> University of California President Daniel Coit Gilman hired Ashburner as professor of mining engineering in 1872 to start the university's college of mines. Ashburner retired after two years, given the competition from his own private practice, but as Honorary Professor, continued to advise on development of the college. William Carey Jones. *Illustrated History of the University of California*. (San Francisco, CA: Frank Dukesmith, 1895), 114. <https://play.google.com/books/reader?id=69k-AAAAYAAJ&hl=en&pg=GBS.PA1>

<sup>28</sup> Goetzmann, 373. Both Goetzmann and Nash lament that Whitney did not capitalize on the legislative interest in finding new ore deposits by pointing out the importance of the connection between paleontological discoveries and their relationships to ore-rich geological strata.

<sup>29</sup> Clarence King. *Mountaineering in the Sierra Nevada* (New York, NY: Scribner's Sons, 1902).

[http://www.yosemite.ca.us/library/mountaineering\\_in\\_the\\_sierra\\_nevada/](http://www.yosemite.ca.us/library/mountaineering_in_the_sierra_nevada/)

<sup>30</sup> See Hank Johnston. *The Yosemite Grant, 1864-1906*. (Yosemite National Park, CA: Yosemite Association, 1995), 108, footnote 3.

<sup>31</sup> Brewster 208.

<sup>32</sup> State Geological Survey of California. *Geology of California, Vol. I—Report of Progress and Synopsis of the Field-Work, From 1860 to 1864*. (Philadelphia, PA: The Caxton Press of Sherman & Co., 1865), xi-xii.

<sup>33</sup> Brewster 209 and Brewer 246.

<sup>34</sup> California, Legislature, Board of Commissioners to Report upon the Feasibility of Establishing a State University. *Report relative to establishing a State University made in accordance with a concurrent resolution passed at the fourteenth session of the Legislature*. Pamphlets on the College of California, no. 12 [Sacramento, State Printers, 1864], 3. Bancroft Library, University of California.

<sup>35</sup> California Legislature, 23, 25.

<sup>36</sup> Jones 19.

<sup>37</sup> California Legislature, 16.

<sup>38</sup> Palmer C. Ricketts, *Rensselaer Polytechnic Institute 1824-1894*. (New York, NY: Wiley and Sons, 1895). Pages 99-102 detail the 1854 courses of study.

<sup>39</sup> Geological Survey of California, xxvi.

<sup>40</sup> Ibid., xxvii.

<sup>41</sup> Verne A. Stadtman. *The University of California 1868-1968*. (New York, NY: McGraw-Hill, 1970), 28. Stadtman is the principal source for the early plans for and opening years of the university.

<sup>42</sup> David Starr Jordan. *California and the Californians*. (San Francisco, CA: A. M. Robertson, 1907), 28. <http://www.gutenberg.org/ebooks/4755>.

<sup>43</sup> Stadtman 93-95. The University did institute a preparatory department in 1870 but abolished it two years later. Stadtman, 55-6.

<sup>44</sup> *The Centennial Record of the University of California*. Compiled and edited by Verne A. Stadtman and the Centennial Publication Staff. (Berkeley, CA: University of California Printing Department, 1967), 87.

<sup>45</sup> Stadtman 51. See also Jones, 27ff. and 334ff. for a more detailed description of the first faculty. Jones also lists an interim professor of Latin and Greek for 1869-70, not mentioned in Stadtman. Notably, the Le Conte brothers and Fisher had all originally been educated as physicians. Joseph Le Conte had received one of the first degrees given by Harvard's Lawrence Scientific School. George Davidson, like William Ashburner, would serve on the board of regents.

<sup>46</sup> A coincidence of dates united the two signal California entities in which Whitney as commissioner played a notable role: establishment, spurred by federal land grants, of the University of California; and creation of the Yosemite Valley and Mariposa Grove of Big Trees Grant.<sup>46</sup>

- March 31, 1864—The California legislature formally accepted Morrill Act lands as a basis for establishing a university to include agriculture and the mechanic arts.
- June 30, 1864—President Abraham Lincoln signed a bill creating the Yosemite Park Grant, including Yosemite Valley and the Mariposa Grove of Big Trees, to be administered by the State of California "for public use, resort, and recreation; ...inalienable for all time."
- September 28, 1864—California Governor Frederick F. Low issued an interim acceptance of the Yosemite Grant, acting in lieu of the state legislature which would not meet again until 1866; and appointed the first commissioners to oversee the grant.
- March 31, 1866—The California legislature passed the Organic Act, creating the Agricultural, Mining and Mechanical Arts College, under requirements of the Morrill Act, to be replaced by the Organic Act of March 23, 1868, establishing the University of California.
- April 2, 1866—The California legislature and Governor Low jointly accepted the Yosemite Grant.

<sup>47</sup> Like Whitney, Olmsted was called on to contribute to university planning in California. The College of California Trustees hired Olmsted to create a campus plan for their Berkeley plot which, however, was shelved, as was the Whitney commission report. The Olmsted plan influenced William Hammond Hall, architect of Golden Gate Park in San Francisco, who was hired in 1872 to complete the first University of California site plan. Hall had consulted Olmsted on Golden Gate Park and once again consulted him on the university plan. Notably, he incorporated from Olmsted's plan the east-west orientation of the campus, capitalizing on views of the Golden Gate. See Kent E. Watson. *William Hammond Hall and the Original Campus Plan*. (Berkeley, Calif. : Center for Studies in Higher Education and Institute of Governmental Studies, University of California, Berkeley, 1996 ).

<sup>48</sup> Brewster. 202.

<sup>49</sup> *Ibid.*, 230.

<sup>50</sup> Brewer, 411.

<sup>51</sup> The highlight of that segment of the Survey was famously memorialized in Clarence King's *Mountaineering in the Sierra Nevada*. Brewer's party had climbed what Brewer believed to be the highest peak on the Sierra crest — a 13,576 foot pinnacle subsequently named by his fellow explorers Mt. Brewer in his honor. At the top they discovered that the actual crest on the eastern horizon held peaks that were hundreds of feet higher. King and the Survey's packer made a daring scramble up and down granite cliffs to reach the crest. The Brewer party christened the highest crest peak Mt. Whitney.

<sup>52</sup> *Ibid.*

<sup>53</sup> Geological Survey, 404

<sup>54</sup> *Ibid.*, 408.

<sup>55</sup> Geological Survey, 403-4. Linda Wedel Greene observes that into the 1880s, Tuolumne Meadows was the summer rendezvous site for the Eastern Sierra Piutes who traded pinon nuts, dried fly pupae, moth larvae, baskets, rabbit and buffalo robes, salt, tobacco and obsidian with Miwoks from the west who exchanged acorns, berries, beads, paint pigments, arrows, baskets and abalone shell ornaments made by coastal Indians. *Yosemite: the Park and Its Resources*. (Washington, DC: United States Department of Interior/National Park Service, 1987), 199.

<sup>56</sup> Joseph Le Conte, *A Journal of Ramblings Through the High Sierras of California*. <http://www.yosemite.ca.us/library/leconte/>

<sup>57</sup> Witold Rybczynski. *A Clearing in the Distance: Frederick Law Olmsted and America in the Nineteenth Century*. (New York, NY: Scribner, 1999), 279-80.

<sup>58</sup> Johnston. 67. In footnote 11 on p. 109, Johnston directly addresses the accusations that the report was suppressed in favor of more funding for the Geological Survey. He finds multiple reasons to cast doubt on the argument.

<sup>59</sup> Jim Snyder introduction to Octavo CD <http://www.octavo.com/editions/wtnyos/>, 4. Josiah Whitney. *The Yosemite Book: a description of the Yosemite Valley and the adjacent region of the Sierra Nevada and of the big trees of California*, (New York, NY: Julius Bien, 1868).

<sup>60</sup> *Ibid.*, 11-12.

<sup>61</sup> *Circular of Information Regarding Yosemite National Park California*, U. S. Department of the Interior, 1931, 36.

<sup>62</sup> In 1888, Hutchings published *In the Heart of the Sierras*, his comprehensive guide to Yosemite, written after the failure of his property claims in the Supreme Court. While using the California Geological Survey reports among many sources, Hutchings took the opportunity to get a bit of his own back from Whitney. He included a chapter justifying his property claims and elsewhere expressed his doubts about Whitney's theory of Yosemite Valley's geological origin. [http://www.yosemite.ca.us/library/in\\_the\\_heart\\_of\\_the\\_sierras/](http://www.yosemite.ca.us/library/in_the_heart_of_the_sierras/)

<sup>63</sup> Whitney, *The Yosemite Book*, 20.

<sup>64</sup> Octavo CD, 6.

<sup>65</sup> See Aaron Sachs. *The Humboldt Current: Nineteenth-Century Exploration and the Roots of American Environmentalism*. (London: Viking Penguin, 2006), 33, on Humboldt's influence on C. Hart Merriam's "life zone" theory.

<sup>66</sup> Whitney, *The Yosemite Book*, 28.

<sup>67</sup> *Ibid.*, 74.

<sup>68</sup> State Geological Survey of California. *Geology of California, Vol. I — Report of Progress and Synopsis of the Field-Work, From 1860 to 1864*. (Philadelphia, PA: The Caxton Press of Sherman & Co., 1865), 421-3. Later field research would prove Clarence King wrong on minimizing the size of the glacier but agreed that it left a lake behind as it melted.

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<sup>69</sup> Whitney, *The Yosemite Book*, 75-6.

<sup>70</sup> Wolfe. 133. At the September 16, 1872 meeting of the California Academy of Sciences, Joseph Le Conte read a paper, "Ancient Glaciers in the Sierras," based on his observations the preceding summer of glacial action in the Merced, Tuolumne and Bloody Canyons, and elsewhere. He spoke about Muir's measurements of living glacier movement on Mt. Lyell and offered a strong statement regarding the importance of Muir's discovery of this and other glaciers. Le Conte refuted the subsidence theory, owing to similarities to Yosemite Valley in at least two other Sierra valleys. He credited both ice and water for the erosion that shaped the Sierra. *California Academy of Science Proceedings*, Vol. IV (1868-1872), 9/16/72.

<sup>71</sup> Whitney, *The Yosemite Book*, 49-50.

<sup>72</sup> Susan Wells et al. *California Academy of Sciences — Architecture in Harmony with Nature*. San Francisco, CA: Chronicle Books LLC, 2008, 010.

<sup>73</sup> Cooper, 102-3.

<sup>74</sup> The Academy cemented its role as public science educator after the San Francisco earthquake of 1906, diminishing its role in promoting scientific field work while focusing on its magnificent new museum in Golden Gate Park.

<sup>75</sup> Brewster, 255.

<sup>76</sup> Leviton and Aldrich, 512-13.

<sup>77</sup> *Sierra Club Bulletin*, II, 2 (May 1897), 124.

<sup>78</sup> *Sierra Club Bulletin*, I, 2 (June, 1893), 27-28.

<sup>79</sup> Goetzmann, 356.