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U.S. PRESIDENTS and THEIR GEOLOGICAL THINKING

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“The movements in nature are in a never ending circle.”

Thomas Jefferson, 1799
Transactions of the American Philosophical Society

ABSTRACT

A number of United States presidents had some experience in geological thought and investigations and keen interests in the environment. The first U.S. president, George Washington, was a land surveyor. Thomas Jefferson, the 3rd U.S. president, was a keen supporter of science and maintained an interest in paleontology, and played a key role in the development of American paleontology. Theodore Roosevelt, the 26th U.S. president, was a strong supporter of the national park service and was an influential naturalist.

Herbert Hoover, the 31st U.S. president, was a Stanford University graduate with a degree in geology and mining – a true geologist/U.S. President. Hoover worked in the mining industry in the western United States, Australia, and China before moving into politics. Hoover lectured on mining at both Columbia and Stanford Universities and his lectures were published in 1909 as *Principles of Mining*. In 1912, Hoover, with his wife Lou Henry, translated

Agricola’s *De Re Metallica* from Latin into English.

KEY WORDS: George Washington, Thomas Jefferson, Theodore Roosevelt, Herbert Hoover, Benjamin Franklin

INTRODUCTION

As of 2012, there have been forty-four Presidents of the United States, beginning with George Washington in 1789. At the time of inauguration, Theodore (Teddy) Roosevelt was the youngest (age 42) and Ronald Reagan was the oldest (age 69). Four presidents have been assassinated while in office: Abraham Lincoln (15 Apr 1865), James Garfield (19 Sep 1881), William McKinley (14 Sep 1901), and John Kennedy (22 Nov 1963). Ronald Reagan was shot while in office and Theodore Roosevelt was shot while campaigning. Warren Harding and Franklin Roosevelt both died while in office. There have been two father-son presidents: John Adams and John Quincy Adams, George Bush and George W. Bush, and one grandfather-grandson: William Harrison and Benjamin Harrison. Richard Nixon resigned the office during his second term. Barack Obama was the first African-American elected President of the United States.

Twenty-six presidents were lawyers and twenty-four had a strong military background (seven were generals). Sixteen presidents served in the Army, six in the Navy, and two were in the Army Air Force or Air National Guard. The state of Virginia has provided the most U.S. presidents at eight, seven are from Ohio, four each from

New York and Texas, three each from Massachusetts and the Carolinas, two from New Jersey, two each from Vermont and Illinois, and one each from 10 other states.

Four U.S. presidents have been awarded the Nobel Peace Prize: Theodore Roosevelt (1906) for mediating the Russo-Japanese War; Woodrow Wilson (1919) for founding the Société des Nations (League of Nations); Jimmy Carter (2002) for decades of untiring effort to find peaceful solutions to international conflicts, to advance democracy and human rights, and to promote economic and social development; and Barack Obama (2009) for efforts to strengthen international diplomacy and cooperation between peoples. John Kennedy won a Pulitzer Prize for his book *Profiles in Courage* in 1955. William (Bill) Clinton was a Rhodes Scholar. Three presidents were on the faculty at a university and three were president of a university: James Garfield (Hiram College), Woodrow Wilson (Princeton), and Dwight Eisenhower (Columbia). Wilson, the only PhD, obtained his doctorate from Johns Hopkins University and entered the academic world at Princeton University. Which U.S. presidents had interests in the natural and geological sciences?

U.S. PRESIDENTS WITH INTERESTS IN THE NATURAL and GEOLOGICAL SCIENCE

Natural science was becoming important near the end of the 18th century and beginning of the 19th century. German native Johann David Schöpfung (1752-1800) was traveling in America and recording

geological observations (Schöpfung, 1788); Comte de Volney (1757-1820), a Frenchman, was writing his 2-volume work on climate and soils (Volney, 1804); and William McClure (1763-1840, a Scot, was busy compiling his geologic map of the eastern United States (McClure, 1809).

Benjamin Franklin (1706-1709), a great friend of Thomas Jefferson, had a considerable influence on the ‘science scene’ of the late 18th century (fig. 1). Like many people, Franklin had a mineral collection. He recognized that oceans had once been where land was today and knew that fossils had once been living animals. Franklin discussed the evidence of fossil sea creatures with Pehr Kalm, one of Linnaeus’ students, who was in North America on a mission for ‘the master’ (Merriam, 2006). Franklin also suggested the Earth might not be solid to the core, but a shell floating on an internal liquid (Merrill, 1904).

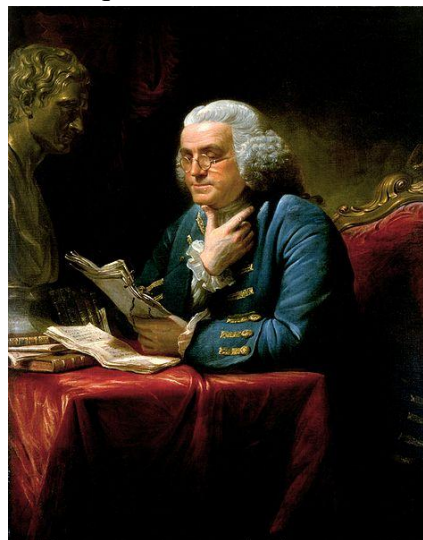


Figure 1. Portrait of Benjamin Franklin painted by David Martin and commissioned by Robert Alexander of the firm of William Alexander & Sons, Edinburgh.

http://en.wikipedia.org/wiki/File:Benjamin_Franklin_1767.jpg

George Washington

George Washington (1732-1799), the 1st President of the United States (1789–1797), was a Virginia farmer/planter, had a good secondary education and was proficient in mathematics, but had no formal education in science (fig. 2). His first job out of school, in 1747 at the age of 16, was working as a surveyor on the western frontier for George Fairfax (Freidel, 1982). He kept a diary of his work for the next three years as he conducted land surveys (Washington, 1892). Washington probably is best described as a keen observer of nature.



Figure 2. Portrait of George Washington painted by the artist Gilbert Stuart in 1796. The portrait hangs in the National Portrait Gallery, Smithsonian Institution in Washington, D.C. [http://en.wikipedia.org/wiki/File:Gilbert_Stuart,_George_Washington_\(Lansdowne_portrait,_1796\).jpg](http://en.wikipedia.org/wiki/File:Gilbert_Stuart,_George_Washington_(Lansdowne_portrait,_1796).jpg)

It was while Washington was surveying that he developed his appreciation of natural history as he kept track of the lay-of-the-land and land parcels and their condition. For example he describes parcels as '...on the side of a Hill in very stony ground, swampy, a rock ridge' and makes reference to the occurrence of prominent rocks and noted limestone (Wish, 1950). Washington also kept diaries of his observations while managing his agricultural lands at Mt. Vernon, and experimented with new ideas on improving the yield and tried different crops. He was a leader in scientific husbandry and maintained a model plantation (Wish, 1950).

Thomas Jefferson

Thomas Jefferson (1743-1826), the 3rd President of the United States, was one of the *avant-garde* persons of the 18th century (fig. 3). Jefferson had a degree in law from the College of William and Mary in Virginia. He wrote *Notes on the State of Virginia*, which contains many references to the geography and geology of the state (Jefferson, 1787). Jefferson communicated with savants of the day, including Joseph Priestley, Benjamin Rush, C.F.C. de Volney, Casper Wistar, B.S. Barton, Thomas Cooper, Alexander von Humboldt, and Benjamin Waterhouse, all prominent natural scientists (Koch and Peden, 1944).

Jefferson was acquainted with and well informed on science, and he made use of the scientific literature from Europe (Smallwood, 1941). He cited Comte de Buffon's account on the origin of the Earth (a comet passing the Sun), change in climate

as the Earth cooled, and animals migrating toward the equator with the cooling. Thus, Jefferson, an ardent sponsor of science, commissioned the Lewis and Clark expedition to the Pacific Northwest and sent Zebulon Pike to explore the Great Plains (Wish, 1950).

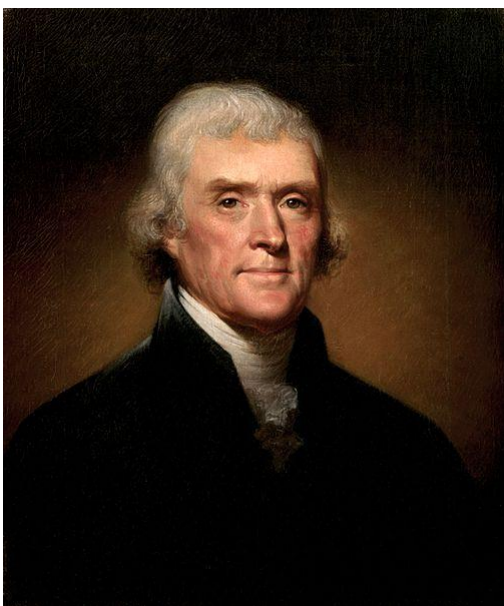


Figure 3. Portrait of Thomas Jefferson painted by Rembrandt Peale in 1800, and hangs in the White House in Washington D.C.

http://en.wikipedia.org/wiki/File:Thomas_Jefferson_by_Rembrandt_Peale,_1800.jpg

Thomas Jefferson was a key figure in the development of American paleontology. In 1799, Jefferson reported on the discovery and excavation of bones in a limestone cavern in Greenbriar County, Virginia and termed the fossil *Magalonyx* (Great Claw) (Jefferson, 1799). He described the *Magalonyx* and compared it to a lion and mused lions might still be present in some part of the country. He estimated the bulk of the creature from its height alone and deduced, if it was a lion, it was at least three times larger than an African lion. Jefferson

presented the results of his findings at the American Philosophical Society in Philadelphia while he was President of the Society. Jefferson later reconsidered that the animal might be the giant ground sloth *Megatherium*. [Note: Jefferson's *Magalonyx* bones are assigned to *Megalonyx jeffersonii*, or Jefferson's ground sloth, and are part of the Thomas Jefferson Fossil Collection housed in the Academy of Natural Sciences of Philadelphia (fig. 4)] He was a defender of the idea that American animals were as big, or bigger, than their counterparts in Europe, contradicting Buffon's theory of degeneracy of life in the Americas (Hindle, 1956).



Figure 4. Fossil bones from the hand of *Megalonyx jeffersonii* (ANSP 12507) with nickel near the top for scale.

<http://www.ansp.org/museum/jefferson/fossils/megalonyx-manus.jpg>

Jefferson was intrigued with fossils, especially vertebrate fossils. When he was elected President in 1801, he took his fossil collection with him to the White House. According to Merrill (1904), Jefferson had his fossil collection from Big Bone Lick in Kentucky spread out in one of the unfurnished rooms of the White House for study.

Theodore Roosevelt

Theodore (Teddy) Roosevelt (1859-1919) was the 26th President of the United States (fig. 5). He had a particular concern for the environment and preservation of our natural resources, which help to set the stage for the creation of the National Park Service. According to the National Geographic Society (2005), one of his most lasting and significant legacies to the world was the permanent preservation of some of the most unique natural resources of the United States. Roosevelt placed under public protection approximately 230,000,000 acres of public lands as national parks, national forests, game and bird preserves, and other federal reservations. In an address to National Editorial Association in Jamestown, VA on 10 June 1907, Roosevelt states, "In utilizing and conserving the natural resources of the Nation, the one characteristic more essential than any other is foresight.... The conservation of our natural resources and their proper use constitute the fundamental problem which underlies almost every other problem of our national life" (Theodore Roosevelt Association, 2005).

In an address to the Deep Waterway Convention in Memphis, TN on 4 October 1907, Roosevelt stated, "...the conservation of natural resources is the fundamental problem. Unless we solve that problem it will avail us little to solve all others." Later in his 7th annual message to Congress (3 Dec 1907), Roosevelt declared, "The conservation of our natural resources and their proper use constitute the fundamental problem which underlies almost every other

problem of our national life" (Theodore Roosevelt Association, 2005).

On August 25, 1916, President Woodrow Wilson, the 28th President, signed a bill that established the National Park Service "to conserve the scenery and the natural and historic objects and wildlife therein, and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations



Figure 5. Photograph of Theodore Roosevelt taken in 1904, and available from the Library of Congress.

http://en.wikipedia.org/wiki/File:President_Theodore_Roosevelt,_1904.jpg

Herbert Hoover

Herbert Hoover (1874-1964) was the 31st President of the United States (1929–1933) and a member of the first graduating class at Stanford University (fig. 6). At Stanford, Hoover majored in geology and earned his way through school by typing

material for Professor John Caspar Branner (Smith *et al.* 2007). For more on Hoover's geological training at Stanford, see Sweetkind-Singer (2010).

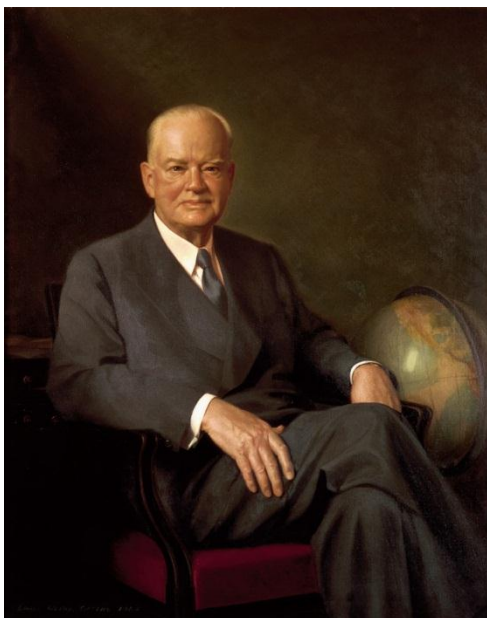


Figure 6. Oil painting of Herbert Hoover by Elmer Wesley Greene in 1956. The painting hangs in the White House in Washington D.C. http://en.wikipedia.org/wiki/File:Herbert_Clark_Hoover_by_Greene,_1956.jpg

Professor Branner got Hoover a summer job with the U.S. Geological Survey mapping the terrain in the Ozark Mountains, and the following summer, Hoover worked in Yosemite National Park. It was in Professor Branner's geology lab where Hoover met his future wife, Miss Lou Henry, of Waterloo, Iowa, who, at the time, was Stanford University's only female geology student.

Hoover received his AB degree in geology and mining in 1895. He went to work for the U.S. Geological Survey as a field assistant to Waldemar Lingren, the famous economic geologist (Petroski, 2006;

Barnard, 2006). Hoover's geological work in California and Colorado resulted in three short notes (Hoover, 1896, 1897, 1920).

In October 1897, the British mine engineering firm, Berwick Moreing and Company, Ltd., was looking for consultants to go to Western Australia where a Gold Rush was under way. They needed a young man, as the job would be extremely strenuous - but not too young, as it required thorough experience; say a man of thirty-five (Hartley, 1993). Stretching the truth about his age (fig. 7), the 23-year old Hoover convinced the London firm of Bewick, Moreing to hire him as a geologist, and he was sent to the Australian outback where, as Smith *et al.* (2007, p. 9) states, "Hoover won the trust of rowdy Aussies by his take charge ways and democratic habits".



Figure 7. A young Herbert Hoover during his time in the Australia goldfields. While in the goldfields, Hoover grew a beard in order to appear older.

<http://www.kalgoorlietourism.com/Herbert-Hoover>

Due to the vast stretches of sand in the Western Australia outback, travel in the goldfield was typically by camel (fig. 8). On an early expedition, a camelback trip into the desert, he camped near an obscure mine developed by three Welshmen. Recognizing its potential for profit under aggressive management, Hoover encouraged Berwick, Moreing and Company, Ltd to buy the operation and put him in charge. The mine, called Sons of Gwalia (Gaelic for "Wales"). The Sons of Gwalia mine, located at Gwalia, a few kilometres south of Leonora, Western Australia, was one of the most productive mines in Australian history, and yielded more than 2 million ounces of gold. Gold from the Sons of Gwalia mine netted \$65 million for Bewick, Moreing and Company (> \$350 million in current dollars). Hoover managed the mine from May to November 1898, and the mine remained in production until 1963.



Figure 8. Hoover, sporting a beard to cloak his age, sits astride a camel, which were imported from Afghanistan, for use in the Western Australia goldfields. Hoover hated camels and considered them “an even less successful creation than a horse” (King, 2010, p. 21). Photo from Coughlin, (2000).

With the success of Sons of Gwalia, Hoover's salary more than doubled and he became a partner with a stake in the mine. Acclaimed as one of the most astute managers in the goldfields, he radically reorganized the operation during his seven months at the helm. Just that quickly -- in a period of his life largely neglected by historians -- he launched the fortune and reputation that would lead him to the American presidency.

Today, the head frame, Hoover designed for the Sons of Gwalia mine, still stands (fig. 9) as part of the Gwalia Museum. The mine mangers house, where Hoover celebrated his 24th birthday in August 1898, today houses photographs and other memorabilia. Hoover later designed and built a home in Leonora (fig. 10) where he lived from 1897 through 1898. Today, a famous Leonora landmark, Hoover's home is a B & B and sits at the the edge of the now closed Sons of Gwalia open pit gold mine



Figure 9. Head frame for the Sons of Gwalia mine. Photo from ABC (2004).



Figure 10. Herbert Hoover's home in Leonora, Western Australia. Photo from GTN (1012).

In 1899, Hoover returned briefly to California where he married his Stanford sweetheart, Lou Henry on 10 February 1899, in Monterey, California, and on the next day, the couple sailed for China. The Hoovers had a home in Tianjin, and both Lou Henry and Herbert learned Mandarin Chinese. Herbert had a reputation, earned in the Australian gold fields, as a shrewd, capable, and energetic mine manager and he traveled extensively in China as part of his job with Bewick, Moreing and Company, where he became known as the 'doctor of sick mines'. He was made a partner in Bewick, Moreing and Company in 1901, with the responsibility for operations in Australia, where he continued to visit between 1901 and 1907.

Along with William Baillieu, an Australia financier and politician, Hoover founded the Zinc Corporation in 1905, with the intention to purchase and treat the zinc-rich tailings of the Broken Hill ore deposit in Broken Hill, New South Wales, Australia, the world's largest and richest zinc-lead ore deposit. However, problems existed in separating the zinc from tails, until Hoover

connected with Fleury J. Lyster, whom Hoover had met years before at the Sons of Gwalia mine in Leonora, Western Australia. Based on the Delprat-Potter method of flotation for separation, Lyster developed a new flotation process, now known as the 'Lyster Process', for separating zinc and lead, and by September, 1912, the Zinc Corporation was operating the first commercial selective flotation plant in the world (Fairweather, 2000).

Hoover left Berwick, Moreing and Company in 1908, to become an independent mining consulting and to make investments in various mining operations. Drawing from his extensive background in mining methods and management, Hoover published *Principles of Mining: Valuation, Organization and Administration: Copper, Gold, Lead, Silver, Tin and Zinc* (1909), which became the standard textbook on mining engineering for several decades (fig. 11). *Principles of Mining* available on-line from the Gutenberg Project at: <http://www.gutenberg.org/ebooks/26697>.

Between 1907 and 1912, Herbert and Lou Henry, a trained Latinist, worked diligently on an English translation of the medieval mining treatise *De Re Metallica* by Georgius Agricola. The translation, published in London by *The Mining Magazine*, is noted for its clarity and extensive footnotes, appendices, and references to the history of mining law in England, France and German and mine safety (fig. 12). Herbert even conducted laboratory experiments to check Agricola's descriptions. The Hoovers' translation is available on-line as part of the Gutenberg Project at:

<http://www.gutenberg.org/files/38015/38015-h/38015-h.htm>.

The Hoovers received many accolades for their scholarship, including the Mining and Metallurgical Society of America's first gold medal for their contributions to the literature of mining. The gold medal has only been awarded to 30 individuals in the 100-year history of the Society (MMSA, 2008). It is interesting to note that the Hoovers dedicated the translation to their Stanford University professor, Dr. John Caspar Branner, with the inscription, "The inspiration of those teaching is no less great than his contribution to science."

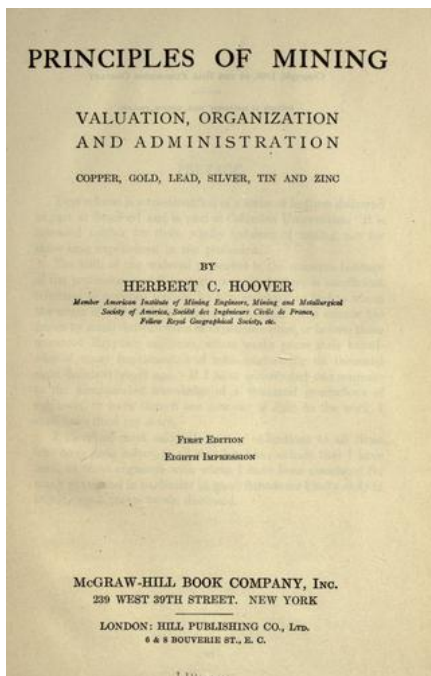


Figure 11. Title page from Hoover's *Principles of Mining*. From the Open Library. http://openlibrary.org/works/OL143956W/Principles_of_mining

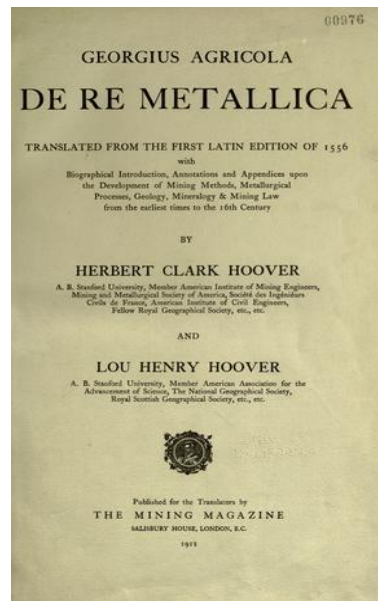


Figure 12. Title page from the Hoovers' translation of *De Re Metallica* (Agricola, 1556). From the Open Library.

http://openlibrary.org/books/OL6556978M/Georgius_Agricola_De_re_metallica

SUMMARY

There have certainly been U.S. presidents with an interest in the natural sciences, such as Thomas Jefferson, and presidents interested in preserving the environment, such as Theodore Roosevelt. A few U.S. presidents had no formal higher education, but most of the presidents did attend college (or university). A few attended U.S. military academies and served in the military prior to their presidency, such as Grant, Eisenhower, and Carter. Garfield, Wilson, and Johnson (LBJ) were teachers. A few had degrees in economics, political science, or history. However, the majority trained to be lawyers, and a few, such as Lincoln, became lawyers without formal training. Only Herbert Hoover had a college degree in science - Geology.

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