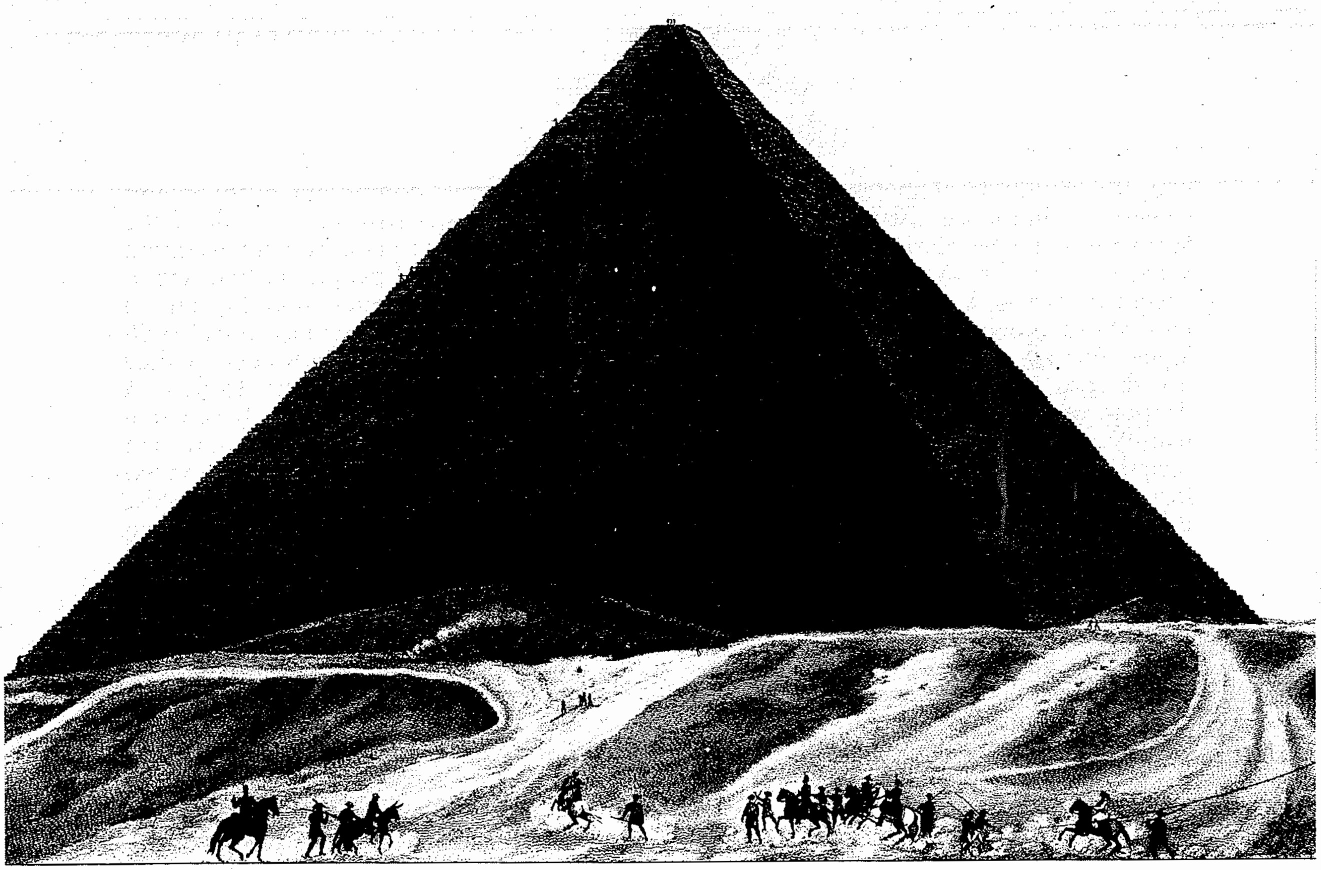
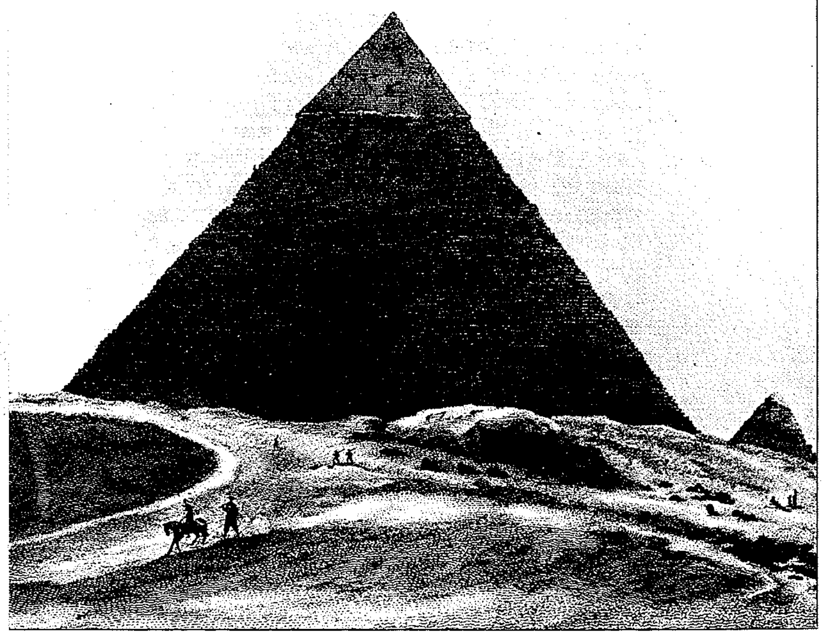


Afterlives of the Great Pyramid

by Daniel J. Boorstin

During the 1970s, *Time* and *Esquire* ran articles about the "healing energy" of *pyramid power.* A Nobel Prize–winning physicist bombarded the Great Pyramid at Giza with cosmic rays to discover its secrets. New Age devotees erected small pyramids in which to meditate and make love. Was this only one more passing fad? Perhaps not. Daniel Boorstin reveals that many respected figures in Western history—including Sir Isaac Newton and Napoleon Bonaparte—have been intrigued by the Egyptian pyramids. Their attempts to unravel the "mystery" of the Great Pyramid is the story of Enlightenment rationality gone astray, a tale of how easily the scientific mentality can slip into mystical speculations.



Napoleon's general staff reach the Great Pyramid at sunrise. The etching comes from the Napoleonic expedition's archaeological survey of the pyramids, published in 21 volumes.

The grandeur of the Great Pyramid at Giza challenged the young Napoleon's imperial imagination. When the ambitious 29-year-old general led his ill-starred expedition to Egypt in 1798, he visited Giza where he was awed by what he saw. Some of his officers climbed all 450 feet to the top of the Great Pyramid, but Napoleon remained below, drawing and calculating. We still have his sketches of the Giza pyramids and his notes. Napoleon reportedly informed his generals, after their descent, that the three pyramids contained enough stone to build a wall 10 feet high and one foot wide around all of France. Recalling Alexander the Great before him, Napoleon asked to be left alone in the King's Chamber inside the Great Pyramid. On coming out he was said to be pale, as though he had witnessed a mysterious vision. Napoleon never told what he had seen, but he repeatedly hinted at an epiphany that revealed his destiny. Seventeen years later, while a prisoner on St. Helena, he was tempted to reveal this experience to Emmanuel Las Cases, to whom he was dictating his memoirs, but he stopped abruptly, saying, "What's the use? You'd never believe me."

Awe of the Great Pyramid led Napoleon's savants to measure and describe the monument with unprecedented accuracy, providing solid data for generations of scientific fantasy. Retreating from Egypt, Napoleon left his scientists and artists to complete their work. They were captured by the British, who chivalrously allowed them to return to France with their notes and drawings. Their achievement, the first detailed survey of the monuments of Egypt, was also the first modern archaeological survey. Their nine large folio volumes of text and 12 volumes of plates, the *Description de l'Egypte* (1808–25) was a monument in itself, described by admirers as "the most immortal conception and glorious performance of a book ever realized by man." One of Napoleon's officers found near Rosetta, at a branch of the Nile Delta, an unimpressive three-foot diorite slab. A quarter-century later, this stone—carved in hieroglyphics, cursive Egyptian, and Greek—provided the key for the precocious Jean-François Champollion's deciphering of the hieroglyphic language used by the ancient Egyptians. "The only true conquests," Napoleon once remarked with uncharacteristic humility, "are those gained by knowledge over ignorance." Despite the hasty retreat of his armies from Egypt, it was the site of one of Napoleon's more enduring conquests.

The creators of the pyramids unwittingly created the speculative science—and art—of Pyramidology. Since the Great Pyramid bore no inscription revealing its meaning, archaeologists have sought other clues. The cryptic language of numbers has proved seductive. Could not the message of the Great Pyramid be carried by its dimensions? Even before there was a modern science of Egyptology, this hope enticed generations of earnest European scholars to Giza. The famous English astronomer and pioneer of Egyptian metrology, Charles Piazzi Smyth (1819–1900), explained:

> [T]he Great Pyramid was never even remotely understood.... [But] it is able nevertheless to explain its grand, even Messianic, mission, most unmistakably. Not, indeed, in the usual manner of less ancient monuments, by the use of any written language, whether hieroglyphic or vulgar, but by the aid of the mathematical and physical science of modern times applied to show the significance residing in the exact amount of its ancient length, breadth, and angles; a means most efficacious both for preventing the parable being read too soon in the history of an, at first, unlearned world; but for insuring its being correctly read, and by all nations, when the fullness of prophetic time, in a science age, has at last arrived.

If the power of a work of creation is revealed in its iridescence—its capacity to inspire meanings unimagined by its creators—then the Great Pyramid has few peers.

These speculative fantasies have enlisted some of the best scientific minds of the English-speaking world, beginning with Sir Isaac Newton (1642–1727). His demonstration of his theory of gravitation in Book III of his *Principia* depended on the shape and dimensions of the Earth. When the classic figures for the Earth's circumference provided by the Greek astronomer and geographer Eratosthenes (third century B.C.) did not fit Newton's propositions, he looked for something better. Newton's Biblical piety—reflected in his thousands of manuscript pages of theological speculation and his New System of Cosmology to confirm the Biblical narrative—suggested another source for the data he needed.

Newton found encouragement in the work of a mathematician-traveler named John Greaves (1602–1652). To find the precise dimensions of the Earth, Greaves had gone to Egypt in 1638, seeking clues in the Great Pyramid. An enlightened suspicion then current among the learned held that the sciences did not all begin with the ancient Greeks. In particular, it was believed that the Greeks had learned their geometry from the Egyptians. Pythagoras himself was reputed to have said that the Greek units of measure had come from Egypt. And was it not plausible that the Egyptians used their grandest and most durable monument—the Great Pyramid—to embody and perpetuate their standard of measure?

This devious line of reasoning led Greaves, the brilliant young Oxford mathematician, to Egypt and into the Great Pyramid. With his measuring instruments, "creeping like a serpent" down the Pyramid's Descending Passage, he fired his pistols to clear away the cloud of bats, some a foot in length. He finally reached the Grand Gallery and the King's Chamber, where he examined the empty granite coffer, taking measurements as he went. Returned to England, Greaves became the Savilian Professor of Astronomy at Oxford. Assembling his data in a little book, the *Pyramidographia*, he attracted the attention of the scientific community. Sir William Harvey, renowned for his theories of respiration, was puzzled that Greaves had not found any ventilating conduits for the Pyramid's interior chambers. The energetic Sir Isaac Newton then came up with his own *Dissertation upon the Sacred Cubit of the Jews and the Cubits of several Nations: in which, from the Dimensions of the greatest Pyramid, as taken by Mr. John Greaves, the ancient Cubit of Memphis is determined.* In this treatise, Newton displayed a dual interest—Biblical and scientific. Definition of the ancient cubits would clarify the Bible's obscure and mystical passages. For exam-

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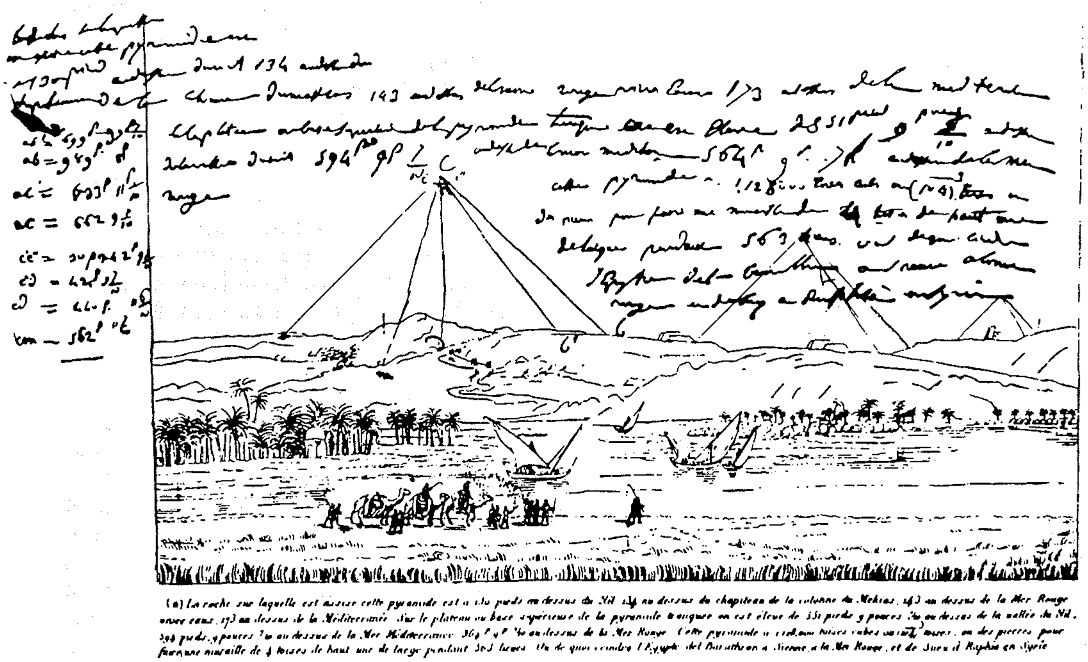
ple, it might help define the dimensions of the Temple of Solomon, which symbolized the heavenly reality.

Newton's scientific purpose would also be served, because a precise ancient Egyptian cubit would help mark the length of the "stade" or "stadium." Ancient authors had suggested a connection between the "stade" and a geographical degree of the Earth's surface. According to Aristotle, the most ancient measure of the Earth's circumference—by Thales (640?–546 B.C.) and Anaximander (611–547 B.C.)—was 400,000 "stades." Newton suspected that this figure, much alive. New schools of Pyramidology were sparked by the 175 savants who came to the pyramids with Napoleon in 1798. Aided by a large crew of the Ottoman Turks, the savants cleared away debris at corners of the Great Pyramid. At last they exposed the rectangular sockets, 10 by 12 feet, hollowed into the base rock and level with each other, on which the original cornerstones of the structure had been laid. This made possible newly accurate measurements of the apothem (the sloping surface) and the circumference at the base.

Edmé-François Jomard, one of the



Sketches, calculations, and notes that Napoleon made of the Great Pyramid in 1798.

older than Eratosthenes's, was truer and that the stadium unit might somehow be embodied in the Great Pyramid.

Newton never succeeded in finding what he was looking for in the Great Pyramid. He never visited Egypt, and, even if he had, it might not have helped much. The accumulated debris around the base made it impossible to secure an incontrovertible, precise figure. For the measure of the Earth's circumference used in his *Principia*, he turned elsewhere.

Still, the hope to calculate the dimensions of the Great Pyramid remained very younger and more energetic of Napoleon's savants, was tantalized, then obsessed, by the secret message of the stones. He did some measuring on his own. To determine the height, he climbed to the summit. From there, even with a slingshot, he could not hurl a stone far enough to clear the base. The Arabs reported that they had done no better with an arrow. Jomard counted and measured the steps, then figured the length of the apothem. This he estimated at 184.722 meters, surprisingly close to the 185.5 meters which the ancient Greeks used as their figure for the "stade." Jomard recalled that Diodorus Siculus and Strabo had said the apothem of the Great Pyramid was precisely one "stade." Jomard also discovered that the opening end of the Descending Passage was pointed with startling accuracy in the polar direction and precisely oriented to see the transit across the meridian of a circumpolar star.

Everything Jomard measured seemed to open new possibilities. The empty sarcophagus in the King's Chamber appeared to embody the Egyptian cubit, which led Jomard to speculate that the pyramid might not have been primarily a tomb at all. The sarcophagus was empty, and there was no indisputable evidence that it had ever contained a corpse. Surely, he said, there must have been good reason for Egypt's reputation as the birthplace of geometry, repeated by the wisest of the ancients—Herodotus, Plato, Solon, and Pythagoras. Could not the Great Pyramid have been built on purpose to record their profound geometric and geographic science? Instead of a funerary monument for a dead pharaoh, perhaps they had intentionally left this monument of learning to be deciphered by distant generations.

Jomard's efforts were not wasted. His tantalizing suggestions were picked up by a most unlikely messenger, a pious and sedentary English man of letters, John Taylor (1781–1864). The son of a London bookseller, Taylor received at a provincial grammar school a solid foundation in Latin, Greek, and mathematics. Apprenticed as a bookseller at the age of 14, he later formed a small publishing house with a friend in London. His wit and omnivorous curiosity made him the center of a literary circle of marginal and neglected authors. Interest in literary puzzles made him the first to identify the probable author of the notorious *Junius* diatribes (1769–1771) against the government of George III. He penned religious tracts which even included finding a name for the great beast of the Apocalypse.

Among the marginal poets whom he sponsored was John Keats (1795–1821). To champion this odd young writer took some courage. *Endymion* (1818), Keats's longest poem, was dismissed in the leading literary magazines as an uncouth work of "the Cockney School." Still Taylor remained Keats's publisher and his generous patron. He advanced £100 for the copyright to *Endymion*, then made it a gift to the author. When Keats's works were not selling, when he was besieged by creditors and deathly ill with consumption, Taylor sent Keats on his final trip to Italy to recover his health. He also tried to recover for Keats the money that Keats's brother had absconded with to America. Keats considered Taylor his close friend and principal patron.

Taylor never traveled to Egypt nor even out of Britain. But he arranged for the publication of his own *Emphatic New Testament* (1854), and he enjoyed travelers' accounts of Egypt. In 1859, the year of Darwin's *Origin of Species*, Taylor made his own "attempt to recover a lost leaf in the World's History." His work on the origin of measures, according to his leading disciple Piazzi Smyth, was "the most precious discovery of the age for all mankind." Taylor's motto was his favorite passage from Deuteronomy (xxv, 15): "Thou shalt have a perfect and just Weight, a perfect and just Measure shalt thou have: that thy Days may be lengthened in the Land which the Lord thy God giveth thee."

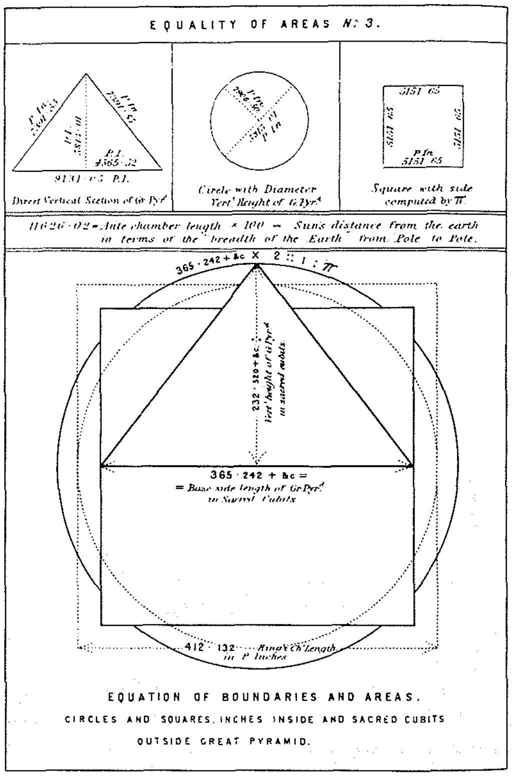
Taylor's copious researches attempted to prove "that in the Great Pyramid the world now possesses a Monument of Inspiration, as it has long possessed a Book of Inspiration." Somehow concealed there was the perfect, divinely inspired standard of measure. This unit—intended to be a certain fraction of the Earth's circumference from which the whole could be calculated—was part of the original design of nature. By studying the angle of an original casing stone, Taylor calculated the original height of the structure and discovered the astonishing fact that the relation of the height to the circumference was almost precisely $1{:}2\pi$. Scholars had assumed that Archimedes (287–212 B.C.) was the first to arrive at the irrational number for the relation between the radius and the circumference of a circle. Now it appeared that, long before Archimedes, the Egyptians had solved this problem. What made this fact doubly gratifying, Taylor concluded, was that they appeared to have used the British inch. Or perhaps more accurately, the British were unknowingly perpetuating the divinely inspired Egyptian inch.

This seemed to lend credence to the appealing proposition of Richard Brothers (1757–1824), a religious fanatic and the self-proclaimed descendant of the Biblical David, that the British people were descended from the lost tribes of Israel. "Our Motto, from Deuteronomy," Taylor explained, "points to a very important consideration: viz.—That the people who maintain a perfect and just weight, and a perfect and just measure, may expect lengthened days in the land which God giveth them. If any people were ever entitled to so great a favor it might be the Inhabitants of this Country. They have had the same measures of Length, Capacity, and Weight, from the earliest times; and they have been blessed with a long and unbroken series of peaceful Governments. Greater freedom from external foes, and from internal dissensions, has not fallen to the lot of any other nation." Taylor's thesis seemed to be supported by the backwardness of Egyptian science. Since their mathematics was too rudimentary (as later historians have confirmed) for them to have arrived on their own at the irrational number π, and since they plainly lacked the know-how to build so mathematically perfect a structure, "the Great Pyramid must have been erected under Divine instructions to its architect." Which, of course, attached a divine aura to the British inch.

Richard Brothers's Biblical prophecies, which included his demand that George III deliver up his crown to him as a descendant of David, prince of the Hebrews and rightful ruler of the world, led to his confinement as a criminal lunatic. John Taylor's less implausible prophecies agitated the Royal Society and enlisted the enthusiasm of eminent scientists of the age. *The Great Pyramid: Why was it Built & Who Built it?*, which Taylor published at the age of 79, applied the English inch to the Biblical dimensions of Noah's Ark, the Tabernacle, the Tower of Babel, the Temple of Solomon, and the height of Goliath. Taylor drew on supposed etymologies in Hebrew, Egyptian, Greek, and Latin. What his thesis lacked in plausibility it more than made up in learning. The American secretary of state John Quincy Adams, in his "Report upon Weights and Measures" (1821), had earlier asked whether the curious decimal relation of the axis of the Earth to the diameter of the equator (333 to 334) was purely accidental. "It is not accidental," Taylor observed, "but the result of the measurement made of the Earth's diameter before the Deluge by the Sacred Cubit then in use, and of the same measurement after the Deluge by the corresponding cubit, the Itinerary Cubit of the Great Pyramid." And so he enlisted Adams too as an ally of the British inch. "So complete," Taylor concluded, "is the knowledge now obtained that it leaves scarcely anything to be desired."

Taylor's book luckily caught the attention of one of the more accomplished astronomers of the age, Piazzi Smyth, the Astronomer Royal for Scotland, Professor of Practical Astronomy at the University of Edinburgh. Smyth was born in Naples, the son of an eminent astronomer who immigrated to England and became an admiral in the Royal Navy. At 16 the precocious Smyth became assistant at the Royal Observatory at the Cape of Good Hope, where he drew the course of the great comets of 1836 and 1843. He was diverted to the earthly riddle of the Great Pyramid by his mentor, Sir John Herschel (1792–1871), who was at the time working at the new observatory at Cape Town. The versatile Herschel had achieved fame in mathematics, found new ways to use the telescope, and would later explore the infant science of photography as well as translate into English Dante's *Inferno* and Homer's *Iliad*.

Herschel had been reading British travelers' descriptions of the Great Pyramid. He was intrigued by Herodotus's suggestion that the Pyramid had an occult metrological significance. Herschel noted Taylor's revelation that the figure for π derived from the Great Pyramid (if calculated in British inches) provided a convenient unit for measuring the circumference of the Earth. This relation between the British inch and the dimensions of the Earth proved to him that the British possessed a modular standard "more scientific in its origin, and numerically, very far more accurate than the boasted metrical system of our French neighbours." In 1860, when Herschel pub-



Piazzi Smyth used diagrams to argue the Great Pyramid was built with "accurate knowledge of high astronomical and geographical physics."

lished his observations, he made the dimensions of the Great Pyramid a matter of public interest in Britain and also a weapon in the battle against the metric system and decimal coinage. Herschel helped delay the metric cause for at least a century.

The prestige of the "Einstein" of the age gave new momentum to Taylor's thesis. Fueled by popular opposition to the metric system, Taylor's speculations acquired a sudden respectability. When Piazzi Smyth read Taylor's works, he determined to make his own on-the-spot study of this "Monument of Inspiration."

In November 1864, Smyth and his wife sailed for Egypt. In Cairo they won the friendly support of the powerful Ismail Pasha (1830–1895), rebuilder of Cairo and promoter of the Suez Canal. The Pasha supplied donkeys and a camel train to take them to Giza and provided 20 laborers to clean the main chambers of the Pyramid for their accurate measurements. The Smyths set up a cozy household in an abandoned tomb in a cliff of the Giza Hill.

Using instruments made to their order by a British optician, they noted every inside and outside dimension of the grand monument. To measure individual stones they used mahogany and teak rods tipped with brass and treated to prevent variation from humidity or temperature. Smyth's newly precise measurements showed that the builders really had incorporated in the relation between the altitude and the circumference of the Pyramid a value for π to the figure of 3.14159+. Further evidence proved that this figure incorporated in the building was a clue to the precise number of days in the year (because the Earth is a sphere and rotates once a day).

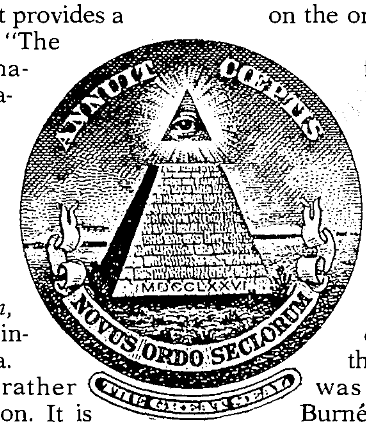
Smyth's measurements of the Great Pyramid, published in numerous volumes, brought him the gold medal of the Royal Society of Edinburgh. But some members of the scientific community objected to his extravagantly pious conclusions, which included Pyramid prophecies of the Second Coming of Christ. A skeptical colleague called Smyth's work "a series of strange hallucinations which only a few weak women believe, and perhaps a few womenly men, but no more." When the Royal Society of London refused his request to report his studies, he resigned from the Society and so added a martyr's crown to that of a prophet.

But there now came a delightful irony as well as a new kind of hero to the history of Pyramidology: William Matthew Flinders Petrie (1853–1942). Petrie would found a modern science of Egyptology and revolutionize the techniques of all archaeology. His grandfather, Matthew Flinders (1774–1814), was the famous circumnavigator of Tasmania, the pioneer cartographer of the Australian coast. His father, a mechanical engineer, had been so intrigued by the theories of Taylor and Smyth that he spent 20 years designing more precise measuring instruments for the Egyptian climate. Inspired by family tradition and by Smyth's book on the Great Pyramid, which he read at the age of 13, Petrie very early determined to pursue the history of the world's standards of measure. He became an expert surveyor, practicing on English

IS THAT A PYRAMID IN YOUR POCKET?

How many Americans have wondered what that curious-looking pyramid is doing on the U.S. dollar bill? Why did the Founding Fathers, democratic and forward-looking, choose for the back of the republic's Great Seal an ancient royal tomb with a radiant mystical eye at the top?

The Treasury Department provides a reassuring interpretation: "The pyramid stands for permanence and strength. The pyramid is unfinished, signifying the United States' future growth and goal of perfection. A sunburst and eye are above the pyramid standing for the Deity." The motto below the pyramid, *Novus Ordo Seclorum*, or New Order of the Age, invokes the new American era.



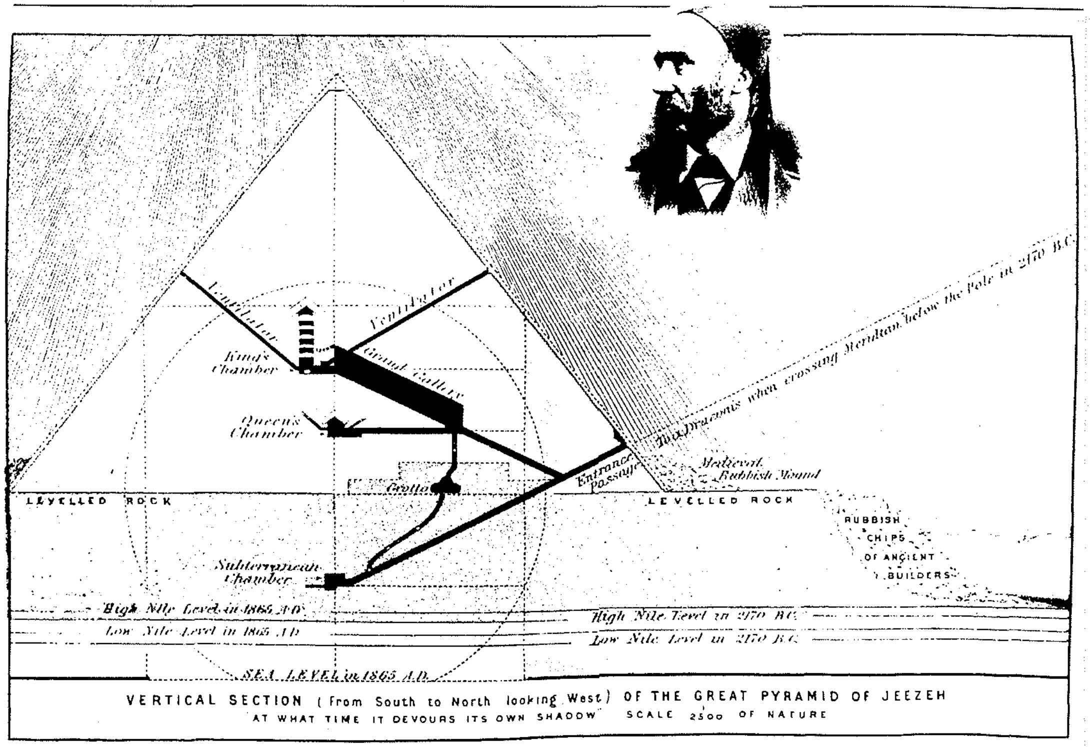
There is, however, a rather more provocative explanation. It is associated with the Masons. Some of the Founding Fathers, including George Washington, were Freemasons, and, according to Manley Hall, an expert on Masonic lore, they received aid from a secret European group to establish the United States for "a peculiar and particular purpose known only to the initiated few." The unfinished pyramid of the Great Seal symbolizes, says Hall, "the task to the accomplishment of which the U.S. Government was dedicated from the day of its inception." This task was kept a secret but hinted at by putting the Great Pyramid on the Great Seal and the Great Seal on the one-dollar bill.

This claim, with all its far-fetched causality, has seemed plausible to a number of people. Books such as Norman Frederick de Clifford's *Egypt, the Cradle of Ancient Masonry* (1902) trace the Masons back to an ancient brotherhood who, more skilled than modern architects, encoded their hidden wisdom in the geometry of the Great Pyramid. That wisdom was well-hidden indeed: Ton Burnês in *Secrets of Ancient Geometry*, a book dedicated to the Freemasons, argues that the Pyramid's geometry was never fully decoded until, in fact, the publication of his own book in 1969. It may be that every person with a feverish imagination and a dollar bill to spend is a potential convert to Pyramid speculation.

churches and even on Stonehenge. Drawing on his field work, he published at the age of 24 his epoch-making *Inductive Metrology, or the Recovery of Ancient Measures from the Monuments* (1877), followed by his survey of Stonehenge (1880).

To make his own survey of the Great Pyramid, Petrie arrived in Egypt in November 1880, laden with his father's improved measuring instruments. He enlisted Ali Gabri, the genial Arab guide who 16 years earlier had helped the Smyths set up their household at Giza. Petrie, too, established himself comfortably in an abandoned tomb. For the next two years he surveyed and re-surveyed the Pyramid. Sometimes he spent a whole day repeating observations at a single station. Ali Gabri would hold a parasol over Petrie's theodolite, or surveyor's telescope, to keep the sunshine from making it expand unevenly. Petrie discovered that the base line of the Pyramid should be measured not from the corner "sockets" used by Smyth but by the edge of the pavement 20 inches higher. This produced a figure for the baseline of the Great Pyramid of only 9,069 British inches (instead of Smyth's 9,140). Petrie later recalled his astonishment that the enthusiasm for Smyth's theory that had drawn him to Egypt had led "to the ugly little fact which killed the beautiful theory." His new figures destroyed the mathematical coincidences between the Pyramid, the days of the year, the circumference of the Earth, and the British inch, and so demolished the whole vast pyramid of speculation and fantasy. Only a few obstinate enthusiasts and fanatics would refuse to surrender.

Petrie would, more than anyone before him, clarify the real achievements of the Egyptians. He invented sequence dating,



Piazzi Smyth (inset), who first measured the pyramids using modern equipment.

developed the techniques of cross-dating (using shards of ancient pottery), and produced a revolution in the ways of archaeological excavation. Petrie noted in 1911, "Hitherto the comparatively brief outlook of Western history has given us only the great age of classical civilisation before modern times. We have been in the position of a child that remembers only a single summer before that which he enjoys."

The fertile afterlife of the Great Pyramid reveals a bizarre and little-known twist in posterity's capacity to misunderstand—or re-understand—the message of a work of art or architecture. It is common enough to force an original work of art to speak in the vocabulary of our generation, to see for example in *Julius Caesar* or *Coriolanus* the modern totalitarian dictator. In the afterlife of the Great Pyramid, too, we see the strenuous but pathetic effort of each later generation to make an ancient monument declare its own modern wisdom. For over two centuries British scientists attempted to find in the Great Pyramid the divinely ordained yardstick that revealed the superiority of the British over the French ways of measuring. (And why not, too, the superiority of other things British?) Theirs was a touching faith in the powers of science to confirm the good opinion that God-fearing Britons held of themselves.

But we must not conclude that the afterlives of the Great Pyramid are only a gloss on the fallibility of mortal man in the search for truth. We can enjoy some providential optimism in the surprising "conclusion" of this story. For it was out of the effort to test the simplistic dogmas of earlier Pyramidologists and to settle the "Battle of the Standards" that the bold and brilliant Sir Flinders Petrie founded modern Egyptology and gave to ancient Egyptian life a new vividness. Once again we see the iridescent power of great works of creation to carry unintended messages.