

# Finding Those Indelible Marks Flinders Petrie Left on the Giza Plateau

by Glen Dash

Flinders Petrie has been called “the Father of Egyptian Archaeology.”<sup>1</sup> His 1880–’81 survey of the Giza Plateau and its pyramids was a watershed. Without doubt, he left his mark on archaeology. As it turns out, at Giza he left his marks literally as well. These were his “stations,” the markers in his survey network. They can still be found, if you know where to look, and they are still important. Most of them have not been seen in more than 130 years. In this paper I identify where they are, and what they should look like.

William Matthew Flinders Petrie (1853–1942) was the son of William Petrie, a surveyor and inventor. His mother, Anne Flinders, was the daughter of a famous sea captain, Matthew Flinders, who mapped the Queensland coast of Australia. Young Flinders began surveying archaeological sites in England with his father while a teenager. By the age of 22, he

had surveyed and planned 40 of them, including Stonehenge.<sup>2</sup>

In 1866, at the age of 13, Flinders Petrie purchased

Charles Piazza  
Smyth’s  
*Our*

*Inheritance in the Great Pyramid.*<sup>3</sup> Smyth, following John Taylor, claimed that the Great Pyramid was divinely inspired and, among other things, prophesied the future and recorded the measures of the Earth.

Petrie and his father resolved to travel to Egypt to see for themselves. Precise measurements of the Great Pyramid’s internal and external elements, it was thought, could be used to confirm Taylor and Smyth’s theories. Petrie’s father’s interest may have waned, but young Flinders’s did not, and in 1880 he set off on his mission.<sup>4</sup>

Petrie arrived at the foot of the Great Pyramid on December 21, 1880, the winter’s solstice. “We reached the pyramid about 10; a lovely morning with a delicate mare’s tail sky, and the pyramids, one side warm with sunshine, the other grey blue with slight haze.”<sup>5</sup> He settled into an empty tomb and commenced his survey work. On February 11, 1881, he wrote:

I have planned out and made a good beginning, in a large survey of geodetic accuracy, to extend round all the Gizeh pyramids and to shew us their real errors of construction. Few people will sympathise with such a work, but I feel it is shameful not even to know the accuracy of the finest work of ancient times; to attain it is something beyond the zeal of modern architects, but at least we ought to be able to measure more accurately than they worked.<sup>6</sup>

To conduct a “geodetic” survey of the kind Petrie describes, a surveyor begins by picking reference points around the target area from which to survey.<sup>7</sup> These were Petrie’s “stations.” At each station the surveyor places a signal, so the location of the station can be seen from adjacent stations.

The surveyor’s first task is to carefully measure the angles between stations, known as azi-



*“The Great Pyramid has lent its name as a sort of by-word for paradoxes; and, as moths to a candle, so are theorizers attracted to it. The very fact that the subject was so generally familiar, and yet so little was accurately known about it, made it the more enticing ...”*

~ W. M. Flinders Petrie<sup>8</sup>

Glen Dash and Mohamed Abd el-Bassett ponder over Petrie Station B on the north side of the Khafre Pyramid Temple. Photo by Mark Lehner. On the far left the ghost of Petrie “haunts” the Giza Plateau.

muths, and calculate the distances between them, a process known as reduction. The calculations allow the surveyor to place the stations on a map. The surveyor then proceeds to measure the angle to a particular feature, such as the corner of a pyramid temple, from multiple stations. Using triangulation, the surveyor can calculate the location of this feature relative to the stations, which allows the surveyor to place that feature on the map. Moving feature to feature, a picture, or plan, of the whole area can be built up.

For Petrie, the endeavor proved daunting owing to the conditions at Giza. On February 7, 1881, he wrote:

A typical day. Off by 7.45 with Ali [Gabri] to station on hill top W. of pyramids, placing signals on the way there. Then began observing, but the wind was so high that three times I had to leave off and take a run of ¼ to ½ mile and back to replace signals blown over ... to add to which a gust constantly came driving sand into one's eyes and making one screw them up for a minute before anything could be seen again. ... I had to go to and fro moving things; the theodolite of 36lbs was a lug to carry 1/3 mile and then up a slope of rubbish. Hence I took azimuths to 5 stations, the wind gone down then and then just finished by sunset, packed up and then west round and collected signals, getting in by 6½. After supper reduced all observations and then wrote this and to bed about 11.00.<sup>9</sup>

The nights could be as bad as the days. In a passage generations of field archaeologists can empathize with, Petrie wrote:

Did not get any sleep till 11 or 12 and then [sleep] broken by 1<sup>st</sup> trap down, big rat, killed and reset.  
2<sup>nd</sup> Mouse about trap for long, though bait must be eaten, got up to see.  
3<sup>rd</sup> Fleas.  
4<sup>th</sup> Mouse let trap down without going in, got up, reset it.  
5<sup>th</sup> Mouse in, got up, killed him, re-set trap.  
6<sup>th</sup> Fleas.  
7<sup>th</sup> Dog ...<sup>10</sup>

Prior to Petrie's arrival, British astronomer David Gill had surveyed incompletely the base of the Great Pyramid in 1875.

He had left a series of permanent stations, or monuments, around the Great Pyramid consisting of bronze stakes set in lead and mounted into holes in the bedrock or into stone slabs. Petrie had hoped to use Gill's monuments, but, upon his arrival, found half of Gill's markers had been stolen. He did find three at the corners of the Great Pyramid, at the northwest, northeast and southeast. The fourth, at the southwest corner was gone, leaving an empty 1.6 inch (4 centimeters) square hole. Petrie would set his own stations, and resolved not to have them disappear. He wrote:

For station marks on rocks and stones, I entirely discarded the bronze lead forms [used by Gill]. They may be very good in a law-abiding country, but I found that half of those put down by Mr. Gill, in 1874, were stolen or damaged ... I therefore uniformly used holes drilled in the rock, and filled up with blue tinted plaster; they are easily seen when looked for, but are not attractive. To further protect them, I made the real station mark a small hole .15 [inches in] diam.; and, to find it easier, and yet draw attention from it if seen, I put two ½ inch holes, one on each side of it; usually 5 inches from it, N.E. and S.W. Thus, if an Arab picked out the plaster (which would be not be easy, as the holes are 1 to 1 ½ inch deep) he would be sure to attack a large hole, which is unimportant. Where special definition was wanted, as in the main points round the Great Pyramid, a pencil lead was set in the middle of the plaster. This cannot be pulled out, like a bit of wire, but crumbles away if broken; yet it is imperishable by weathering. To clean the surface of the marks, if they became indistinct, a thin shaving can be taken off the rock, plaster, and central graphite altogether.<sup>11</sup>

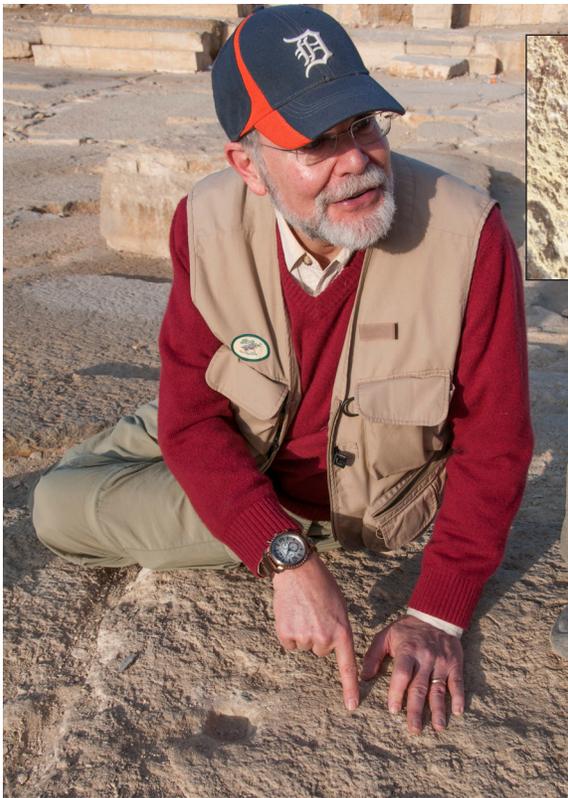
One hundred and thirty-four years later, on February 7, 2015, Egyptologist Mark Lehner, surveyor Joel Paulson, and I stood at the southwest corner of the Great Pyramid. We were there to conduct a survey of the base of the Great Pyramid using the latest equipment and survey techniques. We started the way Petrie did, looking for monuments from previous surveys. Standing at the Pyramid's southwest corner we saw exactly just what Petrie had seen so many years before, an empty hole in the rock

(shown in the photo below left). There should have been a modern control monument there. Mark Lehner and Surveyor David Goodman had replaced the lost Gill stake in 1984 by filling the 4-centimeter hole with epoxy and setting a survey nail in it. However, sometime between 2014 and 2015, that was stolen as well.

For us, the missing monument was a problem. We had only a few days to complete our survey, and resetting the marker would take time. Still, it had to be done. So we began to scrape away a

The southwest corner of the Great Pyramid, looking north. The empty hole that once held David Gill's bronze survey monument can be seen in the foreground next to the north arrow. Photo by Glen Dash.





Petrie rediscovered. Glen Dash points at Petrie's blue-plaster-filled hole, just north of where Gill's bronze monument was once set. We used it as a station in our 2015 survey of the base of the Great Pyramid. Photo on the left by Mark Lehner. Inset photo by Rebecca Dash.

and G on the north side of the Khafre Pyramid Temple and on Lepsius Tomb 17, respectively. We used stations o, w, u, and Q in our survey of the base. We also found and recorded station L, a surviving Gill monument north of the Great Pyramid's entrance. All the others remain to be recovered, recorded, and photographed.

Fortunately for us, Flinders Petrie left some indelible marks on the Giza Plateau. They are so subtle and well set that they may survive a thousand years, well after the rest of our markers are gone. When encountered, their bright blue appearance contrasts so much with their drab surroundings that they shock the eye. Spread around Giza, they are tiny monuments of Flinders Petrie's work here, still useful today.

At the conclusion of his work, Petrie reflected on the theories of Smyth and Taylor which had brought him here:

As to the results of the whole investigation, perhaps many theorists will agree with an American, who was a warm believer in Pyramid theories when he came to Gizeh. I had the pleasure of his company there for a couple of days, and at our last meal together he said to me in a saddened tone, -- "Well, sir! I feel as if I had been to a funeral." By all means let the old theories have a decent burial; though we should take care that in our haste none of the wounded ones are buried alive.<sup>13</sup>

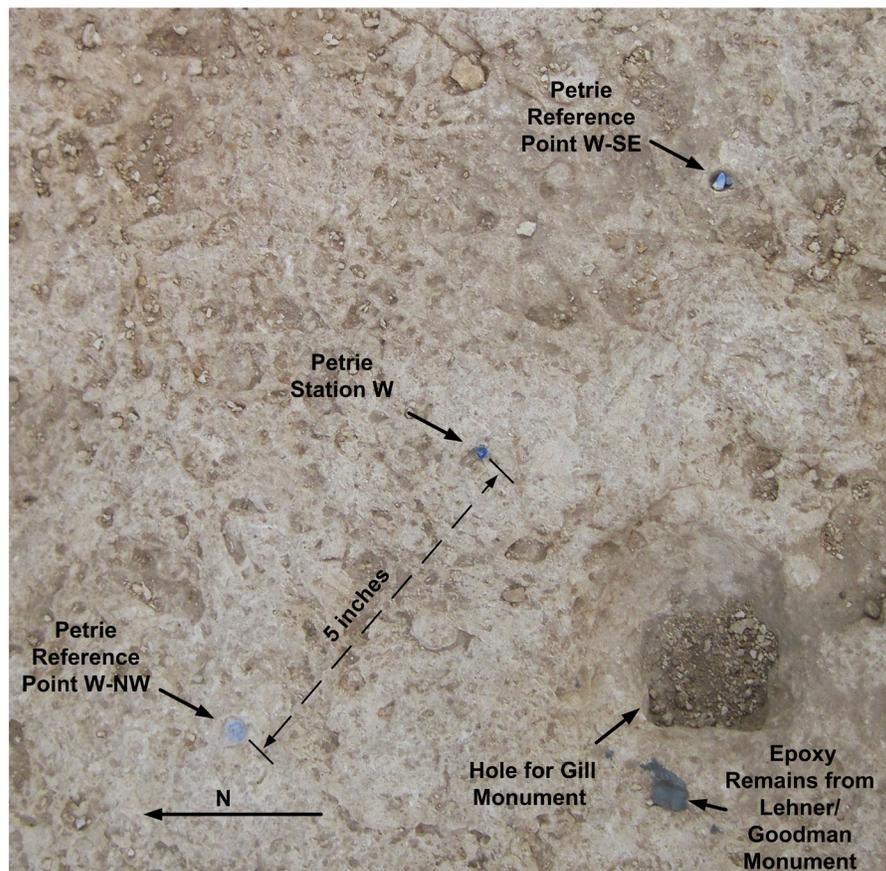
One hundred and thirty-four years on, we are still trying to answer many of those same questions. Fortunately, owing to Flinders Petrie's genius, we still have his assistance.

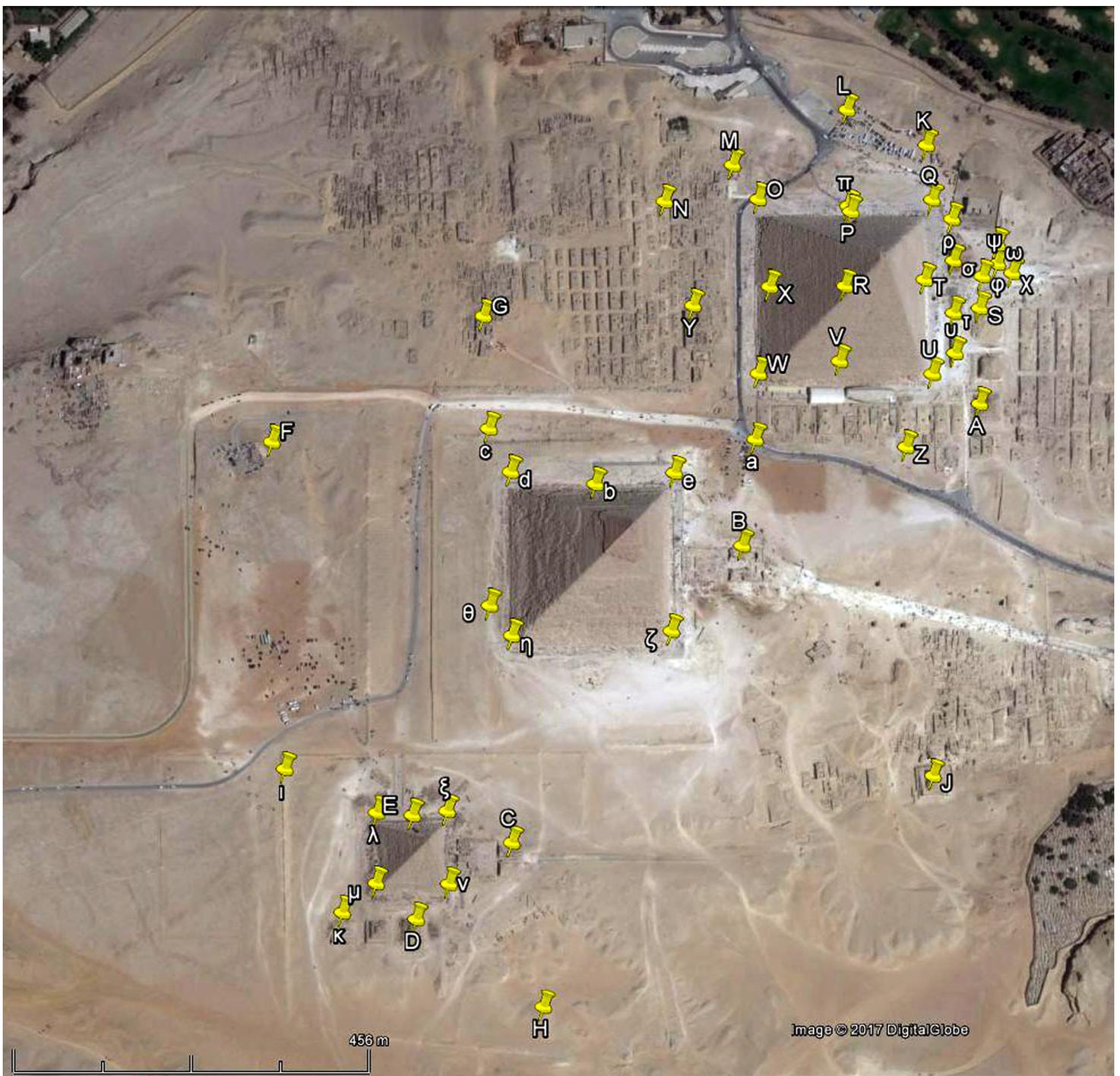
layer of encrustation over the limestone slab to prepare the area when we saw a baby-blue-plaster-filled hole (shown above). It was Flinders Petrie's calling card. We were most happy to find it. We would use it as our southwest station for our pyramid survey.<sup>12</sup>

The blue-plaster-filled hole was one of three Petrie had left here. It was not until the 2016 season that we cleaned enough of the surrounding surface to find the other two. All three were much as Petrie had described them, except that the half-inch holes that flanked the center hole were to the northwest and southeast rather than to the northeast and southwest (below right). The center hole was complete with its pencil lead. The flanking holes, which surveyors refer to as "reference points" or RP, were exactly 5 inches from the center hole.

In *The Pyramids and Temples at Gizeh*, Petrie recorded the location of all his stations on a survey grid of his own devising.<sup>13</sup> In tables available at <http://dashfoundation.org/downloads/archaeology/working-papers/Coordinates-for-Petrie-Stations.docx>, I have converted the coordinates of the stations as reported by Petrie to points on the modern survey grid we now use at Giza, the Giza Plateau Mapping Project (GPMP) grid established by Mark Lehner and David Goodman in 1984-1985. I also list each point's longitude and latitude.

The figure on the facing page shows their locations on the Giza Plateau. During our 2015 and 2016 seasons, we found Petrie's stations B





Above: Location of Petrie's stations. The Latin or Greek letters denoting each station are from Petrie 1883, pages 35–36, and are listed in Tables 1 and 2 (<http://dashfoundation.org/downloads/archaeology/working-papers/Coordinates-for-Petrie-Stations.docx>). Photo courtesy Google Earth and Glen Dash.

Facing page: Petrie's Station "W." During our 2016 season we carefully brushed clean the area to the north and east of the hole that once held the Gill monument. We found all three blue-plaster-filled holes Petrie had left here, their appearance being much as he had described them in his 1883 book. Photo by Glen Dash.

1. Lehner, M., *The Complete Pyramids*, London: Thames and Hudson, page 56, 1997.
2. Smith, H. S., "Preface," in *Letters from the Desert* by M. Drower, Oxford: Oxbow Books, page viii, 2004.
3. Piazzi Smyth, C., *Our Inheritance in the Great Pyramid*, London: A. Strahan and Company, 1864.

4. Smith, H. S., in Drower 2004 (see footnote 2), pages viii–ix.
5. Drower 2004, page 14.
6. Drower 2004, page 24
7. Surveys of this type, generally known as traverse surveys, can be geodetic or planar. A geodetic survey factors in the curvature of the Earth, whereas a planar survey does not. There is no evidence that Petrie figured in the Earth's curvature. As such his survey may be better described as a planar survey.
8. Petrie, W. M. F., *The Pyramids and Temples of Gizeh*, London: Field and Tuer, page 1, 1883.
9. Drower 2004, page 21.
10. Drower 2004, page 26.
11. Petrie's reference to 1874 is in error. Gill set his monuments in 1875, after returning from the transit of Venus expedition to Mauritius in 1874. Petrie 1883, pages 20–21.
12. The method we used to measure the base of the Great Pyramid can be found in G. Dash and J. Paulson, "The 2015 Survey of the Base of the Great Pyramid," *Journal of Egyptian Archaeology* 102, pages 186–195, 2016.
13. Petrie 1883, pages 34–36.
14. Petrie 1883, page xvi.