Injury and Induration: George William Wigner and Cleopatra's Needle

Chris Elliott, Doctoral Student in Archaeology, University of Southampton

Based on a presentation made at the Annual Conference of the Association of Public Analysts held at Canterbury Cathedral Lodge, Canterbury, on 27th October 2017.

Summary

On 20th November 1878 George William Wigner, a founding member of the Society of Public Analysts, read a short paper entitled "On Cleopatra's Needle" to members of the Society[1]. In it, he gave details of the physical structure and chemical composition of weathered and un-weathered samples of the granite from which the Needle, an Ancient Egyptian obelisk, was made.

He drew particular attention to the amount of water that could be absorbed by the weathered surfaces of the granite and how this might lead to erosion of the obelisk by freezing and thawing. He went on to suggest that the best way of protecting it would be to coat it with a non-porous and neutral substance such as paraffin wax. In advocating this Wigner differed from others at the time and initial treatments of the surface of the Needle adopted an alternative approach. This paper compares Wigner's analysis of the need for protection and the best way to achieve this with others over nearly one hundred and forty years and concludes that in a number of significant ways his views reflect contemporary ones.

Introduction

At a meeting of the Society of Public Analysts[2] on Wednesday 20th November 1878 George William Wigner, later described as "one of [its] founders, if not the father"[3], read a short paper entitled "On Cleopatra's Needle". In it, he assumed that his audience would not only be familiar with the Needle, but with the appearance and origin of the granite from which it was made, and referred to samples of this granite "which, by the courtesy of Mr Dixon[4], I am enabled to exhibit tonight". He then went on to describe the physical and chemical composition of the rock, including its specific gravity and density, its surface condition resulting from weathering over the years, and a series of experiments that he had carried out to determine the ability to absorb water of the weathered and un-weathered surfaces of samples. He discussed the risk that weathered surfaces of the granite, because they were able to absorb more water, could more easily be damaged by flaking when this water froze, and

concluded by recommending that the Needle be protected with "a non-porous and neutral substance" such as paraffin wax.

The Ancient Egyptian obelisk known as Cleopatra's Needle had finally been brought to London and erected on the Thames Embankment in September 1878, almost eighty years after this had first been proposed, and the reasons for a Public Analyst to be lecturing on the preservation of an Egyptian antiquity throw an interesting light not only on Wigner and his work, but on the reaction of the British public to what had been described as "our distinguished visitor"[5].

Cleopatra's Needle

Cleopatra's Needle is an Ancient Egyptian obelisk[6]. In their classic form, these were monoliths, quarried from a single piece of rock, usually pinkish red granite from quarries at Aswan in the south of Egypt. They varied in size, from over thirty metres tall to less than ten[7], but shared the same form of a narrow square sectioned shaft tapering gradually to a pyramid shaped top (pyramidion). Typically, they were set up in pairs in front of temple gateways and were engraved with inscriptions in hieroglyphs on all four sides of the shaft and pyramidion. The obelisk now on the Victoria Embankment in London was one of a pair set up in 1468 BC outside the temple of the sun god Re at Heliopolis, now a suburb of Cairo, to celebrate the third Jubilee (a festival celebrating and renewing the vigour of the ruling Pharaoh) of Thutmose III, in the thirty-seventh year of his reign. Around 10BC both obelisks were moved to the city of Alexandria on the Egyptian coast by the Roman Emperor Augustus to stand outside the Caesareum, a temple to the deified Julius Caesar, his maternal great-uncle and adopted father. Despite the association between the Needles and Cleopatra there is no real evidence that she had anything to do with moving them. One Needle remained standing until it was moved to New York in 1880 but the other, now in London, fell, probably in an earthquake at the beginning of the fourteenth century, but remained unbroken.

In 1798, a French expeditionary force led by Napoleon landed in Egypt but was soon effectively stranded there after a British naval squadron commanded by Horatio Nelson destroyed the French fleet at the Battle of the Nile in August of that year. In 1801 a British expeditionary force under the command of General Sir Ralph Abercromby landed in Egypt and defeated French forces at the Battle of Alexandria, leading to their subsequent surrender and evacuation. During the battle, Abercomby was wounded in the thigh by a musket ball, and later died. A number of British officers, including Lord Cavan, who assumed command after Abercromby's death, wanted to transport the fallen obelisk to England, to act as a memorial to the victories of Nelson and Abercromby, and those who had died during the campaign. A fund for this was raised by subscription from officers and men but the attempt failed when the jetty constructed to load the Needle onto a ship was destroyed by a storm and further attempts were vetoed by senior commanders in the Mediterranean over concerns that they might be politically sensitive.

In 1820 the Needle was offered as a gift to the Prince Regent on his coronation as George IV by Muhammad Ali, technically the Ottoman Sultan's Viceroy in Egypt, but in practice its *de*

facto ruler. Despite this and a number of other proposals over the years to bring it to London it was not to finally arrive until 1878, due to a combination of political issues and concerns over the cost of transport and the state of preservation of the obelisk. By the late 1860s, Alexandria was expanding rapidly as Egypt modernised and industrialised and the land on which the Needles stood was increasingly valuable. Serious concerns were raised that the fallen Needle in particular might be broken up to clear the land for development. General Sir James Alexander[8], who had seen the Egyptian obelisk brought to Paris in 1833, became aware of the threat to the Alexandrian obelisk and in 1867 began a campaign to bring it to England. Over ten years later, his efforts were successful, thanks mainly to the civil engineers John Dixon and his brother Waynman, who had formulated a plan to build an iron barge around the Needle and tow this to London and the surgeon and dermatologist Erasmus Wilson, who provided funds to make this possible.

A Hostile Environment

The London to which the Needle came was a city which had expanded dramatically during the nineteenth century, with considerable industrial activity, and one where coal was the main fuel. This led to dangerous levels of air pollution, and it was thought that the combination of acid rain, soot, and extreme temperature (the Great Blizzard of 1881 brought three foot snowdrifts to London) would combine to rapidly erode the Needle and destroy its inscriptions. The Egyptian obelisk, many believed, could not survive in the hostile environment of the United Kingdom's capital and a formula emerged which was has now been used for nearly a hundred years; at least as early as 1878, and as recently as 1967[9]. This was that the Needle had suffered "more damage in X years in London than X centuries in Egypt". Fears that the Needle would be eroded were fuelled by press reports about the obelisk in the Place de la Concorde in Paris, brought from Luxor in Egypt in 1833. A Dr Mohr, about whom there seems to be little or no biographical information, claimed in letters to the press that its condition had deteriorated dramatically in the short period of time that it had been in Paris. The implication was that if this continued at the same rate, it would not survive indefinitely.

However, a note of common sense was sounded by those who pointed out that London's granite statues seemed to be surviving its polluted atmosphere fairly well and that if the Needle was being eroded, so must the granite of the Embankment on which it stood and there were no obvious signs of that. Nevertheless, the view of many was that the Needle would be damaged by bringing it to London, and that it must be protected in some way.

Proposals for Protection

Among the proposals put forward, some were more practical, and some probably more serious than others. The area of greatest concern was the possible erosion of the obelisk's inscriptions, and although some of the more extreme suggestions, such as re-cutting them and polishing the obelisk surface, or as one member of the House of Lords proposed, filling them with lead, were thankfully not implemented, plaster casts were taken to record the state of the inscriptions on the Needle's arrival. This was done for the South Kensington (now Victoria

and Albert) Museum, but the casts have subsequently disappeared. Moving the monolith indoors was another way of preserving it, and the British Museum was an obvious location for this. Also suggested, and seriously contemplated in 1852, was the newly built Crystal Palace, which was to have an Egyptian architectural court and large reproductions of the colossal statues of Ramses II at Abu Simbel. Generally, though, the most common suggestion was that the Needle should be cleaned and a protective coating applied.

This was the theme of George Wigner's address to the Society of Public Analysts in November 1878, about two months after the Needle had been erected on the Victoria Embankment, and a few weeks after he had turned thirty-six. Born in Norfolk, and educated at what was then Lynn Grammar School, he had moved to London when he was seventeen. Until he was twenty-two, he worked not as a public analyst, but in a private bank, although he continued to study chemistry and other scientific fields in his spare time, and lectured on them to schools and societies. It was at these lectures that he met, and was offered employment in its laboratory, by the owner of a Deptford chemical works. He worked there for four years before branching out on his own at the age of thirty, and within a few years had built up a successful practice advising chemical manufacturers on new processes and patents He also advised merchants and brokers, probably on food standards, as he was actively involved in the creation of the Sale of Food and Drugs Act, which was enacted in 1875, and in 1880 won a $500 prize awarded by the National Board of Trade of the United States for an essay on and draft Act for legislation to regulate the sale of food and drugs and to prevent their adulteration. Obviously a man of immense energy and enthusiasm, Wigner was not only one of the first elected Public Analysts, acting for Plumstead, Greenwich, and Deptford, but also acted as an expert witness in court cases, and was consulting chemist to a number of companies and to the Board of the Thames Conservancy. Not content with this, he took a leading role in the formation of the Society of Public Analysts (SPA), acted as its Honorary Secretary until assuming the role of President in 1883, edited its journal, *The Analyst*, and contributed fifty papers to it. As if all of this was not enough, he also acted as judge at a number of food exhibitions, and was a juror at the International Health Exhibition of 1884, which involved him in carrying out hundreds of analyses of food samples. He was also married, with a young son and daughter. Sadly, his wife died in early 1884, and Wigner survived her by less than a year, dying in October 1884, probably from cancer of the oesophagus, two days before his forty-second birthday. It is difficult to disagree with the anonymous author of his obituary in the proceedings of the SPA, that "His life was one of incessant hard work, allowing but little time for the necessary relaxation to maintain health"[10].

It is no surprise then that a man of such energy and wide-ranging interests as Wigner should involve himself in a *cause célèbre* such as Cleopatra's Needle, nor that someone whose professional life was so heavily involved in matters of adulteration, contamination, and protection, should interest himself in how an Ancient Egyptian obelisk should be protected from the grossly polluted atmosphere of Victorian London. Wigner's conclusion, as outlined earlier, was that water absorption by exposed surfaces of the obelisk's granite, and subsequent freezing, were a significant factor in its weathering. He also made clear his view "what an act of vandalism it would be to cover such a stone as this with silicate solution, as has been proposed. Such a solution would not even fill up the pores of the weathered portion,

and it could not sensibly increase the coherence of the porous surface. The only proper course is to fill the pores with a non-porous and neutral substance – such as paraffin wax, for instance."[11]


THE POINT OF THE "NEEDLE": L.C.C. OFFICIALS—SURVEYORS AND A CHEMIST—WITH WORKMEN, EXAMINING THE CONDITION OF THE STONE BEFORE CLEANING BEGINS.

In August 1878, while the Needle was still horizontal, part of the pyramidion (the pyramid shaped section at the top of an obelisk) had been washed and treated with a solution of beeswax dissolved in spirits of wine[12], very much as Wigner had recommended, but this seems to have only been a test, and the proposal to which he refers was for the Needle to be coated, before it was raised and swung onto its base, with what was described by John Dixon as "[A] solution of silica supplied to me by the skilled chemists of the British Museum"[13]. This treatment had been suggested by Richard Owen, Superintendent of Natural History at the Museum, and Samuel Birch, its Keeper of Oriental Antiquities, a department which at that time included material from Ancient Egypt, who Dixon described as "my old friends", and it had been used for a number of years by the Museum to consolidate and preserve fragile bones, shells, and fossils. It was not their own formulation, however, but a commercial product known by a number of names, including Browning's Invisible Preservative, manufactured by the splendidly named Indestructible Paint Company. It took its name from the founder of the company, Henry Browning, who had patented the solution in 1869[14]. It was essentially a form of clear varnish, made up in descending proportions of Spirit, Dammar Gum, Wax, Sugar of Lead, and Corrosive Sublimate. Arguments over its effectiveness meant that despite some press reports, treatment was not actually carried out until late April and early May 1879, when three coats were applied, after cleaning of the obelisk, under the personal supervision of Henry Browning. The company referred to this treatment, in its trade literature and advertisements, as the "induration" or hardening of the obelisk.

Although this treatment was meant to permanently protect the Needle, it had to be cleaned again several times within the next twenty years, a reflection of the build-up of soot and tar from the smoky atmosphere[15]. In 1911, it was cleaned with plain water and, on the advice of chemists at the London County Council (LCC), coated with paraffin wax as Wigner had suggested. Even this was not the end of the story, however, as there was still concern over the preservation of the Needle and from time to time stories surfaced in the press alleging that it

was threatened. The *Daily Mail* issue of 3rd February 1932 had a headline "Cleopatra's Needle Crumbling – Effects of acid-laden fog" and an accompanying picture was said to show "a portion of the rotting stonework's pitted surface". A variety of companies approached the LCC to promote their proprietary solutions, including two American companies who had treated the New York obelisk, the other half of the pair that had stood together at Alexandria, with pressurised application of paraffin wax in 1885, and "Texaco El Glykol" in 1914. A past Honorary President of the American Pharmaceutical Association wrote to the LCC in 1932 recommending that the London Needle should be coated with boiled linseed oil.

Until the passing of the first Clean Air Act in 1956, any attempt to clean the Needle could only be a temporary solution, but by 1949 plans were again afoot to clean and coat it. Reflecting developments over the seventy years since this had first been done, it was to be cleaned with Lissapol N, a condensed ethylene oxide organic detergent produced by ICI, but coating was still to be with paraffin wax. Despite an approach by the Indestructible Paint Company, urging a fresh application of Browning's solution, a report from the LCC's chemists concluded that it would only be a surface treatment, whereas paraffin wax could penetrate more deeply, even if this involved heating it with blowtorches. Before this could be done, the existing dirt had to be removed, and it proved so stubborn that bristle brushes were not enough, and power driven wire brushes had to be resorted to. On the more heavily soiled surfaces, before the detergent was used, the deposits had to be treated with a 9:1 mixture of carbon tetrachloride and benzol. Following this cleaning, it was recommended that the obelisk be cleaned annually with high pressure water jets, with the possible addition of detergent, to prevent fresh deposits of soot and tar building up. It was noted that "care must be taken to ensure that such treatment does not tend to increase flaking of the stone". Initially, it was thought that this could be done at minimal cost by the London Fire Brigade but then it was noted that there were no hydrants on the river side of the Embankment and that hoses from the other side would need to cross the tram lines. It was therefore accepted that subsequent cleaning would still necessitate scaffolding the Needle, and the extra cost meant that this would be done every five years rather than annually.


D LONDON NEWS 89

WASHING CLEOPATRA'S NEEDLE.

Cleopatra's Needle, the great obelisk which stands on the Victoria Embankment between Charing Cross Station and Waterloo Bridge, is now "in stilts," being encased in a pagoda-like series of stages. This is in order to enable it to be cleaned with a non-fatty detergent and dressed with a preservative wax, in order that it may look its best and play its small but distinctive part in the 1951 Festival of Britain. It stands directly across the river from the South Bank exhibition site now in course of preparation. This celebrated pink granite obelisk has, of course, nothing to do with Cleopatra. It was one of a pair first erected by Thothmes III., a Pharaoh of the Eighteenth Dynasty, at Heliopolis about 1500 B.C. These were usurped by Rameses the Great about two centuries later, and at about 12 B.C. they were taken to Alexandria. The one now in London was presented to the British nation by Mohammed Ali in 1819, but no steps were taken to remove it from Alexandria until 1878, when it was shipped from Egypt "through the patriotic zeal" of Sir Erasmus Wilson, F.R.S., and, after being abandoned in the Bay of Biscay during a storm and subsequently recovered, it was erected in its present position, bronze Sphinxes by G. Vulliamy being set at the base.

A GIANT "NEEDLE-CASE": THE SCAFFOLDING ERECTED ROUND CLEOPATRA'S NEEDLE ON THE VICTORIA EMBANKMENT TO ENABLE THE GREAT OBELISK TO BE CLEANED.

In the years of austerity following the Second World War, even a five yearly cleaning cycle proved to be too expensive and cleaning does not seem to have been carried out again until 1966, when the Needle was cleaned by low pressure blasting with silica free grit (actually graded copper slag), and then washed down with water. After that, an even longer interval elapsed before the next cleaning was carried out in 2005. This was accompanied by a full assessment of the Needle's condition[16], which described the surface as "covered in a dark layer of carbonaceous material and general dirt and grime [with] a heavy build-up of guano on the apex". Some flaking was present, from particle sized to portions up to 10cm^2 and up to

4mm thick, typical of contour decay in granite. The relatively low levels of quartz in Syenite granite, from quarries at Aswan in southern Egypt, means that it is not as hard as some other types, and can be subject to decay from acid rain (pH 5). A lighter area of the obelisk, on its south-west corner, was less subject to flaking, which might be due to prevailing winds keeping it drier. Cleaning was carried out with high pressure steam, soap solution, and hand held nylon brushes. Repeated treatments were needed to fully clean the surface of the obelisk. This method was chosen over others to avoid over-wetting the stone, which could lead to further erosion from the freeze-thaw cycle, and the cleaning was also carried out during the summer months. As a report on the cleaning noted "the syenite granite of the Needle differs greatly [from the more modern granite of its plinth] as it is weaker, more eroded and has been tooled. Its surface is softer, far more open and water will penetrate deeper than it would on other granite surfaces."[17]

It also noted that further deterioration of the surface is inevitable, as it is "part of the natural life span of granite", but considered that consolidation of the stone was undesirable as it would be likely to prevent it from breathing. The overall conclusion was that the obelisk was "in surprisingly good condition for its age". To minimise further deterioration, regular steam cleaning was recommended.

Conclusion

Writing in 1877 in *The British Architect*[18], Edward Godwin FSA, the architect and designer, asked rhetorically "Unprotected then, under London skies and all their impurities, how long would the incisions be readable? Would they last a hundred years? Would they endure for fifty?"

His question has been answered, and far more positively than he would have imagined. Bringing the Needle to London was not the catastrophe that some feared. It may have been begrimed by the grossly polluted atmosphere of Victorian and Edwardian London, and eroded to some extent by its acid rain, but just as its residence here is as yet insignificant compared to its whole existence, so the reasons for much of its ageing may lie in the past. The Needle, and its sister in New York, had stood for centuries in Alexandria, where they were, because of their location near the harbour and the Mediterranean climate of the city, exposed to severe winds, rain, salt spray, and a far wider range of temperatures than in London. Even before this, they may have been toppled and exposed to fire in the sack of Heliopolis following the Persian invasion of Egypt in 500 BC, a factor which has been seen as responsible for the dramatic erosion on some faces of the New York obelisk[19]. During the time that Cleopatra's Needle has been in London, a variety of approaches have been adopted to cleaning and preserving it. While modern conservation practice has moved away from surface treatments such as the application of paraffin wax recommended by George Wigner in 1878, his conclusion that water absorption and the subsequent freezing and thawing of this water were the main threats to the obelisk's surface and inscriptions still hold good, and are a tribute to him as a scientist and Public Analyst.

Acknowledgements

I am extremely grateful to Duncan Campbell for providing initial biographical information on Wigner, to Jon Griffin for inviting me to speak at the Association's annual conference, and to Michael Walker for encouraging me afterwards to submit a version of my presentation to the JAPA.

The photograph of George William Wigner is reproduced courtesy of the Royal Society of Chemistry Library.

References

1 Later published in the Society's journal, *The Analyst*, 1 January 1878, 382-284
2 The Society of Public Analysts became the Society of Public Analysts and Other Analytical Chemists, then the Society for Analytical Chemistry, and eventually became the Analytical Division of the Royal Society of Chemistry. In 1953, the Association of Public Analysts was formed to better serve the interests of Public Analysts, who were in a minority in the RSC.
3 J Chem Soc 47 (1885): 344-5
4 John Dixon, the civil engineer primarily responsible for the transport of Cleopatra's Needle to London.
5 The Times, Feb 1 1878, leader article.
6 See Arnold, Dieter, *The Encyclopaedia of Ancient Egyptian Architecture*, 165-166.
7 Habachi, Labib, *The Obelisks of Egypt*, 116-117.
8 1803-1885. See Dictionary of National Biography, *Alexander, Sir James Edward*.
9 for example, *The Builder*, February 16 1878, 158-159, and *Financial Times* October 19 1967, 15
10 Obituary, J Chem Soc 47 (1885), 344-5
11 Wigner, George. "On Cleopatra's Needle" *Analyst*, 1878, 3, 384.
12 *Illustrated London News*, August 10 1878, 133-134, *The Builder*, August 3 1878, 802.
13 *British Architect*, May 30 1890, 386.
14 Letters Patent, 1st June 1869, No. 1691.
15 The main sources of material on the cleaning and preservation of Cleopatra's Needle are London Metropolitan Archives files ACC/3499/EH/07/01/103-105
16 "The Conservation of Cleopatra's Needle", Antique Bronze Ltd 2005
17 Ibid, 16
18 *The British Architect*; November 9 1877, 225-226
19 D'Alton, M. 1993, 70. *The New York Obelisk or How Cleopatra's Needle came to New York and what happened when it got here*. The Metropolitan Museum of Art, New York.