

# PYRAMIDOLOGY AND RADIOCARBON: THE DATING AND INTERPRETATION OF A FRAGMENT OF WOOD FROM THE GREAT PYRAMID

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## Introduction

During an investigation of the Great Pyramid in 1872 by Waynman Dixon and James Grant, two narrow shafts from the 'Queen's Chamber' were discovered. In them were items including a copper alloy hook, stone ball and a fragment of wood. James Grant was an important, though little known, figure in late nineteenth century Egyptian archaeology, whose large collection of Egyptian archaeology is now in the University of Aberdeen. His work was part of the development of a 'scientific Egyptology', with its roots in a desire to reconcile biblical history with archaeology and careful observation, but also in racism and imperialism.

## Charles Piazzi Smyth and 'pyramidology'

Charles Piazzi Smyth (1819–1900), was appointed Astronomer Royal for Scotland in 1846, and visited Egypt in 1865 to carry out a measured survey of the Great Pyramid as part of a campaign led by the astronomer John Hershell to prevent the adoption of the metric system in the UK.<sup>1</sup> Following work by John Taylor who had 'calculated ratios of the height and circumference of the Great Pyramid and claimed to have discovered a unit of measurement, the 'pyramid inch', that corresponded both to biblical measurements (1/25 of a cubit) and to the modern imperial inch',<sup>2</sup> Piazzi Smyth hoped to prove this link by detailed measurement of the pyramids, which he believed had been built by the Israelites. Having satisfied himself that he could achieve this, he then tried to 'decipher the hidden message of the Great Pyramid'. The ascending and descending passages, he declared, symbolised the progress of civilization from the earliest Biblical times, year by year; major interruptions in the passages, such as steps, or changes in slope, denoted events in man's history'.<sup>3</sup> While Piazzi Smyth's survey was initially well-received, his 'inability to distinguish real facts from chance coincidences'<sup>4</sup> led to his resignation from the Royal Society and permanent damage to his scientific reputation.

His interest in 'pyramidology' continued after his visit to Egypt, resulting in his book *Our Inheritance in the Great Pyramid*,<sup>5</sup> which combined scientific measurements with biblical history and the occult, to become very popular and with many reprintings – most recently in 1977. In *Our Inheritance*, Charles Piazzi Smyth gave a detailed account of the 1872 investigations in the Great Pyramid, describing how Waynman Dixon, an English engineer working on a bridge over the Nile, Bill Grundy, one of his employees, and Dr James Grant, discovered two channels in the north and south walls of the 'Queen's Chamber', comparable to those previously known in the 'King's Chamber' while carrying out investigations at the request of Piazzi Smyth. He described how:

<sup>1</sup> Brück 2004.

<sup>2</sup> Moshenska 2008: 8.

<sup>3</sup> Drower 1995: 37.

<sup>4</sup> Drower 1995: 37.

<sup>5</sup> Piazzi Smyth 1874.

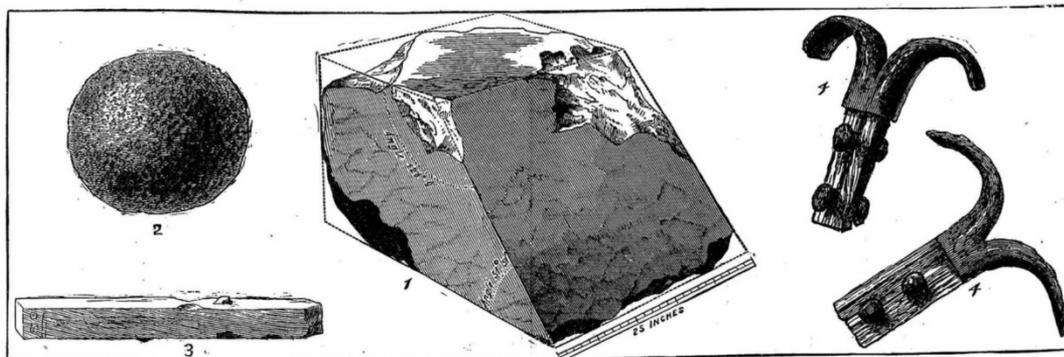
*Fires were then made inside the tubes or channels; but although at the southern one the smoke went away, its exit was not discoverable in the outside of the Pyramid. Something else, however, was discovered inside the channels, viz., a little bronze grapnel hook; a portion of cedar-like wood, which might have been its handle; and a grey granite of green-stone all, which, from its weight, 8,325 grains, as weighed by me in November, 1872, must evidently have been one of the profane Egyptian mina weight balls, long since valued by Sir Gardner Wilkinson at 8,304 grains.<sup>6</sup>*

The combination of a detailed account, with speculation about ancient measures is typical of Smyth's writing. He suggested that these items (fig. 1), subsequently known as the 'Dixon relics', were 'dropped down the channels unintentionally by some of the mason's labourers or boys at the passages' upper ends, when the place of those ends were still open and accessible'.<sup>7</sup> The three items found at the time, the stone ball and copper-alloy hook were donated to the British Museum in 1972 by Dixon's grand-daughter, Mrs Beth Porteus<sup>8</sup>, while the fragment of wood was donated to the University of Aberdeen in 1946 by Elsie Frances Morice (née Grant, 1895–1972), Grant's daughter. An exploration of the shaft by Robert Gantenbrink in 1970 with a robotic camera recorded a long piece of wood 'similar to the piece of wood found by Dixon. It is possible that the short piece of wood reported by Dixon simply broke from the larger piece. A modern metal pole found alongside the piece of wood supports this theory'.<sup>9</sup> Bauval<sup>10</sup> discusses the search for the missing piece of wood, and how it was traced to the museum collections of the University of Aberdeen in 2001. Despite a thorough search of the Egyptian collections for a 'Five inch piece of wood', however, it was not found.

Dec. 7, 1872]

THE GRAPHIC

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1. Original Casing Stone from North Side—2. Granite Ball, 1 lb. 3 oz. weight—3. Piece of Cedar, apparently a Measure—4. Bronze Instrument with portion of the Wooden Handle adhering to it  
DISCOVERIES IN THE GREAT EGYPTIAN PYRAMID

Fig. 1: Illustration of 1872 finds from the Great Pyramid, including the fragment of wood discussed here.

Part of the popularity of pyramidology lay in the prominence of the British-Israelite movement in the late nineteenth century. As Moshenska has shown, 'the British-Israelites played a significant role in the creation and promulgation of the pseudo-science of pyramidology, which has remained one of the most popular and profitable branches of

<sup>6</sup> Piazza Smyth 1874: 364.

<sup>7</sup> Piazza Smyth 1874: 365.

<sup>8</sup> Lehner and Hawass 2017: 158.

<sup>9</sup> Hawass 2003.

<sup>10</sup> Bauval 2001.

alternative archaeology ever since'.<sup>11</sup> Its core belief was that 'The Jews are not the whole of God's people Israel, as so many imagine, but only a small part of the chosen race – at the most two tribes out of twelve... and British-Israelites maintain that the Anglo-Saxon race embody, and are, the ten-tribed kingdom of Israel'.<sup>12</sup> This racist attitude made a direct link between the builders of the pyramids and the British rulers of Egypt in the nineteenth century. While no longer having any traction in mainstream archaeology, they have developed into the white-supremacist Christian Identity movement in the USA,<sup>13</sup> and can also be seen to explain the attraction on explanations that deny that the indigenous people of Egypt were capable of building the pyramids and so turning to a previous lost civilisation, such as refugees from Atlantis, or even extra-terrestrials for explanation.

Flinders Petrie (1853–1942) who went on to become a significant figure in archaeology and perhaps the most famous Egyptologist<sup>14</sup> was initially attracted to the study of ancient Egypt by the work of Piazzi Smyth, 'ranking himself firmly with the Biblical literalists, in opposition to the new science; the Great Pyramid he referred to as "the grandest writing on earth"'.<sup>15</sup> He was, however, not a British-Israelite and published a chart to show that 'the Great Pyramid's Passages are not chronological or *not* as taught in the so-called time-passage theory' which 'he sent to all prominent Anglo-Israelites, and received one or two furious letters in reply'.<sup>16</sup> Nonetheless, Petrie has been shown to have regarded the study of race as critical to understanding the past, while his work was closely entwined with the development of eugenics in the early 20<sup>th</sup> century.<sup>17</sup>

### James Grant

James Grant was born in Methlick, Aberdeenshire in 1840, and studied Arts followed by Medicine at the University of Aberdeen between 1857 and 1864.<sup>18</sup> Initially working in medical hospitals in North-East Scotland, he spent a year in Egypt in 1866–7 to help with a cholera epidemic, he returned to Egypt in 1868 and settled in Cairo as a government medical officer. He also became physician to Mohamed Tewfik Pasha, the Khedive of Egypt, and was awarded the title of Bey in 1880.

Grant also established a large collection of antiquities such that he became well-known locally 'as a collector, and has thus the pick of many finds of antiquities'.<sup>19</sup> His collection was 'open to the inspection and study of all interested in archaeology and Egyptology; and at least once a week, the Doctor holds a reception, at which he lectures on some interesting subject bearing on Egypt and its art or monuments, and conduct his visitors also over the rooms that form his great museum'.<sup>20</sup> His opportunity for personal fieldwork was restricted by his medical duties, but occasionally managed to spend a night at Giza uninterrupted by travellers.<sup>21</sup> He also became an important contact for people arriving in Cairo, showing them his collection and introducing them to useful people. For example, Flinders Petrie met him within days of arriving, and Grant negotiated on his behalf in Arabic and introduced him to his right-hand man

<sup>11</sup> Moshenska 2008:6.

<sup>12</sup> Dixon 1915: 16.

<sup>13</sup> Livingstone 2008.

<sup>14</sup> Drower 1995.

<sup>15</sup> Drower 1995: 30.

<sup>16</sup> Drower 1995: 31.

<sup>17</sup> Challis 2013.

<sup>18</sup> Johnston 1906: 210.

<sup>19</sup> Petrie 1880: 31.

<sup>20</sup> Smith 1897: 113–114.

<sup>21</sup> Petrie 1880.

Ali Gabri. In his diary, Petrie said of Grant that 'nothing could have been kinder or more open than his manner and ways, if I had come to him with a strong introduction; and considering how unceremoniously I dropt (*sic*) on him, it is far more than I could have expected' and that his was 'the place to meet agreeable and intellectual people'. Petrie also noted that he was relieved to learn that Grant was 'not at all bound to Piazzi, or anybody of the party; in fact, he laughs at many or most of their ideas; & is even not averse to the tombic theory: hence I am quite safe not to have any opposition in any way from that cause'.

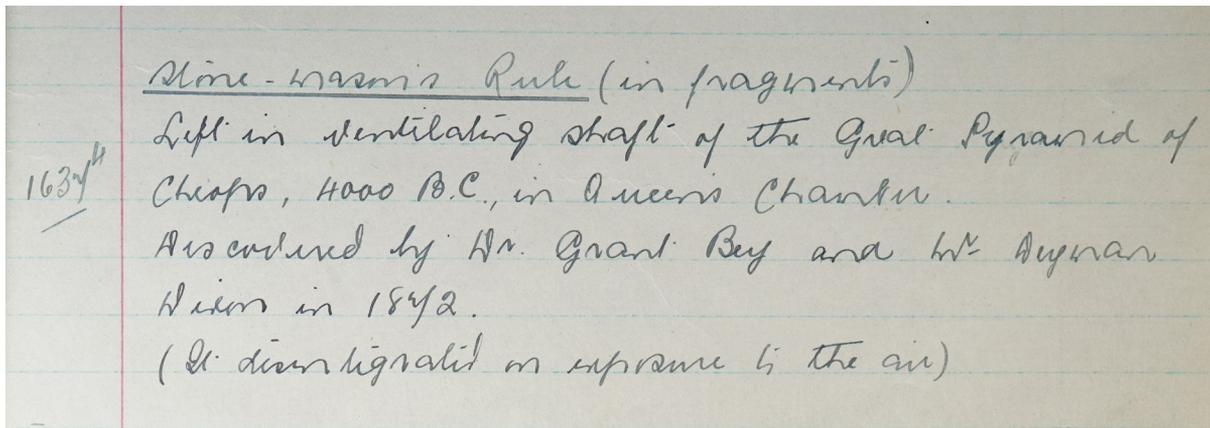


Fig. 2: Extract from museum register recording acquisition of fragments of wood in 1946.

On Grant's sudden death at the age of 55, his collection was bequeathed to the University, which had previously awarded him an honorary LLD in 1882. A small number of items were retained by the family, of which a number were donated to the university in 1946 by his daughter Elsie Frances Morice (née Grant, 1895–1972), including the fragment of wood from the Great Pyramid (fig. 2). Grant's bequest is the largest element of the University's Egyptian Archaeology collection,<sup>22</sup> now numbering about 6000 items, expanding on a small collection formed since the later eighteenth century that he would have known as a student, and to which were added items deriving from excavations by Finders Petrie, David Randall-Maclver, John Garstang, the Egypt Exploration Fund, Egypt Exploration Society and Deutsche Orient Gesellschaft.<sup>23</sup>

### Cataloguing, classification and research

The establishment of the University's Anthropological Museum in 1907 saw a systematic organisation of the collections in the displays, stores and catalogue. With the Honorary Curator, Robert Reid, being Regius Professor of Anatomy, it is not surprising that he used a scheme that was based on ideas of biological race – the 'different races of Man'.<sup>24</sup> The world was divided into eight regions which considered 'geographical regions, racial characteristics and cultural variance were seen as explicitly linked through an evolutionary scheme, binding the artefacts to an idea of evolution of societies from "primitive" to "complex"'.<sup>25</sup> Items from Africa were therefore divided between those from 'North Africa' which was placed next to Europe in the catalogue, and those from 'Africa, South of the Sahara' which was the last chapter of the catalogue. Even by the 1920s this classification had become problematic, with

<sup>22</sup> Reid 1912.

<sup>23</sup> Curtis, Kockelmann and Munro 2005.

<sup>24</sup> Reid 1912: iii.

<sup>25</sup> Southwood 2003: 94.

items being reclassified from one category to the other. This probably reveals that changing ‘definitions of whether countries like Abyssinia (Ethiopia), Sudan and Egypt should be identified as ‘civilised’ and therefore archaeological and North African, or “primitive” and therefore tropical, “ethnographic” Africa’.<sup>26</sup>

Following the publication of the *Illustrated Catalogue in 1912*,<sup>27</sup> subsequent acquisitions were first allocated to the relevant regional/racial section, and then given a two-part number that related the item to generally similar items in the printed catalogue. Information was recorded on slips of paper kept in loose-leaf folders and the items themselves stored together in these regional/racial sections. The final item in the Egyptian section of the 1912 catalogue was number ‘North Africa 1637’, being two fragments of petrified wood found near the Great Pyramid, so when acquired in 1946, the fragment of wood from the Great Pyramid was therefore allocated number ‘North Africa 1637/4’. As the numbering system started at ‘1’ in each section of the catalogue, the labels attached to items were therefore often duplicates of those in other sections, making the location of items within the store critical to their identification. However, as it was stored in a small, lacquered box with inlaid crescent and stars (fig. 3), at some later date it appears to have been moved to be alongside nineteenth-century items collected in the Ottoman Empire in the area of the store which housed collections from Asia, without the number being altered. The box came to attention in late 2019 as part of a review of the East Asian collections, which included checking all other items in the Asian section of the store for those originating in China or Japan. The member of curatorial staff carrying out this work, Abeer Eladany (one of the authors), recognised the inlaid crescent and stars as resembling the flag of Khedivate of Egypt (1867–1914) as she is herself Egyptian, and noticed that the number did not relate to any items in the Asia section of the catalogue. It did, however, tally with that for the record of the fragment of wood from the Great Pyramid, which included the observation that it had ‘disintegrated on exposure to the air’.

### Radiocarbon dating and discussion

Establishing a detailed absolute chronology for Egyptian archaeology has been a long-lasting endeavour. Initially this used information about the order and length of the reigns of pharaohs that was recorded in ancient texts, backed up with some astronomical events. Once established, this chronology became the basis for local chronologies in the eastern Mediterranean and beyond.<sup>28</sup> Following Piazzzi Smyth’s interests, proposed astronomical alignments<sup>29</sup> have also been used to suggest dates for the Great Pyramid.

With the advent of radiocarbon dating in the 1950s, ‘the historical chronology of Egypt was used to prove the applicability of the radiocarbon method, and for a long time Egyptologists were hesitant to take up this new technique due to larger error margins than what the traditional historical chronology could (seemingly) offer’.<sup>30</sup> Nonetheless, radiocarbon dating offered the opportunity to challenge or confirm the existing chronology and the date of the Great Pyramid if suitable organic material could be identified. It was this that lay behind the rejuvenated interest in the ‘Dixon Relics’ and so the wish to date the wooden fragments.

One of the fragments was selected for radiocarbon dating, which was carried out by the Scottish Universities Environmental Research Centre. The resulting date - SUERC-94187 (GU55350) – is  $4490 \pm 25$  BP ( $-20.2\text{‰}$   $\delta^{13}\text{C}$ ) (fig. 4). This radiocarbon date can be converted to

<sup>26</sup> Southwood 2003: 103.

<sup>27</sup> Reid 1912.

<sup>28</sup> Renfrew 1973.

<sup>29</sup> For example, Bauval and Gilbert 1994; Brück 1995.

<sup>30</sup> Höflmayer 2016: 15.

a 'real' date by comparing it with 'the record of  $^{12}\text{C}/^{14}\text{C}$  ratios as determined by tree-ring sequences (the calibration curve). The rising and falling  $^{12}\text{C}/^{14}\text{C}$  ratios in the atmosphere result in the wiggly shape of the calibration curve and translate a single radiocarbon year into a range of possible dates'.<sup>31</sup> Unfortunately, this is a particular problem for radiocarbon dates

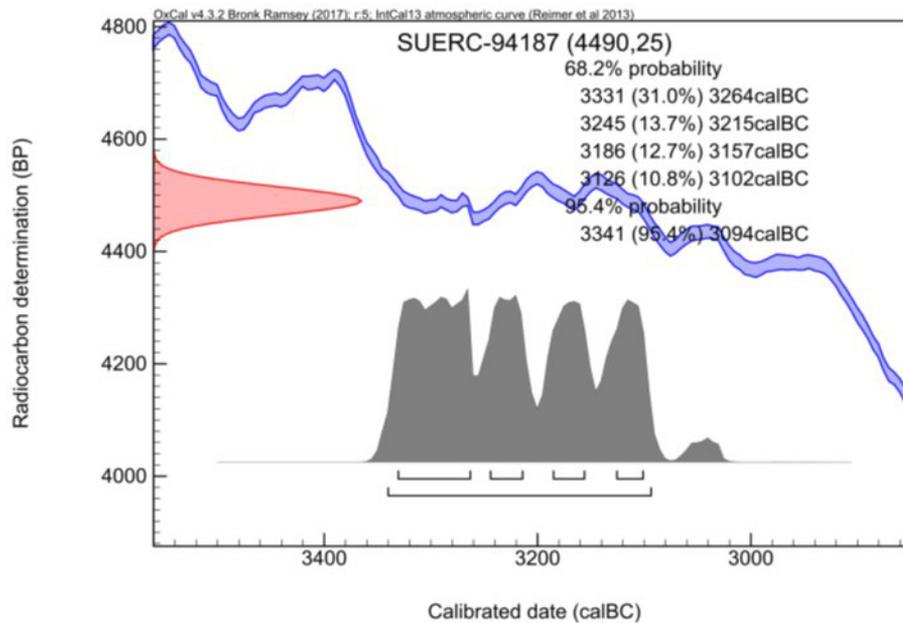


Fig. 4: OxCal v4.3.2 calibration of radiocarbon date from wooden fragments.

around c4400–4600BP as they relate to portions of the calibration curve which are flattened, so a single  $^{14}\text{C}$  determination can generate a wide uncertainty in the calibrated date BC. As a result, the calibrated date for this sample at 95.4% probability is the rather large range of 3341-3094CalBC.

The Great Pyramid has been dated on the basis of presumed stellar alignments in its design, resulting in estimates of approximately 2450 BC,<sup>32</sup> 25<sup>th</sup> century BC<sup>33</sup> and 2478 BC,<sup>34</sup> while Bonani *et al.*<sup>35</sup> averaged a series of dates from charcoal to suggest a range of 2871–2604 BC, though this did not take into account the potential longevity of a charcoal sample. It is generally accepted that the Great Pyramid was built for the pharaoh Khufu, whose reign has been calculated on historical evidence to 2580–2560 BC<sup>36</sup> and by radiocarbon dates on short-lived plant remains to within the range 2629–2558 BC.<sup>37</sup>

The earlier-than-expected date of the analysed fragment may be the result of 'old wood' as the radiocarbon date relates to the date when the wood grew, rather than when the tree was cut down or when it was deposited. This could be because that 'the giant stone pyramids

<sup>31</sup> Höflmayer 2016:4.

<sup>32</sup> Bauval and Gilbert 1994.

<sup>33</sup> Brück 1995.

<sup>34</sup> Spence 2000.

<sup>35</sup> Bonani *et al.* 2001.

<sup>36</sup> Jackson 2011.

<sup>37</sup> Ramsay *et al.* 2010.

in the early Old Kingdom may mark a major consumption of Egypt's wood cover',<sup>38</sup> including the scavenging of wooden items for charcoal to make bronze tools and mortar. Alternatively, it could be the intentional deposition of an old piece of wood, perhaps because the rarity of trees in ancient Egypt meant that local and imported wood was scarce, treasured and recycled or cared for over many years.<sup>39</sup> The intentional re-use of stone from older buildings is known from later periods, such as the pyramid of Amenemhet I at Lisht which includes material from Old Kingdom buildings, including the pyramids at Giza,<sup>40</sup> while the step pyramid of Djoser, the Third Dynasty king incorporated at least 40,000 stone vessels many of which include the names of pharaohs from the First and Second Dynasties.<sup>41</sup> While the radiocarbon date of the fragment of wood does not conclusively date the Great Pyramid, it does support the idea that – whatever their use – the 'Dixon Relics' were original to the construction of the Great Pyramid and not later artefacts left behind by those exploring the chambers. It also provides a *terminus post quem* for its construction, so ruling out the fringe belief that the Great Pyramid was built by a previous lost civilisation.<sup>42</sup>

Despite the radiocarbon date not conclusively providing an answer to the dating of the Great Pyramid, it should inspire further thinking about how it was built and about the exploitation of wood in the Old Kingdom. The radiocarbon date also exposes some of the flaws in the evidence relied on by some alternative theories, but of greater importance is that the renewed interest in the finds from the Great Pyramid highlights the politics and priorities of nineteenth century Egyptology and so underlines the necessity for a more critical historiography of the field. That these finds are still known as the 'Dixon relics' is a reminder of the imposition of expectations, and sometimes racism, on the evidence and the complex of motivations of those interested in the Great Pyramid.

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<sup>38</sup> Anon 1999.

<sup>39</sup> Creasman 2013.

<sup>40</sup> Goedicke 1971.

<sup>41</sup> Raffaele 2005.

<sup>42</sup> Jackson 2011.

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