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CAMPI PHLEGRAEI 1776: THE VOLCANOLOGICAL LEGACY OF SIR WILLIAM HAMILTON

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Sir William Hamilton (Figure 1) was born in Scotland on 13 December 1730 (1730–1803) and was the fourth son of Lord Archibald Hamilton (1673–1754) [youngest son of William Douglas (1634–1694), Duke of Hamilton and Anne Hamilton (1632–1716), 3rd Duchess of Hamilton], Governor of Jamaica. William served in the army from 1747, resigning his commission after his marriage to Catherine Barlow in 1758. Catherine (1738–1782) was a wealthy Welsh heiress, known for her elegance, and for her ability as a harpsichord player. As she suffered from asthma the Hamiltons decided to leave the harsh English climate a few years after their marriage and moved to Naples where a position had become vacant. Aged thirty-four Sir Hamilton arrived in Naples on 17 November 1764, replacing Sir James Gray (c.1708–1773), as "Envoy Extraordinary and Plenipotentiary of Her Britannic Majesty" to the court of Ferdinand IV of Bourbon (1751–1825).

Figure 1. William Hamilton (1730–1803) in a portrait by Giovanni Elia Morghen, after Hugh Douglas Hamilton's engraving, 1790s. Source: Wikimedia commons.

Apart from his political role – which essentially consisted in sending reports to King George III (1738–1820) of what was happening in Naples – Hamilton's interests were essentially divided between art collecting and volcanoes. Art and volcanoes are linked in Hamilton's life by the event that characterized the entire Neapolitan cultural world in the 18th century: the discovery of the ruins of Herculaneum (1738) and Pompeii (1748), buried under deposits of the eruption of Vesuvius in 79 AD (Figure 2).

A favourite at the court of Ferdinand IV, Hamilton's household represented a centre of intellectual life in Naples at the time, no "foreigner" could pass through the city without experiencing the *Cavaliere's* hospitality, as for example Johan Wolfgang Goethe (1749–1832) who visited Hamilton in May 1787. His residence *Palazzo Sessa* – the official seat of the British Embassy – or his houses such as *Villa Emma* in Naples and *Villa Angelica* near Vesuvius were key destinations for scholars, artists, antiquarians, and scientists from all over Europe.

On his arrival in Naples Hamilton immediately began collecting works of art and artefacts from archaeological finds which would go on to form his famous collection, described in the volume *Greek and Roman Antiquities*, a monumental volume published in Naples in 1766–67. He soon demonstrated a passion in searching for beauty and natural curiosities, possessing a keen spirit of observation and being driven by a scientific curiosity typical of the Enlightenment (Grimaldi in Hamilton 1985).

In 1766 Hamilton was elected Fellow of the Royal Society of London and it would be to this learned society that he would address in the form of letters his detailed descriptions of the Italian volcanoes. In 1772 he sold his art collection to the British Museum in London and in the same year commenced work on the "*Campi Phlegraei*" volume. *Villa Angelica* was Sir William's favourite place of residence during the years he undertook his volcanological studies, used as a base from where to start his countless excursions to the Vesuvius volcano accompanied by the faithful guide Bartolomeo Pumo.

Figure 2. View of the first discovery of the Temple of Isis at Pompeii. *Campi Phlegraei* (Hamiliton 1776), Plate 41.

In the series of letters that Sir William sent to the Royal Society of London, the first dated 10 June 1766, detailed accounts are given of the eruptive phenomena of Vesuvius which he witnessed first-hand. Two letters addressed to James Douglas (1702–1768), 14th Earl of Morton, President of the Royal Society, were first published in the *Philosophical Transactions of the Royal Society* in 1768 and 1769, and were accompanied by a livelier and less scientific account in the *Annual Register* of 1767, entitled "*A curious account of the great eruption of Mount Vesuvius...*". From 1768 to 1771 four letters were addressed to Matthew Maty (1718–1776), Secretary of the Royal Society, with further observations on Vesuvius and other Italian volcanoes, and in 1771, another on Etna, and these were also published in the *Philosophical Transactions*. All six letters were republished with additional "hitherto unpublished Explanatory Notes by the Author", firstly in 1772 and in a second edition in 1774, by the publisher Thomas Cadell in London as a volume entitled *Observations on Mount Vesuvius, Mount Etna and other volcanoes …*".

In 1776 all these writings were reproduced within the magnificent "*in folio*" volume of "*Campi Phlegraei*" printed by Francesco Morelli (Knight in Hamilton 2000) with 54 plates, to which was added in 1779 the description of the 1779 eruption of Vesuvius, with 5 additional plates. These 54+5 tempera style paintings that characterize the "*Campi Phlegraei*" were the work of the English-born artist Pietro Fabris (1740–1792), who, based on Hamilton's original drawings and descriptions, painted these landscapes with the utmost fidelity and attention to the colour of the different stratigraphic units, as expressly requested by Sir William. Both volumes were published at Hamilton's own expense by Fabris. In 1795 a final letter was

published concerning the 1794 eruption of Vesuvius which would be added to the edition of "*Campi Phlegraei*" issued posthumously in 1809 after Sir William's death.

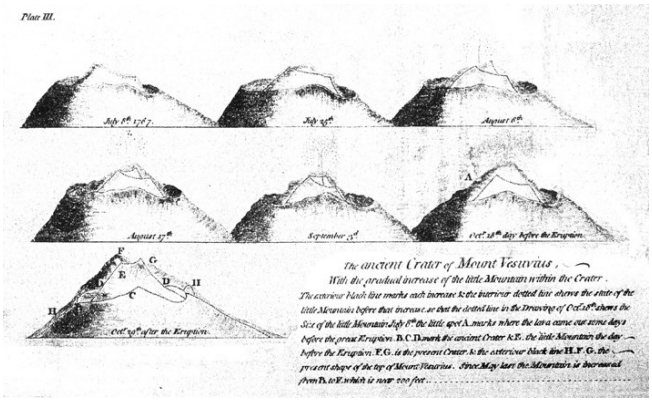

Figure 3. Comparison between Plate II of "*Campi Phegraei*" (Hamilton 1776 ed.) and Plate III in Letter II to Earl Morton of 1767 (Hamilton 1767). The diagrams illustrate the evolution of the summit of the Great Crater of Vesuvius from 8 July to 29 October 1767. The last two diagrams in both plates represent the summit of Vesuvius the day prior to and at the end of the eruption respectively. There is no conceptual difference between the two plates, except that Peter Fabris' plate is aesthetically more pleasing. From a volcanological perspective, however, it is important to emphasize that both plates derive from a continuous series of observations made not at random but over a precise period of time by Hamilton, with the clear aim of documenting in detail the morphological changes of the Vesuvian cone. The latter are also accurately described in the caption to Plate II.

The project of "*Campi Phlegraei*" arose from a need that today we would call "graphic" on Hamilton's part. The letters and their publication in 1772 and 1774 by Candell did not adequately capture and portray the majesty of the phenomena, the landscapes, and the details described by the author in the text. Hence to satisfy this requirement for high quality complementary illustrations Peter Fabris (1740–1792), "a most ingenious and able artist", supposedly of English origin living in Naples, was assigned the task by Hamilton in 1772.

In fact, the text of "*Campi Phlegraei*" remained the same as that published by Candell, except for the addition of an introduction. The real innovation was the paintings "*in folio*" format (47x34cm), the famous 54+5 plates, and the descriptions given in the captions on the facing pages. In these short captions Hamilton clearly explained both the reason why a particular plate was created and the scientific thinking behind it. The plates are of four different types: there are large-scale landscape views and panoramas, which illustrate the incredible beauty of the Phlegrean–Vesuvian area in the 18th century, and details of Vesuvius in eruption. Then there are representations of places of particular interest to the author, such as quarries (Plate VIII), specific stratigraphic sections (e.g., Plates XV, XVI, IX, XXXV), and a dozen plates with reproductions of samples from the collection of rocks found by the author during his countless excursions. Each of these image types reflects and allows us to interpret part of Hamilton's volcanological vision.

In the case of the specific landscape views, these are not repetitive images of panoramas, of which Neapolitan iconography of that period abounds, but images that refer to particular sites of interest (a sulphur spring, a stone quarry, the mouths of an ancient eruption etc.) which have been extracted from a larger landscape image and their significance is explained to the reader in the caption. In this context, the specific views provide the general

framework within which the eruptive phenomena were observed firsthand by Hamilton himself while his lithological and stratigraphic observations on eruptive scenes and of the stratigraphy of individual outcrops are represented in the plate captions. Hence, the large map accompanying the "*Campi Phlegraei"* displays the main places of interest marked by numbers, and on the map itself reference is made to the plates that discuss these sites in detail.

During the period Hamilton was resident in Naples, three major eruptions of Vesuvius occurred: in 1767, 1779 and 1794. All the plates related to these eruptions are of great interest, however, here I wish to draw attention to the caption of Plate XII which depicts the lateral eruption of Vesuvius in 1760. This event occurred prior to Hamilton's arrival in Naples, and the plate is based on an original drawing made *de visu* by Fabris. In the caption, Hamilton states: "*The objective of this plate is to shew that those who have asserted that the site of the fire is always towards the summit, or not lower than the middle of the volcano, have been very ill informed. These New Mountains are at least four miles from the summit of Vesuvius, and almost in the plain. As the Earthquake which preceded this eruption, (and was caused undoubtedly by the confined lava) was sensibly felt at Naples, the seat of the fire must necessarily have been at a considerable depth, to have affected so great a space, for that City is more than 8 Miles from the spot where the eruption happen'd.*"

Considering that the eruptive scenario of Vesuvius displaying a lava flow originating from a lateral eruptive fissure, fed by magma rising from depth instead of from diverse typologies of magma reservoirs located at shallow depth beneath the volcano, has only recently been proposed (Principe 2024), thus Hamilton in a few explanatory lines showed all his modernity.

Figure 4. "*Campi Phlegraei*", Hamilton 1776, Plate XII. The 1760 lateral eruption of Vesuvius.

In synthesis, the volcanological work that Hamilton left us with his writings and in particular with "*Campi Phlegraei*" can be summarized in a few important points: (i) his ideas were always deliberately formed on the basis of his own direct and repeated observations of the phenomena he intended to comprehend, and in a very modern manner his descriptions report separately the observations and the interpretations he drew from them; (ii) the stratigraphic principle - when William 'Strata' Smith (1769–1839) was not yet scientifically born - found in Hamilton a mature and unprejudiced application; from his stratigraphic observations, Hamilton deduced that a volcano formed in various epochs, during which volcanic materials overlapped and eruptive periods were followed by periods of stasis; as well as the belief that (iii) volcanoes are formed from the superposition of materials that they

themselves erupt ("e.g. Plate XV: *"...a most convincing proof of the volcanic origin of the Mountain of Sommas, the whole of which is composed of strata of erupted matter*"), when the theory of Plutonism by James Hutton in the late 18th century (with his masterpiece *Theory of the Earth* in 1795) had not yet been proposed. Finally, the observations that Sir William was able to make during the excavations of Pompeii and Herculaneum, as well as in the natural sections and quarries of Vesuvius and the Phlegraean Fields, made him aware of the coexistence in volcanoes of very different materials, such as lavas, tuffs, pumice, ash and mudflows, possibly erupted in the same eruptive event as had occurred in the 79 AD eruption.

Hamilton's writings as well as the "*Campi Phlegraei*" Plates repeatedly emphasize the usefulness of the products of volcanism, be they the sulphur springs of the Phlegraean Fields, the alum and sulphur deposits of the Solfatara, or the excellent building stones that can be extracted from Vesuvian lava or from the Piperno and Yellow Tuff of the Phlegraean Fields. Hamilton collected all these materials. Numerous plates of the "*Campi Phlegraei*" are dedicated to the volcanic products and various types of "stones" that could be found in the field, demonstrating Hamilton's aptitude for collecting. The latter collections clearly represent the transition from the attention focussed on the "strange and wonderful" of 18th century collections to the exhaustive cataloguing and description that would be typical of the 19th century. A few dozen specimens of Sir William's rock collection are still preserved at the Natural History Museum of London. These are predominantly lavas from Monte Somma, polished skarn laminae and coloured breccia fragments with sedimentary elements, some of which can still be traced back to Plates IL and L of the "*Campi Phlegraei*" (Figure 5).

Figure 5. Two specimens reproduced from Plate IL of "*Campi Phlegraei*" flanked by a photo of the original specimens held in the Hamilton Collection of the Natural History Museum of London; © Claudia Principe. Left to right: a tuff sample from the Phlegraean Fields; a breccia with marble elements sampled in Fosso Grande within the Vesuvius tefra.

Through his letters and works, the name of Sir William Hamilton was linked to the ranks of authors – the so-called *Vesuvius fathers* – who had described the eruptions of Vesuvius and attempted to understand them. But Sir William's greatest fame is undoubtably linked to "*Campi Phlegraei*". This celebrated and refined masterpiece is considered one of the most beautiful books of the entire 18th century. Certainly, its success has been influenced by the sumptuous typographic presentation "*in folio*" and the spectacular 54+5 plates by Pietro Fabris, illustrating the fires of Vesuvius, and the beautiful Phlegraean Fields landscapes. But the most profound reason for its fame lies in its being material evidence of that exceptional cultural and historical moment, which politically corresponds to the time interval dating from the Kingdom of Charles Bourbon to the Neapolitan Revolution of 1799. During this extended period, which occupies almost the entire 18th century, Naples represented the pinnacle of an enlightened, cultured, and cosmopolitan society, capable of attracting and fascinating the scientific intelligentsia and the most open minds of Europe.

Hamiliton's wife Catherine died in Naples in 1782, and William remarried in 1791 to Emma Hart (1765–1815). The Hamiltons left Naples under the threat of French invasion in December 1798, fleeing to Palermo with the Royal Court aboard the HMS Vanguard, the flagship of Lord Horatio Nelson (1758–1805). Suffering from ill health Hamilton resigned his post as Envoy in 1800 and the family returned to England where he died in London on 6 April 1803.

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