

The Thera eruption and Egypt: pumice, texts, and chronology

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Introduction

In their previous study, Foster and Bichler¹ drew attention to pieces of pumice that had been found decades ago in Egyptian graves of the late Second Intermediate Period and early Dyn. XVIII at Thebes, Maiyana, and Kahun. They hoped that Instrumental Neutron Activation Analysis (INAA) of this contextualized pumice might contribute in a small but significant way to the debate over the date of the mid-second millennium BC Thera (Santorini) eruption, referred to hereinafter as the Minoan eruption. To this end, they undertook a search for the pumice, which had been distributed among museums on three continents, and sought permission from the relevant authorities to perform INAA on samples.

Of the two pieces from the Theban Assasif graves, one (Metropolitan Museum of Art 16.10.375) was deaccessioned in the 1950s and consigned to an unknown fate; the other (Cairo Museum JE 45681) was not made available for analysis. Two of the three pieces from Maiyana (Petrie Museum of Egyptian Archaeology 31635a, b) proved upon inspection not to be pumice. The third piece (Ashmolean Museum 1921.1320), as well as the two pumice lumps from the so-called Tomb of Maket at Kahun (Ashmolean Museum 1890.885 and Petrie Museum UC 27929), were sampled as part of the present project.

The potential importance for Bronze Age chronology of analyzing archaeologically retrieved volcanic material, particularly from datable Egyptian contexts, has been recognized ever since Marinatos discovered in the late 1960s near the modern village of Akrotiri on Santorini a town that had been buried by the cataclysmic eruption of the island's

volcano, a site aptly dubbed "the Pompeii of the ancient Aegean". In 1973, the Ashmolean pumice from the Tomb of Maket was examined by Harrison of the Petrographical Department, Institute of Geological Sciences, London. His report, which included measurement of its refraction index, concluded that there was insufficient data on Mediterranean pumice optics to establish a source for the Maket piece.² As we now understand, even if there had been comparanda at that time, the use of one parameter, such as the refraction index, is not reliable for pumice sourcing.

A decade later, the tephra particles found in core samples drilled in the eastern Delta were said to come from the Minoan eruption, based on their refraction index as well as on several microprobe analyses.³ Recent INAA studies of volcanic particles from numerous stratified soil samples and from drill cores throughout the eastern Mediterranean have pointed to the distribution of Thera tephra at low altitudes in an arc to the southeast of Thera, not reaching Egypt, and at high altitudes in an arc to the northeast, across Anatolia to the Black Sea, again not reaching Egypt.⁴ Given these results, and if indeed the volcanic particles in the Delta cores analyzed by Stanley and Sheng came from the Minoan eruption, they seem more likely to have been alluvial pumice or fragments from human use, rather than airborne tephra.

Goedicke announced that pumice from the Tomb of Maket came from the Minoan eruption.⁵

¹ Foster & Bichler 2003.

² Foster & Bichler 2003, 438.

³ Stanley & Sheng 1986.

⁴ Bichler *et al.* 2003.

⁵ Goedicke 1988.

He had sliced off a section from the Petrie Museum piece in 1984 and presumably had it analyzed at the Smithsonian, but it is difficult to assess the work as he never published a report nor filed one with the museum.

The present study forms part of the Thera Ashes project, which falls within the framework of the Synchronisation of Civilizations in the Eastern Mediterranean in the Second Millennium BC (SCIEM 2000) research program. In the 1990s, the radiochemistry group at the Atominstitut of the Austrian Universities began a comprehensive, multiphase, volcanological/radiogeochemical project to determine the provenance of Mediterranean volcanic ejecta, focused especially on stratigraphically well defined material. To date, the group has analyzed hundreds of pieces of pumice from numerous archaeological and volcanic sites, as well as tephra particles from soil and other samples and drilled cores.⁶ As the project has progressed, the pumice sample size required has been reduced by a factor of 100 to less than 100mg, making it possible for the first time to preserve the integrity of museum specimens, such as the Ashmolean and Petrie Museum pumice, while obtaining highly reliable results.

Grave 1262, Cemetery K, Maiyana

In the winter of 1921, under the auspices of the British School of Archaeology in Egypt, Brunton directed the excavation of several small cemeteries in the desert near Maiyana and Sidmant, located at the mouth of the Faiyum Oasis.⁷ The modest graves of Cemetery K comprised shallow rectangular pits, some of which contained brick walls meant to form coffins. Plunderers had caused ample disorder in many of the graves. There was no sign of re-use, however, and Brunton concluded that “it is most probable that all the objects found are closely dated to the same period”.⁸ The occupants of Cemetery K were nearly all women, children, and elderly men, to judge from the bones remaining in the pits or from the grave goods.

Our pumice piece comes from Grave 1262, which thieves had all but emptied, leaving only the

toe bones and a small round basket in the southwest corner. The basket, together with its contents, perhaps escaped the notice of the robbers because it was tucked beside the brick wall running down the centre of the grave. In the basket were an alabaster vase, a Bichrome jug, blue glass and faience scarabs, shell ring beads, amulets, seashells, and the lump of pumice.⁹

From the less disturbed graves, we may gain a sense of what 1262 originally contained. The woman (or girl) was wrapped in cloth and matting and laid with her head to the north. She probably had a lambskin pillow stuffed with sweet-scented straw or palm fibre. Strings of beads encircled various parts of her body. In addition to the goods in her basket, she may have had a wooden box with beads and trinkets. The presence in 1262 of a gold-mounted scarab and the brick coffin-wall may indicate that she was slightly better off than the poorest people buried in Cemetery K.

For dating purposes, the most diagnostic items in 1262 are the scarabs and the Bichrome jug. The scarabs mainly display stylistic features characteristic of Egyptian work of the late Hyksos period.¹⁰ The gold-mounted scarab, with its symmetrically linked spirals, finds its closest parallels in Canaanite scarabs of the same timeframe.¹¹

The jug is one of several vases from Cemetery K with the distinctive black on dark red geometric designs of Levantine and Cypriot Bichrome Wheel-made Ware. Bichrome Ware apparently developed in Syria, spreading westward to Cyprus and southward into Palestinian regions, where it became “the most distinctive product of their Late Bronze I ceramic industry”.¹² With the breakdown in central control during the Second Intermediate Period, the circulation of pottery and other products seems to have

⁶ Bichler *et al.* 2002; Huber *et al.* 2003; Steinhauser *et al.* 2006; Bichler *et al.* 2007; Warren 2007; references therein to previous publications.

⁷ Brunton & Petrie 1924.

⁸ Brunton 1924, 16.

⁹ Brunton & Petrie 1924, pls. XLI:33, XLIII:64–93, XLV: 67; Foster & Bichler 2003, pl. LXXXIIIe.

¹⁰ O'Connor, cited in Merrillees 1970, 12.

¹¹ Ben-Tor 2004, figs. 6:28, 29, 32.

¹² Merrillees 1970, 16.

increased, rather than diminished.¹³ Once Bichrome Ware reached Egypt, it spawned an imitative, local industry in the making of these vessels.¹⁴ It can sometimes be difficult to distinguish the imitation from the imitated. Does the carelessness of the painting on the Maiyana vessel “hint at provincial production”,¹⁵ that is, Egyptian manufacture, or is the quality of the fabric of certain pots higher than one might expect in Egypt at the time?¹⁶

As for its imported counterparts, the excavations at Tell el-Dab^a (Avaris) have shed much light on the chronology and typology of Levantine and Cypriote Bichrome Wheel-made Ware in Egypt.¹⁷ Bichrome Ware sherds from Tell el-Dab^a phase D/2 (late Hyksos period/beginning Dyn. XVIII) bear simple linear patterns, while those from phase D/1 (early Dyn. XVIII) and from phases C/3 and C/2 (to the end of the reign of Amenhotep II) have bands filled with neatly drawn hatching, zigzags, and other more elaborate designs, as well as some figural motifs of birds and fish.

Taken as a whole, the finds in Grave 1262 support the proposal that the people of Cemetery K were “largely assimilated Pan-grave Nubians, who had moved into Lower Egypt before the end of the Hyksos occupation and settled in the Sidmant area”,¹⁸ leaving their families there to render military service. While retaining certain Nubian ways, such as leather pillows, they also adopted practices and goods current in Lower Egypt at the time, among them rectangular grave shapes and certain pottery types, including Bichrome Ware, Tell el-Yahudiyeh juglets, and Cypriot Base-Ring I vessels, some pieces of which may have been Hyksos gifts to encourage loyalty to their side.¹⁹ Indeed, Nubian mercenaries, including perhaps prisoners-of-war, seem not always to have served the Hyksos, but may be seen fighting also for the Thebans, as well as for the first pharaohs of the New Kingdom.²⁰ At Tell el-Dab^a, for instance, a military camp of early Dyn. XVIII yielded distinctively Nubian weaponry and pottery, attesting to the ongoing, active deployment of these skilled soldiers.²¹

In sum, the chronological range of Grave 1262 spans the final years of the Hyksos and the period of the Theban campaigns against them, including the first years of the reign of Ahmose.

The Tomb of Maket, Kahun

In 1890, Petrie excavated the walled town of Kahun, located about twenty kilometres north of Maiyana. The rock-cut cellar beneath one of the houses in the southern section, built originally for personnel associated with the nearby Dyn. XII pyramid of Sesostris II, was re-used in Dyn. XVIII as a tomb.²² Twelve coffins containing over forty bodies, as well as two boxes for infants, were jammed into the cellar chambers, with previous burials pushed aside and their offerings often heaped up to make room for fresh interments. Petrie, assisted solely by an Egyptian youth on the day he cleared the tomb, found the two lumps of pumice in the jumble of items piled in the southwest corner of the main chamber. Coffin 7 contained the only inscribed objects, gold and silver jewellery belonging to “the lady of the house, Maket”, who has given her name to the ensemble.

All the burials in the Tomb of Maket appear to have taken place during the reign of Thutmose III.²³ While it is true that some scarabs of Thutmose I and Thutmose II emerged from the sifted debris in the main chamber, these would seem to be heirlooms,²⁴ since Coffin 1, lying on the floor at the rear of the inner chamber, and Coffin 9, blocking the doorway between the inner and main chambers, both contained scarabs of Thutmose III. As for the Cypriot Base-Ring I Wares and the Late Helladic IIB squat jar found among the goods in Coffins 7, 8, and 9, they may have been in circulation before the reign of Thutmose III, but one may reasonably conclude that “the vessels found their way into the tombs

¹³ Bourriau 1981a, 42.

¹⁴ Merrillees 1968; Eriksson 1992.

¹⁵ Merrillees 1970, 11.

¹⁶ Bourriau 1981a, 134.

¹⁷ Bietak 2001; Hein 2001b; Maguire 1995.

¹⁸ Merrillees 1970, 14.

¹⁹ Merrillees 1970, 25.

²⁰ Bourriau 1981b; 2000, 199.

²¹ Bietak 2005a, 75.

²² Petrie 1891, 22–23.

²³ Eriksson 1993, 85–88; 2001a, 60–1, Warren 2006, 316.

²⁴ Jeffreys 2003.

during the chronological horizons of the ceramic periods to which they belong".²⁵

INAA analyses of Maiyana and Tomb of Maket pumice

Sampling was carried out in February and October 2007 at the Ashmolean Museum in cooperation with Helen Whitehouse and at the Petrie Museum in cooperation with Stephen Quirke. The pumice lumps were cleaned by partial immersion in distilled water in an ultrasonic tank cleaner for three minutes. Optical microscopy was applied to study the visible properties, such as pore size and structure, as well as the mineral content. Samples were taken by carefully microquarrying suitable particles along pre-existing natural microcracks. About 50mg of each pumice piece were then transferred to PE capsules, washed again with distilled water in the ultrasonic device and dried at 110° for 20 hours.

In Vienna, the usual INAA procedures were applied. The whole sample quantities were weighed into Suprasil quartz glass vials, sealed and irradiated for five days in the central irradiation tube of the TRIGA Mk II reactor of the Atominstitut at a thermal neutron flux density of $10^{13} \text{ cm}^{-2} \text{ s}^{-1}$. After a decay time of five days, a first γ -spectrum was measured to obtain the activities of the short- and medium-lived activation products to determine the concentrations of As, Na, K, La, Sm, and U. Three weeks later, a second measurement was started to detect the long-lived activation products to quantify Ba, Ce, Co, Cr, Cs, Eu, Fe, Hf, Lu, Nd, Rb, Sb, Sc, Ta, Tb, Zn, and Zr. The measuring times were 3600 s and 10800 s, respectively. All samples were measured using an automatic sample changer connected to a 222 cm^3 HPGe- γ -detector (1.78 keV resolution at the 1332 keV 60 Co peak; 48.2% relative efficiency) and a PC-based multi-channel analyzer (Canberra). A set of reference materials (RMs), namely CANMET reference soil SO1, NIST SRM 1633b Coal fly ash, light sandy soil BCR No. 142, NIST SRM 2702 Inorganics in Marine Sediment, and MC rhyolite GBW 07113 were used as standards.

An in-house RM from Santorini (BO1—control sample) was used to check the reproducibility of the results.

A full report on the analytical results is presented in a separate publication.²⁶ In summary, the Maiyana Grave 1262 pumice is Cape Riva pumice from Santorini (Ashmolean Museum 1921.1320); one piece of the Tomb of Maket pumice is Lower Caldera pumice from Nisyros (Ashmolean 1890.885) and the other is from the Minoan eruption (Petrie UC 27929).

Of pumice and time

As matters stand, there are two main contenders for the date of the Minoan eruption: 1550–1500 BC, with 1525/24 the most likely within that range, and 1650–1600 BC with 1627–1600 the most likely within that range.²⁷ We leave to others the assessment of the vast, complex body of evidence from archaeological material, cultural synchronisms, Egyptian astronomical observations, dendrochronology, ice cores, and radiocarbon data.²⁸ Here, our interest is in the contribution of pumice sourcing.

The INAA work carried out on the stratified pumice found at Tell el-Dab'a has been of critical chronological importance. In brief, the history of the site from the end of the Hyksos period to Amenhotep II may be reconstructed as follows.²⁹ After Ahmose conquered the Hyksos capital, probably between years 18 and 22 of his quarter-century reign (1540/39 – 1515/14 in Low Chronology), he appears to have constructed a palatial fortress atop the Hyksos palace area at 'Ezbet Helmi, the citadel at Tell el-Dab'a. One or more of Ahmose's successors of early Dyn. XVIII (Thutmose I to Thutmose III) developed the site into a sizable palatial precinct, for which Aegean fresco

²⁵ Wachsmann 1987, 127–8.

²⁶ Sterba *et al.* 2009, in press.

²⁷ Friedrich *et al.* 2006; Wiener 2006a.

²⁸ Bietak 2003b; Manning 1999; Warren 1998; 2006; Wiener 2003a, 2007.

²⁹ Bietak 1996a, 2000b, 2005a, 2005b.

artists seem to have been brought in to decorate palaces F and G.

For the most part, the painters used their customary methods, including applying the pigments over lime plaster. While this is a perfectly suitable technique for walls of hard stone, such as characterize the Minoan palaces, mudbrick walls erected on alluvial ground require soft coatings if they are to survive the natural compaction of the material. As Bietak postulates, “Either the Aegean artists who executed the paintings were completely inexperienced with the compaction problems of mud-brick architecture, or the paintings were only made for a specific occasion”.³⁰

Whatever the reason, the frescoes soon crumbled, probably within fifteen years of their application. Some small bits remained *in situ*, but most fell off the walls and were removed, the majority of them taken down the palace ramps to be dumped, especially from Palace F. Preliminary study of the thousands of fragments points to close parallels with Theran and Minoan iconography, so close that there may well have been an Aegean/Minoan presence within the palace precinct, perhaps reflecting the marriage of a Minoan princess to a member of the Egyptian royal family, or at the very least a special relationship between the newly established dynasty and Minoan Crete.³¹

A second phase of construction in the palace precinct took place from the time of Thutmose III to Amenhotep II. A small settlement was built to the east of Palace F, including several workshops, associated with a stratified series of scarabs, amulets, and small plaques, eighteen of which bear the names of pharaohs from Ahmose to Amenhotep II. Five loci also contained numerous large pieces of water-rounded pumice, initially thought to occur mainly in earlier Thutmose levels (Jánosi 1994), but now understood to be concentrated in the levels associated with late Thutmose III and Amenhotep II.³² INAA analyses of thirty-two pieces of this pumice reveal that all but three (one from Nisyros, two from Kos) came from the Minoan eruption.³³

The INAA analyses performed on stratified pumice from other sites have yielded comparable results. At Tell Hebua (Tjaru) in the northwest Sinai, for instance, the ten pieces obtained from strata

above the final Hyksos settlement were all from the Minoan eruption.³⁴ At Tell el-‘Ajjul (Sharuhén) in southern Palestine, to cite another example, forty-six pieces were from the Minoan eruption, while three were from Nisyros, all of them retrieved from levels post-dating the town’s destruction that probably occurred when Ahmose besieged the remnants of the Hyksos who had fled there from Avaris.³⁵

In short, contexts prior to Dyn. XVIII contain pumice from older Aegean eruptions, such as Kos, Giali, Nisyros, and previous Santorini events (as in Grave 1262), but not from the Minoan eruption, whereas many early Dyn. XVIII sites contain Minoan eruption pumice in overwhelming quantities. A logical and straightforward conclusion is simply that the eruption occurred at the beginning of the Eighteenth Dynasty.

But if it took place a century or so earlier, how might we account for this situation?³⁶ Rafts of pumice from the Minoan eruption floated across the Mediterranean to Egypt within a short period of time after the explosion.³⁷ Did it lie uncollected on the ancient shoreline? Was pumice obtained instead through Mediterranean traders who purveyed this material from other sources? Was Minoan-eruption pumice not desirable for some reason? Or was the opposite true, that it was used so enthusiastically as an abrasive that it vanished? It is important to note that Hyksos-era workshops have thus far not been located, so we may yet find some in the archaeological record, if pumice supplies were not handed down to subsequent generations.

Much depends on the results from future studies of pumice. Archaeologists and museum curators understandably paid scant attention to pumice in the decades before we knew of this great eruption. If Petrie had not himself cleared the Tomb of Maket, for example, the two small lumps amidst

³⁰ Bietak 2005b: 87.

³¹ Bietak 2005a, 2005b; Morgan 2006: 255; Marinatos 1998.

³² Bietak *et al.* 2001.

³³ Bichler *et al.* 2003.

³⁴ Bichler *et al.* 2003.

³⁵ Fischer 2003.

³⁶ Manning 1999, 145–50.

³⁷ Foster & Bichler 2003, 437; Huber *et al.* 2003, 83.

all the debris and disintegrating mummy wrappings might well have gone unnoticed or been pulverized accidentally. Today, with archaeologists at critical sites such as Tell el-^cAjjul applying flotation techniques to recover volcanic material,³⁸ we may look forward to analyzing a substantially enlarged corpus of stratified pumice from datable contexts. Other avenues of inquiry include compiling data on the sources of pumice used at various sites, contextualized and not, which, it is hoped, will shed light on collection practices and the operations of the international pumice trade.³⁹

The Tempest Stele of Ahmose revisited

As we have examined pumice found in Egyptian graves long before Marinatos excavated Thera, so may we consider certain Egyptian texts in post-Thera light. The broken pieces of the monument usually referred to as the Tempest Stele of Ahmose emerged in the 1940s and 50s as part of the investigations of the stones Amenhotep III used as filling for his Third Pylon at the Karnak Temple.⁴⁰ The original context of the tall, thin, bifacial stele is unknown, but it was probably part of the complex of early Dyn. XVIII structures situated at the junction of the north/south and east/west axes of Karnak and dismantled by Amenhotep III.

In the 1980s and 90s, Aegeanists became intrigued by the Tempest Stele. Was it possibly a description of the upheavals caused by the great eruption? Reluctantly, most concluded it was not, mainly because Vandersleyen in his initial text edition, published just before the discovery of Thera, had emended portions of the text to reflect his understanding, natural under the circumstances, of the storm as a localized, Theban-centred phenomenon. Foster and Ritner offered a new rendering of the stele, in large part to restore its actual wording, which explicitly states in several places that the catastrophes affected the Two Lands, the standard term for the entirety of Egypt.⁴¹ In sum, they proposed that the Tempest Stele might well provide a contemporaneous account of the Egypt-wide after-effects of the eruption.

Wiener and Allen,⁴² echoed by Manning,⁴³ challenged their suggestions on three main grounds: the regnal year of the text, the darkness said to be “in the west”, and the historicity of the account. In view of the renewed interest the monument has recently aroused⁴⁴ and in the context of the results thus far of the Thera Ashes project, the time seems ripe to revisit the Tempest Stele.

As for the regnal year, none is preserved or implied in the extant portions of the stele. Along one side of the figural scene atop the stele, Allen restored an entire column of text with mention of regnal year one. He and Vandersleyen believed the composition to have been symmetrical, but slightly offset, displaced from mirror image format by a now-missing vertical line of text. But the scene may well have been asymmetrical, with, say, an ithyphallic, standing figure of Amun-Re on one side and an enthroned figure of the god on the other. Or it might have had subtle asymmetries, as we see for example in the stele of Ahmose honouring his grandmother, Queen Tetisheri, from the shrine he built for her at Abydos.⁴⁵ We see no compelling compositional need to add a column of text, nor any particular reason to restore therein a date of regnal year one.

Furthermore, the putative column of text would result in an atypical start to the horizontal lines of the inscription. Instead, as most have restored it, the first line begins with the *ankh* sign preceding the Horus name of the king, “Long live the Horus...,” which is “le début normal d’un protocole sans date”.⁴⁶

One additional remark on the regnal year is in order. Until now we have accepted the usual premise that the text must date prior to the last three years of the reign of Ahmose, based on the way in which the moon-sign in the king’s name appears. Conventional wisdom holds that the cres-

³⁸ Fischer 2003, 266.

³⁹ Bichler *et al.* 2006; Sterba *et al.* 2009, in press.

⁴⁰ Klug 2002, 35–46.

⁴¹ Foster & Ritner 1996.

⁴² Wiener & Allen 1998.

⁴³ Manning 1999.

⁴⁴ Wiener 2006a.

⁴⁵ Roehrig *et al.* 2005, 31.

⁴⁶ Lacau, quoted in Goedicke 1995, 189.

cent faced downwards before year 22 and turned upwards thereafter. Ryholt has recently called this epigraphic/temporal linkage into question for two principal reasons, pointing out that any such change is likely to have been gradual, rather than instantaneous, and that the evidence for the shift is far from overwhelming.⁴⁷ Accordingly, we no longer need to date the stele prior to year 22.

We turn now to the problem of where the darkness was localized. Line 8 of the stele tells us that the gods caused a tempest of rain and darkness “in the west”. Lines 9 to 12 elaborate on the meteorological phenomena, describing deafening noise and torch-defying darkness lasting some days. Surely the Egyptians knew that the Aegean lies to the north/northwest of the Nile Valley. If the eruption caused this storm and unusual darkness, both perfectly consistent with the after-effects of a major volcanic explosion, why not situate it in the north? We believe that there are two interrelated explanations for the darkness being “in the west”.

First, the Egyptians associated the cardinal points with foreign peoples according to the following schema: north (Asiatics), south (Nubians), east (Puntites), and west (Libyans and Keftiu/Cretans).⁴⁸ If the author of the Tempest Stele wished to refer to the Aegean as the source of the darkness, he would indeed have placed it “in the west”. Furthermore, the Egyptians envisioned directional correspondences of north and west, south and east.⁴⁹

Second, the passage in question uses a construction meant to convey an abstract, indefinite quality about what is being described, in this case “a darkness like that of the West”, the Netherworld of the ancient Egyptians. “Putting it into a modern idiom, the gods are assumed to have conjured up that ‘a storm-flood came and darkness as in hell’.”⁵⁰ In this dark, tempestuous sky lurked the chaotic, dual dangers of water and night, all the more frightening the longer it lasted.

In our view, the Egyptian author intended this complex metaphor of “the west/West” as a literary device bearing both spatial and conceptual significance, whose appreciation effectively removes this second barrier to an eruption connection. Sophisticated metaphors of similar type occur elsewhere in Egyptian texts likewise describing desolation or a

time of troubles. As one parallel, we may cite a passage in the Great Karnak Inscription of Merneptah, which pictures Egypt in misery, with the tombs of the ancestors flooded, when “all the kings sat in their pyramids”.⁵¹ The image of the pyramids calls to mind not only the suffering of the deceased for lack of proper funerary rituals during this period of disorder, but also evokes the shape made by the enemy corpses piled on the battlefield, slain in the struggle to put matters right.

The third issue is the most difficult to resolve and the most open to personal interpretation. Does the Tempest Stele reflect an actual event, or is it simply an eloquent expression of the Dissolution-and-Restoration (or King-as-Restorer) theme well known in Egypt and the ancient Near East? Or did the author meld the two, setting for greater literary and propagandistic effect an exceptional occurrence within the pattern of the topos? Numerous Egyptian texts from the Middle Kingdom to the Late Period use the device of an era of disarray, which can encompass such troubles as civil strife, anarchy, flooding, neglect of temples and other monuments, and failure to enact funerary and other cults. Human error, invaders, and even the gods themselves may be blamed. Finally, a pharaonic champion emerges and re-establishes order.⁵²

In Dyn. XVIII, the genre includes the Speos Artemidos inscription of Hatshepsut, in which she holds the Hyksos accountable for the supposedly lamentable state of temples and the sad condition of the roads and army,⁵³ and the Restoration Stele of Tutankhamun, who claims to have found upon his succession that the gods had forsaken Egypt, presumably owing to the theology of the Amarna period.⁵⁴ While both texts refer explicitly or implicitly to historical events that did disrupt accepted norms, these are subsumed into grand statements, rich in clichés designed to exalt the pharaoh.

⁴⁷ Ryholt 1997, n. 669.

⁴⁸ Posener 1965, 76–7.

⁴⁹ Darnell 2004, 360 n. 371.

⁵⁰ Goedicke 1995, 140.

⁵¹ Manassa 2003, 110.

⁵² Redford 1986, 259–75; Tait 2003; Manassa 2003, 110–15.

⁵³ Goedicke 2004.

⁵⁴ Davies 1995, 30–33.

In evaluating the historicity of ancient texts such as these, how should we proceed? What should we set as limits for our credulity or scepticism? Under what contextual circumstances should we be asking if “this or that statement or implication be true? rather than Why might it be false?”.⁵⁵ Ought we to focus not only on *what* we know about the events from other evidence, but also on the documents “as a source for the knowledge itself”, that is, *how* the events are narrated?⁵⁶

In the Tempest Stele, there are certainly some passages of pharaonic bombast, as when Ahmose declares in line 12, “How much greater this is than the wrath of the great gods, than the plans of the gods!”. And the text ends with a recitation of the usual woes – tombs flooded, pyramids collapsed, temples ruined – and details the standard remedies – cult statues reinstalled, offerings revived, and wages doubled for temple personnel. Accordingly, some view the whole text as an extended metaphor for the Hyksos: “the circumstances for which the storm is blamed are actually events for which the Hyksos can be seen as responsible”.⁵⁷ Others agree that it is “an obviously metaphorical text”, but would take its meaning as “dating to, and related to, the accession of a new ruler (Ahmose, succeeding Kamose)”.⁵⁸

While the monument surely extols Ahmose’s restoration of order following a catastrophe, there is no reason, as we have discussed, to assign it to his accession, which in any event took place nearly two decades before he ousted the Hyksos for good. As for who or what caused the storm, human agency is not cited. Instead the text tells us it was the gods and that Ahmose went to Thebes to mollify Amun-Re, great god of Karnak, with rich offerings. As Karnak was always under Theban control during the Second Intermediate Period and never suffered invasion or raids, so far as we know, was it really thought that the Hyksos were ultimately to blame for this divinely sent calamity?

Moreover, the Egyptians were normally enthusiastic in their excoriation of the Hyksos, as in the Speos Artemidos inscription, in which Hatshepsut exults that “the earth has removed their footprints”,⁵⁹ or in a barbed New Kingdom story, in which the Hyksos king Apepi sends an inflamma-

tory message to the Theban king Seqenenra Taa, telling him that the hippos in the Thebaid are keeping the Hyksos awake at night.⁶⁰ If the Tempest Stele is about the Hyksos, it is a uniquely reticent, subtle condemnation, and this seems unlikely.

Enclosed within more high-flown descriptions of Ahmose’s restoration activities is the heart of the text: a non-hyperbolic account of a natural disaster that struck the Two Lands. We read of torrents of rain, extraordinary noise, and hellish darkness “in the west”. The author effectively expresses the enormity of the event by using language whose straightforward substance underscores the exceptionality of the phenomena observed. He says that the roaring is “louder than the noise of the cataract which is at Elephantine” (lines 9–10)⁶¹ and that it was so dark that “a torch could not shed light in the Two Lands” (line 12).

Wiener and Allen⁶² suggested that the storm might be one of the monsoons that periodically sweep up the Nile Valley from the Indian Ocean. While this is possible, in our view the Tempest Stele descriptions accord remarkably with those of societies ancient and modern, literate and illiterate, relating the events and after-effects of major volcanic eruptions. The reports reveal impressive consistency across time and cultures, particularly in terms of the noise and darkness experienced.⁶³

It is especially instructive to read what people heard and felt following the eruptions of Tambora in 1815 and Krakatau in 1883, both of them Indonesian eruptions comparable in magnitude to that of Thera. The noise from Krakatau, which was likened to thunder or the roar of cannon, travelled tremendous distances over land and water. The explosion was heard as far away as Alice Springs and Perth in Australia and Diego Garcia and Rodriguez

⁵⁵ Beckman 2005, 349.

⁵⁶ Liverani 1973, 179.

⁵⁷ Ryholt 1997, 144.

⁵⁸ Manning 1999, 196–8.

⁵⁹ Bourriau 2000, 215.

⁶⁰ Simpson 1972, 77–80.

⁶¹ Contra Redford 1997, 16 “louder than the noise of the ‘Cavern’ which is in Abydos”.

⁶² Wiener & Allen 1998.

⁶³ Foster 2005.

in the Indian Ocean.⁶⁴ Houses shook in East Java, 780 km from Tambora.⁶⁵

As for darkness, many legends from volcanic areas about the world speak of a “Time of Darkness”, or “Great Darkness”, when flares, candles, and torches were unable to penetrate the gloom, which was made more terrifying by rain, noise, wind, and earthquakes. These tales of darkness are borne out by correlating the data gleaned from global volcanological reports, which give an idea of the duration of the darkness, the distance from the volcano, and the thickness of the uncompacted tephra that fell.⁶⁶ We find, for instance, that 380 km from Tambora total darkness lasted nineteen hours, with an uncompacted tephra thickness of only 3.2 cm. Some sites within 600 km of Tambora reportedly experienced modest tephra accumulations, but the sky was pitch-black for two days.⁶⁷

But would there have been darkness in Egypt if, as we think at present, little or no ash actually fell in Egypt? From the volcanological literature, it seems as though quite small amounts of ashfall, possibly not yet retrieved or retrievable in Egypt, are sufficient to provoke darkness, as well as to cause roofs to collapse.⁶⁸ Even if none fell, we should note that some darkness legends tell of frightful black clouds, using language strikingly reminiscent of the Tempest Stele: “Once upon a time, in olden days, men saw to the south the whole land was covered with dark clouds”.⁶⁹

A final, small point involves the enigmatic lines 13-14, in which we learn that many Egyptians had “no clothing on them after the manifestation of the god’s wrath”. This puzzling mention may have a volcanic explanation. In 1912, the Alaskan Valley of Ten Thousand Smokes erupted in massive explosions, spewing sulphurous fumes that so impregnated laundry hung outside over 3000 km away in Vancouver that the clothes shredded when hot irons were applied.⁷⁰ Could this have happened to Egyptian linen? If so, we may wonder parenthetically what the effect might have been on sails, which in the case of Thera ships may each have needed 500 meters of sailcloth, a daunting amount of linen to repair or replace.⁷¹

Conclusions

Our INAA results with respect to the pumice from Maiyana and the Tomb of Maket are entirely consistent with the sourcing picture that has emerged from the Thera Ashes project, namely, that Minoan eruption material is not present in pre-Dyn. XVIII contexts, from palatial complexes to modest graves. At the same time, our re-examination of the Tempest Stele of Ahmose raises anew the question of its relevance and significance. An eruption date falling exactly within the chronological horizon of the stele finds support in archaeological and analytical evidence that is highly suggestive but still inconclusive.⁷²

Among other things, what is needed for the future is to determine as precisely as possible when in chronometric terms pumice from the Minoan eruption first appears. The sites of Tell el-Dab^a and Tell el-^cAjjul in particular hold much promise. Thus far, we have it at Tell el-Dab^a as early as the reign of Thutmose I⁷³ and at Tell el-^cAjjul just after Ahmose, or possibly in the last year or two of his reign.⁷⁴ These findings bring a putative eruption date mid-to-late in the reign of Ahmose within easy reach of the documented use of its pumice in Egypt and Palestine.

It would not be unexpected if there were a short time lag, on the analogy of the pumice stratification at the Minoan site of Pseira, where “only about 10% of the pumice came from the LM IA eruption context itself...whereas around 90% came from the LM IB destruction context, perhaps about two generations later”.⁷⁵

Our work has raised many questions, of which we pose here three. How would an Ahmoside

⁶⁴ Simkin & Fiske 1983, 146–59, 367.

⁶⁵ Blong 1982, 2.

⁶⁶ Blong 1982, 143–4.

⁶⁷ Stothers 1984.

⁶⁸ Blong 1982, 160.

⁶⁹ Blong 1982, 4.

⁷⁰ Herbert & Bardossi 1968, 68.

⁷¹ Tzachili 1999.

⁷² Warren 2007; Wiener 2006a.

⁷³ Bietak *et al.* 2001.

⁷⁴ Fischer 2003.

⁷⁵ Wiener 2006a, 323.

eruption date aid our understanding of the Aegeanizing items connected with his reign, such as the ceremonial weapons he gave his mother, Queen Ahhotep? What is the meaning of her unparalleled title, "Mistress of the Littoral"? And what relation is there between the artists and workshops responsible for the Thera frescoes and those who painted the walls of early Dyn. XVIII palaces at the former Hyksos capital? We look forward to further investigations with keen anticipation.

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