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Summary

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7. SUMMARY

My primary aim in this work is to underline how vital detailed investigation, research and study of human activity continues to be in our efforts to reconstruct sequences and causality of historical events. Indeed, as the pace of change in our knowledge of the natural background to these historical events increases and is, in turn, affected by such research, its role could be described as crucial.

We operate with large datasets collected over almost 200 years of systematic archaeological activity but, despite the efforts of a veritable 'army' of scholars over the years, many of the so-called 'big' questions remain unanswered. I chose to focus here on the absolute chronology of the Late Bronze Age volcanic eruption on Santorini and its effects across the wider region. Why? We are all familiar with the event: a massive eruption of the Santorini volcano. Its relative chronology is also clear: (LM IA/IB). The primary impact, on the Aegean environment at least, can easily be documented. Yet we still cannot place the event within an absolute chronology and it is therefore impossible to establish how people reacted, or what changed in the social sphere, the economy and in the flow of history.

The absolute dating of the Santorini eruption is one of the most frequently discussed and studied topics of Aegean prehistory, especially since the mid 1970's, when the first radiocarbon dates from the region were published and the difference between those dates and archaeological/historical dates became clear. The question is much more than simply methodologically important; in this period in this region is a key point for understanding the Late Bronze Age in the whole of Europe.

I have, within this monograph, set out many arguments, facts and data and attempted to assess which are secure and which vague. I have tried to indicate where errors may possibly have arisen and identify those areas where there have been failures in aspects both of our research and comprehension.

As first there are presented chapters describing the natural circumstances, reconstruction and intensity of the eruption, together with an historical overview. Let us remember that the Santorini Bronze Age eruption has been evaluated as the most violent eruption of the last 10,000 years, with VEI = 6.9. The devastated island was not re-inhabited until the Geometric period, an hiatus of at least 800 years. The ash and tsunami deposits have been found on many sites on Crete and all the neighbouring regions, including Asia Minor, the Near East and North Africa, were impacted. Even the climate changed, for at least a number of years after the event.

This giant eruption left primary or secondary traces in archaeological contexts around the Eastern Mediterranean and it appears reasonable to suppose that determining its absolute date should be a simple issue. The eruption occurred at, and probably defined, the transition from the LM IA to the LMIB period. The absolute dates of the Aegean Bronze Age were connected to the Egyptian chronology and originally the eruption was dated to the mid-15th century BC but the radiocarbon dates suggested a much earlier ('higher') date, placing the event before 1600 BC. The first calibrated radiocarbon dates were followed by dendrochronological dates obtained from tree ring sequences and by glaciology studying Greenland ice stratigraphy. This problem is still with us and the arguments are summarised in the following table:

	Method	Suggested date of the eruption/chronology	Chronological accuracy		Chapters in the book
			"Pro"	"Cons"	
Hard Sciences	Radiocarbon	High	Large datasets from a wide region and from many and various labs. Great accuracy of measurement.	Calibration curve(s). Incomplete knowledge of impact factors (e.g. "old" C^{14}).	2.1.1.
	Dendrochronology	High	General accuracy of the method in particular circumstances. Good evidence of climatic events in global scale.	No local sequences. Olive wood used in Santorini.	2.1.2.
	Ice-core dating	High	General accuracy of the method in particular circumstances. Accurate for global events if chemically significant.	Unclear identification of the event(s) in the ice stratigraphy.	2.1.3.
Humanities	Egyptian chronology	Low	Literary sources. Historical calendars. Astronomical observations.	Gaps in literary documents. Different understandings of calendar. Discrepancies between historical and radiocarbon dates (17^{th} – 15^{th} century BC).	2.2.2.1.
	Literary sources	High & Low	Descriptions of volcanic events (e. g. Ahmose's Tempest Steal)	Unclear relationship with the Santorini events.	2.2.2.1., 2.2.2.2
	Cretan (and Aegean) and Egyptian exports/ imports	High & Low	Aegean objects in Egypt and Egyptian ones in Aegean.	Longue durée styles and types. Problems of heirlooms. Old excavations with incomplete documentation.	2.2.2.4., 2.2.2.5.
	Cyprus chronology	Low	Cyprus pottery spread across the Near East and Egypt	Related to Egyptian historical chronology (cannot be accepted as independent).	2.2.4.
	Iconography	High & Low	Minoan iconography in Asia Minor, Near East and in Egypt	Impossible to date the so called Aegean frescoes stylistically.	2.2.3.1., 2.2.3.2., 2.2.2.3.
	Asia Minor's chronology	High	Literary sources and stratigraphy of Alalakh.	Synchronism with Aegean and Egypt.	2.2.3.1.
	Near Eastern chronology	High	Literary sources, astronomical observation.	Difficult synchronism with Aegean and Egypt mainly in SIP.	2.2.3.2., 2.2.3.3.
	European chronology	High	Large dataset of radiocarbon dates from independent measurements and laboratories.	Chronology depends on Aegean scales.	2.2.6.

Table 8
High or Low chronology? "PRO" and "CONS".

As shown above, the absolute chronology of the Santorini volcano eruption is still uncertain. There are serious doubts, mainly from the perspective of Egyptian historical dating scales. Although it seems today that the majority tends to prefer the high chronology, this cannot be directly interpreted as indicating a correct answer. In archaeology, as in other disciplines, we cannot simply present guesswork, or even a considered

estimation of plausibility, as a result. This principle is accented in the book because it has, in the past, sometimes been overlooked by historians and archaeologists interpreting prehistory.

New radiocarbon dates obtained from a large number of Bronze Age sites, including those outside the Eastern Mediterranean, appear to exclude almost any date after 1600 BC. On the other hand it is impossible to exclude completely the arguments of classical archaeological methods and Egyptian absolute chronology reconstructed from historical sources completely. Stratigraphical sequences containing artefacts from different regions supporting both low and high chronologies cannot be rejected. All these discrepancies must be resolved since, logically, only one option is correct. This means that "someone" is wrong. But who and why? What do we know for sure and what remains unclear? From which point have we taken a wrong turn?

The actual questions can be defined as follows:

1. Did the Santorini eruption happen during the SIP or during the early Eighteenth Dynasty? In other words: Is the LM IA phase contemporary with the SIP or with early Dynasty XVIII?

2. Is it possible that Egyptian absolute chronology can have a larger deviation than has been assumed and, if so, when precisely does it begin to deviate?

3. If the Egyptian chronology is correct, why does the radiocarbon dating method provide incorrect dates?

And the main question can possibly be simplified as: 'Does the problem lie in radiocarbon methods or in Aegean prehistory and Egyptology?' I don't seek to denigrate the Egyptian chronology since I, as an archaeologist and prehistorian, am not competent to judge but, at present, it does seem that it may be necessary to consider its revision.

After the analysis presented in the book, I am convinced that at the moment there are archaeologists who ought to revise their methodologies – both prehistorians and Egyptologists. Although our relative typological scales are very precise we may well be failing in our understanding of their regularities, and how to use them in an actual historical process. Albeit we know that people don't operate within the simple universe described by Newtonian mechanics, and their cosmologies and mechanisms of deciding/resolving are much more complicated and complex, we still stick to the positivist interpretation of the artefact sets. We tend to ignore the inconvenient fact that the time conserved and expressed in the artefacts has a speed, is relative and it certainly does not constitute a direct proportionality. It seems that they don't "behave" in time and space as we expect. Similar opinions have also been expressed in the past but seem to have been little heeded.

There are many examples today of major shifts of styles and fashions in time and space and examples of longue durée pottery styles. Changes in shapes and decorations have their logic but this logic is not universal, it is not valid for each type in each time and space. Some of them have incredible duration: e.g. trickle-decoration on Cretan Bronze Age pithoi, TY ware in the Near East and transport amphorae from the Hellenistic period to the Middle Byzantine period and even later.

A major conclusion from the analysis must be that it is essential that we be critical of our own methods and results.

Returning to the Santorini issue, I suggest that not only should earlier finds be reviewed, since many mistakes have automatically been transferred from publication to publication, but also that new finds and fresh stratigraphic evidence must be sought. It is important to include more northern regions, such as the Balkans or central Europe, in the exercise. One of the most important regions seems to be Macedonia, where tells, such as Kastanas, Dikili Tash and others, may prove fruitful.

Not only do we need new contexts and finds, we also need new methodologies, new paradigms. It seems that the way we currently work with parallels, imports and influences doesn't always give us correct dates and connections and relationships. There are heirlooms, there are types and styles which survive, virtually unchanged, for centuries, styles which repeat and styles which are consciously resurrected, more progressive and conservative regions etc.; the people of the past would most probably, have had a very different approach to their material world, . Radiocarbon dates cannot simply be rejected when they do not match with the archaeological chronologies, the exponents of both methods should look for possible reasons for any discrepancy.

It seems, at present, that the archaeological and historical scales are slightly shorter than radiocarbon based chronologies.

The conclusions of the book should not be interpreted as judgments and do not imply that previous researchers were necessarily wrong. This has been an attempt to provide as complete as possible a summary of contemporary results, analysing the arguments concerning each method, and to create a threshold for further research which should be upgraded and enriched by new approaches and methods.