Tagungen des Landesmuseums für Vorgeschichte Halle Band 9 | 2013

1600 – Kultureller Umbruch imSchatten des Thera-Ausbruchs?1600 – Cultural change inthe shadow of the Thera-Eruption?

4. Mitteldeutscher Archäologentag vom
14. bis 16. Oktober 2011 in Halle (Saale)
4th Archaeological Conference of Central Germany
October 14–16, 2011 in Halle (Saale)



Landesamt für Denkmalpflege und Archäologie Sachsen-Anhalt LANDESMUSEUM FÜR VORGESCHICHTE

> herausgegeben von Harald Meller, François Bertemes, Hans-Rudolf Bork und Roberto Risch

Halle (Saale) 2013

	Die Beiträge dieses Bandes wurden einem Peer-Review-Verfahren unterzogen. Die Gutachtertätigkeit übernahmen folgende Fachkollegen: Prof. Dr. François Bertemes, Prof. Dr. Olaf Bubenzer, Prof. Dr. Helga Bumke, Prof. Dr. Robert Chapman, Prof. Dr. Raf- faello Cioni, Prof. Dr. Janusz Czebreszuk, Dr. Stefan Dreibrodt, Prof. Dr. Peter Ettel, Prof. Dr. Andreas Furtwängler, Prof. Dr. Svend Hansen, Dr. Karl-Uwe Heußner, Dr. Reinhard Jung, Dr. Flemming Kaul, Dr. Mechthild Klamm, Prof. Dr. Margarita Primas, Prof. Dr. Hans Ulrich Schmincke, Dr. Ralf Schwarz, Prof. Dr. Frank Sirocko, Prof. Dr. Ingmar Unkel, Prof. Dr. Dietrich Wildung, Dr. Bernd Zich.
	Bibliografische Information Der Deutschen Nationalbibliothek Die Deutsche Nationalbibliothek verzeichnet diese Publikation in der Deutschen Nationalbibliografie; detaillierte bibliografische Daten sind im Internet über http://portal.dnb.de abrufbar.
ISBN	978-3-944507-00-2 1867-4402
Wissenschaftliche Redaktion Redaktion und Übersetzung der englischen Texte Organisation und Korrespondenz Technische Bearbeitung	Kathrin Legler, Manuela Schwarz, Wolfgang Schwarz, Anna Swieder Erika Hanning, Louis D. Nebelsick, Marion Page Anna Swieder Thomas Blankenburg, Nora Seeländer, Sylvia Gili Suriñach, Mario Wiegmann
	Für den Inhalt der Arbeiten sind die Autoren eigenverantwortlich.
Ĉ	by Landesamt für Denkmalpflege und Archäologie Sachsen-Anhalt – Landesmuseum für Vorgeschichte Halle (Saale). Das Werk einschließlich aller seiner Teile ist urheberrechtlich geschützt. Jede Verwertung außerhalb der engen Grenzen des Urheberrechtsgesetzes ist ohne Zustimmung des Landesamt für Denkmalpflege und Archäologie Sachsen-Anhalt unzulässig. Dies gilt insbesondere für Vervielfältigungen, Übersetzungen, Mikroverfil- mungen sowie die Einspeicherung und Verarbeitung in elektronischen Systemen.
Papier Satzschrift	alterungsbeständig nach лил/1so 9706 FF Celeste, News Gothic
Konzept und Gestaltung Layout, Satz und Produktion Druck und Bindung	Carolyn Steinbeck • Berlin Nora Seeländer Salzland Druck GmbH & Co. KG

Inhalt/Contents

9 Vorwort der Herausgeber/Preface of the editors

Sektion Naturwissenschaften/Section sciences

19 Hans-Rudolf Bork und Stefan Dreibrodt

Vulkanische Extremereignisse in der Nacheiszeit und ihre Folgen für den Menschen und seine Umwelt in Mitteleuropa

23 Hartmut Leser

Paläo-Umweltgeschichte und Geomorphologie: Möglichkeiten eines geowissenschaftlichen Forschungsansatzes

37 Walter L. Friedrich

The Minoan Eruption of Santorini around 1613 B.C. and its consequences

49 Clive Oppenheimer

Nature and impacts of the Minoan Eruption of Santorini

59 Walter Kutschera Dating of the Thera/Santorini volcanic eruption

65 Mike Baillie Radical thinking on the Thera debate

77 Christoph Siart and Bernhard Eitel Santorini tephra on Crete: a mineralogical record of Bronze Age environmental change

89 André Billamboz

Der Standpunkt der Dendroarchäologie zu den Auswirkungen der Thera-Eruption nördlich der Alpen

101 Gernot Patzelt Bergstürze im 2. Jahrtausend v. Chr. im Ostalpenraum

- 109 Leo Rothacker and Frank Sirocko Evaluation of flood events in three Eifel maar sediment records during the 16th century B.C.
- 117 Giovanni Orsi, Raffaello Cioni and Valeria Di Renzo The Campanian Plain during the Bronze Age: development of volcanism and impact of the Vesuvius Avellino eruption in a densely populated area

Sektion Archäologie/Section archaeology

137 Anna Michailidou

The final settlement at Akrotiri on Thera: the buildings, the people, and the eruption

149 Annette Højen Sørensen, Walter L. Friedrich, Samson Katsipis and Kirsten Molly Søholm Miniatures of meaning – interdisciplinary approaches to the miniature frescos from the west house at Akrotiri on Thera

163 Tobias Neuser

Willkommen sei die Ordnung, denn das Chaos hat versagt. Die Auswirkungen des Vulkanausbruchs von Akrotiri auf das Selbstverständnis ägäischer Eliten

177 Wolf-Dietrich Niemeier

Die Auswirkungen der Thera-Eruption im ägäischen Raum

191 François Bertemes

Tavşan Adası. Das Thera-Event und seine Auswirkung auf das minoische Kommunikationsnetzwerk

211 Katharina Pruckner

The so-called »Middle Helladic Tradition« in Aegean pottery production of 1600 B.C.

221 Joachim Friedrich Quack

Gibt es in Ägypten schriftliche Quellen zum Thera-Ausbruch?

235 Reinhard Jung

The time around 1600 B.C. in Southern Italy: new powers, new contacts and new conflicts

253 Halinka Di Lorenzo, Mauro Antonio Di Vito, Pierfrancesco Talamo, Jim Bishop, Nicola Castaldo, Sandro de Vita, Rosella Nave and Marco Pacciarelli

The impact of the Pomici di Avellino Plinian eruption of Vesuvius on Early and Middle Bronze Age human settlement in Campania (Southern Italy)

267 Alessandro Vanzetti

1600? The rise of the Terramara system (Northern Italy)

- **283** Vicente Lull, Rafael Micó, Cristina Rihuete Herrada and Roberto Risch Political collapse and social change at the end of El Argar
- **303** Mauro S. Hernández Pérez, Francisco Javier Jover Maestre and Juan Antonio López Padilla The social and political situation between 1750 and 1500 cal. B.C. in the central Spanish Mediterranean: an archaeological overview
- 315 Francisco Javier Abarquero Moras, Antonio Blanco-González, Ángel Esparza Arroyo and José A. Rodríguez Marcos

The Central Iberian Meseta at the time of the Thera-Eruption: an overview

327 Carola Metzner-Nebelsick

Gedanken zur Frage des kulturellen Wandels in der Zeit um 1600 v.Chr. in Nordwest-Rumänien und Nordost-Ungarn

355 Klára P. Fischl, Viktória Kiss, Gabriella Kulcsár and Vajk Szeverényi Transformations in the Carpathian Basin around 1600 B.C.

373 Jozef Bátora

The settlement structure problem and the end of fortified settlements from the final period of Early Bronze Age in Slovakia

387 Jaroslav Peška

Das Besiedlungsbild in der Blütezeit der Frühbronzezeit im Gebiet des mittleren Donauraumes

411 Alexandra Krenn-Leeb

Sozialer Wandel um 1600 v. Chr. in Österreich

435 Margarita Primas

Settlement and interregional connections in the Central and Eastern Alps

443 Florian Innerhofer

Von der frühen zur mittleren Bronzezeit in Süddeutschland - Wandel oder Zäsur?

453 Michal Ernée

Bernstein und der Zusammenbruch der klassischen Aunjetitzer Kultur in Böhmen

469 Bernd Zich

Aunjetitz – Nebra – Sögel. Die Zeit um 1600 v. Chr. im westlichen Mitteldeutschland

493 Harald Meller

Der Hortfund von Nebra im Spiegel frühbronzezeitlicher Deponierungssitten

527 Johannes Müller

1600 B.C. – Social topographies and the development of Early Bronze Age societies in Central Europe

539 Anna Swieder

Carpathian Basin, Oder, Baltic Sea. The role of the Oder River as communication corridor at the end of the Early and the beginning of the Middle Bronze Age

551 Juliane Filipp

Southern Scandinavia around 1600 B.C. Signs of mobility, trade, and communication – the scimitars from Rørby (Denmark)

567 José Gomez de Soto

The Bronze Age in Atlantic France around 1600 B.C.

577 Timothy Darvill

Dark sides of the moon: life, death, ritual, and regional identity in Britain ca. 1600 B.C.

Abschlussdiskussion/Final discussion

597 Roberto Risch und Harald Meller

Wandel und Kontinuität in Europa und im Mittelmeerraum um 1600 v. Chr.

The final settlement at Akrotiri on Thera: the buildings, the people, and the eruption

Anna Michailidou

Zusammenfassung

Dieser Beitrag soll einen Überblick über die Auswirkungen auf die Gebäude und ihre Ausstattung sowie das Verhalten der Bewohner während der sogenannten Minoischen Eruption geben, die nach Meinung zahlreicher Forscher die spätbronzezeitliche Siedlung von Akrotiri auf Thera um 1600 v. Chr. zerstörte. Der ausgegrabene Bereich belegt ein Erdbeben der Stärke 7 auf der Richterskala, Aufräumarbeiten während einer kurzen Phase, als die Einwohner in ihre Häuser zurückkehrten, sowie die Plinianische Eruptionsphase und die darauf folgenden Flutwellen. Weiterhin sind Schäden an den Gebäuden dokumentiert, die durch das aufgehäufte vulkanische Material entstanden, das die kurz vor dem Vulkanausbruch verlassene Stadt versiegelte.

Bei den meisten Gebäuden sind das Erdgeschoss und Teile des ersten Stockwerkes erhalten, bei manchen sogar der gepflasterte Fußboden und Wandabschnitte des zweiten Stockwerkes. Die Art des Fußbodens – mit Fliesen ausgelegt oder nur einfacher gestampfter Lehmboden –, die Infrastruktur, das Verschüttungsmaterial (oder auch das vulkanische Material) auf dem Boden im Erdgeschoss sind ausschlaggebende Faktoren für die Beschaffenheit der Fußböden der oberen Stockwerke und deren Einrichtung. Die Grabungstagebücher zeigen, wie dicht nebeneinander Lehmböden vom ersten und zweiten Stockwerk oft senkrecht und nahezu parallel herunterfielen; mit der Folge, dass Keramik von beiden Stockwerken auf derselben Ebene liegen kann, wobei sogar ein Gegenstand aus dem zweiten Stockwerk nun tiefer als ein Objekt aus dem ersten Stockwerk liegen kann.

Die kritische Frage ist, wie sich die Menschen verhielten, als die Stadt kurz vor Beginn des Ausbruchs verlassen wurde? Sicher besaßen sie Schmuckobjekte aus wertvollem Metall, wie die Wandmalereien der privaten Räume in den oberen Stockwerken zeigen, die sie sicherlich mitnahmen, da hiervon nichts zu finden war. Lediglich eine goldene Ibexstatuette wurde gefunden, die in einem Holzkästchen in einer Tontruhe in der Nähe einer Anhäufung von Ziegenhörnern lag. Auch einige Werkzeuge und Gefäße aus Kupfer und Bronze wurden in oder außerhalb von Gebäuden zurückgelassen. Ein Hort aus fünf Bronzegefäßen wurde in einem Keller gefunden; möglicherweise der Besitz eines Metallhändlers, da bisher nur in diesem Haus ein Bleigewicht eines halben Talentes gefunden wurde. Der Besitz bzw. das Handelsgut eines anderen Händlers war in einem sehr engen Raum seines Hauses verstaut, wo auch Aufzeichnungen über Tiere und Textilien in Linear A-Schrift aufbewahrt wurden. Der beste Beleg für die Anhäufung von Privatbesitz stammt aus dem Obergeschoss eines Hauses, in dem ein Kupferbarrenfragment zusammen mit einigen rituellen Gegenständen zwischen den

Summary

This paper is intended to offer an overview of the effects on buildings and their equipment and the behaviour of the inhabitants themselves, during the so-called Minoan Eruption that destroyed the Late Bronze Age settlement at Akrotiri on Thera, at a date around 1600 B.C., according to many scholars. The excavated site presents evidence for an earthquake of 7 on the Richter scale, for clearing works during a short interval when the inhabitants returned to their houses, for the Plinian phase of the eruption and the base surges that followed, as well as for the damages to the buildings caused by the accumulation of the volcanic material that sealed the town already abandoned for a second time just before the eruption started.

Most of the buildings preserve the ground floor and parts of the first floor, some even the paved floors and parts of walls of a second floor. In brief, the kind of the floor – paved with slabs or simply made of beaten earth – the infrastructure, the infill, or otherwise, of volcanic material of the ground floor, are crucial parameters affecting the behaviour of floors on the upper storeys and consequently of their fittings. The excavation notebooks show how close floors of beaten earth from both first and second floors often fell in a vertical and almost parallel position, thus resulting in pottery from both floors ending up together on the same level, whilst sometimes an item from the second floor may be found at a level beneath that of some object from the first floor.

The critical question is how did the people react while the city was being abandoned just before the eruption started? They certainly possessed jewels of precious metals, as indicated by the wall paintings adorning their private apartments located on the upper floors of their houses, which they obviously carried away since none was found. Only a gold figurine of an ibex was found kept in a wooden box inside a clay chest located in the vicinity of a cluster of caprine horns. Some copper and bronze tools and vessels were left behind inside or outside the buildings. A hoard of five bronze vessels was found in the cellar of a basement, possibly the property of an entrepreneur who dealt in metals, since it was in his house that the only known half-talent lead weight was found. The property/merchandise of another merchant was found stored in a very narrow space of his house where also records of animals and textiles were kept in Linear A script. The best evidence for the hoarding of private property comes from the upper floor of a house, where a fragment of an ingot of copper was hidden together with some ritual objects among the stones of a loosely built wall. Balance pans, balance weights and a few silver rings and copper bands that in pre-coinage societies functioned as means of payment were also found. Steinen einer locker errichteten Wand versteckt war. Auch Waagschalen, Gewichte, einige Silberringe und Kupferbänder, die in vormonetären Gesellschaften als Zahlungsmittel dienten, wurden gefunden. Es ist jedoch wahrscheinlich, dass die Händler von Akrotiri die meisten Wertsachen mitnehmen konnten.

The eruption

Thera is the ancient name of the island of Santorini, after the name of the Greek founder Theras of the 8th century B.C., while >Santorini< is the name in use from the time of the Venetian occupation of the Aegean archipelagos. This paper is intended to offer an overview of the effects on buildings and their equipment and the behavior of the inhabitants themselves, during the eruption that destroyed the Bronze Age settlement at a date around 1600 B.C. This is the socalled >Minoan Eruption<, because it occurred at the time of the peak of the so-called >Minoan< civilization. The map by G. Vougioukalakis (Fig. 1) indicates the area estimated to have been covered by volcanic tephra. D.A. Sewell (2001) has modelled the wind patterns at Thera throughout the year to demonstrate that summer winds are more likely to shift from the southeast to the east, thus conforming to the observed tephra distribution, »and this summer wind tephra distribution pattern fits well with archaeobotanist Anaya Sarpaki's observation that the pantries were low when their owners fled; this could mean that the agricultural produce

However it is most probable that the merchants living in Akrotiri had taken most of their >silver< away with them.

was either still in the fields, or being processed elsewhere before being transported to the urban residences« (MacGillivray 2009, 158). It seems that a change to a wet climate immediately followed the Theran eruption. Similar results have been obtained from pollen cores in Turkey, which all contribute to the picture of a widespread climatic change (MacGillivray 2009, 159).

There have been many eruptions in the history of the island of Thera, both before and after the >Minoan< eruption. One of these eruptions, that of 1866 A. D., awoke the interest of geologists all over Europe and Greece, who arrived on the island to study this phenomenon. At the same time, the intensive quarrying of pozzuolana on the south coast of Therassia, intended to cater for the enormous demand for this material caused by the construction of the Suez Canal, revealed prehistoric buildings, which were very useful for the archaeological dating of the geological strata. I. Tzachili has collected reports and evidence on the early excavations on Therassia and Thera (Tzachili 2005; Tzachili 2006). The owner of the mines on Therassia, Siguras Alaphouzos, and his friend, Dr. Nicolas Nomikos, uncovered a house with its

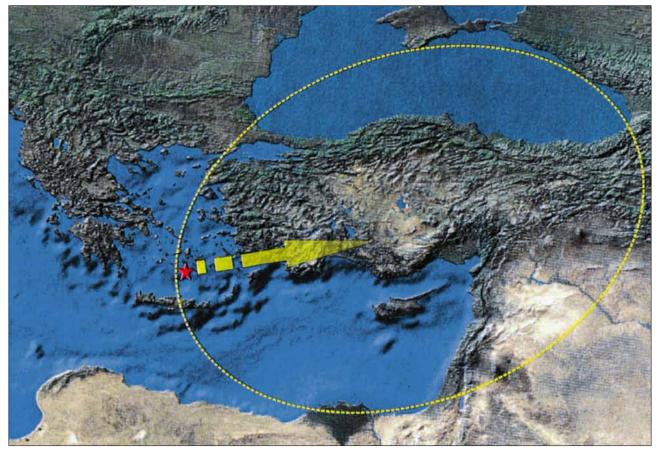


Fig. 1 Akrotiri on Thera. The area estimated to have been covered by the volcanic tephra.

Fig. 2 Akrotiri on Thera. One of the blocks ejected from the volcano has landed within the upper floor of room Delta 8A.

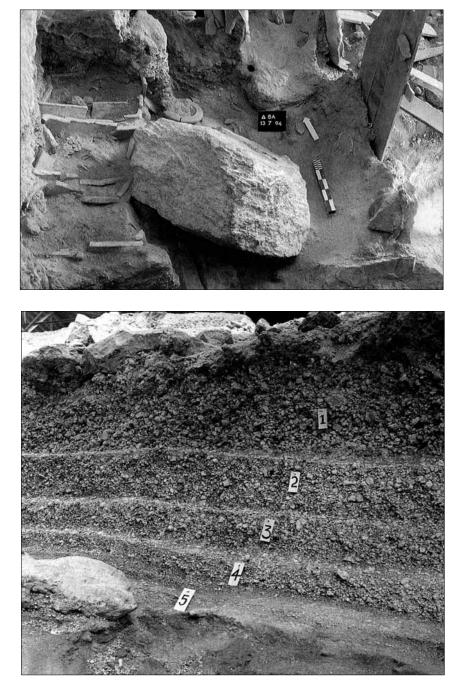


Fig. 3 Akrotiri on Thera. Five layers of pumice of the Plinian phase, with the fifth thin layer belonging to the precursory phase of the eruption.

equipment and the only human skeleton found as yet. This house was found under the layer of pumice, thus providing evidence regarding habitation before the eruption that created the high layers of volcanic material. It is very interesting that at first the buildings were dated to the Stone Age, on the grounds that metal objects were not found (Tzachili 2005, 245), whilst later evidence proved that they dated to the Bronze Age.

In the years 1867 and 1870, French geologists and archaeologists (F. Fouquè, H. Mamet and H. Gorceix) started digging on the main island of Thera. The first buildings of an urban centre at Akrotiri and two houses at Balos were unearthed and Theran pots were first put on display in collections and museums. In Tzachili's words, this was how Aegean prehistory was born, since all this occurred at a time when the excavations by A. Evans at Knossos had not yet started, >Minoan< Culture being therefore still unknown. Since neither Troy nor Mycenae had yet been excavated, it is not too much to say that Aegean prehistory was born on Thera in 1866 (Tzachili 2006, 24 ff.). I. Tzachili also makes interesting observations on aspects of the interest in the 19th century eruption displayed by the elites of the period. The Greek historian Constantinos Paparegopoulos writing an article in 1867, that is, in the immediate aftermath of the eruption of 1866, comments on the ancient eruption on Thera in 726 A. D. and lays emphasis on the *stasis* (rebellion) against the Byzantine emperor Leo the Isaurian that took place at the same time. By analogy, he relates the eruption of his own time to the revolution of the Cretans against the Ottoman government in 1866 A. D.

The eruption in which we are interested here, that is, the Minoan Eruption, is possibly dated to around 1600 B.C.



Fig. 4 Akrotiri on Thera. Grooved hammer stones found amidst the ruins, possibly manufactured originally to serve as mining tools (?).

There has been great discussion regarding this particular date and one of the most recent contributions to the debate is a monograph produced by the Danish Institute at Athens, published in 2009 (Warburton 2009). We will only quote the last paragraph from one of the chapters of this book (Friedrich/Heinemeier 2009), in connection with two olive branches found on the caldera rim: »...The trees were standing in life position, the wood slightly charred. We consider the date from this branch to be the most solid scientific determination of the timing of the Minoan Eruption presently available« (Friedrich/Heinemeier 2009, 63). It is indeed a fascinating find, the parts of the two olive trees been found standing in a living position near a man-made wall. Part of an olive trunk preserved by the volcanic ashes covering one of the buildings at Balos excavated in 1870 was also among the first finds, but this pride of the French excavators is now unfortunately lost (Tzachili 2005, 254 note 6).

The town of Akrotiri was systematically excavated by S. Marinatos from 1967 to 1974 and since 1976 the excavations have been directed by C. Doumas, the material being studied by a team of Greek archaeologists. As the excavators unearthed the city, first evidence they found came from the final stage of the eruption when, during the pyroclastic flows of the volcanic ash, huge blocks were ejected and damaged walls that were still standing, sometimes even landing within the upper stories of the buildings (Fig. 2). From a deeper level comes the evidence of previous phases of the eruption, the second (of the base surges) and the first (the Plinian phase). A good example is given by a wall that fell during the second phase above the level of the pumice that fell from the air during the first phase, this pumice layer covering the destruction level caused by previous earthquakes. In places, five layers of pumice of the first, Plinian, phase, are to be observed (Fig. 3), with the fifth thin layer belonging to the precursory phase (Michaelides/Angelides

2006, Fig. 5). This thin layer, particularly visible in open spaces, provides a hard cover over the destruction layer of the site and has helped preserve organic materials¹ such as, for instance, a piece of wood bounded with ropes or a sack with barley lying on top of the debris. Organic materials wrapped inside the layers of pumice were also preserved, in particular when they have been stored inside clay pots, while in tephra layers are found the best preserved hollow spaces left by objects now decayed.

Between the earthquake preceding the actual eruption and the initial phase of the eruption itself the inhabitants had returned to the town evidently in order to clear the area, reconstruct buildings and generally resume their lives there again. The evidence is provided by the presence of walled doors on upper floors, of newly built walls and of household equipment, such as clay pots or baskets or even wooden beds, which had moved into the open, the impression of the wooden structure being found in the pumice². Amidst the ruins some grooved hammer stones were found, possibly being re-used here to demolish dangerous buildings (Fig. 4)³. To judge from the debris found left in various streets, such as the road south of the imposing building Xesté 4, it is obvious that the inhabitants did not finish clearing the site. The precursory phase of the actual eruption forced them to abandon the area for good. They deserted the city, taking with them their valuables and closing the doors of their houses, as in some cases the imprints of the wooden door leaves indicate (Fig. 6).

The buildings

Such is the plan and the picture of the settlement now revealed (Fig. 5–6). The town of Akrotiri in its heyday may possibly be that depicted by artists in the miniature wall

1 As remarked on by Michaelides/Angelides (2006, 71 and Fig. 14–16). 3 Doumas 1974; Michailidou 1993–94; Michailidou 2007, 236; Michailidou (2008a, Fig. 1–2) suggests that these hammers were manufactured perhaps originally to serve as mining tools and were subsequently transported to be used in emergency repair work.

² Marinatos 1970, Pl. 42; Nikolakopoulou 2003, Fig. 6–8; Friedrich/Sigalas 2009, Fig. 6.

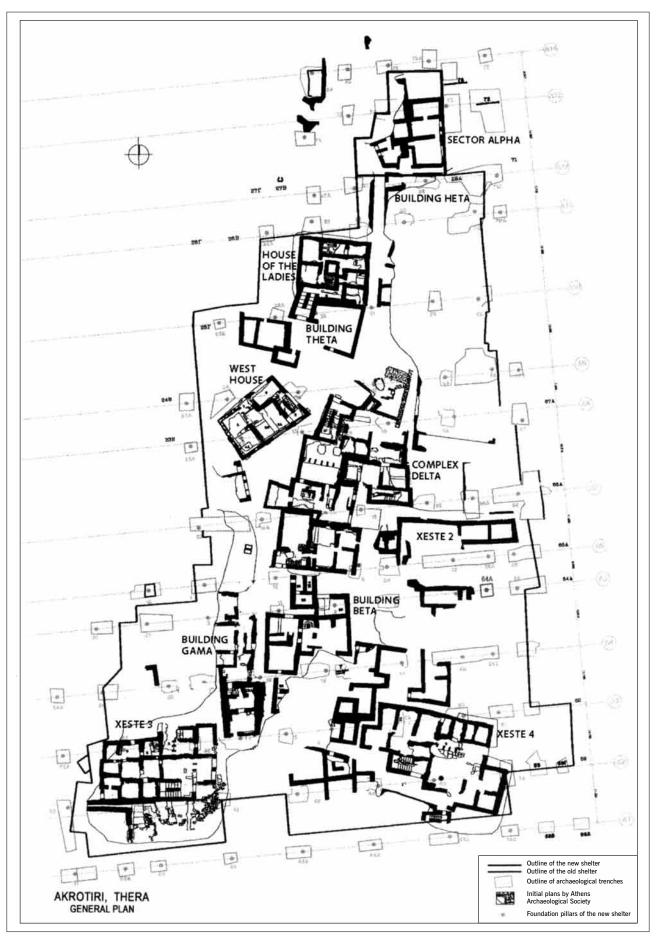


Fig. 5 The plan of the settlement of Akrotiri on the island of Thera.

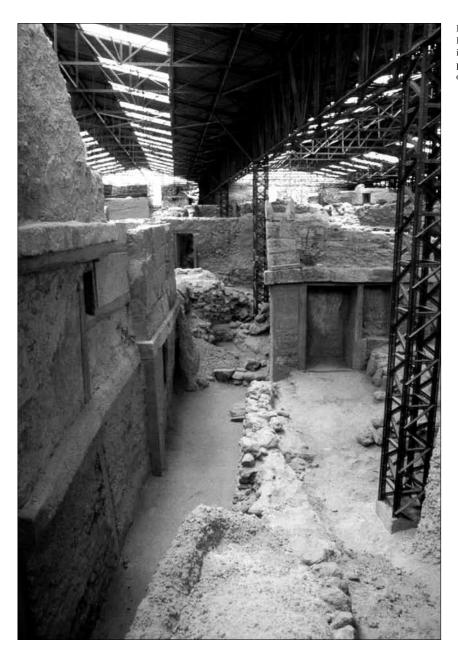


Fig. 6 Buildings of the settlement at Akrotiri. East entrance of House Delta East with the impressions on the volcanic ash of the two planks of the leaf of the door and north wall of building Xesté 2.

painting with the >Fleet< which adorned the upper floor of a room in the so-called West House⁴. The buildings, some of them up to three storeys in height, in the view of vulcanologists show the sort of damage inflicted by an earthquake of 7 on the Richter scale. This includes such results as the deformation of the upper floors' window sills, inclination of walls and destruction of staircases (Vougioukalakis 2006, 28 and Fig. 3–5). The phenomena that followed – the rain of pumice, the base surges and the load of accumulated tephra – caused further damage to the buildings and their fittings.

We now concentrate on the interior of the buildings and on the existing evidence regarding the effects on roofs, upper storey floors and movable finds during the volcanic destruction and afterwards. One single-storied unexcavated room has preserved its roof, as C. Palyvou showed. Its upper surface, made of fine, well-compacted clay, displays a steep inclination (25%) toward one of the corners of the roof, where the terracotta spout is located (Palyvou 2005, Fig. 185– 186). In other buildings, fragments of the roof were found in the debris and are of a structure similar to that of a typical floor⁵. J. Shaw has studied the structure of a fragment of the roof of the West House which had fallen on a cupboard on the upper floor (Shaw 1977).

Most of the buildings preserve the ground floor and parts of the walls and floors of the first floor. Other buildings are partially preserved up to the second floor paved floors, as is the case with the imposing Xesté 4, where four flights of steps, all made of dressed stones⁶, lead to a second-floor

⁴ Doumas 1992, 68–85; Televantou 1994, folded drawing 3, Pl. 68.

⁵ Palyvou 2005, 128: »above the beams and the branches is a layer about 0,20 cm thick of

packed soil, and on top are several layers of well packed fine clay, each 0,01–0,025 m thick.«

⁶ Palyvou 2005, 133: "They usually have steps

pavement whose surface still displays pier and door partitions (see Palyvou 2005, Fig. 137–138). Thirty five different houses can be identified in the area excavated, whilst 16 entrances are anyway visible (according to Palyvou 2005, 45).

The discussion here focuses on two houses:

- 1. To start with the West House with its entrance on the triangular square (Fig. 5), there the construction of the flight of stairs follows the logic of the floor in an inclined position, the steps being independent of the wall. This construction accounts for the weakness of the stairs during earthquakes. The beams are the first element to be detached from the side walls, thus leaving the walls intact while the stone steps and their substructure subsides (Palyvou 2005, 134). At Akrotiri, the main staircase displays the standard treatment for entrance systems, which makes clear differences in function between the ground floor and the upper floor, further emphasized by the frequent presence of a door at the foot of the staircase (Michailidou 2001, 460).
- 2. To turn to the >House of the Ladies<, known as such because of its frescoes7: This house has revealed valuable evidence for the effects on floors and fittings on both first and second floors. The pier and door partition of the second floor resting on top of the first floor dividing wall between two rooms survived, while the level of the first floor is indicated in both rooms by the beam holes on the walls. Along the north wall of one of the rooms (Room 7), slabs from the second floor were found fallen in front of vases on the first floor that had remained in position near the walls, and these second floor slabs were going deeper to the ground floor (Michailidou 2001, Fig. 114; 116; 123). In brief, the kind of the floor, the infrastructure, the infill, or otherwise, of volcanic material of the ground floor are crucial parameters affecting the effects on floors on the upper floors and consequently of their fittings8.

In regard to the first floor pavements, in some cases this is preserved *in toto*, thanks to the presence of a dividing wall underneath it, as happened in Building Beta. Also thanks to the fact that in certain cases it was supported by the volcanic infill of the ground floor room, as is the case with the pavement in Xesté 3 (Michailidou 2001, Fig. 185–189; 246–247). In some cases, the paved floor has subsided, sagging more in the centre than elsewhere, this being caused by the bending of the underlying support beams, which, however, held in place at some height. In other rooms occasionally the pavement have split open and the slabs have collapsed onto the ground floor, frequently parallel to the walls⁹.

If the first-storey floor was made of beaten earth, it may today still be in almost its original place, as is the case with one of the upper rooms of building complex Delta where large pithoi had been placed among the openings in order to

protect them from earthquakes, the infill of pumice helping preserve them in their position there (Marinatos 1972, Pl. 17; Michailidou 2001, Fig. 211-212; 225). More often, however, the beaten earth floor has subsided in sections, as is the case with one of the rooms in the House of the Ladies, where close attention was needed to distinguish the sloping first storey floor from the fallen fragments of the second storey floor (Michailidou 2001, Fig. 134-136; 143-147). Another room of the same house presents an interesting case. Here one of the ground floor walls had bulged downwards, bringing down the wall of the upper room together with the first storey floor. However, another wall, located in the basement beneath, caused the floor of the first floor to fracture at this point. Consequently half of the floor sloped downwards and the vases that had been standing on the floor had rolled down and gathered in this area (Michailidou 2001, Fig. 128-130; 276). We were thus able to find a closed assemblage of vases that certainly belonged to an upper storey, a rare piece of luck for an excavator. The excavation notebooks show how close floors of beaten earth from both first and second floors often fell in a vertical and almost parallel position, thus resulting in pottery from both floors ending up together on the same level. Sometimes an item from the second floor may be found, perhaps even intact, at a level beneath that of some object from the first floor (Michailidou 2001, Fig. 137 [vase A 30]).

With regards to the wall paintings, which as a rule decorate upper floors, in room 4 on the first floor of the West House wall painting fragments and volcanic materials moved uniformly as a single mass during the subsidence of the floors, after the floor beams fractured¹⁰. In the adjacent room 5 of the same house, the »Fisherman Fresco«, showing clear scars from the volcanic fallout during the precursory face, was detached from the wall, but had come to rest on the slabs preserved along the north wall¹¹. Later on, the rest of the pavement, covered with volcanic tephra, split open and the slabs fell into the room below, which happened to be empty of volcanic material. Thus some slabs carrying the fallen fresco fragments with them nearly reached the floor of the basement below (Michailidou 2001, Fig. 29–31; 38–40).

Turning to the subject of the inhabitants of the buildings, the reconstruction of the West House by C. Palyvou is very typical of the luxuriously decorated environment in the private apartments located on the first floor (Palyvou 2005, Fig. 241; Pl. 3). The room with the miniature frieze and the paintings of the two fishermen was the meeting point for the inhabitants of the house, as revealed by its position in the circulation pattern. On the other hand, the large, undecorated room with the central column, the big window and more than 400 loom weights found there, was a weaving workshop to which the upper entrance lobby gave immediate access¹².

- 7 Marinatos 1972; Doumas 1992, 32–44; Palyvou 2005, 83–85.
- 8 Cf. Michailidou 2001, 463–465 (for captions of figures in English see pages 471–486).
- 9 Michailidou 2001, Fig. 223; 248 (e. g. West House, room 5). Likewise interesting is the case of the slabs in a room of Xesté 3 where

the rest of the floor, made of beaten earth, fell abruptly down, smashing a large jar on the ground: Michailidou 2001, Fig. 265.

10 Marinatos 1974, coloured Pl. 2; Michailidou 2001, Fig. 21–22. In these two pictures two successive stages of excavation are visible revealing the fallen upper room mud brick wall which was adorned with the painting of »ikria«.

- 11 Marinatos 1974, Fig. 38; 42; Palyvou 2005, Fig. 55; Friedrich/Sigalas 2009, Fig. 8.
- 12 See the circulation pattern in Michailidou 2001, Fig. 281; 296; also pages 468; 485–486.

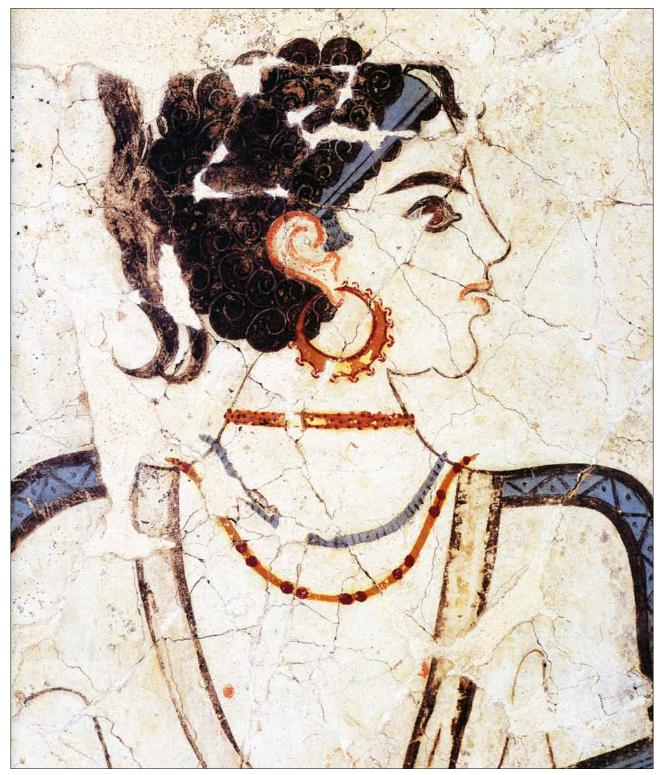


Fig. 7 Akrotiri on Thera. One of the women depicted with her jewellery in the Saffron Gatherers wall painting of the building Xesté 3. Her earrings are very similar to a golden pair found in a Mycenaean Shaft Grave.

The people

In the words of C. Doumas, »the development of an extensive urban centre on Thera, an island with limited resources, can only be understood in its context as a trading station and shipping centre« (Doumas 1986, 236–237). The depictions of people, boats and ships in the town of arrival depicted on the miniature frieze and the possible representation of ship sheds or large storerooms (as Shaw 1990, 430 and Fig. 16–18) on the shore side of one of the towns¹³, perhaps give us a picture of harbour activities on the island (Michailidou 2008, 219). As for the possible size of the town of Akrotiri, the excavated area of approximately 10000 m² is only part of the town, its size estimated by C. Palyvou to be in the region of 100000 m² and the population being around 2000 people¹⁴. Fig. 8 Akrotiri on Thera. Silver rings (total weight 8,4 gr.) from room Delta 16 (the shop?), tested for size on the smallest scale pan No. 6874 from the same room.





Fig. 9 Akrotiri on Thera. Copper rings (each currently weighing ca. 1 gr.) and bound strips (currently weighing ca. 5,5 gr.) found in room Delta 1a where also the scale pans No 7352 were found.

Now comes the critical question: how did the people of Akrotiri react while the city was being abandoned? What did they take away with them? Most certainly they took their gold and silver jewels, since these were not found in the buildings, although the whole town was sealed up by the volcanic material, thus offering no opportunity for looting or disturbances later. The inhabitants of Akrotiri certainly had jewels, as is shown by the depiction of such objects on wall paintings, and of earrings in particular (Fig. 7). The earrings depicted reflect a reality, whether they represent personal property or merely function as a semeiotic marker. They reflect the reality of the desire for gold earrings on the part of goddesses and women of whatever status in Akrotiri (Michailidou 2008, 264). What jewels were still left behind? Only very few and tiny pieces of gold beads or applications have been found, together with a number of beads of faience and a bronze ring.

However, apart from precious metals, it is currently accepted that bronze and copper had both a use value and an exchange value in the pre-coinage societies of Bronze Age. And yet some inhabitants abandoned inside their houses, after closing the door, bronze vessels or tools, such as, for instance, a used pan on the upper floor and a sickle placed on a shelf on the ground floor of one of the rooms in Building Complex Delta or a bronze laver left on the ground inside one of the basement storerooms of the West House, etc. (Michailidou 2008a). Metal objects were also left outside the buildings, probably having been temporarily deposited

13 Although this town is not identified as Akrotiri (Televantou 1994), the ship sheds or storerooms at the harbour may have been taken from the painter's real environment, as is also commonly assumed in regard to the pastoral scene in the section of the wall painting (Michailidou 2008, 219; Trantalidou 2008).

Fig. 10 Akrotiri on Thera. A small disc made of tuff may be a balance (weight of 8,1 gr.) capable of use on a small scale pan such as No. 6874.

there during clearing work. These include even elaborate vessels, such as a single-handled basin of an elegant type known from Crete and from a Theran depiction in a ritual context. More personal belongings, some easier to carry, such as a wooden box containing two balance pans and two weights, were also left in the open, together with a large, therefore heavy, hydria with ropes of plant fiber around both handles, a vessel also depicted in a ritual context on a Theran wall painting (Michailidou 2008, Fig. V,59–60; II,94–95.98; Michailidou 2006, 258–261).

Did some inhabitants hoard their possessions? In fact, a hoard of five vessels consisting of two lavers, found one inside the other, two jugs and a large hydria, all possibly wrapped in a cloth and a straw mat, were kept in the cellar of a basement in Building Complex Delta (Marinatos 1971, 17–18; Michailidou 2008, 113–115; Fig. II,107). In my view, the vessels hoarded were the metal property of the tenant of one of the four houses of this Complex, possibly an entrepreneur who dealt in metals, since it was in his house that the only known half-talent lead weight was found, along with a cluster of lead balance weights (Michailidou 2008, 267–269). We should keep in mind that apart from their use value, metal vessels could at any time be used as a means of payment according to their weight value, as is mentioned in Egyptian texts (cf. Michailidou 2005, 39).

There is reason to believe that the tenants of all four houses of Building Complex Delta were merchants (Boulotis 2008, 88–89; Michailidou 2008, 247; Fig. V,57) and that one of them possibly dealt also in textiles (Michailidou 2008, 259) since he lived in the house where a Linear A tablet with a record of 200 textiles was found. He had hoarded his property/merchandise under the still preserved floor of an upper storey room, unless all the material found stuck in a narrow space was pushed there by the pressure of the torrent¹⁵. The hoard accumulated in this very narrow space consists of imported stone vessels, miniature clay and metal vases, a bronze pair of tongs, two daggers with silver capped rivets, the matrices in the pumice of two wooden tables and three wooden stools, the relics of a barrel-shaped wooden container and a considerable number of baskets of various shapes and sizes. Many items were carefully stored in wooden boxes or baskets. The list also includes two oars¹⁶. More supportive of the view that we are dealing here with stored merchandise is the great number (380) of clay pots found, some of them apparently definitely unused, and the small size of the house in contrast to the number of luxuries left inside.

Perhaps the best evidence for the hoarding of private property comes from the upper storey of another building, not yet fully excavated. Here a copper ingot fragment of 3kg in weight, together with another smaller piece of copper, two ritual clay vessels and a triton shell, were all found located among the stones of a loosely built wall which started at the level of the upper floor alone and reinforced one of the existing walls of the room of the house (Michailidou 2008, 101-106; cf. 269-270). Thus it seems probable that these objects, of monetary and ritual value, were hoarded away during the interval period of the clearing works. Despite being made of gold, another ritual object was left behind elsewhere in the town, whether on purpose or by accident, we do not know. It is a unique gold figurine of an ibex kept in a wooden box inside a clay chest. The chest was found as a secondary deposition, belonging to the period of the clearing work, and located in the vicinity of a cluster of caprine horns that were possibly wrapped in a linen cloth¹⁷.

In another house of Complex Delta, in a large basement room with a central column and a low large window facing

16 For more details see Polychonakou-Sgouritsa 17 2000; Michailidou 2008, 245–249.

17 Doumas 1999, Pl. 108–109. For more on the context of this find see Trantalidou 2008.

the road, possibly a sort of shop (Doumas 2008, 349–350; Michailidou 2008, 223), two balances had been left behind. These were the largest and the smallest scales respectively found in the whole settlement. Also means of payment were left behind in the same room with the balances, these being simple rings of silver (Fig. 8; Michailidou 2008, Fig. V,53– 55). Silver in the Near East served as an index of value and silver rings as the principal form of money. Another means of payment, copper rings and bands (Fig. 9), were also abandoned in the room of another house of Complex Delta, where once again in the same room a pair of scales and a set of lead balance weights was left behind (Michailidou 2008, 285). We know that in the Near East, copper functioned as a cheaper form of money and bided bands are beginning to appear in various Cretan places (Mochlos, Juktas), possibly representing a codified amount of liquid assets (cf. Brogan 2006). These quantities of silver (and copper) could be easily weighed during transactions by the merchants of the houses of Complex Delta by means of their personal balances and balance weights (Fig. 10). Judging from the luxuries in their houses, there must have been more silver that was easily removed, silver being always the most convenient medium for physically compressing value and for carrying over long distances. There is also plenty of evidence in Near Eastern texts to the effect that merchants possessed silver (cf. Doğan/ Michailidou 2008, 42–43). There is no reason why these should not have included the merchants in Akrotiri who fled with their »money« and left their merchandise behind.

Bibliography

Boulotis 2008

C. Boulotis, The Linear A Tablets from Akrotíri (THE 7-12): Aspects of the economic life of the Settlement (in Greek). In: C. Doumas (ed.), Akrotíri on Thera. Thirty years of research (1967–1997) (Athens 2008) 67–94.

Brogan 2006

T. M. Brogan, Tipping the Scales: Evidence for weight measurement from the wider Neopalatial community at Mochlos. In: M. E. Alberti/E. Ascalone/L. Peyronel (eds.), Weights in Context. Proc. Symposium Roma 22–24 November 2004. Istituto Italiano di Numismatica. Stud. e Mat. 13 (Roma 2006) 265–289.

Doğan/Michailidou 2008

I. B. Doğan/A. Michailidou, Trading in prehistory and protohistory: Perspectives from the eastern Aegean and beyond. In: C. Papageorgiadou-Banis/A. Giannikouri (eds.), Sailing in the Aegean. Readings on the exonomy and trade routes. MELETEMATA 53 (Athens 2008) 17–53.

Doumas 1974

C. Doumas, Late Bronze Age engineering in the Aegean. Arch. Analecta Athinon 7, 1974, 365–370.

Doumas 1986

C. Doumas, Trade in the Aegean in the Light of the Thera Excavations. In: M. Marazzi/ S. Tusa/L. Vagnetti (eds.), Traffici Micenei nel Mediterraneo. Problemi storici e documentazione archeologica. Magna Graecia 3 (Taranto 1986) 233–240.

Doumas 1992

C. G. Doumas, The Wall-Paintings of Thera (Athens 1992).

Doumas 1999

C. Doumas, Excavations at Akrotiri on Thera (in Greek). Πρακτικά Αρχαιολογικής Εταιρείας (Prakt. Arch. Et.) 1999, 155–202.

Doumas 2008

C. Doumas, Religion at Akrotiri (in Greek). In: C. Doumas (ed.), Akrotiri on Thera. Thirty years of research (1967–1997) (Athens 2008) 333–362.

Friedrich/Heinemeier 2009

W. L. Friedrich/J. Heinemeier, The Minoan Eruption of Santoríni Radiocarbon Dated to 1613 ± 13 BC – Geological and Stratigraphic Considerations. In: D. A. Warburton (ed.), Time's Up! Dating the Minoan Eruption of Santoríni. Acts of the Minoan Eruption Chronology Workshop. Sandbjerg, November 2007. Monogr. Danish Inst. Athens 10 (Athens 2009) 56–63.

Friedrich/Sigalas 2009

W. L. Friedrich/N. Sigalas, The effects of the Minoan eruption. In: D. A. Warburton (ed.), Time's Up! Dating the Minoan Eruption of Santoríni. Acts of the Minoan Eruption Chronology Workshop. Sandbjerg, November 2007. Monogr. Danish Inst. Athens 10 (Athens 2009) 91–100.

MacGillivray 2009

J. A. MacGillivray, Thera, Hatshepsut, and the Keftiu: crisis and response in Egypt and the Aegean in the mid-second millennium B.C. In: D. A. Warburton (ed.), Time's Up! Dating the Minoan Eruption of Santoríni. Acts of the Minoan Eruption Chronology Workshop. Sandbjerg, November 2007. Monogr. Danish Inst. Athens 10 (Athens 2009) 155–170.

Marinatos 1970

S. Marinatos, Excavations at Thera 3 (1969 season)(Athens 1970).

Marinatos 1971

S. Marinatos, Excavations at Thera 4 (1970 season) (Athens 1971).

Marinatos 1972

S. Marinatos, Excavations at Thera 5 (1971 season) (Athens 1972).

Marinatos 1974

S. Marinatos, Excavations at Thera 6 (1972 season) (Athens 1974).

Michaelides/Angelides 2006

I. Michaelides/P. Angelides, Preservation conditions of organic materials in the prehistoric settlement of Akrotíri on Thera (in Greek). Periodical Publication of the Society for the Promotion of Studies on Prehistoric Thera. A $\Lambda\Sigma$ 4, 2006, 61–81.

Michailidou 1993–94

A. Michailidou, Investigating metal technology in a settlement. The case of Akrotíri at Thera. Archaeognosia 8, 1993–94, 165–180.

Michailidou 2001

A. Michailidou, Akrotíri on Thera. The study of the upper storeys of the buildings (in Greek with an English summary) (Athens 2001). Michailidou 2005

A. Michailidou, Weight and Value in precoinage societies. An introduction. MELETEMATA 42 (Athens 2005).

Michailidou 2006

A. Michailidou, Stone balance weights? The evidence from Akrotíri on Thera. In: M. E. Alberti/E. Ascalone/L. Peyronel (eds.), Weights in Context. Proc. Symposium Roma 22–24 November 2004. Istituto Italiano di Numismatica. Stud. e Mat. 13 (Roma 2006) 233–263.

Michailidou 2007

A. Michailidou, The metal finds. In: C. Doumas (ed.), Akrotíri on Thera. The West House (in Greek) (Athens 2007) 185–243.

Michailidou 2008

A. Michailidou, Weight and Value in precoinage societies 2. Sidelights on measurement from the Aegean and the Orient. MELETEMATA 61 (Athens 2008).

Michailidou 2008a

A. Michailidou, Metal Tools and vessels from the buildings at Akrotíri: Household equipment and social relations of production (in Greek). In: C. Doumas (ed.), Akrotíri on Thera. Thirty years of research (1967–1997) (Athens 2008) 17–33.

Nikolakopoulou 2003

I. Nikolakopoulou, Akrotíri, Thera. The city in a state of emergency (in Greek). In: A. Vlachopoulos/K. Birtacha (eds.),

APFONAYTHS. A volume in honor of Professor Christos Doumas (Athens 2003)

554–573. Palyvou 2005

C. Palyvou, Akrotíri, Thera: An Architecture of Affluence 3.500 Years Old. Prehist. Monogr. 15 (Philadelphia 2005).

Polychronakou-Sgouritsa 2000

N. Polychronakou-Sgouritsa, The storage of goods in the Late Bronze Age settlement at Akrotíri on Thera (in Greek). *Aρχαιολογική* Εφημερίς (Arch. Eph.) 2000, 65–94.

Sewell 2001

D. A. Sewell, Earth, air, fire and water. An elemental analysis of the Minoan eruption of the Santorini volcano in the Late Bronze Age. Diss. Univ. Reading (Reading 2001).

Shaw 1977

J. W. Shaw, New evidence for Aegean roof construction from Bronze Age Thera. Am. Journal Arch. 81, 1977, 229–233.

Shaw 1990

J. W. Shaw, Bronze Age Aegean Harboursides. In: D. A. Hardy/C. Doumas/J. A. Sakellarakis/ P. M. Warren (eds.), Thera and the Aegean World 3. Proceedings of the Third International Congress. Santoríni (Greece), 3–9 September 1989. Vol. 1: Archaeology (London 1990) 420–436.

Televantou 1994

C. A. Televantou, Akrotíri on Thera. The wall paintings of the West House (in Greek) (Athens 1994).

Trantalidou 2008

K. Trantalidou, Archaeozoological research at Akrotíri. Periodical Publ. Soc. Promotion Stud. Prehist. Thera. AAS 6, 2008, 26–67.

Tzachili 2005

I. Tzachili, Excavations at Thera and Therasia in the 19th century; a chronicle. Journal Mediterranean Arch. 18, 2005, 231–257.

Tzachili 2006

I. Tzachili, The beginning of Aegean prehistory. The excavations on Thera and Therasia in the 19th century (in Greek) (Athens 2006). **Vougioukalakis 2006**

G. Vougioukalakis, The Minoan Eruption and the Aegean World. Periodical Publ. Soc. Promotion Stud. Prehist. Thera. $A\Lambda\Sigma$ 4, 2006, 20–55.

Warburton 2009

D. A. Warburton (ed.), Time's Up! Dating the Minoan Eruption of Santoríni. Acts of the Minoan Eruption Chronology Workshop. Sandbjerg, November 2007. Monogr. Danish Inst. Athens 10 (Athens 2009).

Source of figures

- 1 after Vougioukalakis 2006, Fig. 32
- 2 Courtesy of the Archaeological Society at Athens
- 3 Courtesy of the Archaeological Society at Athens
- 4 author

Address

Dr. Anna Michailidou National Hellenic Research Foundation (N.H.R.F.) Institute for Greek and Roman Antiquity (K.E.R.A.) 48 Vassileos Constantinou Avenue GR-Athens 11635 amihail@eie.gr

- 5 Courtesy of the Archaeological
- Society at Athens
- 6 author
- 7 after Doumas 1992, 154
- 8–10 author