

EARTHQUAKES AND THE END OF THE MYCENAEAN PALACES*

Résumé. — À la fin de l'Helladique Récent III B, la plupart des palais mycéniens ont subi un violent désastre. Certains d'entre eux sont alors abandonnés. Jusqu'à présent, les archéologues et les historiens n'ont donné aucune explication satisfaisante de ces destructions. En 1980, feu le professeur Klaus Kilian a introduit une nouvelle théorie qui attribue la destruction des sites mycéniens à un tremblement de terre. L'objet de cet article est d'examiner et d'analyser les traces archéologiques qui confortent cette théorie.

Introduction

The fall of a great civilisation has always been a particularly fascinating subject for historians and the fate of the Mycenaean power centres is certainly very enigmatic still today.

In the late 13th century B.C., i.e. Late Helladic III B 2 in the Argolid, reinforcement and extensions of fortifications were made at centres, such as Mycenae, Tiryns, Midea and Athens. Even at Pylos, which remained without a fortification wall,¹ buildings were restructured, making the palace complex a more inwardlooking unit. At several sites, large depots were constructed apparently for the storage of provisions, and elaborate arrangements were made to ensure that a safe water supply was accessible from inside the walls. At first sight, these modifications seem to be possible indications that a number of Mycenaean centres anticipated some kind of serious attack. Suddenly, at the very end of Late Helladic III B or more precisely during the newly recognized transitional phase Late Helladic B

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1. But see now E. ZANGGER *et alii* (1997), p. 616-613, 625: members of the Pylos Regional Archaeological Project conjecture the presence of a substantial terrace or fortification wall, perhaps marking the limit of the Pylian settlement.

2/III C, soon after 1200 B.C., most of these suffered a violent disaster. Some major sites, such as Pylos, are then deserted and, at the others, the palaces were no more rebuilt.

Many theories as to the cause(s) of the Mycenaean palatial collapse at the Late Helladic III B 2/III C transition have been proposed. They fall into two main categories: natural cause (change of climate, earthquakes) or human factor (raids or invasions by foreigners, internal strife, etc.).² Recently Robert Drews has suggested that the primary cause of the downfall of the Mycenaean and eastern Mediterranean kingdoms was the transition from chariot to infantry warfare.³ From an Aegean point of view, this observation is not accurate at all. Moreover, in identifying a single cause for a very complex combination of events that lasted one and a half centuries on a very large area, Robert Drews, as many other scholars, is guilty of the same oversimplification as that of all the "single-answer" approaches to this collapse.

On the basis of the archaeological discoveries alone, the historical reconstruction of the end of the Mycenaean palaces is very difficult because archaeology is generally unable to identify the human or natural factor of a destruction. Archaeologists excavate not people or history but things. But later Greek tradition seemed to provide an answer to the question of the destroyers' identity: these were the Dorians whose invasion was assimilated with the legendary return of the Herakleids. Therefore, until recent generations, archaeologists and historians considered Dorians and Herakleids as the agents of the destruction of the Mycenaean palaces. In fact, for a considerable time, invaders were the usual solution for major destruction. However, there is no archaeological confirmation of newcomers because the cultural features once linked with the supposed Dorian invaders have proved undependable. So the theory that the Dorian invasion was the cause of the destruction of the palaces has now been rejected.⁴

A new theory

In 1948, Claude Schaeffer made the statement that earthquakes were responsible for the destructions around 1365 B.C. in the Eastern Mediterranean.⁵ Later, the excavator of Ras Shamra, who long held the view that the Sea Peoples were responsible for the final burning of Ugarit ca. 1200 B.C., has attributed the destructions of Ugarit and many other

2. See Ph. BETANCOURT (1976); J. VANSCHOONWINKEL (1991), p. 498-509.

3. R. DREWS (1993).

4. J. VANSCHOONWINKEL (1991), p. 331-336, 498-502; (1995).

5. C. F. A. SCHAEFFER (1948), p. 560-561, 565.

cities or kingdoms in Syria and Asia Minor at the very beginning of the 12th century B.C. also to natural events, undoubtedly favouring the involvement of earthquakes.⁶ However, his hypothesis was viewed with great suspicion and generally ignored. Afterwards archaeologists and historians avoided the seismic explanation if at all possible.

However, in 1977, Spyros Iakovidis, one of the excavators of Mycenae, expressed his conviction that the catastrophe at Mycenae during the last quarter of the thirteenth century was the result of a violent earthquake.⁷ In 1980, on the basis of his excavations in Tiryns, the late professor Klaus Kilian presented a new theory pointing to an earthquake as cause of the destruction of all Argolid sites at the end of Late Helladic III B.⁸ Three years later, at the colloquium *Dori e mondo egeo*, held in Rome, Klaus Kilian expanded his earlier thesis to include all the Peloponnesian sites.⁹ This thesis has been accepted by a number of scholars, and Paul Åström, director of the excavations at Midea, gave it a significant boost when he accepted an earthquake as the explanation for the ruins of his site.¹⁰ The theory is supported not only by archaeological evidence, but also by the geological situation of Greece. In fact, the Mediterranean lies at the junction of the African and Eurasian tectonic plates and the Aegean region is the focus of a whole complex of active earth movements. This explains why Greece is a seismically and tectonically active area.¹¹ Consequently, earthquakes must have affected not only ancient constructions, but also the history of the sites.

The archaeological evidence

The purpose of this paper is to review the evidence recorded by archaeologists in their excavations. Numerous traces of destruction have, of course, been noticed at the Mycenaean sites, but only clear evidence of earthquake will be taken into account here. Only recent and thorough excavation of settlement can bring such information (Fig. 1).

6. C. F. A. SCHAEFFER (1968), p. 753-768.

7. Sp. IAKOVIDIS (1977), p. 134, 140 n. 1. In 1996, G. MYLONAS (1966, p. 83, 221, 225) already pointed to an earthquake as cause of the destruction of the Panagia Houses at Mycenae.

8. Kl. KILIAN (1980), p. 182-185, 193.

9. Kl. KILIAN (1986), p. 74-75.

10. P. ÅSTRÖM *et alii* (1986), p. 19, 20; see also P. ÅSTRÖM & K. DEMAKOPOULOU (1996); G. WALBERG (1998), p. 176-177.

11. N. N. AMBRASEYS (1996).

Mycenae

I shall begin this survey with Mycenae where the signs of violent destruction are more numerous and significant.¹²

These signs have been noticed both outside and inside the walls. Among the houses lying outside the citadel, the Panagia Houses, north of the treasury of Atreus, were built in Late Helladic III B. About the end of this period, House I was suddenly and violently destroyed. The absence of deep layers of ash on the floors of the house indicates that the destruction was not caused by fire. Vessels and a chimney pot were lying smashed on the floor and the skeleton of a middle aged woman whose skull was crushed by a falling stone was found in the doorway between the main room and the anteroom. Her body had been buried by the debris of the house. This shows that the destruction was probably caused by a strong earthquake. Other confirmation of the earthquake may possibly be seen in the collapsed state of the doorway leading into the house and the condition of the south wall of Room 2 where the preserved portion of that wall was found leaning outwards. House I was so badly damaged that it was permanently abandoned. The two others were also severely damaged, but they were repaired.¹³

The Plakes House, some 200 m. north of the citadel, also had a dramatic end. Several skeletons were found buried beneath the debris of a fallen structure (Fig. 2). Walls were displaced and corners were pushed out by the destructive force. As was the case of Panagia House I, no attempt to rebuild the house was made and the skeletons were not retrieved for proper burial.¹⁴

There are, of course, traces of destruction in various parts of the citadel too. The clearest have been found in the Cult Centre and the House of the High Priest, where evidence suggest that earthquakes caused destructions at both the Late Helladic III B 1 and Late Helladic III B 2 ends.¹⁵

The buildings of the Cult Centre were severely damaged, but only signs of minor fire were observed. Damage which appears to be associated with an earthquake was especially noted in the area of the Round Altar. This is a small open area with a high circular altar in the middle, enclosed along its south side by a portico roofed with thin slabs of schist. Some of them were found in slanting positions against the side of the altar, indicat-

12. W. TAYLOUR (1981), p. 9-10; Sp. IAKOVIDIS (1986); J. VANSCHOONWINKEL (1991), p. 56-66; E. B. FRENCH (1996).

13. I. MYLONAS SHEAR (1987), p. 154-155.

14. G. MYLONAS (1975a), p. 158-161; (1975b), p. 95-101.

15. E. B. FRENCH (1998), p. 2-4.

ing clearly that they slid from their position when a tremor caused the collapse of the portico. Moreover, the south-west corner of the Gamma 1 Shrine was pushed out of position and the wall flanking the entrance to the Shrine with the Idols, also called Temple, bulged outwards.¹⁶

The walls of the so-called House of the High Priest also collapsed; the mud brick walls were partly burnt and partly not. The fallen north wall of room 2 crushed a young man whose skeleton was found *in situ*. His hands were stretched over his head, as a protection from the falling parts of the wall. Those of the south wall had blocked the door. The debris were full of large enough fresco fragments to show that they had come loose from the walls before the walls themselves had fallen.¹⁷

The archaeological data at Mycenae actually show two destruction horizons caused by earthquakes.¹⁸ The destruction of the Panagia Houses should more probably be correlated with the destruction of the West House, the House of the Oil Merchant, the House of Shields and the House of Sphinxes, which occurred at the end of Late Helladic III B 1.¹⁹ On the other hand, the other above-mentioned destructions are the result of the violent earthquake that Mycenae suffered at the end of Late Helladic III B 2.

A detailed geomorphologic-seismotectonic investigation at Mycenae showed the presence of faults surrounding and intersecting not only the hill of the acropolis, but also the surrounding area (south-east and east of Mycenae). According to this study, the maximum size of the earthquakes that occurred in the Mycenae area should have been at least as strong as the Kalamata earthquake in 1986.²⁰

Tiryns

At Tiryns, the Late Helladic III B period also came to an end with a great conflagration. A thick layer of ashes and burnt debris has been found almost everywhere in the *Oberburg* and the *Unterbürg*. From the signs of destruction found in Area H, it seems very probable that the *Außensiedlung*

16. G. MYLONAS (1972), p. 123; (1973), p. 102.

17. G. MYLONAS (1970), p. 122-124; (1971), p. 148-151.

18. E. B. FRENCH (1998), p. 4. Among the excavators of Mycenae, some (G. MYLONAS [1996], p. 83, 221, 223; I. MYLONAS SHEAR [1987], p. 154-155; E. B. FRENCH [1996]) have long championed the view that a single destruction by earthquake occurred at the middle of Late Helladic III B, although others (Sp. IAKOVIDIS [1977], p. 134; [1986], p. 258-260; G. MYLONAS [1983], p. 154-148) take into consideration only a catastrophe by earthquake at the end of Late Helladic III B.

19. P. MOUNTJOY (1999), p. 63.

20. H. MAROUKIAN *et alii* (1996).

met with the same fate. The recent excavations in the lower citadel have provided the most significant indications about the cause of the catastrophe. Kilian's conclusion was in large part based upon his discoveries in this sector.

All the buildings of the *Untenburg* were almost entirely demolished. They generally collapsed and burnt down, but some, such as Building I, have left no trace of fire. Several stone walls present undulating distortions or were discovered in tilted position; their corners are not at right angles (for instance, Buildings VI and X). Moreover, a lot of vessels were found *in situ*. In front of Building X, the excavators have come upon the skeletons of a woman and a child buried under the rubble. They have also found a skull in the open area running along Building VI. In addition, many terraces were shifted and began to lean. The niches in the fortification wall were also damaged and most of them were blocked up later in the Mycenaean period.

After the catastrophe, the survivors immediately erected humble dwellings in the *Untenburg*. The ruins of Building II were used as a cemetery: several unfurnished burials, maybe the graves of victims of the disaster, were brought to light. Early in Late Helladic III C the area was completely reorganised with little regard for the previous plan.²¹

In the course of his geomorphologic study of the Tiryns area, Eberhard Zangger discovered an unusual flood in the Holocene stratigraphy, which accumulated up to 4 or 5 m. of alluvium, especially east of the citadel. This flood, which buried much of the Lower Town (*Außensiedlung*), would have occurred in late Late Helladic III B-early Late Helladic III C, apparently simultaneously with the earthquake at the beginning of the 12th century.²²

Midea

Recent excavations on the acropolis of Midea by a Greek-Swedish expedition have also revealed evidence of destruction at the end of Late Helladic III B. The citadel wall was erected during Late Helladic III B 2 and houses and storerooms were built against it immediately afterwards.

These were destroyed at the end of this period. A thick layer of a pinkish grey colour which represents a great fire was found at some points. Some walls are somewhat distorted and another is tilted on the verge of collapsing (Fig. 3). Moreover, fallen blocks may represent collapsed walls,

21. KILIAN (1979), p. 404; (1981), p. 175, 177; (1982), p. 399-411; (1983), p. 303; (1988), p. 111-133; (1996).

22. E. ZANGGER (1994), p. 207-212; (1996).

and because of the large size of the stones, the destruction is likely to have been caused by an earthquake rather by human force. Other trenches on the lower terraces have provided similar evidence. Layers containing ashes, crushed mud bricks and fallen stones were found everywhere.

Two gates were also excavated. The West Gate and the interior tower room were destroyed in a great fire. The hypothesis of an earthquake is supported by the presence of scattered stones and massive building blocks fallen from both the bastion and the retaining wall, the latter of which was, at many points, completely destroyed. A room next to the gate was full of debris indicating that the area ceased to be used following the catastrophic destruction. Inside the room, a few clay vessels were found in fragments, but *in situ*. Although the undisturbed deposits of this room are exactly the same as those of the West Gate, no trace of fire was found here. The East Gate gives a similar picture. The floor of a room inside the gate was full of ashes and burnt mud bricks. The fire was so intense that many of the vases on the floor were deformed by the heat. In one of the rooms in the East Gate area, the excavators found the skeletons of a young girl, whose skull and backbone were smashed under fallen stones.

All over the site, strata clearly represent the remains of a catastrophe, probably due to an earthquake, which the associated pottery dates towards the end of Late Helladic III B 2.²³

Menelaion

In Laconia, the recent excavations at the Menelaion have provided evidence of Late Helladic III B occupation at several points. The final occupation of the so-called Mansion 3 on the Menelaion hill ended in Late Helladic III B 2 in a fire destruction. Three skeletons, probably victims of the disaster, were found beyond a corner of the building. On the flank of the Prophitis Ilias hill, a deep ancient erosion gully was backfilled with pottery and other occupation debris of the Late Helladic III B 2-Late Helladic III C transition. This heavy deposit evidently derives from destroyed Mycenaean houses on this side of the hill. Lastly, the complex on the south flank of the Aetos hill—with a monumental terrace wall, buildings and an associated street—was destroyed while Late Helladic III B 2 was in use. The terrace wall was 1.20 m wide and when it collapsed, it did so suddenly and unexpectedly. This is implicit in the discovery of an adult human skeleton fallen face down, the legs trapped by the debris. On the other hand, the adjacent building was not damaged so seriously that it could

23. P. ÅSTRÖM *et alii* (1986); (1988); (1990); (1992), *passim*; P. ÅSTRÖM & K. DEMAKOPOULOU (1996); G. WALBERG (1998), p. 176-177.

not subsequently be emptied of its contents. After the destruction, a squatter occupation, associated with Late Helladic III C pottery, roughly reconstructed the terrace and one or two buildings.²⁴

Pylos

The palace and the lower town at Pylos were burnt down and entirely destroyed towards the end of Late Helladic III B. Contrary to the suggestion by Mervyn Popham that Pylos was destroyed in the middle of Late Helladic III B rather than at the end,²⁵ Penelope Mountjoy has clearly shown that the latest pottery from destruction levels in the palace belongs to the transition from Late Helladic III B to Late Helladic III C.²⁶ The demolition was so vast that the site was deserted for a long period of time. Klaus Kilian attributed the destruction to an earthquake, although that was not the conclusion of the excavator, Carl Blegen. Of course, some parts of the palace have left no trace of fire.²⁷ But we must keep in mind that the complex was no more in use after the catastrophe and yet the excavators have brought to light not a single human bone and nothing of value buried in the ruins under the debris of walls, floor, and roof. Moreover, the excavators have reported no evidence of mining operations to retrieve the bodies of the victims. Therefore, it is difficult to imagine that an earthquake suddenly surprised the people of the palace and the town.

Athens

I will close this review with another example of possible destruction by earthquake, which was not listed by Klaus Kilian. In Athens, the small houses on the north slope of the Acropolis were suddenly abandoned towards the end of Late Helladic III B or at the beginning of the Late Helladic III C. In several of the rooms the pottery was found standing upright on the floors, most of the vases in fragments but complete. These vases were dug out from among the stones which must have come from the fallen walls. In one room, a cooking pot with three feet was discovered still standing in the ashes of the fire. So far as could be judged, the houses had not been looted nor was there any indication that they had been destroyed by fire.²⁸ From all these indications, the possibility that an earthquake destroyed the houses cannot be excluded.²⁹ Although severe earthquakes are

24. H. W. CATLING (1979), p. 19-20; (1981), p. 18-19.

25. M. R. POPHAM (1991).

26. P. MOUNTJOY (1997); (1999), p. 304, 343-352.

27. For instance, C. BLEGEN (1966), p. 305-306.

28. O. BRONEER (1933), p. 352-354; P. MOUNTJOY (1995), p. 45-46.

29. According to J. BUNDGAARD (1976, p. 28-30), the houses were buried by a landslide, probably associated with an earthquake.

not common in Athens,³⁰ Oscar Broneer, the excavator, has taken into account this hypothesis for the destruction, not of the houses, but of the Mycenaean underground fountain on the Acropolis. Indeed its wooden stairway collapsed at about the same time and Oscar Broneer thought that an earthquake hastened the destruction.³¹ Whatever causes the sudden abandonment of the north slope settlement, the houses were never again rebuilt.

Conclusion

As we have seen, the opinions of the excavators are mainly based on the following observations. Several deformations in the stone structures can suggest that the walls have been shaken by an earthquake: walls are more or less distorted, curved or tilted. Other indications are the walls displaced and the corners pushed out by the seismic force. Destruction layers consisting of crushed mud bricks, fragments of tiles and/or fallen blocks may represent a collapsed wall. Moreover, human skeletons are sometimes associated with fallen blocks from a wall. The bones are cracked and crushed in these cases. Nevertheless, the survivors generally retrieved the bodies of the victims.

The absence of traces of fire has always been considered as evidence for earthquakes. Most archaeologists think that earthquakes in ancient times are not liable to cause fire, probably because there were no gas mains or electrical cables. But, as we have seen, traces of fire have also been noticed in the Late Helladic III B 2 destruction contexts. The fire does not, however, appear to have been caused by hostile forces, since weapons or slain warriors have nowhere been found. Indeed, lamps or braziers upset by the quake could easily account for the fire after the inhabitants had fled to the open fields. So inflammable materials, such as wooden construction elements, furniture, cloth, and oil, which were present in large quantities, could easily have caught fire.

After the disaster, buildings were generally repaired and the city lived on. Many traces of destruction were obliterated then. However, settlements were sometimes deserted. In this case, clay vessels and other objects are often found in fragments, but *in situ* on the floor.

On the other hand, it should be noted that the destruction layers, and in general all archaeological levels, are dated by pottery styles. But stylistic

30. According to N. N. AMBRASEYS (1996, p. 32), "earthquakes in Central Greece are numerous, of medium size, preceded and followed by damaging shocks, causing localised destruction and relatively small loss of life."

31. O. BRONEER (1956), p. 13.

time is not historical time. The analysis of the stylistic development of a certain class of pottery does not take into account the obvious fact that young and old, progressive-minded and traditional artists work at the same time. For example, the same vessel could be attributed by different excavators after the middle, in the second half or at the end of Late Helladic III B 2. Consequently, it is quite likely that all the destructions observed in one stylistic phase happened within one or two decades, and not at one time. Yet, it is clear that most of the Mycenaean centres were destroyed in a relatively short period.

Such is the evidence collected by the excavators in favour of the destruction of the Mycenaean palaces by earthquakes. In view of the increasing evidence for earthquakes, this explanation has more and more adherents today.³² But only geologists can answer the question whether several major earthquakes could have occurred in a relatively short span of time or even the same catastrophic earthquake could have destroyed such remote settlements as Mycenae and Menelaion. They have given the beginnings of an explanation. Gerasimos Papadopoulos concludes his paper delivered at the meeting *Archaeoseismology* thus:

Analysis of seismic intensity data, existing since the beginning of the present century, indicates that the probability of observing at least one destructive ($I > 6$) earthquake, in one or more Greek mainland Mycenaean regions, in time intervals of thirty years or more, is very high. This result implies that from a seismological point of view the archaeological suggestion for two phases of destruction of several Mycenaean palace sites on the Greek mainland is reasonable provided that each one of these phases lasted for about thirty years or more.³³

To conclude, it may be said that, if earthquakes were the cause of the final destruction of the Mycenaean palaces, they were not the cause of the end of the Mycenaean civilisation. They certainly had the role of a catalyst in the collapse of the overextended palatial system. However, the decline of the civilisation was a much more complex phenomenon and the catastrophic destruction was only one of its aspects.³⁴ In fact, this decline was gradual and lasted one and a half centuries more.

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32. For example, G. A. PAPADOPOULOS (1996); A. NUR (1998); R. ÉTIENNE, Ch. MÜLLER & Fr. PROST (2000), p. 52; C. W. SHELMEKDINE (2001), p. 381.

33. G. A. PAPADOPOULOS (1996), p. 208.

34. J. VANSCHOONWINKEL (1991), p. 497-518.

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