HOLOCENE FAULT SCARPS AT MYCENAE (GREECE) AND POSSIBLE CULTURAL TIES

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Summary

The upper citadel at Mycenae is the upthrown block or horst between two active normal faults, both represented by prominent scarps. The northeastern fault is thought to have moved during Mycenaean times (in this case between about 1650 and 1300 BC). On the southwest side, the more famous Lion Gate fault zone and its fault scarps are involved in the archaeology of at least three features: the gate itself, Grave Circle A, and the Temple Complex, the latter built across one of these scarps. One outcrop exposure of this scarp has been thought to have had cultic significance, to which we can now add that the scarp apparently provided the focus for a curious arrangement of adjacent cultic paraphernalia, resulting in an intriguing puzzle of original intent and perception.

INTRODUCTION

The hilltop citadel of Mycenae at the head of the Argos basin gives its name to the entire Late Bronze Age culture of mainland Greece, and was a referent for several aspects of later classical Greek culture via Homer. It was a major center of Mycenaean culture from at least 1650 BC until this culture went into a fairly rapid and steep decline (and the Bronze Age came to a close with it) during the earlier 11th century BC. This paper examines some aspects of the site's geology that may have played a role in its cultural development.

LOCAL GEOLOGIC/TECTONIC SETTING

Mycenae's commanding location results from its position on a mountainous peninsula of Mesozoic carbonate rocks partly surrounded by a much younger Neogene sequence that forms broad aprons below, extending to the Gulf of Argos. This sequence consists of conglomerates and marls that are generally less resistant to erosion, though tough conglomerates within it were locally useful as a building material. This Neogene apron extends up to elevations of about 220-230 m in the region of the citadel (Papanastassiou *et al*. 1993; Maroukian *et al*. 1996; Hinzen *et al*. 2018), in fact reaching into the lower parts of the citadel, as we will show.

The Argos basin was formed by Neogene extensional tectonism, and Mycenae's location at the head of the basin corresponds to Holocene extensional faulting there (Papanastassiou *et al*. 1993, Maroukian *et al*. 1996). Seismicity can also emanate from the adjacent Corinth rift (*e.g.* Jackson *et al*. 1982; Armijo *et al*. 1996), the subduction zone to the south between Hellenic and African tectonic plates, and other nearby tectonic zones. Seismic activity in the basin has been quite moderate in the historic and instrumental (since 1900) periods, however (Ambraseys 2009; Hinzen *et al*. 2018). A considerable literature proposing earthquakes toward the end of the Mycenaean period at the head of the Argos basin (*e.g.* Kilian 1996) has recently been questioned by Hinzen *et al*. (2018).[1]

1 The comprehensive article by Klaus Hinzen, Joseph Maran, and their co-authors (2018) focuses on the Late Bronze Age seismic history of the ancient sites of Tiryns and Midea, 12 to 14 km south of Mycenae. They particularly test proposed earthquake activity in the LH III B Middle and LH III C periods (their p. 2). They show: (1) that the Lower Town of Tiryns, most susceptible to seismic damage, suffered none during this period (especially their p. 5); (2) that other causes of damage in the citadel are more plausible in this period (their p. 21); and (3) that the potential for seismic damage in the region has been moderate throughout prehistoric and historic times. The first two items are of only peripheral interest to our work in this paper, as we make no claim about tectonic activity following 1300 BC. Their third point was supported by analysis of faults throughout the Argos plain district, including the "Mycenae fault" (their table 1, item ABNF 8), an apparent

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Fig. 1. Photograph of the back side of Lion Gate with cyclopean walls atop and beside slickensided fault rock visible through the gateway. Note lineation directly down the ca. 60 degree southwest dip of this fault rock, described by many authors (*e.g.* Maroukian *et al.* 1996). Wace (1921-1923; 1949) found that this rock does not extend across the gateway itself, but is juxtaposed against younger rocks there at lower elevation. This famous (among geologists) exposure is therefore a fault scarp (see text).

Papanastassiou *et al.* (1993) and Maroukian *et al.* (1996) describe fault scarps (abrupt offsets of the ground surface caused by fault movement) bordering the Mycenae citadel. These scarps are typical of the limestone-hosted Holocene fault scarps of the region (Hancock, Barka 1987; Stewart, Hancock 1988; Stewart 1993; 1996); they preserve easily eroded details of their motion, and truncate transient landscape features such as drainages. The two exposed at Mycenae are both steeply dipping normal faults (*i.e.* upper block thrown down), but dip away from each other so that the upper citadel between them is a horst (*i.e.* a block being raised up relative to those on either side).

Indeed two of the citadel's most famous cultural features are themselves tectonic features – the Lion Gate on its western margin (Fig. 1) and the Perseia spring on its northern margin – located along these Holocene faults that form the southwestern and northeastern margins of the upper citadel, respectively (Fig. 2).

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amalgam of faults described herein, which was assigned a magnitude of 6 for an earthquake of unknown (but Holocene) prehistoric age based in part on the fault scarps we describe. An earthquake of this magnitude along a plane that crops out at the earth's surface would, of course, correspond with high intensity values. We thus consider this work supportive of our supposition that any observers of the event would have been impressed not only by the resulting scarp but also by the accompanying earthquake.

THE PERSEIA FAULT SCARP

The northeast-dipping fault forming the northeastern margin of the citadel, mapped and described by Maroukian *et al*. (1996), has cyclopean walls built atop its exposures (their fig. 3). We will refer to this fault as the Perseia fault. The Perseia spring along the fault plane feeds a cistern accessed by three flights of steps within a corbel-vaulted tunnel starting from inside the citadel, a feature usually interpreted as enhancing the defenders' ability to withstand a protracted siege (Fig. 2C).

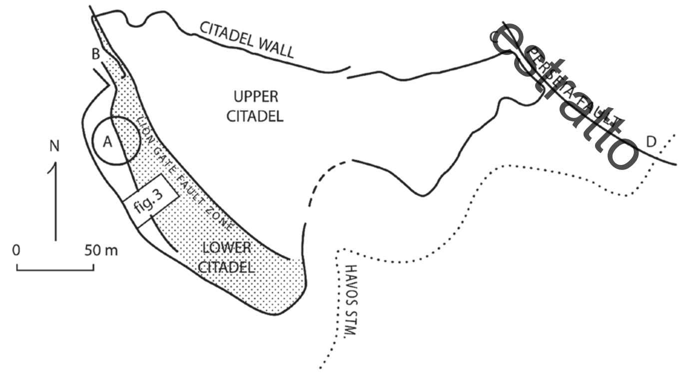

Fig. 2. Sketch map of Mycenae showing citadel walls, Perseia and Lion Gate fault and fault zone, and Havos Stream ravine (dotted). Upper citadel upthrown (*i.e.* as a horst) relative to areas across these faults. Lettered localities: A, Grave Circle A containing Schliemann's shaft graves; B, Lion Gate; C, Perseia spring and cistern; D, Section of Havos Stream dammed by Perseia fault. Alcove outcrop in Temple Complex is within Fig. 3. Probable width of Lion Gate fault zone shown by stippled pattern.

Maroukian *et al*. (1996) also observed that the Perseia fault, present as a continuous fault scarp (readily visible on Google Earth), dammed the Havos (sometimes rendered Chavos or Chaos) stream southeast of the spring (Fig. 2D). The sediments up to 2.5 m deep that infilled the obstructed drainage behind this dam contain exclusively "Mycenaean" sherds at the base, with significantly more recent sherds found only higher within this fill. Maroukian *et al.* conclude that this drainage disruption occurred in the Mycenaean period, *i.e.* between 1650 and 1050 BC. Their conclusion is in accord with accepted practice for the dating of sediment by contained ceramic assemblages (*e.g.* Force 2004), though we would like to see more precise assemblage information. An additional chronological constraint is the age of the cyclopean walls built on its scarp, here about 1350-1300 BC, suggesting the period of tectonic movement should be bracketed between 1650 and 1300 BC.

This dating is consistent with the observation of Maroukian *et al.* (1996, their fig. 5) that the lowest 1.5 m of the Perseia fault scarp plane is fresh, complete with details of its movement ("slickensides" and other rock fabrics produced by unidirectional shear). This lower part shows little evidence of weathering or erosion, in contrast to the weathered and eroded 1.5 m portion above. The lower interval is the part of the fault plane that formed a dam behind which sediment accumulated containing no sherd material later than Mycenaean. This lower portion must therefore have emerged during fault movement within that 1650-1300 BC temporal interval. We conclude, as did Maroukian *et al.*, that faulting occurred "during Mycenaean time". Assuming their dating is correct, we find it logical to conclude that any local inhabitants in that era would have observed the impressive growth in exposed fault planes, announced by rather severe earthquakes.

THE LION GATE FAULT ZONE AT THE LION GATE AND GRAVE CIRCLE A

The bedrock wall on which the northeast bastion of the Lion Gate rests is itself a fault plane striking southeast and dipping about 60 degrees southwest (Fig. 1). It preserves details in its tectonite fabric of down-dip movement and offset; these show its last movement to be recent in a geologic sense, as erosion degrades such features (Stewart and Hancock 1988; Stewart 1996). The Lion Gate and the cyclopean wall built atop this bedrock, however, show that this fault has not moved since their construction in the LH III A2 or early LH III B period (French 1996), ca. 1350-1300 BC.

Historical photos of the fault at the Lion Gate show that it is not a single plane (Taylour 1983, fig. 9), though it does not extend far around the corner into the upper citadel to the northeast (Mylonas 1983, fig. 56). It is best treated as a zone of faulting that we will henceforth refer to as the Lion Gate fault zone. There is no evidence that the Lion Gate fault moved during the period between 1650 and 1300 BC as the Perseia fault did. Indeed, we will see evidence that some fault splays within the zone could predate the Late Helladic period.

The Lion Gate fault zone transects the citadel in a northwest-southeast direction (Fig. 2). Some individual faults within it, which we will call splays, apparently divide the citadel into upper and lower parts along the zone of few ancient structures and poor rock exposure to the lip of the Havos stream's ravine, along the northeastern margin of the zone as shown in Fig. 2. However, we focus here on splays beginning at the Lion Gate itself and continuing in the area of Grave Circle A into the lower citadel, mostly obscured by constructions there.

Wace (1949, 62) traced the contact between limestone and softer rocks from the passageway through the Lion Gate toward the southeast. These softer rocks are the Neogene sequence described above, but farther upslope than Maroukian *et al*. (1996) show (Fig. 2), understandably because excavation would be necessary to reveal outcrops in the latter area. Remarkably, at the Lion Gate, Mesozoic limestone and Neogene deposits lie within ten meters of each other, separated by steeply dipping fault rock, showing that these rocks are juxtaposed along the Lion Gate fault. Since the limestone surface is slightly higher in elevation than the Neogene deposits, the prominent exposure of fault rock through the northeast bastion of the Lion Gate is itself a fault scarp, as any ancient excavations that exposed the fault rock would have destroyed its fragile fault fabrics. The date of the faulting at this locality is not known but must predate the Late Helladic IIIA2 to early IIIB walls built atop fault rock.

Wace (1949, 62) also describes this same contact relation in the area of Grave Circle A, where Schliemann (1880) and Stamatakis had famously found rich artifacts in a series of early shaft graves sunk into rock. Several decades earlier, Wace (1921-1923, pl. 17) had established that these shaft graves were excavated below a rock shelf of limestone. Gates (1985, 265, 270 n. 49, 272, ill.2, citing Karo 1915, pl. 16) noted that several of these shaft graves are cut into soft conglomerate below this shelf edge. Wardle (2015, 580, 588) makes more explicit that this rock boundary is immediately below the shelf. Thus the excavation of the shaft graves of Circle A again exposed a scarp along a fault that juxtaposes Mesozoic limestone and Neogene deposits. Wardle implies that the shafts were excavated in the softer conglomerate by necessity; indeed it appears that at least shaft grave III followed the fault plane itself and that the scarp forms its northeast wall. It is quite possible, albeit not certain, that this scarp is continuous with that at the Lion Gate – it could be a different branch exposing the same relationship – but the fault exposed within Grave Circle A must predate Late Helladic I since shaft grave III incorporated it

Thus in the area of the Lion Gate and Grave Circle A there is evidence of normal faults and associated fault scarps that trend northwest-southeast and lie within the lower citadel at Mycenae. Some of this faulting predates the Mycenaean period. Movement on individual faults of the zone could have occurred from pre-Mycenaean times until the construction of the cyclopean walls and other structures of Late Helladic III date.

THE LION GATE FAULT ZONE IN THE TEMPLE

Given the evidence presented thus far, one might expect to find evidence of faulting and the topographic scarps resulting from it, along the trend defined by these faults farther to the southeast in the lower citadel, in the direction of the Temple Complex (Figs. 2, 3). Extensive excavation there (Taylour 1970; 1981; Moore, Taylour 1999; Wardle 2015) of a Temple Complex of the earlier 13th century BC exposed several bedrock shelves declining to the southwest. An additional planar bedrock exposure has about the same trend and slope as the fault-scarp at the Lion Gate (and quite unlike that of original bedding in any rocks of the area). That is, this plane strikes northwest- southeast and dips steeply southwest (Taylour 1970, fig. 1; 1983, figs. 23-24, 26). The exposure occurs in a back room of the Temple dubbed the Alcove by its excavators (Fig. 3 at 13). Details of the architecture and cultic offerings there prompted Taylour to suggest that the rock exposure itself was of some cultic significance. He pointedly repeated this suggestion in a later summary (Taylour 1983, 50), adding a fairly detailed description of the planar shape and unaltered natural surface of this outcrop.

The location and elevation of this Temple and the Alcove with its bedrock outcrop are along the trend of some fault outcrops of the Lion Gate fault zone as described above, so could constitute an extension of one of its branches. Taylour's (1970; 1983) descriptions of the outcrop are insufficient to determine whether this rock is a tectonite, that is, generated within the fault zone, and no photograph that includes it (Taylour 1983, fig. 24; see also Moore, Taylour 1999 including microfiche) is useful for this purpose. Its attitude (Taylour 1970, fig. 1; 1983, fig. 26) is as one would expect for an exposure of the Lion Gate fault zone, and is not that of regional bedding in either of the sedimentary units present.

Two photographs of bedrock surfaces excavated nearby, however, strongly suggest tectonite origin and lie between the Alcove outcrop and Grave Circle A. Like the Alcove outcrop and the fault rocks at the Lion Gate and within Grave Circle A, these surfaces slope steeply south or southwest , and they show tectonic fabrics of down-dip unidirectional shear. The photograph of that at the east end of Room 14 (Fig. 3; see Taylour 1981, 173c, photo 2721a) exposes steep down-dip lineation. A second photograph of the southeast margin of Corridor 34 west of the alcove (Fig. 3) exposes shear fabrics in cross-section dipping along its steep southwest slope (Taylour 1981, 187a, photo 3301a). These we interpret as fault scarps, the former probably correlative with that in the Alcove. The latter occurrence was found behind a wall of Middle Helladic date, showing this fault splay to be Middle Helladic or older; it is on trend with the fault at Grave Circle A and possibly correlative with it. Neither of these exposures would have been visible after the construction of the later Temple Complex obscured them. However, the outcrop in the Alcove singled out by Taylour (1970; 1983) would have been visible.

Indeed, Taylour considered that this tiny space was a focus of cult in some sense, but was sheltered from the view of ordinary traffic by its architecture. Access to the Alcove was only possible by way of the main room of the Temple (Fig. 3: Room 18), which also gave access via a stairway to Room 19 (the so-called Room of the Idols). There was no other access to or between the Alcove and Room 19.

The excavation literature (Taylour 1981; Moore, Taylour 1999, 161, 166) shows that Taylour's outcrop in the Alcove abruptly separates the earth-on-bedrock floor in Room 19 from a similar earth-on-bedrock floor to the southwest in the Alcove lying some 0.75 m lower. The contemporary plaster floors over bedrock in the central space in the Temple (Room 18) and in its anteroom (Room XI) lie an additional 1.00-1.25 m lower (Moore, Taylour 1999, 4 fig. 2, 110, 130, 151). These abrupt steps in bedrock are most easily explained as a fault scarp. Otherwise a considerable amount of bedrock excavation and removal would have been required to produce this relation, as noted by Moore, Taylour (1999, 1), and excavation clearly would have altered the natural surface of the exposure in the alcove.

So the alcove outcrop itself apparently represents a southwest-dipping fault plane, the exposure of which forms a fault scarp (Fig. 3); Room 19 is on the upthrown block, the Alcove floor and Room 18 on the downthrown block. These rooms and probably the entire Temple Complex postdate any movement of the fault, as the fault does not offset any architectural features there. Instead all these features were apparently built across an existing fault scarp.

The fault plane and its scarp elsewhere in the Temple Complex are obscured by walls and stairways; it would trend obliquely under the southwest corner of Room 19 and the stairway leading up to it (Fig. 3). Its extensions to the southeast and northwest are probably marked by previously described bedrock shelf margins and others less well known under the Megaron (Fig. 3) and South House Annex (Moore, Taylour 1999, x f1g. 1), the latter possibly continuous with those within Grave Circle A. The entire Temple Complex and its neighboring

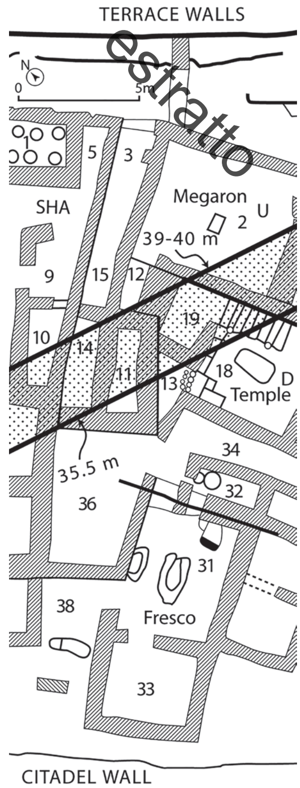

Fig. 3. Environs of the Temple Complex at Mycenae, labelled after Taylour (1983; SHA is South House Annex) showing faults (U, upthrown block; D, downthrown block). The two parallel fault lines are apparently the same S-dipping fault scarp (stippled) at two different elevations; the controls are in the Alcove (shown as Room 13, cf. Taylour 1983, 183) and Room 14. The possibly older fault to the west between Rooms 31 and 32 is between two walls. All these faults are part of the Lion Gate fault zone (Fig. 2).

structures were thus apparently built across fault scarps within the Lion Gate fault zone. However, these scarps were obscured by Temple Complex architecture everywhere except in the Alcove, even though construction of the Temple Complex required intimate knowledge of the scarps there.

Before continuing, it may be useful to summarize the various strands of evidence that a fault scarp underlies the Temple Complex in the lower citadel. Proceeding from the general and regional to the particular, these are:

1. Presence on both margins of the upper citadel of normal faults with fresh scarps showing down-dip tectonite fabrics, one showing movement during the Mycenaean era.
2. Fault scarps of the Lion Gate fault zone juxtaposing Neogene and Mesozoic rocks and aimed southeast toward the Temple Complex, traceable from the Lion Gate through Grave Circle A.
3. Presence of down-dip tectonite fabrics on steep scarps sloping down to the southwest on the margins and elsewhere within the temple complex.
4. Offset of upper bedrock surfaces, in the same sense and magnitude as fault scarps elsewhere in the Lion Gate fault zone, along a natural surface exposed in the Alcove with the same orientation as those faults and on trend with them.

Generally such multi-faceted evidence would be considered more than sufficient to map a fault and its scarp. Next we will review evidence that adds a cultural dimension that enlivens this geological evidence.

THE PECULIAR ARRANGEMENT OF CULTIC OBJECTS IN THE TEMPLE COMPLEX

Taylour (1983, 50, 55) was inclined to associate the unmodified bedrock outcropping in the Room 18 Alcove, a feature we have identified above as a fault scarp, with cultic activities performed in the temple. He was prompted to do so in part by the architecture surrounding the outcrop, but was also influenced by the odd depositional circumstances in which many of the large terracotta figures (or "idols") of humanoids and snakes recovered from the Temple Complex were found.

The largest concentration of these figures was discovered in Room 19, which therefore was initially dubbed the Room with the Idols (Taylour 1983, 49-51, figs. 23-24, 26-27), but a substantial assortment of figure fragments was also located in the non-communicating Room 18 Alcove immediately to the west, a space accessible only by way of a window-like aperture at the northwest corner of the temple's main Room 18, the so-called Room with the Platforms. In all, 35 anthropomorphic figures (Moore, Taylour 1999, 46-62, 70, 303-393, 452-459: four of

Mycenae Excavations Inventory Number	Nature of Figure	Museum Number [N = Nafplion; M = Mycenae]	State of Completeness [estimated]	Rooms/Spaces in Temple Complex Yielding Joins Other Than Room 18 Alcove	Other Rooms/Spaces in Temple Complex Yielding Matches (= Non-joining Fragments of Same Object)	Moore and Taylour 1999: Text [in Bold], Plans, and Matrices	Moore and Taylour 1999: Photographs
68-1584	Anthropomorphic vase	N15006	80%	Room 19 (ΓMB 68/170)	-	**168**, 180, 194, 196, **306**	307-308
69-068	Anthropomorphic figure, Type A	M23984	40%	-	-	**155**, 160, 194, **315**	316-317
68-1587	Anthropomorphic figure, Type B	M23974	90%	Room 19 (ΓMB 68/170)	Room 18 (ΓMBW 68/250, 251)	**169**, 180, 189, 194, 196, **332**	333-335
68-1591	Anthropomorphic figure, Type B	M23975	60%	Room 19 (ΓMB 68/170); Room 18 (ΓMBW 68/251; 69/57, 149)	-	**156**, 180, 189-190, 193-194, 196, **346**	346-347
68-1593	Anthropomorphic figure, Type B	N15002	95%	Room 19 (ΓMB 68/170)	-	**169**, 180, 194, 196, **350**	163 (negs. 3158b, 3162b), 351-352
68-1596	Anthropomorphic figure, Type B	N15005	90%	Room 19 (ΓMB 68/170)	-	**169**, 180, 194, 196, **360**	361-363

69-061	Anthropomorphic figure, Type B	M23978	40%	Room 19 (ΓMB 68/170)	-	**155**, 160, 194, 196, **371**	153 (negs. 3261b, 3262, 3267a), 372-373
69-062	Anthropomorphic figure, Type B	M23985	50%	Room 19 (ΓMB 68/170); Room 18 (ΓMBW 68/207, 230, 234, 264; 69/37, 44)	Room 18 (ΓMBW 68/261)	**156**, 160, 189, 192, 194, 196, **374-375**	153 (negs. 3261b, 3262, 3267a), 376-377
69-063	Anthropomorphic figure, Type B	M Exhibition	90%	Room 19 (ΓMB 68/170)	-	**156**, 160, 194, 196, **378**	153 (negs. 3261b, 3262, 3267a), 379-380
69-064	Anthropomorphic figure, Type B	M23980	50%	Room 19 (ΓMB 68/170)	Room XI (Γ23 66/120); Room 18 (Γ23 68/177; ΓMB 68/194; ΓMBW 68/250, 252); Room 31 (Γ22 66/102)	**156**, 160, 185, 189, 192, 194, 196, **381**	153 (negs. 3261b, 3262, 3267a), 382-383
69-065	Anthropomorphic figure, Type B	M23987	25%	Room 19 (ΓMB 68/170)	Room 18 (ΓMBW 69/79); Room 31 area	**156**, 160, 190, 194, 196, **385**	153 (negs. 3261b, 3262, 3267a), 386
69-066	Anthropomorphic figure, Type B	M23988	35%	-	Room 19 (ΓMB 68/170, 184); Room 18 (ΓMBW 69/44, 52)	**156**, 160, 191-192, 194, 196, **387**	153 (negs. 3261b, 3262, 3267a), 388
69-109	Anthropomorphic figure, unusual	M23986	35%	-	-	**155,** 194**, 454**	454
68-1621	Snake figure	M24031	90%	Room 19 (ΓMB 68/170, 184, 187)	Room 18 (Γ23 66/14; ΓMBW 69/137)	**169**, 180, 191, 193-194, 196, **409**	410-412
68-1622	Snake figure	M24027	90%	Room 19 (ΓMB 68/170, 184, 187)	Room 18 (ΓMBW 68/251); Passage 34 (ΓMBW 69/56)	**170**, 180, 189, 194, 196, **413**	414
68-1623	Snake figure	M24026	85%	Room 19 (ΓMB 68/170)	-	**170**, 180, 194, 196, **415**	416
68-1624	Snake figure	M24029	75%	Room 19 (ΓMB 68/170, 184, 188); Room 18 (ΓMBW 68/250)	Room 19 (ΓMB 68/169); Room 31 (Γ32 69/62)	**170**, 180, 189, 194, 196, **417**	418
68-1625	Snake figure	M23973	> 95%	Room 19 (ΓMB 68/184)	-	**170**, 180, 194, 196, **419**	420-421
69-071	Snake figure	M24035	40%	Room 19 (ΓMB 68/170)	-	**156**, 160, 194, 196, **424**	153 (negs. 3261b, 3262, 3267a), 425
69-072	Snake figure	M Exhibition	80%	Room 19 (ΓMB 68/170)	-	**156**, 160, 194, 196, **426**	153 (negs. 3261b, 3262, 3267a), 427-428
69-073	Snake figure	M24024	80%	Room 19 (ΓMB 68/170, 184)	-	**156**, 160, 194, 196, **429**	153 (negs. 3261b, 3262, 3267a), 430-432
69-074	Snake figure	M24023	35%	-	-	**156**, 160, 194, **433**	153 (negs. 3261b, 3262, 3267a), 434-435
69-075	Snake figure	M24032	20%	Room 19 (ΓMB 68/170)	Room 18 (ΓMBW 68/248; 69/92); Room xxvii (Γ23 64/66)	**156**, 160, 189-190, 194, 196, **436**	153 (negs. 3261b, 3262, 3267a), 437-438
69-076	Snake figure	M24025	55%	Room 19 (ΓMB 68/170); Room 18 (ΓMBW 68/186, 198); Room XI (ΓMBW 69/175)	-	**156**, 160, 187, 189, 194, 196, **439**	153 (negs. 3261b, 3262, 3267a), 440-442
69-077	Snake figure	M24033	50%	Room 19 (ΓMB 68/170)	Room xxv (Γ33 68/30)	**156**, 160, 194, 196, **443**	153 (negs. 3261b, 3262, 3267a), 444-445

Table 1. Findspots of anthropomorphic vases and figures and of snake figures of which parts were found in the Room 18 Alcove (Phase 0831; ΓMBW Units 69/7, 17, and 26) in Mycenae's Temple Complex.

Type A, including a single anthropomorphic vase, 27 of Type B, and four of uncertain type) and between 15 and 17 different snake figures (Moore, Taylour 1999, 63-69, 403-451) were catalogued from the Temple Complex, the vast majority of which (between 42 and 44 snake and Type B anthropomorphic figures) represent types attested only in this single building at Mycenae. With the exception of one Type B anthropomorphic figure found *in situ* on one of the platforms at the north end of Room 18 (Taylour 1983, 50-51, figs. 25-26; Moore, Taylour 1999, 29-30, pls. 9b, 21), all of the complete or restorable anthropomorphic figures were recovered from either Room 19 or the Room 18 Alcove (Moore, Taylour 1999, 47). With one possible exception found largely incomplete and badly broken on the steps leading up to Room 19 from the main Room 18 (Moore, Taylour 1999, 31, 63, 449-451), the same is also true of the snake figures.

In their final publication of the Temple Complex, Moore and Taylour drew attention to the significance of the numerous joins between figure fragments found in both Room 19 and the Room 18 Alcove (1999, 17, 22). Such joins appear to have been limited to the figures, however, since none of the ceramic containers recovered from these two spaces – 41 in Room 19, but just four from the Alcove – exhibited similar cross-joins. Since the doorway to Room 19 was walled up at the end of Phase VII of the Temple and the room was thereafter no longer accessible, the authors reasonably concluded "that the two groups of material were deposited at roughly the same point in time, or subsequently one after the other . . . and that before this they were in use in much the same area" during Phase VII (Moore,Taylour 1999, 17). "It is as if material was first gathered together and stored in **19** and then later a second collection was made of remaining fragments and these were placed in the **18 Alcove** . . ." (Moore, Taylour 1999, 22).

The fragments deposited in the Room 18 Alcove, however, continued to be accessible, and possibly even in use (Moore, Taylour 1999, 31), during the subsequent Phase VIII, at the end of which both groups were completely buried in burnt destruction debris (Moore, Taylour 1999, 3 table 1). The authors also noted that some of the figures are likely to have been produced as much as a century prior to the construction of the Temple Complex; these must therefore have originally been displayed or used in some other building (Taylour 1983, 53; Moore, Taylour 1999, 17, 47, 50, 66). But in their various tabular and prose summaries of how many figurine fragments were found where (Moore, Taylour 1999, 18 table 2, 84, 155, 166), they greatly underestimated the numbers of cross-joins linking the finds from the two rooms, as our Table 1 shows. Of the 13 anthropomorphic figures of which fragments were found in the Room 18 Alcove, no less than 11 have either physical joins (10) or matches (one) with finds from Room 19. Similarly, 11 of the 12 snake figures represented among the finds from the Room 18 Alcove have joins in Room 19. The following conclusion by Moore and Taylour thus hardly seems warranted (1999, 84): "Little significance can be drawn from the distribution of objects within the Temple building. As has been noted above the deposits from the **18 Alcove** and **19** appear to have been stored quite casually." On the contrary, we suggest that not only the distribution of the figure fragments but even in some cases their specific arrangements within the spaces where they were deposited are genuinely meaningful. The sketch plan of the disposition of ceramic vessels, terracotta figures, and miscellaneous finds within Room 19 (Moore, Taylour 1999, 23-24 fig. 7,180) shows clearly that 16 of the 17 anthropomorphic figures and all seven of the snake figures recovered from that room were clustered in its northeastern corner and along the east half of its north wall. Moreover, as commented on long ago by Mylonas (1983, 145), the three most fully preserved anthropomorphic figures were placed in such a way that their faces were pressed up against the east wall, thus facing directly away from the Room 18 Alcove and its bedrock outcrop (Taylour 1983, 49 fig. 23, 51 figs. 26-27; Moore, Taylour 1999, pl. 7a-b; 163 photos 3158b, 3162b; 180). By contrast, the heap of figure fragments in the Room 18 Alcove is concentrated in the western angle of that space, as far as possible from the joining fragments in Room 19 as well as from the rock outcrop in the Alcove itself (Moore, Taylour 1999, pl. 8a [mislabeled]; 25 fig. 8, 153 photos 3261b, 3262, 3267a). Of the 12 snake figures represented by fragments recovered from the Room 18 Alcove, no less than three consist of only the heads (Table 1. 68-1622, 68-1623, 68-1625), their bodies having been found in Room 19. A similar prominence of detached humanoid heads in both Room 19 and the Room 18 Alcove (*e.g.* Moore, Taylour 1999, pls. 7b, 8a, 9a; 153 photos 3261b, 3262; 163 photo 3162b) suggests that these may likewise in some cases have been purposefully detached from their bodies in order to be deposited in specific spaces.

These various features of the figures' distributions and placements in the two non- communicating spaces in which they were eventually found show quite clearly that the figures in both spaces, whether complete or fragmentary, had initially been carefully selected from a collection of mostly fragmentary figures, and then just as carefully positioned, at least in the case of Room 19, within a new location. Whether or not some of them were subsequently further fragmented as part of their final process of deposition, at least some of the figures had presumably been initially damaged in a destructive event that required a substantial refurbishment of the Temple Complex at the end of Phase VII.

The thin layer of earth over bedrock that defines the floor of Room 19 lies some 1.75 m above that of Room 18 to the south and 0.75 m above that in the center and west of the non-communicating Room 18 Alcove to the west (Moore, Taylour 1999, 4 fig. 2, 151, 161, 166). In between the earthen floors of Room 19 and the Room 18 Alcove is located the steeply sloping bedrock outcrop that occupies the eastern half of the Alcove (Moore, Taylour 1999, 7 pl. 2b; 21 fig. 6; Taylour 1983, 49-51 figs. 23-24, 26) and constitutes a fault scarp. The carefully divided and positioned deposits of figures that make up the only artifactual link between these two spaces are surely meaningful in their particular topographical setting on either side of the fault scarp; there is, after all, nothing in the pottery or miscellaneous finds from the two locations to connect them. It seems to us difficult to avoid associating the chthonic connotations of the snakes with the fault scarp that separates the two deposits in both plan and elevation. Whether the initial breakage of some of the figures can be attributed to tectonic movement along the fault scarp is not an answerable question, but is perhaps worth raising as a possibility.

CONCLUSION

One of the Holocene faults that border the citadel of Mycenae is thought to have enlarged its scarp in the Mycenaean era. The other, in the Lion Gate fault zone, may be earlier, but one splay, now mapped via excavation reports as a fault scarp extending as far southeast as the Temple Complex in the lower citadel, corresponds there with deposits of broken cultic artifacts that mimic the broken landscape underneath them, fragments finding their match on the other side of the fault scarp. Intentional placement of the pertinent cultic objects is not in dispute, though the distribution of cultic fragments has never made sense to archaeologists. It now makes some sense in tectonic context as a sort of reconstruction of faulting's consequences. There may indeed be some cultic significance to the array, as Taylour (1970; 1983) surmised long ago.

Inhabitants of ancient Mycenae had an unusual opportunity to observe links between fault movement and earthquakes. Inasmuch as in modern world earthquakes and faults were securely linked only in relatively recent times (see *e.g.* Reid 1910), it is remarkable that links among fault scarps, solid-earth structure, and earthquakes might have become apparent to observant inhabitants of Mycenae.

RECOMMENDATIONS

The observations presented here suggest further avenues of research for confirmation and for exploring implications. Perhaps most urgent is the need for more specific dates for the Mycenaean sherds from the basal sediments accumulated behind the Perseia fault-scarp dam in the Havos streambed. Work on the age and geometry of faulting along the Lion Gate fault zone is also needed; better description of bedrock in Grave Circle A would help, and a careful examination of the Havos stream's ravine might be useful. Better mapping of the contact between Neogene and Mesozoic rocks in the citadel area is called for. A proper description of the rock outcrop in the Alcove would test conclusions presented here. A comprehensive re-study of the figures themselves, focusing on the details of their fragmentation and distribution, would also be worthwhile.

Piecing together bits of evidence from excavation reports compiled over more than a century is of course an unsatisfactory way to consider geologic aspects of the study site. At any point, the addition of a geologist to the crew should have made our observations obvious.

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