GRAECO-ROMAN *POLIORKETICS* AND THE DEVELOPMENT OF MILITARY ARCHITECTURE IN ANTIOCHIA HIPPOS OF THE DECAPOLIS AS A TEST CASE

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Abstract

There are a considerable number of ancient sources describing with great precision the preparations for a siege and siege warfare from the end of the 5th century BCE until the 1st century CE. Descriptions of the various sieges provide important information regarding the system of fortifications, their scope, strength and the alterations carried out during the course of the siege. The surveys and excavations carried out in a number of Decapolis cities make it clear that some cities retained the tradition of Hellenistic fortifications that were maintained and/or reinforced during the Roman period. In the course of the excavations conducted in Hippos of the Decapolis on the eastern side of the Sea of Galilee, a number of fortified segments of the Early Roman period were exposed that had very unique characteristics. Hippos can serve as a fascinating test case for the alterations in military architecture in the Decapolis region between the Hellenistic and Early Roman periods. Some of these new findings allow us to try and correlate between the recommendations of Philon in his *Poliorketic*a with the urban fortification systems in the region, and to assume for the first time that Philon's manual served as the guidebook for the military architects fortifying their cities during the Early Roman period.

Introduction

The Greek term Decapolis (Δεκάπολις), which means ten cities, appears a number of times in various historical sources.[1] In all the references to it there is no clear indication that this is a city league (συμμαχία) but merely a regional affiliation – *Regio Decapolitana*. It was the very location of the cities within a given geographical area and the uniformity of their Greek-Hellenistic culture that created the affinities among them. All the Decapolis cities were situated to the east of the Jordan River except for Beth Shean (Nysa-Scythopolis). The region of the Decapolis stretched from Dion in the north, to Philadelphia in the south and from Beth Shean in the west, to the desert fringe in the east (Fig. 1).

[1] For the Decapolis see Parker 1975; and a series of articles dedicated to the Decapolis region in *ARAM* 4 (1992).

Fig. 1 Map of the Decapolis region (drawn by. M. Eisenberg & A. Regev Gisis).

Remains of Hellenistic or Roman fortification systems were found in only a few of these ten cities of the Decapolis, i.e. Gadara, Philadelphia, Hippos and Gerasa. Most of them were erected during the Ptolemaic or Seleucid periods in the tradition of Hellenistic cities. One rarely found a Hellenistic city unfortified, and this is certainly true of the region in question that served for many long years as an arena of warfare between the two kingdoms. We possess historical testimonies, whether direct or indirect, that some of the fortified cities in the Hellenistic period withstood a siege with greater or lesser success. In Gadara, Philadelphia, Hippos and

perhaps Abila as well, remains of urban fortifications of the Hellenistic period were discovered.[2]

Some of the fortifications of the Hellenistic period were destroyed during Hasmonean times or close to the time when Pompey conquered the area. Yet, some of the cities were restored, continuing their urban existence and even expanding and flourishing during the period of *Pax Romana*. In the Early Roman period, the remains of the Hellenistic fortifications were used in accordance with the city needs and the state of preservation of the earlier fortifications.

One of the Decapolis cities excavated recently is Hippos (Sussita). The excavations of Antiochia Hippos, also known by its Aramaic name – Sussita, which means a horse or a mare, were initiated in the year 2000. During 16 seasons of excavations (2000–2015) some of Hippos' military architecture was unearthed and studied.[3] Among the main features to be discussed here are the eastern gate and the bastion dated to the Early Roman period and Hippos' outworks.[4]

The choice of the site

The Sussita Mountain is located on the south-western slopes of the Golan Heights, about 2 km east of the shores of Sea of Galilee (Lake Kinneret) (Fig. 2). The mountain rises to a height of about 350 m above the lake and about 200 m above its surroundings, making it rather dominant in its area (Figs 3–4). The crest of the mountain is long and narrow in shape, descending slightly from east to west, from 142 m ASL (above sea level) on the eastern side, to 100 m ASL on its western side. The length of the

Fig. 2 Orthophotograph of Sussita Mountain and its vicinity, February 2012 (Ofek Aerial Photography).

[2] Gadara: Hoffman & Bührig 2000; Hoffman & Kerner 2002, 98–105; Philadelphia: MacAdam 1992, 27–32; Wood 1992, 105–6; Abila: Wineland 1996, 80; Wineland 2001, 29–30 (one may note that evidence for urban fortifications in Abila are still far from being proven).

[3] For the full reports and publications of Hippos excavations see: Segal *et al.* 2004; Segal & Eisenberg 2005a; Segal *et al.* 2005b; Segal *et al.* 2006; Segal *et al.* 2007a; Segal & Eisenberg 2007b; Segal *et al.* 2008, Segal *et al.* 2009; Segal *et al.* 2010 and Segal *et al.* 2013. Hippos Excavation project is an international enterprise conducted on behalf of the Zinman Institute of Archaeology, University of Haifa, Israel. Between the years 2000 and 2011 the project was directed by Arthur Segal and Michael Eisenberg. As from 2012 the project is directed by M. Eisenberg.

[4] For an in-depth study of the military architecture of Hippos see: Eisenberg 2008 and Eisenberg 2013.

Fig. 3 Sussita Mountain as seen from the Sea of Galilee (photo. M. Eisenberg).

Fig. 4 Sussita Mountain. View from the Golan Heights. Note the location of the ditch in the middle of the saddle marked with an arrow (photo. M. Eisenberg).

crest is about 550 m along a south-east–north-west axis, a maximum width of about 220 m along a north–south axis on the western side, a width of about 150 m at the middle of the crest, and down to about 50 m in width on its eastern side (Figs 5–6).

The mountain is almost cut off from the surrounding area by three riverbeds that flow around it. On the southern side is the Sussita stream (Wadi Jamusiyeh), in the north is the Ein-Gev Stream (Wadi Fik) and Noa stream cuts along the saddle and mountain on the eastern side (Figs 2, 4–5). On the western side, the mountain slopes toward the Sea of Galilee with a twisting snake-like path leading down the mountain side (Figs 2–3, 5). In one place only, on the south-eastern side, the mountain is not detached from its surroundings. This is where a natural saddle ridge connects Sussita with the south-western slopes of the Golan Heights (Fig. 4). It is here, quite naturally, that a paved entrance road led to the main city gate in the east. Sharp basalt cliffs crown the crest of Sussita Mountain, circling the edges of the mountain top and allowing for optimized natural defences upon which the city's fortification wall was built. These topographical features made Sussita a preferred site for the erection of a fortress that developed in time into a Hellenistic fortified *polis*.[5] But it was not only those considerations that the Hellenistic architect had in mind, but also:

[5] See note 6.

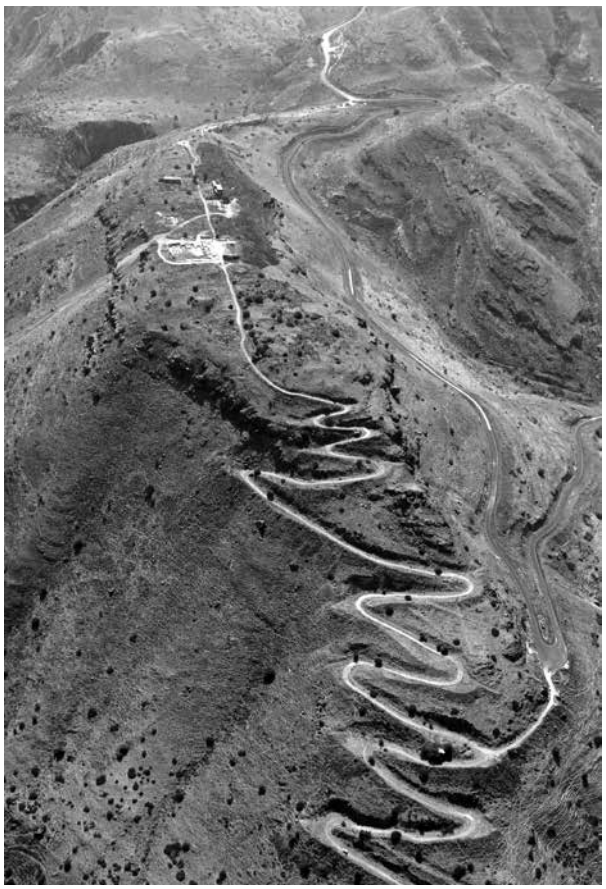

Fig. 5 Sussita Mountain. Aerial photo from the west (photo. M. Eisenberg).

- Hippos lies about mid-way on the eastern bank of the Sea of Galilee.
- It is the only prominent plateau in this region.
- It is located close to the Sea of Galilee and its anchorage.
- Nearby are the springs of Ein-Gev, Haruv and Pik.
- There was an ancient road on the east side of the Sea of Galilee.
- Fertile agricultural valleys surround the Sea of Galilee on all sides.
- The road leading to the cities of Syria runs south-east of the mountain.

All these were part of the considerations in the erection of a city upon the Sussita plateau.

Historical background

Hippos is scarcely mentioned in the historical sources. The writings of Josephus Flavius are the main source of knowledge for its history. Information about the earliest event related to Hippos comes from the Byzantine historian Syncellus, who lists Hippos as one of the cities (or more precisely as one of the 'Macedonian colonies' (*apoikiai*) that Alexander Jannaeus conquered in Transjordania in addition to Pella, Gadara, Abila, Dion and Philoteria (Syncellus *Corpus scriptorum historiae Byzantinae* 558–9). It is very likely that following the Battle of Panias (c. 200 BCE), the Seleucids took over the entire Syro-Palestine region and apparently set their own fortress upon Sussita Mountain.[6] Judging by the archaeological evidence, it may well be that around the middle of the second century BCE the *polis* of Antiochia Hippos was founded.[7]

Hippos was conquered by Alexander Jannaeus, most probably during his first campaign in 101 BCE. The city was destroyed and was rebuilt and resettled only after Pompey's conquest of the region in 63 BCE (Flavius Josephus *BJ* I, 156–7; *Ant. Jud.* XIV, 75–6). During the Roman period the city flourished as did most of the cities of the Decapolis, and only during the Great Revolt (66–73 CE) did it feel endangered by the Jewish uprising in the Golan and Galilee regions.[8]

The fortification wall

The walls that are discernible today along the cliff edge of Sussita Mountain are mostly dated not earlier than the Byzantine period. However, the line of the walls follows the line of the cliffs as the previous fortifications must also have done (Figs 6–7). This means that the length of the wall during the Hellenistic and Roman periods could not have been very different from Byzantine times, totalling about 1550 m. No evidence was found for fortifications of the earlier Hellenistic period that could have been ascribed to a Ptolemaic or Seleucid fort. However, evidence appeared in the survey and excavations to prove the existence of fortifications that underwent at least six

[6] Bar-Kochva regarded the conquest of Hippos as part of the Seleucid military strategy to conquer a string of military outposts of the Ptolemaic kingdom in the Jordan Valley, Galilee and Samaria. There is no clear evidence for Bar-Kochva's claim, but this idea is strengthened following his discussion concerning the goals of the military outposts of the Ptolemaic Kingdom and especially the ones of the Seleucids in the west and east of the Seleucid Kingdom. Bar-Kochva 1976, 35.

[7] For the 2nd century BCE strata under the *Temenos* see Segal *et al.* 2004, 23–4, 143. For an in-depth discussion concerning the origins of the name Hippos and the early military settlement see Eisenberg 2013, figs 65–6.

[8] Eisenberg 2008, 148–51. For an in-depth discussion on the historical geography of Hippos see Dvorjetski 2013.

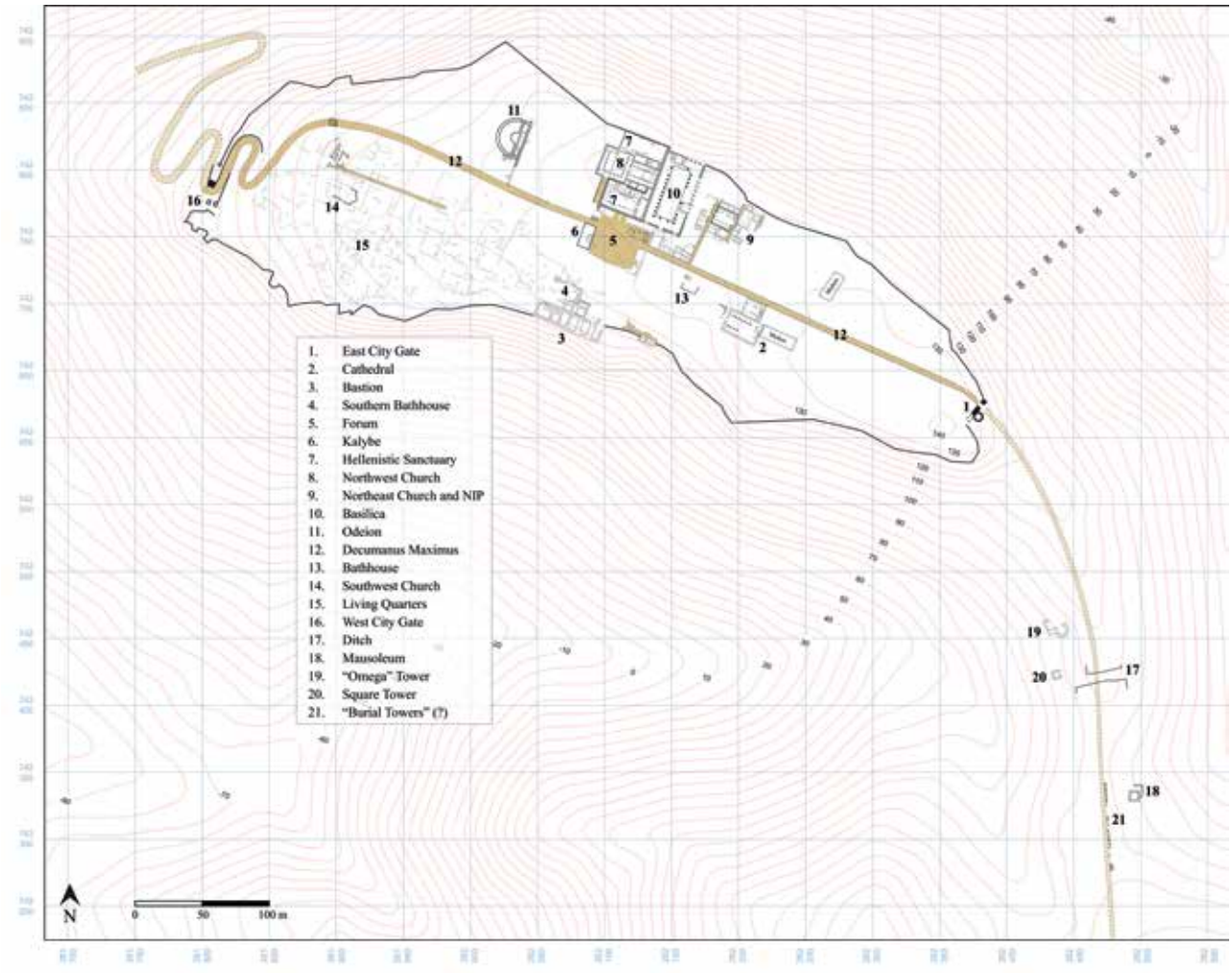

Fig. 6. Hippos contour map with ITM-Israel Transverse Mercator grid (based on Israel National Mapping Agency – SOI).

stages of construction from the late Hellenistic to the Umayyad period. The foundation trenches of the Roman fortification on the south side of the mountain cut across wall sections that date to the end of the Hellenistic period.

Three excavation areas were opened along the fortification walls, one over the north cliff and two along the southern one (Fig. 6). A segment 20 m long was opened over the north cliff where a fortification wall dating from the end of the 2nd to the beginning of the 1st century BCE was exposed.[9] On the southern cliff an excavation of about 50 m long was opened in the middle of the cliff where a bastion was uncovered. About 25 m east of the bastion three small excavation areas were opened, comprising a total length of 30 m above the cliff (Figs 6–7).[10] Those sections along the southern cliff made it clear that the walls visible nowadays are of the Byzantine period, while short segments of fortification walls dating to the Early Roman period were exposed beneath them, except for the Roman bastion which will be dealt with in depth below.

The almost complete absence of towers is well ascribed. The few remaining nowadays, which are dated to the Byzantine period, have not yet been excavated, and we have no evidence of any Roman foundations beneath them. The only dated towers of the Roman period are the one at the east gate of the city and the one incorporated in the bastion, which will be described below. One may explain the absence of Roman period curtain towers not only by the fact that those that may have existed did not

[9] Eisenberg 2007a, 51–6 and figs 79–87; Eisenberg 2002.
[10] Eisenberg 2007b, 37–49 and figs 4, 55–67, 72–6.

Fig. 7 An aerial view towards the centre of the southern cliff. Note the fortification wall, the bastion (marked with arrows) and a series of rooms/hangars (?) beneath it (photo. M. Eisenberg).

survive, but also due to the nature of Sussita Mountain. There are almost no straight natural segments of the cliff surrounding Hippos, hence the sharp angles of the cliff and the wall upon it replaced the need for towers in many areas. Another reason is that Hippos is built high above its surroundings and had no need for the extra height of towers.

The east gate

The narrow shape of the Sussita mountain top required only two gates, one in the west and the other in the east (Figs 5–6). The western gate has not yet been excavated, it was only surveyed and measured, and its style of construction implies that it was built in the Byzantine period. The eastern gate is located at the upper end of the saddle ridge where it reaches the mountain top and from where the main street of Hippos, the *decumanus maximus* crosses through the entire length of the city. The gate overlooks the whole stretch of the saddle ridge on which the main road to the city was paved, and this was the only place from which the mountain was more easily accessible. The saddle ridge was a natural formation that linked the mountain with the south-eastern side of the Golan Heights. This was also, quite naturally, the most sensitive area for the defenders of the city, since it was the only place where the enemy could advance his heavy war machines in an attempt to break through the gate and the city walls.

The gate has a single passageway 3.15 m wide, flanked by two towers protruding from the line of the walls on either side of it. The barrel vault archway and its position can be reconstructed thanks to the location of the wall remains in the north pier. South of the passageway was a solid round tower with an external diameter of 8.2 m, and internal diameter of 5.1 m (Figs 8–9). The thickness of the wall was 1.65 m in its lower layers and 1.3 m in the upper ones. North of the passageway was a tower that was almost square in its dimensions (3.85 × 3.63 m). This tower

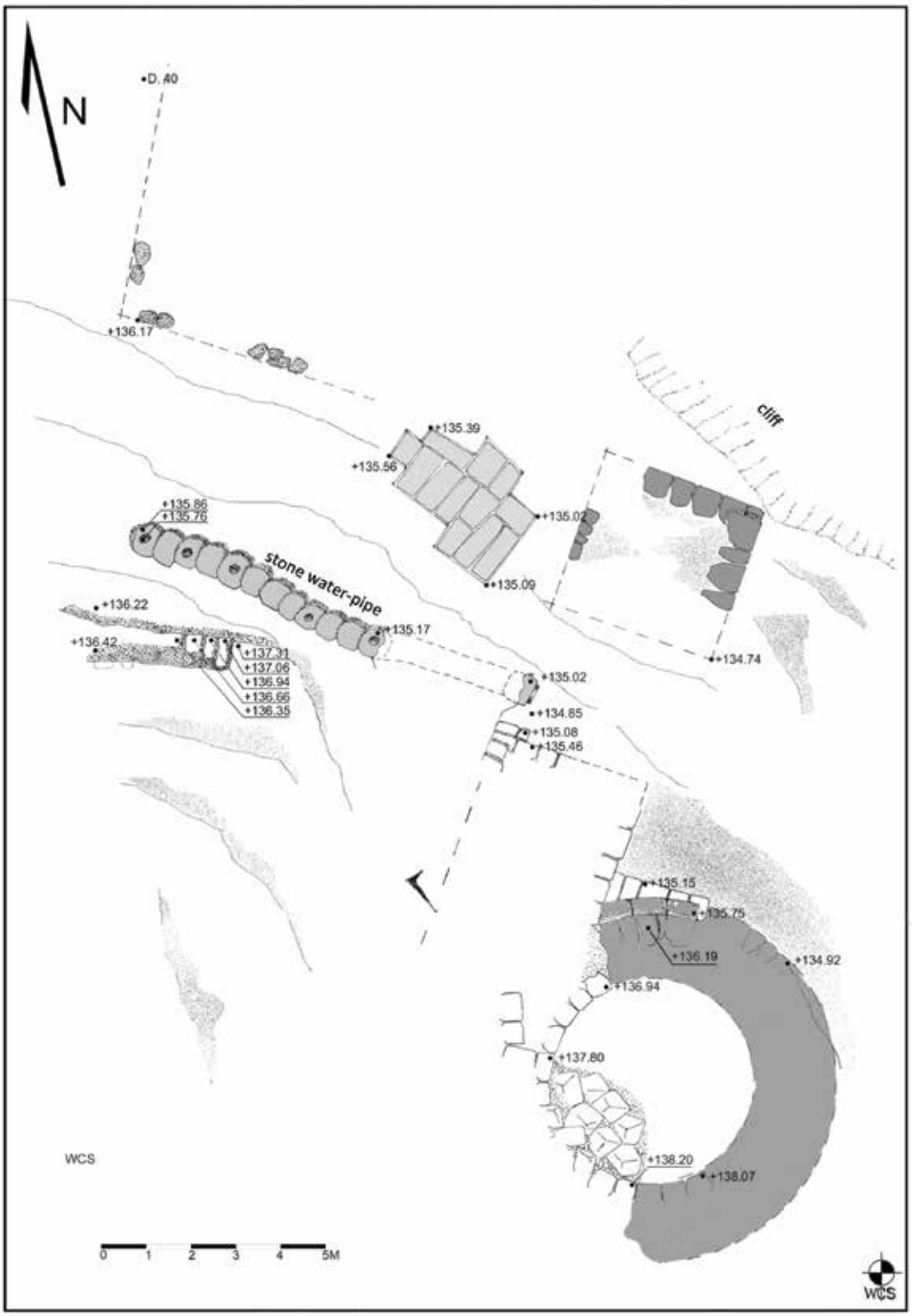

Fig. 8 The east gate, a plan (drawn by M. Ralbag).

was built at the very edge of the rocky expanse above the steep slope that descended eastwards. It appears that this square tower served as the north pillar of the gateway. The unique character of the east gate of Hippos lies in the absence of symmetry regarding the location of the two towers in relation to the gate itself and their extreme contrast in shape. A study of the terrain in the area of the gate makes it clear that this lack of symmetry was due to topographical constraints. The round tower was integrated into the city wall, while the square tower was situated on the edge of the rocky cliff with a deep abyss gaping below it, which does not create any killing field except for the narrow area near the gate passageway itself and the eastern cliff. The round tower did not only survive in a better shape than other components of the gateway structure, but it was also the dominant one when the gate was in operation. In view of its size and diameter, the round tower could have held *ballistae* or catapults' projectiles on the second or third floor. The second floor could have had a ballista machine to launch stones of about 10 *minae* (4.37 kg).[11] On the third floor it would have been possible to install catapult machines for launching missiles: three machines with a missile length of 2 cubits (0.92 m) or two machines with a missile length of 3 cubits (1.39 m).[12] There is a ditch in the centre of saddle ridge, about 190 m distant from the round tower. This range was enough for the machines to protect the area of the ditch and even further. Heavier ballista could have been placed on firing platforms at the base of the wall, since the superior height of the mountain top was more than sufficient.

Whoever passes through the east gate of Hippos will enter into a plaza paved with basalt flagstones, of which only 8 m^2 still survives. This plaza, small in size and apparently oval in shape, is a well-known feature from the gates of cities belonging to the Hellenistic period (Figs 8–9). The relatively good state of preservation of the round tower allows us to determine the details of its construction and the architectural design and decoration of the gate structure. The round tower was built on a fairly steep slope, which made it difficult to set its lower layers securely in the uneven terrain and caused the builders to insert the foundation stones at various levels on the slope. The round tower is mostly of a dry construction with medium-sized ashlars (height: 0.3–0.4 m; width: 0.2–0.9 m). Except for the three lower layers of the tower that will be described below, the tower was built of uniform layers of alternating headers and stretchers (Fig. 8). Binding material is evident in the foundations of the tower where they were mounted upon or placed within foundation channels in the basalt bedrock. The wall of the tower was constructed of two ashlars in thickness similar to the walls of comparable Roman towers in Tiberias and Gadara.[13] The first layer of the round tower was mounted directly on the bedrock that had been levelled for that purpose. The second layer was built in the system of headers, with their long, narrow sides facing outwards. Over this layer a third one of semi-circular shape was placed, decorated in its upper part with a simple graded moulding (Figs 8–9). A decorative component of this kind at the bottom of the tower can be clearly seen in the 'Tiberias gate' in the western part of Gadara, as well as in the southern gate towers in Tiberias. The walls of the tower survived up to a maximum height of 2.3 m. The southern pier of the gate, as compared with the northern one, has survived up to a height of three layers. The original thickness of this pier is not sufficiently clear, but it seems to have been at least 1.5 m. Though the round towers at the gates of Tiberias and Gadara bear similarities in their manner of construction and design to the Hippos tower, the asymmetrical plan of the Hippos gate, its location on a steep terrain overlooking the main road, the single round tower incorporated into the basalt bedrock as well as with the fortification wall, and the protected inner gate plaza make the Hippos gate part of the military architecture design unlike the gates of Gadara and Tiberias (Figs 6, 8–9).

[11] It is reasonable to suppose that the catapult was of the Palintone Vb model of Vitruvius which was common in the Early Roman period (Marsden 1969, 43). Presumably, the new machines in the Roman period allowed for a certain reduction in their size due to improvement in the system of springs, and perhaps it was possible to station here a heavier apparatus up to 15 *minae*. For the calculation formulas, see: Marsden 1969, 25, 33–6.

[12] I suggest reconstructing here the missile launching machines of the Euthytone Va model of Vitruvius, which were common in the Early Roman period. A launcher of 2 cubits in length was 1.83 m. Marsden 1969, 43–5.

[13] For Gadara see Hoffman & Kerner 2002, 114–15. Though the architectural decorative elements of the Tiberias Gate have not been located, the investigators of the gate concluded the gate was never intended to be incorporated in the fortification walls, neither was it built as a fortified one. For the south gate of Tiberias see Foerster 1977; Segal 1997, 86–7; Hartal *et al.* 2010. The southern gate of Roman Tiberias was newly unearthed and further excavations were held here from 2008. Following personal communication with the excavators and after analysing the remains I suggest that the 1.00 m thickness of the tower walls, their small diameter and the location of the gate itself on an almost flat terrain were never meant to bear any military function. In this aspect the south gate of Tiberias and the Tiberias gate in Gadara are rather similar. It was only during the Byzantine period that the southern Tiberias gate was incorporated in the later built curtain wall.

Fig. 9 The round tower and a suggested reconstruction of the east gate (photo. M. Eisenberg, drawn by M. Ralbag).

The city wall is integrated with the round tower, which is also integrated with the southern pier of the gate which makes it clear that all three belong to a single construction phase. According to the data in hand, it may be assumed that the gate was roofed with a barrel vault (Figs 8–9). From the few pottery sherds that were discovered during the excavation of the round tower and from a typological comparison with the gates excavated in Gadara and Tiberias, the erection of the tower can be dated to the 1st century CE.

The bastion

As mentioned above, the bastion was discovered during the excavations of the southern cliff of the city, about 50 m south of the forum (Figs 6–7).[14] The choice of this excavation site was not fortuitous. An attempt was made before the excavation to determine the site where the remains of the ancient fortifications and the location of the artillery platforms for the defence of the city could be found. An examination of the aerial photographs taken by the British Royal Air Force in 1945, the modern air survey and surveys conducted on foot, and finally a search for the vulnerable points in defence, led us to the conclusion that we had here the remains of the platform for the ancient artillery machines. At the end of the excavation it became clear that this was a bastion from the Early Roman period (1st century to the beginning of the 2nd century CE). The centre of the southern cliff was chosen as being the most probable point for the efforts of the city defenders facing the only route along which enemy forces could pass on their way to the city. This was the ancient road that led from the highway on the east side of the Sea of Galilee towards the saddle ridge of Sussita, and that crosses over the Sussita rivulet at a distance of about 250 m south of the line of the southern cliffs of the mountain.

The bastion, which was only partially excavated, was built directly above the cliff line with a total length of about 50 m (Figs 7, 10). It was mounted on the basalt bedrock, while binding material and field stones served to level its foundations on the cambered rock surface. Its foundations were constructed of a series of basalt beams 1.8 m long. A series of four chamber vaults and two towers formed the ground floor on which the

[14] Although the word bastion is of French origin and its use was primarily meant to define artillery positions since the 16th century CE, in modern research this term is also used to define densely concentrated military positions since proto-historical times. I define bastion as a larger defensive position than a tower from which the heavy launchers were operated to defend a city.

upper fortifications, which no longer survive, had been built. The series of chamber vaults were enclosed by a front and back wall, with an exterior distance of 13 m, an interior of 10 m between them and about 1.6 m in thickness of walls. All the walls, like the towers and the vaults were built of high quality ashlars while the core between the chambers was built with binding material and field stones.

The western tower was constructed adjoining and to the east of the western chamber vault (vault I). In the centre and bottom part of the northern wall of the tower facing the cliff, a rectangular opening was found. It had already been planned at the first stage in the construction of the wall since it was based on an empty space created by the absence of a few basalt beams in the foundations (the depth of the opening was the same as that of the basalt beams). Two options were considered for the purpose of this doorway. It may have served as drainage for water accumulating in this section of the wall and tower, or perhaps as a poterna, secret doorway, since it was wide enough for a person to pass through it. Support for this latter claim can be derived from the remains of a wall that was built south of the opening and that was apparently meant to protect it and conceal it from enemy view, exactly as Philon recommends (Philo *Poliorketika* I, 35) (Fig. 10).

Two vaulted chambers, II and IV, were partially excavated (Fig. 10). Chamber IV is the more interesting one and was excavated to a greater extent. The walls of this chamber, the eastern and western ones that supported the vault have been preserved up to their springers and even beyond them. The span was 5.9 m from the western supporting wall to the eastern one, and the full length of the chamber was 10 m. The chamber vault was covered with a mortar layer that was partially preserved and is the only remnant of the upper floor, allowing us to reconstruct the height of the chamber vaults on which the upper fortifications were raised. In the centre of the outer wall which encloses the vaulted chamber, a blocked opening was found built with a maximum span of 4.17 m, located directly upon the southern cliff. There is no access or passageway available here since the slope is extremely steep. At a later time, probably during the Byzantine period, the opening was sealed. The vaulted chambers could, of course, have remained empty, but they could also have served a number of functions such

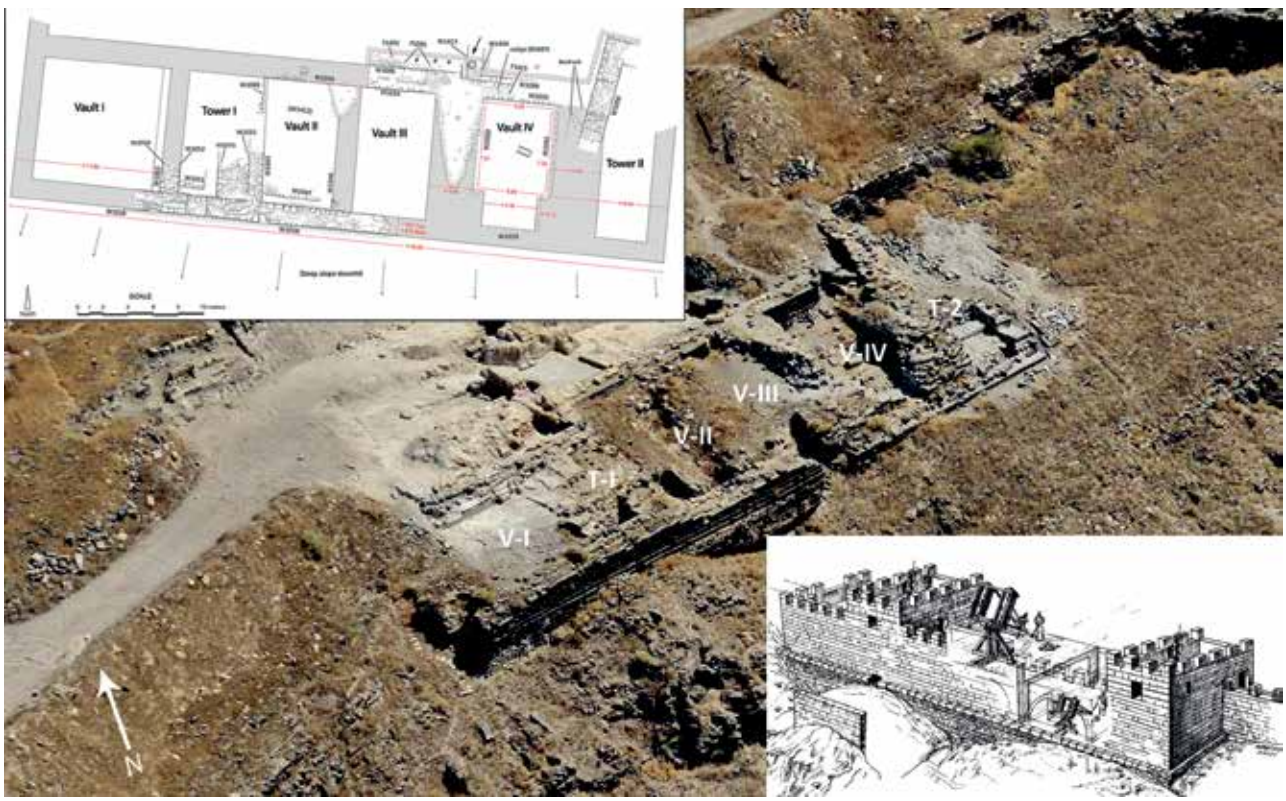

Fig. 10 The bastion. An aerial view, a plan and a suggested reconstruction (photo. M. Eisenberg, plan drawn by B. Cannon and reconstruction by D. Porotski, V. Pirsky and M. Eisenberg).

as the storage of weapons, ammunition and equipment, or even for stationing launching machines. Thus it is not unlikely that a vaulted chamber was used as a position for medium-heavy launching machines that protected the road leading to the east gate. If this supposition is correct, it would be possible to operate a stone launching machine of 40–60 *minae*.[15] The range of these *ballistae* was about 400 m which means that they could be effective over large sections of the road that ascended eastward. Although no remains of ammunition or launching machines were found in Chamber IV, it seems that at this stage this is the only explanation for the existence of an opening of this size. A number of ballista stones weighing 40 *minae* were found in recent years in the excavations at Hippos.

An interesting find was discovered on the northern rear wall of vaulted chamber IV. A number of *caligae* imprints were found in the binding material of the wall. The *caliga* is the standard military boot of the Roman army used from the beginning of the 1st century BCE until the beginning of the 2nd century CE. The most complete imprint contained 44 round indentations created by the *caliga* hobnails, arranged within the scope of the imprint. Three different sizes of the boots were found altogether, indicating those engaged in building the bastion.

In the 3rd century CE, a public bathhouse was built adjoining and also on top of the bastion, which was thereby superseded. The pottery discovered in the foundation channels of the bastion walls and the finding of the *caligae* imprints allow us to determine the time of its erection from the 1st century to the beginning of the 2nd century CE. This was a unique defence position of the Early Roman period, nothing similar to it has so far been revealed.

Outworks

The external system of fortifications in Hippos has not yet been excavated, but they have been surveyed and studied. These components of the external fortifications include wall sections on the northern slopes and especially those on the southern ones, the ditch in the centre of the saddle ridge, and perhaps also the series of structures that housed the launching machines near the ditch.

Wall segments along the southern and northern slopes

During the course of the survey, wall sections built of ashlars were located under the line of the northern and southern cliffs. These walls were built on rock projections above places where there were 'dead spots' that could have been used by the enemy. The wall sections on the slope were meant to give cover to the defenders while protecting those dead spots. Under the bastion and on the east side of the southern slope, a system of walls was found, built in a cell-like formation along a total length of about 40 m and a width of 12 m (Figs 7, 11). The slope here is so steep that it is difficult to suppose that just in this place Hippos' inhabitants tried to overcome it and build civilian or public buildings and a military nature of structure seems more reasonable.

Could there have been additional launching machines housed in protected hangars in the centre of the saddle ridge on which the main road to the east gate was laid, where a ditch was found quarried into the soft limestone? The maximum width of the ditch was 8 m and it was 4 m deep. This ditch also served as a borderline between the necropolis and the *polis*. Hundreds of tombs carved into the soft rock extended up to the south side of the ditch (Figs 4, 11).

A series of four structures was found near the ditch and on the west side of it, with their wide openings facing west in the general direction of the Sussita rivulet and the ancient road (Fig. 11). These structures have not yet been excavated, but their style of construction with basalt ashlars and their attachment to another wall that ascended from the saddle ridge to the north-west in the direction of the bastion raises the possibility that we have here a system of secure hangars for the launching machines that were meant to protect the main road and trained almost directly towards the ancient road on which the heavy war machines of the enemy could ascend. If this is so, then it is the first example of a defence system of this kind precisely in accordance with Philon's recommendations (Philo *Poliorketika* I, 32).

[15] A projectile stone machine (ballista) of 40 *minae* could have been operated here, in a calculation based on Philon's formula in accordance with the length of the vaulted chamber of about 8 m. However, in this case, the barrel of the machine could protrude slightly from the wall and thus perhaps the improved and smaller projectile machines of the Early Roman period, the Palintone Vb model, were installed here. Perhaps even a launcher of up to 60 *minae* could have been introduced into the chamber vault. Marsden 1969, 33–6, 46–7.

Fig. 11 Hippos, a suggested artistic reconstruction of the city during the Roman period and the ancient road leading to the Sussita saddle ridge. Some of the towers are hypothetical (drawn by D. Porotski, V. Pirsky, M. Eisenberg and A. Regev-Gisis).

Conclusions

It seems that the system of fortifications in Hippos during the Early Roman period resembled the 'serrated' wall system adjacent to the line of cliffs (Fig. 10). A wall of this kind was recommended by Philon for a mountainous area (Philo *Poliorketika* I, 84). The number of towers was small because of the advantage of height and because of the sharp crags along the cliff line. The eastern gate and the bastion are among the remaining vestiges of the main fortifications that date from the Early Roman period. It is surprising that just in a period in which, for the first time, unfortified cities began to appear, and Nysa-Scythopolisis the best example for it in this region, a relatively small city such as Hippos was fortified in such an impressive manner. Many question marks still hover over some of these remains, and will certainly be clarified when the time comes to excavate them.

The strong affinity, however circumstantial, between Philon's recommendations in his *Poliorketika* and the military architecture in Hippos raised the possibility that the military architects who built the fortifications on the mountain were well aware of these recommendations or had even held in sight this military manual for the fortification of cities during the Hellenistic period.

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