Economic Challenges of Building a *Geländemauer* in the Middle of the 4th century BC: Quantifying the City Wall of Messene

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The term *Geländemauer*, also called a great circuit, usually means a city wall that not only encircles a settlement itself, but also includes a considerable part of not built-up territory, at the same time making defensive use of the formations of the terrain. The popularity of these sizeable monuments in the Greek world from the Archaic to the Hellenistic period[1] forcibly raises questions about the economic challenges they implicated for the cities building them. In order to approach this question, an attempt of quantifying the city wall of Messene, one of the finest examples of the type[2], in terms of material, workforce, time and costs is made against the background of the city's historical situation.

The monument

Messene was founded in 369 BC as the new capital of Messenia by the Theban general Epameinondas after he had defeated the Spartans in the battle of Leuktra 371 BC and thereafter had liberated Messenia from the Spartan dominion, which had lasted about three and a half centuries. Messene was laid out on the south slope of Mt. Ithome, which bore a high symbolic and strategic value for the Messenians.[3] According to Pausanias (4, 27, 5–7), Messene was equipped with a city wall right at its foundation, which is confirmed by archaeological studies: typology, construction details as well as excavation material all point to its construction around the middle of the 4th c. BC.[4]

One of the best preserved Greek fortifications (fig. 1), the city wall of Messene includes a ring wall around the summit of Mt. Ithome, from where it climbs down to encompass the lower town (fig. 2). The northern, western and eastern parts of the fortifications run over the crests and ridges of hills, while the southern section is oriented along the northern side of a gorge. The total length of the circuit is 9,150 m, which include 1,450 m of natural defences where no wall was necessary, so the length of the built fortifications is 7,700 m. The trace of the wall was clearly chosen on strategic grounds: it constitutes the best defensible line around the city. The total area encircled is 360 ha, of which only around 100 ha (28%) were built-up.

The wall is built entirely of stone instead of having a mudbrick superstructure like most contemporary walls. The curtains consist of two stone faces with a filling of earth and rubble stones in between. In a few sections, this filling consists of large layered stone blocks and virtually represents solid masonry. The two faces are connected to the filling by their rough inner surfaces, by stretchers reaching into

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Fig. 1: Northern part of the western fortifications of Messene with tower 11 in the foreground.

it or by compartment walls connecting the two faces. In more endangered areas, the curtains are considerably wider and higher than in steeper and naturally better protected terrain. Large parts of the wall walk are plastered with limestone slabs. The battlements were crenellated all around the circuit, most sectors also including traverses to stabilize the merlons.

There are remains of 46 towers or other flanking structures preserved, but originally there must have been around 80. Distances between them vary flexibly between 26 and 160 m, according to factors of terrain or security. The towers are mostly square apart from two half-round ones and consist of a solid base with an artillery chamber on top. In crucial areas or close to gates, however, the towers are two-storied in order to increase their defensive potential. Only three two-storied towers are preserved, but we can estimate an original number of around 16 on the basis of topographic and strategic aspects. Their roofs were either gabled or shed.

As for the gates, the largest ones – the Arcadian Gate in the north (fig. 3), the West Gate and the South Gate – were designed as courtyard gates with two outer towers and lockable doors at their inner sides[5], the South-West Gate was originally flanked by two towers without a courtyard, the North-West Gate by only one tower, the South-East Gate perhaps by no tower at all, while the Laconian Gate in the east was designed as a tower-gate housing the entrance in its ground floor.[6]

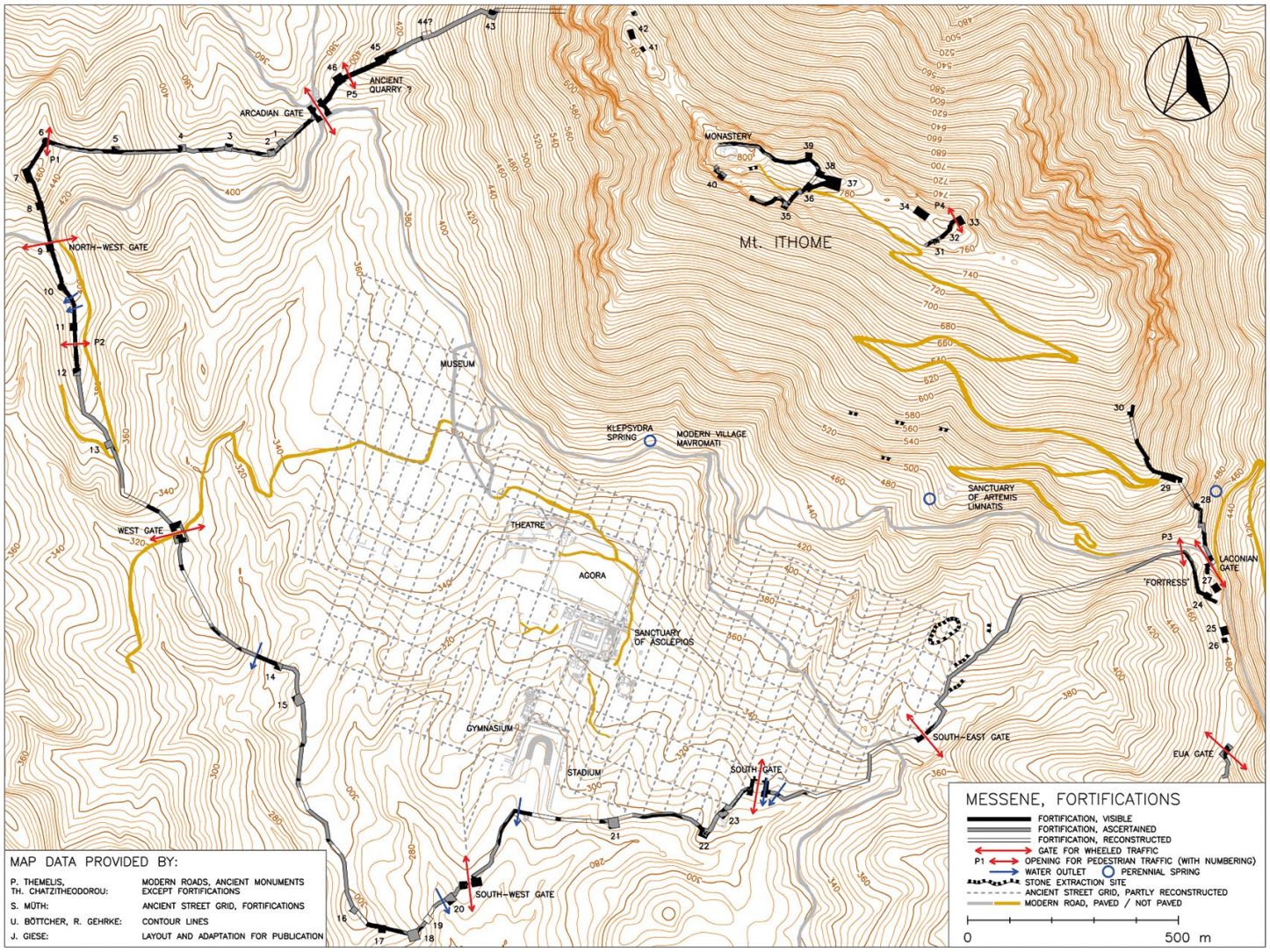

Fig. 2: Plan of the city wall of Messene.

Monumentality versus Efficiency

The circuit includes some heterogeneous elements like differences in construction techniques and typology of curtains, flanking structures, windows, gates and posterns, which indicate the employment of many teams with varying backgrounds and a certain degree of haste in the building process. Moreover, we have already observed aspects of economic planning in the flexible dimensions of curtains and number of tower floors. Also in the choice of material, a stringent economic plan may be observed: the high-quality hard limestone in the well-preserved parts was only used in the north and northwestern parts of the circuit (from the Ithome ring wall to south of T 11), where

Fig. 3: The Arcadian Gate of Messene and the adjacent stretch of wall to the east seen from southwest.

it forms the rocky ground. This hard limestone generates either ashlar or trapezoidal masonry according to the natural characteristics of its deposits (figs. 1, 3 and 8b). In the southeast (from the South-East Gate to T 30), the locally genuine hard limestone with virtually unworkable inclusions served as construction material (fig. 4a). This, however, did not allow for neat joints, so the wall there has largely collapsed. In the southwest and south (from south of T 11 to the South-East Gate) in contrast, a soft psammite (a variety of arenite) was used (fig. 4b). It was easily accessible in quarries south of Messene, could be quarried quickly and generated regular ashlar masonry. On the other hand, this material is prone to weathering and has vanished for most of its parts. Thus, it is obvious that the Messenians did not have time or money to quarry good-quality material for the whole circuit, but always took the easiest accessible variety.

All the same, the city wall of Messene was clearly designed as a strong defensive monument, which was also necessary against the continuous Spartan threat. Furthermore, the wall included various representative aspects like the particularly large double entrances of the main gates, which were chosen rather for reasons of monumentality than the amount of traffic[7], the fine masonry finishing of the Arcadian gate (fig. 3) or the decorative consoles used at its city side and under the lintels of the water outlets in the southern circuit. These features lead us to the conclusion that this

Figs. 4: a. Messene. West corner of T 24 built of hard limestone of mediocre quality with inclusions. b. Remains of the outer face of the psammite curtain south of the West Gate.

city wall was also meant as a monumental symbol, not only of the Theban victory over Sparta, but also of the freedom, independence and common identity of the Messenians.[8]

The defensibility and representativeness of this *Geländemauer* on the one hand and the economic aspects on the other hand indicate that its builders were in a kind of

Fig. 5: a. Extraction sites of hard limestone (marked with A) and course of the wall (pointed line) on Mt. Ithome. b. Extraction site close to the summit of Mt. Ithome with a row of wedge holes.

double bind between monumentality and efficiency and tried to limit the expenses in some way. This leads us to the question, how large an overall investment such a monument meant for its builders.

Quantifying

To estimate the investment of the Messenian wall, the character and amount of the stone material to be quarried, the transport of this material from the quarries to the construction site, the dressing of the blocks, their setting into place and the wood and tile work for second floors and roofs of towers and gates have to be taken into account. These steps have to be calculated in relation to workforce and time, i.e. how long each step took per worker and unit and how many people were employed, in order to estimate the total expenditure and time of construction of the wall.[9] Here, only the stonework as the most important part is considered in detail.[10]

Hard limestone is dominating in the parts of the circuit close to Mt. Ithome, where it outcrops and also serves as the foundation of the walls. It was often quarried on the spot and was normally not transported beyond a distance of 1 km. There are various points of extraction on the hill (fig. 5), sometimes erratic boulders were used and there must have been at least one large, systematic limestone quarry, probably east of the Arcadian gate. In the strata of hard limestone natural fractures facilitate the extraction with a lever. The technical quality of the hard limestone varies heavily: it is mediocre in the southeast of Mt. Ithome, quite good in the northwest and fair in general.

Fig. 6: Detail of the ancient quarry of psammite east of the village of Kalogerorachi (south of Messene).

The closest outcrops of the soft rock called psammite can be found southeast of Messene in a distance of roughly 5 km as the crow flies. We could discover only one ancient quarry close to the village of Kalgerorachi (fig. 6), which is mostly covered but presents a rocky mass without joint or fissure and fronts that prove that large-size masonry blocks have been extracted. The psammite blocks used in the vicinity of gates and in flanking structures often show a chamfer and a regular bevelling around a raw bossage, sometimes featuring a quarrier's mark (fig. 4b), while normal curtains mostly present more cursory faces. Different qualities of psammite can be found: the finest one is particularly used for the flanking structures, whereas the roughest quality used in the normal curtains as a minor variety is a sort of conglomerate composed of small hard pebbles, which are connected by a soft geologic cement. This indicates that different psammite quarries have been exploited at the same time.

The techniques of quarrying can be defined by studying traces on the quarry fronts and on the raw surfaces of the blocks, being mostly grooves caused by the quarrier's pick, while wedges served to break the blocks at their base.[11] In the 1990s,

Fig. 7: Transport routes of the psammite blocks from the quarry south of Messene to the construction sites.

several seasons of restoration and experimental archaeology were conducted in Doura Europos, Syria, using methods and tools similar to the original ones.[12] This allows us to estimate the production time of one psammite block of the average size used at Messene (116 cm × 50 cm × 42 cm) in the quarry at around 3 hours for one man.[13] The transport route for carts between the quarry and the circuit is between 6.5 and 8 km long (fig. 7) and can be estimated at roughly 6 hours, 30 min. including return.[14] If we add waiting times for loading and unloading and care for the oxen, one carter could transport six blocks of a total of 3 tons of weight per day, using six oxen dragging his cart. On the basis of a 10-hours working day[15], this makes 1 hour, 40 min. per block. Another 20 min. have to be added for one man loading and unloading the block.

Also the tools, techniques and time for dressing the blocks of soft rock on the construction site were tested in Doura Europos[16] and can be adapted to the psammite blocks of Messene so that one block would have needed 6 hours 40. For placing these blocks on the wall, two workers would have needed 1 hour and 40 min., which makes 3 man-hours and 20 min. Thus, a total of 15 man-hours was required for production, transport and placement of one psammite block.

As to hard limestone, apart from the naturally fractured strata quarried directly with the lever, quarrying is done by gouging holes and generating a fracture with the help of wedges before the blocks are detached with levers. One block could be produced by one quarrier in 3 hours 30 like this.[17] The general definition of the edges

Fig. 8: a. Experimental dressing of an erratic boulder of hard limestone at Messene by Jean-Claude Bessac. b. Tower 46 at Messene.

of the block is done with an embossing hammer, often in the quarry, but sometimes also on the construction site and did not take more than 10 min. on average for each block.

In order to evaluate the time for dressing hard limestone, practical experiments were conducted on an erratic boulder in Messene in 2006 (fig. 8a).[18] The first step was to remove the rough irregularities of the upper side in a depth of 4 cm in an area of 1 dm^2 with the help of a moil chisel. From this exercise we can calculate 7 hours 45 for a whole block of average size and quality. The other steps included the precise chasing with a flat chisel, which would take 2 hours for a whole block, and the finishing of the anathyrosis at the joints with a pointed chisel, which would take 5 hours 15. The total duration of the dressing of a typical hard limestone block (header or stretcher) may consequently be calculated at ca. 15 hours.

For the transport of limestone blocks, which was done by dragging the blocks on wooden slides, we can calculate an average distance of only 400 m, equivalent to 1 man-hour and 30 min.[19] Placing these blocks on the wall required the same time as for psammite blocks, i.e. 3 hours 20. Thus, the total time for production, transport and placement of one limestone block was 23 man-hours and 30 min.

On this ground, we can venture some total evaluations for the city wall of Messene. Calculating the team sizes according to ideal working procedures and including practical differences between the stone dressing and construction of curtains and towers as well as adequate extra time for the filling of curtains and tower bases with earth and rubble, a two-storied tower of hard limestone, which contained 704 blocks (fig. 8b)[20], would have taken 1,872 man-days or 117 days for 16 workers, and a one-storied tower 1,248 man-days or 78 days for the same workforce. A curtain of hard limestone of an average of 2.20 m width, 4.20 m height, 100 m length and a 2-m parapet would be equivalent to 5,550 man-days or 347 days for 16 workers. A two-storied tower of psammite would amount to 1,287 man-days or 117 days for 11 workers, a one-storied tower to 858 man-days or 78 days for 11 workers, and a curtain of psammite of 2.20 m width, 4.20 m height, an average length of 87 m and a 2-m parapet would have taken 12 workers 265 days, or 3,170 man-days. Looking at the relation between hard limestone and psammite, the use of psammite saves 26.8% of time (or workforce) for the curtains and 31.25% for the towers, which represents a considerable advantage, in spite of the inferiority of this rock in other respects.

For the whole circuit, we arrive at a total amount of 507,335 man-days for the stonework without foundations and special structures. This would mean a minimal time of 325 days or eleven months for a high workforce of 1,565 men, but an optimal organisation would result in 522 men working for 972 days, which is equivalent to two years and eight months.[21] Thus, the total construction time of the monument can be estimated between one and four years, and in consideration of the circumstances of the city's foundation is perhaps rather to be expected on the lower end of this range.

Financial Estimation

It is worth trying to estimate the financial investment, although we are leaving safe ground, as many variables are uncertain. Most importantly, we do not know if unpaid workforce, e.g. soldiers of the Theban and allied troops or parts of the new inhabitants, were available, but as Pausanias (4, 27, 5) explicitly mentions skilled workers having been summoned, we will calculate with paid workforce. The daily salary of a skilled worker on a construction site of the 4th c. BC was two Attic drachmas (dr.)[22], which means a minimum total cost of the stone work of ca. 1,015,000 dr. or 169.2 Attic talents. To this sum, we need to add costs for the carts for the transport of psammite blocks. In the 4th c. BC, a pair of oxen cost around 4 dr. a day[23], so six oxen cost 12 dr. For the total of 17,303 cart days, this would add another 207,640 dr. or 34.6 talents to the costs, which makes a total sum of 203.8 talents, where costs for building the carts are not yet included.

We need to add even more for the construction of transport ways, for special constructions like stairs, gates, posterns and water outlets, for the wall walk,

decorative surface treatment of special features, metal clamps, tiles and woodwork for roofs, upper floors and shutters of towers, for lifting machines and leading and organizing personnel. Neither did we include the foundations the fortification had in its southern parts resting on soft ground, as we do not know their average depth. We are certainly not going wrong with assuming a minimum sum of 300 talents everything included.

For a comparison, the costs of the northern wall of the Epipolai of Syracuse with a length of only 5.7 km[24] are calculated by Henri Tréziny at a maximum of 500 talents, although this is based on the probably exaggerated numbers of workmen and carts given by Diodorus.[25] A wall of 7.7 km (like in Messene) would have cost around 675 talents under these conditions, which is more than the double of what we calculated as a minimum. For the rebuilding of the Long Walls of Athens and the walls of Piraeus by Konon in the early 4th c. BC, which were roughly 26 km of (mostly newly built) mud brick wall on a stone base, Tréziny calculates on the basis of inscriptions and written sources again around 500 talents, but without including the greater height of towers, roofs and special buildings.[26] In this case, the much greater length of this wall is partly balanced by the cheaper construction with mud bricks. On these grounds an estimate of 300-400 talents for the city wall of Messene might be quite realistic.[27]

Setting this into relation to religious buildings, a large temple would fall into the same financial category: the seven temples of Selinous can be calculated on average at around 300 talents each, the Alkmaionid and the 4th-c. temples in Delphi at 300–400 talents each and a masterpiece like the Parthenon at 500 talents.[28]

Thus, a *Geländemauer* like the one of Messene is comparable to a major temple in cost and must have meant an extraordinary expense, even more so for a population that just had gathered, that probably did not have many resources and had to build a whole new town on top of this. All the same, this fortification must have been urgently needed for its defence, and we must presume that the Thebans and their allies paid their share for its construction. This vast expense was worth spending, however, and paid off in the end, as Messene was able to persist and thrive over many centuries and Sparta could never lay hands on it again.

Notes

[1] Cf. Winter 1971, 111–114; Garlan 1974, 82; Beste – Mertens 2015, 284–285; Frederiksen 2011, 90.

[2] We had the pleasure of studying this monument with a team of colleagues in the course of a project of the Free University of Berlin from 2004–2008, thanks to the friendly cooperation of the director of excavations in Messene Petros Themelis and generous funding from the Gerda Henkel Foundation in Germany. The publication is in progress (Müth – Bessac, forthcoming).

[3] For more details cf. Müth 2007, 13–18.

[4] Cf. Müth 2010; Giese 2010; Schwertheim 2010; Müth 2014; Giese – Müth 2016.
[5] The West-Gate may be reconstructed like this with some certainty.
[6] For more detailed data on the walls of Messene cf. Giese – Müth 2016. The identification of the Laconian Gate as a tower gate, however, is a new observation by S. Müth.
[7] Schwertheim 2010.
[8] Cf. Müth 2014, 113–115; Müth et al. 2016.
[9] Cf. De Staebler 2016.
[10] The wood and tilework will be included in the final publication, cf. Müth – Bessac, forthcoming.
[11] Bessac 1980, 137–140; Bessac et al. 1997, 167–177.
[12] Cf. Bessac 1988, 297–313; Bessac – Leriche 1992, 72–78; Bessac 1997, passim.
[13] Bessac 1991, 303 with n. 1; Bessac 1996, 312.
[14] Based on calculations by Raepseat 1984, 118–119. 133–134; Vanhove 1987, 284–285.
[15] As the working hours per day have only in recent times been reduced to around 8, a 10-hours working day makes a realistic average for outside work in Mediterranean regions between winter and summer days.
[16] Bessac 1997, II, 244–250; Bessac 2004, 79–89.
[17] This duration has been calculated for the particular limestone varieties in Messene. For comparisons, cf. Bessac 1987, 34; Bessac 1996, 312–313.
[18] By J.-C. Bessac.
[19] Cf. Aladenise 1982, 104 fig. 55. The time calculation is based on own experience.
[20] For this number, the well-preserved tower T 46 served as a model.
[21] It is impossible to present all the details of this calculation in this frame. They will be supplied in Müth – Bessac, forthcoming.
[22] Loomis 1998, 108–115; Tréziny 2001, 373–374.
[23] IG II,2, 1673, 1, 64–89; cf. Martin 1965, 166–167; Loomis 1998, 108–115.
[24] Mertens 1999; Beste – Mertens 2015, 57–60. 255–259.
[25] Tréziny 2001, 373–374, while Typaldou-Fakiris 2004, 302–303 arrives at only 120 talents, which seems, however, to be based on an error (3000 instead of 6000 pairs of oxen) and too low wages.
[26] Tréziny 2001, 372.
[27] As a contrast, new calculations by Fachard et al., forthcoming for the fortress of Eleutherai with a wall length of ca. 600 m and 13 towers arrive at a cost of only 10–12 talents everything included, which would, translated to the 7,7 km of Messene, mean a sum of only 130-156 talents. This shows the high span for such calculations, depending on different variables.
[28] Cf. Tréziny 2001, 376–377; Hellmann 2002, 56; Hellmann 2010, 309–310 with further literature.

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References

Aladenise 1982
V. Aladenise, Technologie de la taille de pierre (Paris 1982).

Bessac 1980
J.-C. Bessac, Le rempart hellénistique de Saint-Blaise (Saint-Mitre-les-Remparts, B.-du-Rh.): Technique de construction, DocAMerid 3, 1980, 137–157.

Bessac 1987
J.-C. Bessac, Matériaux et construction de l'enceinte augustéenne de Nîmes, in: M.-J. Colin (ed.), Les enceintes augustéennes dans l'Occident romain (France, Italie, Espagne, Afrique du Nord). Actes du Colloque international de Nîmes. IIIe congrès international de Gaule méridionale, 9–12 octobre 1985, Bulletin de l'École Antique de Nîmes 18 (Nîmes 1987) 25–38.

Bessac 1988
J.-C. Bessac, L'analyse des procédés de construction des rempart de pierre de Doura-Europos: questions de méthodologie, Syria 65, 1988, 298–313.

Bessac 1991
J.-C. Bessac, Le chantier antique du creusement des galeries du vallon des Escaunes à Sernhac, in: G. Fabre – J.-L. Fiches – J.-L. Paillet (eds.), L'aqueduc de Nîmes. (Nîmes 1991) 289–316.

Bessac 1996
J.-C. Bessac, La pierre en Gaule Narbonnaise et les carrières du Bois des Lens (Nîmes): Histoire, archéologie, ethnographie et techniques, JRA Suppl. 16 (Ann Arbor 1996).

Bessac 1997
J.-C. Bessac, La construction des fortifications hellénistiques en pierre de Doura-Europos (Syrie) 1–3 (PhD diss. Rennes 1997).

Bessac 2004
J.-C. Bessac, Restitution en pierre du mur nord du socle du Strategion de Doura-Europos et archéologie expérimentale, in: P. Leriche – M. Gelin – A. Dandrau (eds.), Doura-Europos. Études V, 1993–1997 (Paris 2004) 79–89.

Bessac et al. 1997
J.-C. Bessac – J. Abdul Massih – Z. Vallat, De Doura-Europos à Aramel: Enquête ethno-archéologique dans les carrières traditionnelles de Syrie, in: Doura-Europos. Études IV, 1991–1993, Bibliothèque archéologique et historique 149 (Beyrouth 1997) 159–197.

Bessac – Leriche 1992
J.-C. Bessac – P. Leriche, L'analyse des techniques de construction en pierre et en brique crue, DossAParis 172, 1992, 70–81.

Beste – Mertens 2015
H.-J. Beste – D. Mertens, Die Mauern von Syrakus. Das Kastell Euryalos und die Befestigung der Epipolai, Deutsches Archäologisches Institut Rom, Sonderschriften 18 (Wiesbaden 2015).

De Staebler 2016
P. De Staebler, The Building Experience, in: S. Müth – P. I. Schneider – M. Schnelle – P. DeStaebler

(eds.), Ancient Fortifications: A Compendium of Theory and Practice, Fokus Fortifikation Studies 1 (Oxford 2016) 61–74.

Fachard et al., forthcoming

S. Fachard – S. C. Murray – A. R. Knodell – K. Papangeli, The Fortress of Eleutherai: New insight from survey, architecture, and epigraphy, Hesperia 89, 2020, forthcoming.

Frederiksen 2011

R. Frederiksen, Greek City Walls of the Archaic Period, 900–480 BC (Oxford 2011).

Garlan 1974

Y. Garlan, Recherches de poliorcétique grecque (Athens 1974).

Giese 2010

J. Giese, Bautechnische Beobachtungen am nördlichen und nordwestlichen Mauerabschnitt in Messene, in: J. Lorentzen – F. Pirson – P. Schneider – U. Wulf-Rheidt (eds.), Aktuelle Forschungen zur Konstruktion, Funktion und Semantik antiker Stadtbefestigungen, Kolloquium 9./10. Februar 2007 in Istanbul, Byzas 10 (Istanbul 2010) 85–95.

Giese – Müth 2016

J. Giese – S. Müth, Messene, in: S. Müth – P. I. Schneider – M. Schnelle – P. DeStaebler (eds.), Ancient Fortifications: A Compendium of Theory and Practice, Fokus Fortifikation Studies 1 (Oxford 2016) 278–85.

Hellmann 2002

M.-C. Hellmann, L'architecture grecque 1. Les principes de la construction (Paris 2002).

Hellmann 2010

M.-C. Hellmann, L'architecture grecque 3. Habitat, urbanisme et fortifications (Paris 2010).

Loomis 1998

W. T. Loomis, Wages, Welfare, Costs, and Inflation in Classical Athens (Ann Arbor 1998).

Martin 1965

R. Martin, Manuel d'architecture grecque 1. Matériaux et techniques (Paris 1965).

Martin 1973

R. Martin, Aspects financiers et sociaux des programmes de construction dans les villes grecques de Grande Grèce et de Sicile, in: Atti del dodicesimo Convegno di Studi sulla Magna Grecia, Taranto 1972 (Naples 1973) 185–205.

Mertens 1999

D. Mertens, Die Landschaftsfestung Epipolai bei Syrakus, in: E.-L. Schwandner – K. Rheidt (eds.), Stadt und Umland. Neue Ergebnisse der archäologischen Bau- und Siedlungsforschung. Bauforschungskolloquium in Berlin vom 7. bis 10. Mai 1997 (Mainz 1999) 143–149.

Müth 2007

S. Müth, Eigene Wege. Topographie und Stadtplan von Messene in spätklassisch-hellenistischer Zeit (Rahden/Westf. 2007).

Müth 2010

S. Müth, Fortifikationskunst und Repräsentation an der Stadtmauer von Messene, in: J. Lorentzen – F. Pirson – P. Schneider – U. Wulf-Rheidt (eds.), Aktuelle Forschungen zur Konstruktion, Funktion

und Semantik antiker Stadtbefestigungen, Kolloquium 9./10. Februar 2007 in Istanbul, Byzas 10 (Istanbul 2010) 57–83.

Müth 2014

S. Müth, The Historical Context of the City Wall of Messene: Preconditions, Written Sources, Success Salance, and Societal Impacts, ProcDanInstAth 7, 2014, 105–122.

Müth – Bessac, forthcoming

S. Müth – J.-C. Bessac, Die Stadtmauer von Messene I. Topographie und Beschaffenheit – Materialien und Steinbearbeitung – Geschichte und Funktion, forthcoming.

Müth et al. 2016

S. Müth – E. Laufer – C. Brasse, Chapter 7. Symbolische Funktionen, in: S. Müth – P. I. Schneider – M. Schnelle – P. DeStaebler (eds.), Ancient Fortifications: A compendium of theory and practice, Fokus Fortifikation Studies 1 (Oxford 2016) 126–158.

Raepseat 1984

G. Raepsaet, Transport de tambours de colonnes du Pentélique à Eleusis au IVe siècle avant notre ère, AntCl 53, 1984, 101–136.

Schwertheim 2010

U. Schwertheim, Monumentale Hoftore in Messene, in: J. Lorentzen – F. Pirson – P. Schneider – U. Wulf-Rheidt (eds.), Aktuelle Forschungen zur Konstruktion, Funktion und Semantik antiker Stadtbefestigungen, Kolloquium 9./10. Februar 2007 in Istanbul, Byzas 10 (Istanbul 2010) 97–106.

Tréziny 2001

H. Tréziny, Les fortifications de Marseille dans l'antiquité, in: M. Bouiron – H. Tréziny – B. Bizot u.a. (eds.), Marseille: trames et paysages urbains de Gyptis au Roi René: Actes du colloque international d'archeologie, Marseille, 3-5 novembre 1999, Études massaliètes 7 (Aix-en-Provence 2001) 45–57.

Typaldou-Fakiris 2004

C. Typaldou-Fakiris, Villes fortifiées de Phocide et la IIIe guerre sacrée 356-346 av. J.-C. (Aix-en-Provence 2004).

Vanhove 1987

D. Vanhove, À propos d'un chariot servant à transporter le marbre, AntCl 56, 1987, 284–289.

Winter 1971

F. E. Winter, Greek Fortifications (Toronto 1971).