

# ADALYA



SUNA-İNAN KIRAÇ AKDENİZ MEDENİYETLERİ ARAŞTIRMA ENSTİTÜSÜ  
SUNA & İNAN KIRAÇ RESEARCH INSTITUTE ON MEDITERRANEAN CIVILIZATIONS

# ADALYA



SUNA-İNAN KIRAC AKDENİZ MEDENİYETLERİ ARAŞTIRMA ENSTİTÜSÜ YILLIĞI  
THE ANNUAL OF THE SUNA & İNAN KIRAC RESEARCH INSTITUTE ON MEDITERRANEAN CIVILIZATIONS

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## ***Yapım / Production***

Zero Prodüksiyon Ltd.

ISSN 1301-2746

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## **A Short Account of Recorded Calamities (earthquakes and plagues) in Antalya Province and Adjacent and Related Areas Over the Past 2,300 Years - an Incomplete List, Comments and Observations**

T. M. P. DUGGAN\*

This article concerns the record of earthquakes and plague to strike Antalya province and those areas related through the trade routes to the province over the past 2,300 years. It contains evidence from the historical record, from chronicles, inscriptions and other records and from archaeological reports, concerning plague and earthquakes in the province and in the adjacent and related regions. It includes reports of significant earthquakes in the related areas of Rhodes 100 km West and Cyprus 60 km South East of the province, and some seismic events on land, both east, north and west of Antalya province have also been included in this article (Figs. 15 and 16), as neither sea wave (tsunami), caused by an earthquake underwater or on land adjacent to it, nor any earthquake shock wave, pays any attention to provincial boundaries<sup>1</sup>. Major earthquakes can have significant consequences at considerable distances from the epicenter of the earthquake, particularly in areas of alluvial deposition, of mud, sand and clay and in coastal regions subject to tsunami waves, and are of importance in Antalya Province, which is situated in the area of the "Mediterranean earthquake belt" (Akdeniz deprem kuşağı). Likewise, along the trade routes over the past 2,300 years, by sea and overland came not only merchandise and merchants, goods for export and import through the important ports of Antalya, Alanya, Finike, Andriake-Myra, Patara and other smaller ports, but also officials and pilgrims, armies and raiders, the plague and other epidemics.

A link has been established between earthquakes (as well as wars and famine) and some outbreaks of the plague<sup>2</sup>; chronicles record this connection: in respect of 542<sup>3</sup>, both an earthquake and plague struck Cyprus and Rhodes in 1347<sup>4</sup>, the major quake of January

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\* T. M. P. Duggan, Gençlik Mah., 1315 Sok., Ekin Apt., 3/7 Antalya.

<sup>1</sup> Rheidl 1996, 93. For example, the earthquake centered on Chliera by Pergamum of 1296, not only totally destroyed the city and Byzantine fortress of Chliera and destroyed much of Pergamum city but also, brought down the statue of Emperor Andronikos II<sup>nd</sup> and damaged the Church of All Saints in Constantinople (İstanbul) 260 km. away.

<sup>2</sup> Plague 1996, 11-12.

<sup>3</sup> Prokopius 2001, 88.

<sup>4</sup> Zeigler 1973, 111 from Nicephoras Gregoras.

1348 which damaged buildings from Naples to Venice, which affected both Germany and Greece, chroniclers noted, was followed by the plague pandemic<sup>5</sup>, while a series of earthquakes between 1904 and 1908 killed thousands in Sicily and made the cities of Northern Sicily uninhabitable for hundred of thousands of people, with a tidal wave erasing 300 villages and drowning 50,000 people leading to half the population of Sicily emigrating<sup>6</sup>. These are significant events, plague, earthquakes and the associated tidal waves, and it seems sensible to group the occurrence of these two types of calamitous events in a single article.

## The Classical Gods of Earthquakes

Poseidon, the Pre-Homeric and Classical God, who was thought to be responsible for earthquakes, that is, waves on land - earthquakes, as well as waves at sea, including tidal waves - tsunami<sup>7</sup>, was believed to inhabit the mountain range upon which the Lycian city of Termessos is situated, the Bey Dağları range of the Tauros Mountains by Antalya city<sup>8</sup>. The epithet "Asphalios" meaning "The feared danger", was frequently attached to inscriptions dedicated to Poseidon, in the attempt to ward off earthquakes. One example from the last 25 years of the 2<sup>nd</sup> century BC, from Didyma near Miletos reads: "The God has spoken: Petition Poseidon Asphalios with sacrifices in this sign, and pray to him to come propitiously and to preserve the appearance of your city, without tremors and without danger<sup>9</sup>". Later dedications to Zeus Soter - "Zeus the Savior", with inscriptions at: Neapolis where the inscription is built as spolia into a 6<sup>th</sup> century Byzantine Basilica, at Telmessos, at Cyaneae and at Oinoanda, all cities in Lycia struck by earthquakes<sup>10</sup>, as at other cities repeatedly struck by earthquakes such as Antiochia (Antakya), show that a dedication to "Zeus Soter" often related to the dedication or re-dedication of a temple following an earthquake, and the thanks given to the God Zeus by the survivors of an earthquake, for their survival.

Any visitor to the classical sites in Antalya Province, to sites such as Termessos, Perge and Selge will be aware of the impact of earthquakes on the classical cities of Antalya Province. The devastation wrought by earthquakes including, not only the overthrowing of buildings, including temples and large theaters built of dressed stone blocks, fires caused by the quake, release of noxious gasses, the destruction of water supplies and on occasion, tidal waves - tsunami sweeping a kilometer or more inland, but also, on occasion, the loss of entire settlements, that vanished into the ground as a result of an earthquake<sup>11</sup>. There is clear evidence to be seen at classical sites of repair work after earthquakes and of destroyed aqueducts-viaducts, water supply systems and cisterns at for

<sup>5</sup> Tuchman 1989, 96.

<sup>6</sup> F. Viviano, *Blood washes blood* (2001) 68.

<sup>7</sup> Polimenakos 1996, 253-5.

<sup>8</sup> Lanckoronksi II 1-3 for Poseidon at Termessos - Mt. Solymos, also Heredotos 1972, ch. 7, lines 126-30, for the connection between Poseidon and earthquakes, Poseidon making the gorge for the river Peneus and so draining the inland Thessalian Sea.

<sup>9</sup> *Mediterranean* 1994, 149-150.

<sup>10</sup> N. Şahin, *Zeus'un Anadolu Kültürleri* (2001) 174.

<sup>11</sup> *Mediterranean* 1994, 147 re the earthquake of 199-8 BC or that of 1743.



example: Aspendos where an earthquake in the mid 3<sup>rd</sup> century destroyed part of the water supply system that was built in the 2<sup>nd</sup>-3<sup>rd</sup> century, resulting in the re-use of the fallen stone blocks from the Roman aqueduct in the Roman bridge built in the early 4<sup>th</sup> century across the Eurymedon river, which was in turn, brought down by an earthquake; at Perge where the Hellenistic towers on either side of the city gate of 200 BC show clear evidence of earthquake damage; at Selge where the water supply system of Roman aqueducts and terra-cotta pipes, that supported a population of 20,000, were destroyed by an earthquake in the 3<sup>rd</sup> century AD and as a result, the city had to be abandoned; likewise, Termessos was abandoned in the 5<sup>th</sup> century AD because the water supply and storage cisterns were destroyed by one, by a series of earthquakes.

### Lack of full data for the period from the 7<sup>th</sup> Century to the 16<sup>th</sup> Centuries

The record of earthquakes from the mid-6<sup>th</sup> century to the 16<sup>th</sup> century is sparse, in comparison with both earlier and later periods, partly due to the substantial changes in the population density (demographic collapse) and resultant changes in settlement patterns in Anatolia from the 6<sup>th</sup> to the end 15<sup>th</sup> century, with the plague (Pasturella Pestis - Yersinia Pestis) pandemic coming from Ethiopia via the port of Pelusium and then Alexandria in the Nile Delta in 541, to reach Anatolia in 542 both by sea, and overland through Palestine and Syria. The symptoms of plague described by the chroniclers of the 541 and 1347 pandemics have been confirmed by modern scientists as clinically accurate descriptions of Yersinia Pestis<sup>12</sup>. This mid 6<sup>th</sup> century plague pandemic lasted for 200 years and led to massive depopulation in excess of 30%, with perhaps coastal settlements losing 50% or more of their populations, if the death rates of the later Black Death were similar<sup>13</sup>. With another vast plague pandemic sweeping over Anatolia from 1346 onwards, with a similar loss of life, wars, invasions, famines brought about by the loss of labourers, livestock and depopulation and thus inevitably, to a shortage of references in the chronicles to earthquakes affecting the province. The following provides some idea of the degree of chaos and depopulation in both the province and in Anatolia in the period from the 6<sup>th</sup> to the 12<sup>th</sup> centuries. Cities such as Arycanda, Sillyon, Perge, Aspendos, Myra, Aperlae, Xanthos and the adjacent sanctuary of the Letoon (with its Byzantine church only in use from the 6<sup>th</sup> to the 7<sup>th</sup> centuries), all seem to have been largely abandoned at some point from the late 6<sup>th</sup>/7<sup>th</sup> centuries, partly as a result of earthquake damage; and these cities seem not to have been substantially resettled, if at all, until the 11<sup>th</sup> century<sup>14</sup>. For example, Side went into decline in the 7<sup>th</sup> century and was abandoned in the 10<sup>th</sup> century<sup>15</sup>. At some point prior to the 9<sup>th</sup> century there was a massive fire at Side, after which there were no new buildings for more than a century. This great fire may have been caused by an earthquake, as at San Francisco April 18<sup>th</sup> 1906, or as at Antakya in the 526 AD quake, or it may have been the result of an accident, arson or a raid on the city. This depopulation from the mid-6<sup>th</sup> century onwards, revolved around 3 significant factors. Firstly, major earthquake

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<sup>12</sup> Plague 1996, 55.

<sup>13</sup> Zeigler 1973, 53. with a reduction of 40-60% of the population of Italian cities, with the seaports of Genoa and Venice worst affected Zeigler 1973, 43, 231.

<sup>14</sup> Harrison 2001, 7; Foss 1996, II 48 for qualifying remarks.

<sup>15</sup> Mansel 1978, 17.

damage to settlements, both coastal and inland in the 6<sup>th</sup>-7<sup>th</sup> centuries (e.g. the sunken cities of Kekova, Sagalassos etc.) and to the end of significant settlement at cities such as Ephesus destroyed between 612-16, Miletus, Aphrodisias, Laodicea, Nicopolis and Anemurion in the 7<sup>th</sup> century<sup>16</sup>. Secondly and most importantly, the spread of plague, pneumonic, septicaemic and bubonic, and repeated reinfection and consequent depopulation between 542 and 745 that led to the abandonment of Cilician cities such as: Corycos, Anemurion, Kanlıdivane, Anavarza, Canbazlı and Dağ Pazarı and to a major loss of population, perhaps as much as 30 to 50% of the population of Anatolia, with, for example Myra losing one third of its population in a single year 542-3<sup>17</sup>. Plague, transported from its natural reservoirs by rodents, marmots, gerbils, black rats, dogs and cats and fleas, kills not only people, but also sheep, goats, oxen, asses, horses and pigs, the consequence being in many cases famine, further reducing the population<sup>18</sup>. Thirdly, the impact of the early 7<sup>th</sup> century Persian raids (ended by the peace of 628), followed by Moslem maritime raids from the mid-7<sup>th</sup> century (Battle of the masts at Pheonix-Finike in 655 and the capture of Rhodes in 673), on into the 11<sup>th</sup> century on Antalya's coastal settlements, including Myra, occupied as late as 1034, Xanthos, Perge, Side, and the initial capture of Antalya city in 790 by Abu Süleyman Ferej el Hadim et Turk, by Afşin, who held the city from 813 to 833 and a second 20 year Moslem occupation of Antalya, from 841 to 861 by the Abbasid Caliph's naval commander Fazıl bin Karin<sup>19</sup>. This together with the repeated, almost yearly invasions by Moslem armies via the Cilician Gates and other passes into Central Anatolia and to the sack of cities such as Amorium (Hisar Köy, by Emirdağ), had an impact on Byzantine settlement patterns and on the population<sup>20</sup>, with Byzantine Amorium attacked in 644, 646, captured in 668, attacked again in 716 and 796, destroyed in 838 and sacked again in 931. Settlements in Lycia moved inland, away from the coast from the end of the 6<sup>th</sup> century onwards, for example to Mount Sion, Dereağzı was settled in the 9<sup>th</sup> century and Ala Kilise was rebuilt in 812<sup>21</sup>, probably after an earthquake rather than a raid, given its distance and elevation from the sea, while much of the Pamphylian plain seems to have been depopulated. Only in 1084 was Antalya raised to the status of a Metropolitan Bishopric by Emperor Alexis I<sup>st</sup> Comnenus<sup>22</sup>, while the Bishoprics of Perge and Sillyon were ended, no doubt due to their insignificant populations in the 11<sup>th</sup> century, and perhaps they had been of little real importance since the 8<sup>th</sup> century, with the Bishops perhaps residing for most of this period in Constantinople, yet both Perge and Sillyon along with Side were formerly great Pamphylian cities, each with its Metropolitan Bishop. By 1148, from the accounts of 2<sup>nd</sup> Crusade's arrival in Antalya, it seems that Antalya city was cut off by land and had to be entirely supplied by sea, as the Turks controlled the land around the city and perhaps all the rest of the Pamphylian plain.

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<sup>16</sup> Haldon 1997, 104, 111.

<sup>17</sup> Duggan 2003, 322; Plague 1996, 57 suggests a total population reduction of 50% for the 542 pandemic, see Foss 1996, I 19, II 48 for the 7<sup>th</sup> to 9<sup>th</sup> century population decline in Lycia.

<sup>18</sup> Tuchman 1989, 98; Plague 1996, 66-8.

<sup>19</sup> Moğol 1997, 30-31.

<sup>20</sup> Lightfoot 1994, 31-2.

<sup>21</sup> Bean 1989, 134.

<sup>22</sup> Yılmaz 2002, 6.



Due to the province's great loss of population between the 7<sup>th</sup> and the 15<sup>th</sup> centuries and also to the scanty surviving records from the Seljuck and Beylik periods concerning the province, plague and earthquakes there is a lack of localized information, although there are more general references to both events in the chronicles. For the period from the 16<sup>th</sup> century onwards there are records and later, consular reports, at least from the major ports and populated areas, and there has been significant modern research into archives and of records of both calamities that affected the province.

The following list of dated plague outbreaks and also of earthquakes in Antalya province (and the related major quakes in adjacent areas, including those along the fault which runs from Cyprus and Rhodes, past Alanya and Antalya), is unfortunately and inevitably incomplete. There is a lack of records for plague outbreaks in the province in the much of the written record, perhaps evidence of a reluctance to mention this calamity in the sources, but Antalyan ports, being important centers of East Mediterranean trade and also pilgrimage ports, one can suggest that outbreaks of plague in Constantinople-İstanbul, Cyprus, Rhodes, Alexandria, at ports on the Syrian coast and in Palestine, as well as reports of plague occurring in related provinces in Anatolia, would often result in plague arriving at the ports or on the caravan routes of the Province, although for the 18<sup>th</sup> and early 19<sup>th</sup> century there is a substantial study<sup>23</sup>. The published lists of recorded earthquakes in Anatolia, covers the period up to the 10<sup>th</sup> century AD<sup>24</sup>, with some information from mainly Moslem and Armenian sources for the period 1071 to 1269<sup>25</sup>, and then from 1500 to 1800<sup>26</sup>. From 1881 to the present day, there are the published official catalogues of earthquakes recording the measurements obtained by seismic research stations in the Ottoman Sultanate and in the Republic of Turkey<sup>27</sup>. To compile a slightly more complete list of these events, I have added the results of my own research on this matter since 1996 from various sources, inscriptions and articles etc., but, there will of course be many records and accounts of earthquakes and repair inscriptions I have not seen. In addition, the adjacent provinces of Muğla, Burdur, Afyon and İçel which are also subject to major quakes, which may have had an impact upon parts of Antalya Province, have been to a large extent, excluded from this list.

### List of significant recorded outbreaks of plague and of earthquakes in the region of Antalya Province

227 BC Lycia, Caria and Rhodes were struck by a violent earthquake that broke off the Colossus of Rhodes, the 32 meter tall bronze statue of Helios completed in 282 after 12 years work at Rhodes, at the knees, and destroyed arsenals and walls on Rhodes. Pausanius records that this earthquake also destroyed cities in Caria and Lycia, including

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<sup>23</sup> Panzac 1997 which provides an idea of the frequency of recorded outbreaks in Antalya in this period.

<sup>24</sup> Mediterranean 1994; Ergin 1967, 13 AD to 1964.

<sup>25</sup> Arık 1994; Boase 1978; Edbury 1994.

<sup>26</sup> Ambraseys-Finkel 1995.

<sup>27</sup> These include: Türkiye 1996; TMMOB 1997; Deprem 1983 Note the number given is the catalogue number of the earthquake. Ambraseys-Finkel 1995, 30 draws attention to the fact that, "This (Deprem 1983) is an uncritical compilation of data from previous catalogues of macroseismic and instrumental data in which no attempt is made to remove spurious entries or reassess earthquake source parameters"; Sirakaya 1991.

Sidyra where an inscription records that houses, walls and towers were ruined. In an early example of international aid following an earthquake, Hiero and Gelo of Syracuse in Sicily, Ptolemy IV of Egypt and Antigonos of Macedonia, all aided the reconstruction of cities following this earthquake<sup>28</sup>.

199-8 Rhodes and many other cities were struck by an earthquake in this year and Justinus records that it, “caused great damage and even swallowed some cities in their entirety”. While an inscription on Rhodes records that this quake brought down both walls and funerary monuments<sup>29</sup>.

In the reign of Antiochus IV Epiphanes (175-63) plague struck Antiochia, leading to the carving of the gigantic bust of Charon on the cliff above St. Peter’s Church. There is no evidence to show that this plague outbreak reached Antalya, although there is the possibility it spread to the coastal ports of Pamphylia and Lycia<sup>30</sup>.

17 BC Paphos and other towns in Cyprus were severely damaged by an earthquake. The rebuilding of Paphos was commanded by Augustus, two years later in 15 BC, and he issued a decree that the rebuilt city of Paphos be renamed “Augustus”<sup>31</sup>.

13 to 37 AD An inscription from the theatre at Patara records that it was repaired after an earthquake in the period of Emperor Tiberius’s reign 13-37 AD by Polyperchon, Prophet of Apollo<sup>32</sup>.

23 AD An inscription records that the city of Cibyra was destroyed in an earthquake<sup>33</sup> and it was rebuilt with help from Emperor Tiberius who renamed the city “Caesarea Cibyra”.

53 & 60 Quakes struck Sagalassos leading to the rebuilding of part of the fountain house<sup>34</sup>.

68 A tsunami wave struck both Myra and Patara in this year, recorded by Dio Cassius: “that the sea retreated a long way from Egypt and covered a greater part of Lycia”, and also by the Sibylline Oracles: “Fair Myra of Lycia, the earth shall shake and not remain firm, thou shalt fall headlong to the ground and pray to find another place of refuge, as an emigrant, when with thunderings and earthquakes the dark waters of the sea spread sand over Patara, for its godlessness”<sup>35</sup>, in regard to the Patara sand which was brought from the south and filled the coast of the Eşen river. This sand filled the entrance to Patara harbour, to such an extent that navigation was impaired. The harbour was perhaps totally silted up by the late 13<sup>th</sup>-14<sup>th</sup> century.

77 Both Paulus Orosius and Eusebius record that 3 towns in Cyprus were reduced to ruins in an earthquake in this year<sup>36</sup>.

<sup>28</sup> Mediterranean 1994, 140-142; Clayton - Price 1998, 128-9, 137 who gives the date of this quake as 226.

<sup>29</sup> Mediterranean 1994, 147-150.

<sup>30</sup> A. Demir, *Antakya through the ages* (1996) 30.

<sup>31</sup> Mediterranean 1994, 177-8.

<sup>32</sup> Bean 1989, 88.

<sup>33</sup> Bean 1989, 162; Freely 1997 gives the date as 25 AD.

<sup>34</sup> Sagalassos 1995, 47.

<sup>35</sup> Mediterranean 1994, 211, see also Öner 1998, 207-220 re Patara sand.

<sup>36</sup> Mediterranean 1994, 214.



117-133 Possible quake at Paphos, Cyprus, from the excavated archaeological evidence in the reign of Hadrian 117-138<sup>37</sup>.

136-7 ? The temple of Apollo Klarios at Sagalassos seems to have been repaired after an earthquake, with the dedicatory inscription dated 138-40<sup>38</sup>.

141 A great earthquake seriously damaging many cities on Rhodes, Cos and in Lycia and Caria. Pausanias writes: "The cities of Lycia and Caria and Cos and Rhodes were struck by a violent earthquake. The Emperor Antonius Pius came to their aid with massive sums of money and vigorous support for their restoration". Much of the rebuilding after the quake was sponsored by the wealthy Lyciarch, Opramoas of Rhodiapolis<sup>39</sup>. This included the rebuilding of the stone theaters at: Xanthos at a cost of 30,000 denarii<sup>40</sup>, at Olympos, at Myra where the theatre was destroyed and was reconstructed at a cost of 150,000 denarii<sup>41</sup> by 147, at Pinara where he gave 5,000 denarii for the rebuilding of public buildings<sup>42</sup>, and 20,000 denarii for rebuilding the theatre at Limyra<sup>43</sup> and 60,000 denarii for the rebuilding of the theatre and baths at Tlos<sup>44</sup>. The gymnasium at Myra was rebuilt by Opramoas at a cost of 56,000 denarii, who also extensively rebuilt the Letoon complex: 30,000 denarii to the rebuilding of the agora, 10,000 for the council building, 45,000 to the gymnasium and baths, 10,000 denarii to the rebuilding of the women's bath house, 30,000 to the temple dedicated to the Imperial cult<sup>45</sup>. Other cities that were aided included: Corydalla, Choma, Podalia, Arycanda where the agora was rebuilt for 10,000 denarii and the theatre repaired<sup>46</sup>, Oinoanda, Calynda, Phaselis, Cyaneae, Aperlae, Nysa, Sidyma, Gagae and Acalissos. The theatre at Patara was restored within 2 years by the wealthy patroness Vilia Procula<sup>47</sup> and the Temple of Artemis Eleuthera at Myra was also repaired after this quake<sup>48</sup>. Much of the city of Limyra, by Kumluca, built in part on the alluvial flood plain rather than on rock, was flattened and had to be rebuilt in addition to the theatre<sup>49</sup>. It seems probable that much of the 2<sup>nd</sup> half of the 2<sup>nd</sup> century building and rebuilding throughout the province, at Perge, including the remodeling of the theater's stage building<sup>50</sup>, of the north nymphaeum and archway<sup>51</sup>; of the stage building at Termessos<sup>52</sup> etc., can be related to the damage caused by this earthquake.

<sup>37</sup> op.cit., 277-8.

<sup>38</sup> Waelkens 1993, 46.

<sup>39</sup> Wörle 1975.

<sup>40</sup> Foss 1996, I 18.

<sup>41</sup> op.cit., I 18.

<sup>42</sup> Bean 1989, 74.

<sup>43</sup> op.cit., 144.

<sup>44</sup> op.cit., 67.

<sup>45</sup> Foss 1996, I 18.

<sup>46</sup> Bayburtluoğlu 2003, 66.104.113.

<sup>47</sup> Bean 1989, 88.

<sup>48</sup> Borchhardt 1975.

<sup>49</sup> Freely 1997, 273.

<sup>50</sup> Freely 1998, 61-2.

<sup>51</sup> op.cit., 67.

<sup>52</sup> op.cit., 17-18.

220-230 The Forum and Basilica at Cremna (Bucak) was badly damaged in this earthquake<sup>53</sup>, and the terra-cotta water pipes leading from the cisterns to the bath house were so badly damaged that the bathhouse could no longer function as such<sup>54</sup>. It may be this quake which caused the 3<sup>rd</sup> century repairs to be made to the North nymphaeum at Perge<sup>55</sup>.

240 5<sup>th</sup> August, night, quake struck Arycanda and led to theater alterations and the damage led to the building of the Yazıtlı Ev Hamamı<sup>56</sup>.

Foss suggests a quake may have destroyed the nymphaeum at the Letoon in the late 3<sup>rd</sup> century<sup>57</sup>.

293-306 Malalas dates this earthquake and associated tidal wave to the reign of Constantinus Chlorus (293-306) and writes: "The city of Salamis in Cyprus suffered from the wrath of God and the greater part of it was plunged into the sea by an earthquake. The remainder (of the city) was leveled to the ground"<sup>58</sup>.

332 Theophanes records that "A strong earthquake hit Cyprus and (the town of) Salamis was destroyed and lost a large part of its inhabitants"<sup>59</sup>.

342 A violent earthquake on Cyprus<sup>60</sup>.

344 Both Theophanes and Cedrenus record that in this year: "A violent earthquake occurred and the Island of Rhodes was destroyed", i.e. most of the buildings were destroyed<sup>61</sup>.

365 21<sup>st</sup> July, 5.30 am<sup>62</sup>. There was a major earthquake at Paphos and Kourion, Cyprus, which resulted in the total destruction of S.W. Cyprus, de-population and the transfer of governance and religious authority from the S.W. to the East of the Island<sup>63</sup>. This quake was combined with a tsunami wave that drowned thousands and swept a large wooden boat 2 miles inland, depositing it on a roof in Alexandria, Egypt<sup>64</sup>. Kessener and Piras<sup>65</sup> suggest that it was this quake (363-365) which probably destroyed the Roman aqueduct at Aspendos built in the 1<sup>st</sup> half of the 2<sup>nd</sup> century AD, an example of the consequences of an earthquake on Cyprus damaging structures in Antalya Province.

385 July 21<sup>st</sup> major quake struck Arycanda<sup>66</sup>.

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<sup>53</sup> Cremna 1995, 67, 137.

<sup>54</sup> *op.cit.*, 157.

<sup>55</sup> Freely 1998, 67.

<sup>56</sup> Bayburtluoğlu 2003, 33. 54. 66-7. 104. 137.

<sup>57</sup> Foss 1996, I 21.

<sup>58</sup> *Mediterranean* 1994, 246.

<sup>59</sup> *op.cit.*, 246.

<sup>60</sup> *op.cit.*, 249-250.

<sup>61</sup> *Mediterranean* 1994, 251.

<sup>62</sup> *Cyprus* 1985, 299.

<sup>63</sup> *op.cit.*, 300.

<sup>64</sup> *Cyprus* 1985, 307-8; *Cyprus* 1986, 205; *Mediterranean* 1994, 277-8.

<sup>65</sup> *Aspendos* 1998, 153.

<sup>66</sup> Bayburtluoğlu 2003, 189.



At some time in the 4<sup>th</sup> century the town of Corycos, between Silifke and Mersin, was struck by an earthquake<sup>67</sup>, perhaps related to a quake on Cyprus, or related to a quake along the Göksu valley fault. At some time after the 4<sup>th</sup> century the Basilica and South arcade at Cremna was thrown down by an earthquake<sup>68</sup>, the city was abandoned in the 6<sup>th</sup> or 7<sup>th</sup> centuries.

474-78 "An earthquake on Rhodes destroyed the Gymnasia and all the beauty of the city", i.e. all the public buildings were destroyed in this quake<sup>69</sup>.

At some time in the 5<sup>th</sup>/6<sup>th</sup> centuries the Side theatre and the stoa opposite were damaged in a probable earthquake<sup>70</sup>.

515 Both Evagrius and Malalas record this earthquake on Rhodes: "The Emperor (Anastasius) gave generously both to the survivors and to the city for rebuilding purposes"<sup>71</sup>.

At some point in the 5<sup>th</sup>/early 6<sup>th</sup> centuries, probably the quakes of 518 and 529<sup>72</sup>, the 3<sup>rd</sup> church at Sagalassos was left incomplete, the south wall and the naves were never built, "probably because an earthquake interrupted construction"<sup>73</sup>.

518 & 528 Major quakes struck Sagalassos and destroyed much of the city. After this earthquake the fountain house no longer functioned as such as, "most if not all of the aqueducts (bringing water to the city) were destroyed"<sup>74</sup>.

526 Major Antiochia earthquake resulting in 0.7-0.8 m coastal uplift at Seleuceia Pieria<sup>75</sup> may have impacted on Antalya's coastal settlements.

529-30 AD. An earthquake struck the region of Myra. Malalas records, "In that year, Myra the metropolis of Lycia suffered from the wrath of God, and the Emperor (Justinian 1<sup>st</sup>) gave generously to the survivors and to the city for rebuilding purposes"<sup>76</sup>. The horizontal displacement along the fault line from this quake was recently measured at Aperlae near Kekova and was found to be 7 meters<sup>77</sup>. This quake also damaged Patara, Xanthos and elsewhere along the coast. This event seems to have repeated the earthquake and tidal wave (tsunami) of 68 AD which hit the same areas of the Lycian coast, Patara, Myra etc. After the 529/30 quake Emperor Justinian 1<sup>st</sup> sponsored the rebuilding of St. Nicholas's Church at Myra<sup>78</sup> which seems also to have been repaired after probable earthquake

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<sup>67</sup> Mediterranean 1994, 246.

<sup>68</sup> Cremna 1995, 63.

<sup>69</sup> Mediterranean 1994, 301.

<sup>70</sup> Foss 1996, IV 37-7.

<sup>71</sup> Mediterranean 1994, 312.

<sup>72</sup> Ergin 1967, 14 no. 61. 69.

<sup>73</sup> Waelkens 1993, 49; Vanderput 1993, 93; Sagalassos 1997, 101.

<sup>74</sup> Sagalassos 1995, 47; Sagalassos 2000, 616. 625. 632 and 797.

<sup>75</sup> Pirazzoli 1996, 242.

<sup>76</sup> Mediterranean 1994, 326.

<sup>77</sup> Lycia 2000, 211. It is to be noted for comparison that the horizontal displacement along the fault of the 1906 San Francisco earthquake was between 3 and 5 meters, M. Levy - M. Salvadori, *Why Buildings fall down* (2003) 95.

<sup>78</sup> Ötügen 1996, 77; Freely 1997, 266.

damage, as well as perhaps damage caused by Moslem raiders, in the 9<sup>th</sup> century when the dome was rebuilt and at some point from the mid 11<sup>th</sup> century to 1195<sup>79</sup>.

542 Great plague pandemic that reached Constantinople in the spring of 542 from Ethiopia. It reached the ports of Pelusium and Alexandria in Egypt in 541, and then spread to Constantinople where it killed between 5,000, 10,000 and 16,000 people per day. Between May and the autumn of 542, at least two out of every 5 people, 300,000 of Constantinople's population were dead<sup>80</sup>. Constantinople was struck again in 555-6, 558, 560-1, 572-3, 585-6, 592, 598-9, 608-9, 618 and in 697-8<sup>81</sup>, again in 746-748; while other reported plague outbreaks in the East Mediterranean occurred in 558, 567-8, 580-1, 615, 639, 673-4, 687-8, 716-17 and possibly in 725, 735, 745 and 747. This left the city, virtually uninhabited, with a suggested population in 750 of only 25,000 people<sup>82</sup>. As there was regular contact between Antalya and Constantinople for much of this period, there is the distinct possibility that the cities and towns of Lycia and Pamphylia were also infected and reinfected, not only from Alexandria, Palestine and Syria, but also from Constantinople. Antioch was re-infected 4 times in the 15 years following 542. The 542 plague pandemic in Anatolia killed at least 30% of the population, and in the ports, if figures for 1348 reflect the death toll of the more virulent pandemic of 542, then at least 50% of residents of port cities died<sup>83</sup>.

<sup>79</sup> Ötügen 1996, 77-9.

<sup>80</sup> Browning 1987, 120; Prokopius 2001, 5; A. Cameron, Procopius and the 6<sup>th</sup> century (1985) 41-2 and for the financial crisis caused by the plague 168-9.

<sup>81</sup> Haldon 1997, 111.

<sup>82</sup> Keys 1999, 17; C. Mango, Byzantium: The Empire of New Rome (1994) 68, 77-8, 80.

<sup>83</sup> Estimates for plague deaths in port cities and major route junctions on land are generally higher than for other towns and cities, Mango suggests a population loss for the port city of İstanbul of at least 50% in 542, C. Mango, "Le développement Urbain de Constantinople (IV - VII) siècles (1985) 51. which he reduced to 30-50% in C. Mango, Byzantium: The Empire of the New Rome (1994) 68, where he describes plagues as perhaps the determining factor in the collapse of urban life, while W. Napley-A. Spicer, Plague-black death and pestilence in Europe (2004) 15, suggest a 40% death rate. While in 1348, the riverine ports of: Cairo lost 200,000 from a population of 500,000 (Dols 1977, 215, 219) Paris with a population of about 100,000, lost one half of its population, Florence with a population of about 100,000, lost three to four fifths of its population, Venice, also with a population of about 100,000, and Bremen and Hamburg lost about two thirds of their populations (Tuchman 1989, 98), of the 24 doctors in Venice at the outbreak only 4 survived (Tuchman 1989, 100) and the city was reinfected in 1397 (Tuchman 1989, 575), the port of Marseilles lost 56,000 people, most of its population (Plague 1996, 63) (the riverine port of Bruges in the 1401 outbreak, lost 12,000 people and had to halt cloth production. Datini 1992, 149); yet, the estimated average death toll in the 1347-8 plague pandemic was about one third of the population. It is reported that proportionally more of the young and the poor died than the old and the wealthy (Tuchman 1989, 98) and that the plague in İstanbul regularly recurred from April-May, peaking in August and subsiding in October, while in Cairo in 1348-9, the peak was between November and January with a decline in February (Trade 1970, 119). The port city of Marseilles, in an outbreak as late as in 1720, which was probably brought into the port from North Africa, lost 50,000 people (Plague 1996, 71). The record from the port of İzmir and for the caravan junction of Aleppo in the 18<sup>th</sup> century shows 50 outbreaks of plague in a century, while the plague killed 300,000 in İstanbul in 1812, and which spread throughout Europe, and with another outbreak in İstanbul and 30,000 dead in 1836; the port city of Salonica suffered 12 epidemics in the 18<sup>th</sup> century, including that of 1781 when 25,000 died and İzmir where one in five of the population died of plague in 1812 alone (İnalçık 1994, Vol. II 651, 787, 788). Immigration into port cities was essential to maintain population levels. Port cities suffered repeated outbreaks due to their maritime connections even after the institution of quarantine regulations (quarantine from the French for the 40 days of isolation), a cholera outbreak in 1893, one of 9 major epidemics at Mecca and Medina between 1865 and 1893, at the haj, where 2,455 people died in single day at al-Mina and a total of 33,000 of the 200,000 pilgrims died of cholera, was brought by the returning pilgrims to İstanbul where 1,200 people died from this outbreak in 1893 and returning pilgrims also brought it to the ports of İzmir and Trabzon. Likewise in the 1865 outbreak, the cholera spread from Mecca to Alexandria where it killed 60,000, to Marseilles and then on across the Atlantic to the port of New York (Peters 1994, 301-9; G. Saryıldız, "XIX Yüzyıl'da Osmanlı İmparatorluğu'nda kolera salgını", in: İstanbul Üniversitesi, Tarih Araştırmaları Merkezi, Tarih boyunca Anadolu'da doğal afetler ve deprem semineri



C. Foss amongst others<sup>84</sup>, draws attention to the, “major demographic effects” of the plague of 542, on Lycian cities such as Myra and Arycanda for example, where the population of the new settlement of Arif, following the abandonment of Arycanda in the 6<sup>th</sup> century, a consequence of both plague and raids, was to a more secure site to house a population containing a maximum of only 1000 people<sup>85</sup>, while Side passed through a period of massive contraction dated to the middle of the 6<sup>th</sup> century, with the building of a new city wall, enclosing a far smaller area, built largely from spolia from the remains of the city beyond the new walls<sup>86</sup>. With the exception of Constantinople, Arab historians regarded Byzantine Anatolia as without major cities, just of settlements in and around castles such as at Amorium, Ancyra and Sillyon<sup>87</sup>, where all the population was massed on the walls of Sillyon, both male and female to impress an Arab raiding party with the strength of the garrison of the “city” in 824, the city being so greatly depopulated. Thus the entire settlement pattern in Anatolia changes from the mid 6<sup>th</sup> century onwards, in part as a result of repeated population loss and Haldon, writing of this phenomena says, “Indeed many cities not directly affected, or only occasionally affected by hostile actions and its results, nevertheless suffered ultimately the same fate as the others”<sup>88</sup>. Recent research draws our attention to the consequences of the massive depopulation of Anatolia on the landscape, with agricultural areas returning to nature, population flight and resulting changes in Byzantine land tenure, taxation, military recruitment and the abandonment of farmland<sup>89</sup>. Also to the natural re-afforestation of the Anatolian landscape in the ensuing centuries

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(2002) 309-318. This maritime connection is made clear by Babinger for the 1469 outbreak where the ports used by the Florentines were hit by plague (Babinger 1992, 277) which led to a loss of life, trade and state revenue; while the port of Venice was struck with “70 major epidemics in 700 years” (Zeigler 1973, 53). The documentary record shows that between 1721 and 1796 66% of French flagged ships and 23% of Venetian flagged ships arriving at the port of İzmir (Smyrna) carried plague (Panzac 1997, 68-70, Table 1:18) and it is improbable that if records existed for the ports of Antalya, Alanya, Meis-Kaş and Macri (Fethiye), they would paint a very different picture. Some idea of the international trade connections of the ports of Antalya in the 6<sup>th</sup>-7<sup>th</sup> centuries and in the 14-15<sup>th</sup> centuries (Duggan 2003, 314-317) provides a picture of how open the city was to infection from overseas, from outbreaks of plague elsewhere in the region. Imports and exports included: indigo, henna, saffron, pepper, pulses, wheat and barley to Italy (Fleet 1999, 64, 72) and wheat to Alexandria on Ragusan ships in 1451 (Fleet 1999, 66), carpets (Fleet 1999, 97), flax and wool (Fleet 1999, 100), iron, copper and spun gold and silver (Fleet 1999, 113-4, 117, 120), timber and pitch to Alexandria (Fleet 1999, 34, 131-2). Exports from Antalya & Alanya in 1313 and Fethiye in 1300 included slaves (Fleet 1999, 38, 40), to Italy alum (Fleet 1999, 86) and to the ports of Alexandria and to Constantinople in the 14<sup>th</sup> century silk (Fleet 1999, 98). Imports included camlets from England shipped via Cyprus (Fleet 1999, 102-3) to Alanya and Antalya and tin (Fleet 1999, 114). In the 16<sup>th</sup> century records show that black slaves were imported through Antalya from Egypt (İnalçık 1994, Vol. I, 285), soap, cotton and olive oil were imported from Syria; Faruqi et al. 1997, 317. while timber and pitch exports to Egypt and Syria continued. Although cities such as Demre, Perge, Side and Aspendos must have extensive plague burial pits dating from 542 to the 8<sup>th</sup> centuries, these have not been found, or have not been substantially reported in the literature. On a visit in 1999 to Doğuş Belen, Gündoğmuş in Akseki district, I heard unconfirmed reports from the villagers of the discovery of a mass of skeletons, “100’s”, in a large Roman tomb, found in illegal excavations, which may date from the plague pandemic of the 6<sup>th</sup> to 8<sup>th</sup> centuries, or possibly from some later epidemic. In 2000 an illegal excavation in a tower at Tyberissos revealed a mass of burnt human skeletal remains and from the ceramic evidence, this mass grave can be dated to the 6<sup>th</sup>-7<sup>th</sup> centuries and may well be a result of the 540 pandemic. My thanks to Prof. M. Zimmermann for drawing my attention to this presently unpublished find. The practice of mass plague burials in towers, occurred in 540 at Sycae (Galata), “whence an evil stench wafted over the city” C. Mango, Byzantium (1994) 68.

<sup>84</sup> Haldon 1997, 29.112.141.146-147 “demographic decline”.

<sup>85</sup> Foss 1996, I 19, 24.

<sup>86</sup> op.cit., IV 43.

<sup>87</sup> Foss 1996, IV 21-22.

<sup>88</sup> Haldon 1997, 105, 113.

<sup>89</sup> op.cit., 1997, 144.

following the plague pandemic due to population loss, and an end to the: “degrading of vegetation by the actions of man”<sup>90</sup>. Some idea of the consequences to the landscape and to the food supply to cities such as Constantinople following the 542 pandemic were recorded by the contemporary John of Ephesus: “We saw desolate and groaning villages and corpses spread out on the earth, staging posts on the roads full of darkness and solitude filling with fright everyone who happened to enter and leave them. Cattle abandoned and roaming scattered over the mountains with nobody to gather them in. Fields abundant with grain, which was becoming white and stood erect, yet had nobody to reap or gather it in”<sup>91</sup>.

565 Major quake struck Arycanda which was abandoned about this time, the much reduced population, a maximum of 1000 then inhabited a much smaller walled site, Arif, in the valley<sup>92</sup>.

570 to 580 A major violent quake struck both rugged and plain Cilicia, i.e. eastern Antalya Province and İçel, as well as Antiochia<sup>93</sup>.

580's The city of Anemurion by Anamur was badly damaged by this earthquake and the settlement occupied afterwards was of a very reduced size<sup>94</sup>. It was possibly at this time, certainly at some point during the 6<sup>th</sup> century AD<sup>95</sup>, that the city of Viranşehir-Soli by Mersin was totally destroyed in an earthquake. In the 2<sup>nd</sup> century AD Viranşehir had had a population of 250,000 people.

Two major quakes in the 7<sup>th</sup> century hit Myra and caused parts of the cities of Aperlae, Kekova and Simena to drop into the sea, forming Antalya's “sunken cities”, with Aperlae abandoned at the end of the 7<sup>th</sup> century<sup>96</sup> and the large Basilical church at Limyra was destroyed<sup>97</sup>, probably in the same event<sup>98</sup>. The city of Xanthos, with the great basilica burned down between 610-41<sup>99</sup> and the Letoon, were abandoned, partly as a result of these quakes and not re-inhabited until the 11<sup>th</sup> century, Patara was also struck by this same quake. An earthquake in Early Medieval times destroyed much of Pinara<sup>100</sup>

It is evident that from the 7<sup>th</sup> century to the end of the 11<sup>th</sup> century there were earthquakes that had an impact on the province of Antalya, but there are no dated records that provide any certain information on earthquakes in this period. A massive earthquake struck Sagalassos in the mid-7<sup>th</sup> century, and probably had an impact on Antalya province, and it, “could have been so destructive that the city was abandoned”<sup>101</sup>. The lack of

<sup>90</sup> Sagalassos 1994, 230.

<sup>91</sup> Keys 1999, 9-16 from the W. Wittakowski (ed.), “Chronicle of the Pseudo Dionysius of Tel-Mahre (1996) Part III. the full text: 74-98.

<sup>92</sup> Bayburtluoğlu 2003, 54; Foss 1996, 24.

<sup>93</sup> Mediterranean 1994, 346.

<sup>94</sup> Haldon 1997, 109; Freely 1998, 132.

<sup>95</sup> Freely 1998, 218.

<sup>96</sup> Lycia 2000, 207.

<sup>97</sup> Foss 1996, II 49.

<sup>98</sup> see Sagalassos 2000, 797 for the link between major landslides and earthquakes serving as the trigger mechanism.

<sup>99</sup> Foss 1996, I 26.

<sup>100</sup> Haynes 1974, 62.

<sup>101</sup> Vandeput 1993, 93; Sagalassos 2000, 797; Earthquake 2000, covers this quake in detail, but is presently inaccessible to me.



records is in part due to the population losses caused by the plague pandemic from 542 onwards, the breakdown of order, raids and invasions, and the resultant lack or loss of records<sup>102</sup>. However the destruction-rebuilding of the church of St. Nicholas in the 9<sup>th</sup> century<sup>103</sup>, the rebuilding of Ala Kilise in 812 and the significant level of fire destruction at Side, may be evidence of earthquake damage in this period.

The substantial reconstruction of Antalya's Byzantine city walls in 910<sup>104</sup>, was caused by the increasing importance of the city from the 10<sup>th</sup> century onwards for Byzantine military operations against the Moslems, and almost certainly included repair work to earthquake damage to the city walls.

1080-81 Earthquake affecting coastal cities on the south-east Anatolian coast of the Mediterranean<sup>105</sup>. The earlier earthquakes at Rammla in 1033 and 1068 were probably far too distant to have any impact upon Antalya province.

1091 November 26<sup>th</sup>, Major earthquake affecting Antakya, Syria and the Eastern Mediterranean<sup>106</sup>.

1100 Major plague outbreak in Egypt<sup>107</sup>.

1112-13 Plague recorded along the coastline of Anatolia<sup>108</sup>

1114 29<sup>th</sup> November, major quake affecting the area from Syria and Maraş to the Çukurova may have had an impact on the Eastern parts of Antalya province<sup>109</sup>.

1138-9 A major quake that struck both Anatolia and Syria and caused extensive damage<sup>110</sup> and may have impacted on the buildings of the province.

1141 A quake damaged many places along the Mediterranean coast of Anatolia<sup>111</sup>.

The restoration of the city walls of Antalya by the Byzantine Emperor Manuel I Comnenus (1143-80) in 1158<sup>112</sup> may in part, have been caused by earthquake damage from the quake of 1138-9, from that of 1141, or from the Syrian quake of 1158 (see below 1169-70).

1148 A plague - epidemic is reported in Antalya which followed the arrival of the members of the 2<sup>nd</sup> Crusade, which led to significant loss of life and perhaps, was a factor in the hasty departure of the wealthier members of the crusade from the stricken port city, leaving the bulk of the army to march overland to Antiochia<sup>113</sup>. This plague outbreak may

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<sup>102</sup> See section "Lack of data".

<sup>103</sup> Myra 1998, 29.

<sup>104</sup> Foss 1996, IV 8.

<sup>105</sup> Arik 1994, 18.

<sup>106</sup> op.cit., 18.

<sup>107</sup> Irwin 1999, 218.

<sup>108</sup> Keşik 2002, 30

<sup>109</sup> Arik 1994, 19; Mayer 1990, 59.

<sup>110</sup> Arik 1994, 20.

<sup>111</sup> Keşik 2002, 31-2.

<sup>112</sup> Foss 1996, IV 12.

<sup>113</sup> Foss 1996, IV 11 says "disease", but page 11 says plague struck after the crusaders left; Meade 2001 from the chronicler Odo de Dueil's "De prefessione Ludovici VII in orientum", suggests an outbreak of plague when the crusaders arrived at Antalya, 124.

be related to the plague outbreak in Egypt of 1145<sup>114</sup>. Other recorded plague outbreaks in Egypt in the period, which may have reached Antalya through the trade and pilgrimage routes, were in: 1065-72, 1097, 1099-1100 major outbreak in Cairo (this plague outbreak of 1099 lasted in Palestine for 4 years), 1066-7, 1111/12 a major outbreak in Cairo and Fustat, 1201-3 a major outbreak which left half of the Jewish population of Fustat (old Cairo) dead, and in 1216-17, 1273 and 1295<sup>115</sup>.

1169-70 Major quake in Antakya and the Eastern Mediterranean<sup>116</sup> which may have affected Antalya province, following a major quake in 1158 that destroyed many of Nur-ad-Din Muhamud b. Zangi's Syrian forts.

1185 Syria coastline quake<sup>117</sup>.

1200 A major earthquake affecting the Mediterranean coast of Anatolia, Iraq, Syria, Egypt, Lebanon etc<sup>118</sup>.

1204 A major quake affecting Cyprus, the Eastern Mediterranean coast of Anatolia, Egypt, Syria, Palestine etc<sup>119</sup>. Perhaps it was partly a byproduct of this earthquake, as well as of the 4<sup>th</sup> Crusade's capture of Constantinople, that the city of Antalya passed from Byzantine hands into the hands of the Tuscan adventurer Aldobrandini.

1212 A major quake destroyed buildings from Damascus to Antiochia and may have affected buildings in Antalya province<sup>120</sup>. The rebuilding of most of the tower to the right of Hadrian's Gate (Üç Kapılar) dates from 1220 (h. 617)<sup>121</sup> and may have been due to quake damage. The later Ottoman restorations of this tower include wooden "hatıl" of Juniper "ardıç" built into the partially destroyed Seljuck walls of this rebuilt tower as earthquake shock absorbers, indicating clearly earthquake damage as the cause of this later undated Ottoman repair work.

1222 A major quake hit Cyprus at night and totally destroyed the western coastal city of old Paphos, destroyed its castle built only 30 years earlier and its harbour and damaged parts of Limassol and Nicosia<sup>122</sup>. There can be no doubt this quake must also have caused damage in Alanya and Antalya, and this earthquake may have caused the rebuilding of parts of the city walls of Antalya in 1225, including 8 towers<sup>123</sup>. This earthquake may also have destroyed or significantly damaged the Lesser Armenian fortifications of the citadel of Alanya, taken by the Seljucks in 1221, and which led to the total rebuilding of the fortifications of Alanya by the Seljucks, with the first section completed in 1226.

<sup>114</sup> Goitein 1993, Vol. V 72.

<sup>115</sup> Hillenbrand 1999, 37-8; Goitein 1993, Vol. V 71-2, 373-4 & Vol II 141; Irwin 1999, 218.

<sup>116</sup> Arık 1994, 21; Mayer 1990, 59.

<sup>117</sup> Mayer 1990, 59.

<sup>118</sup> Arık 1994, 21.

<sup>119</sup> Edbury 1994, 14; Arık 1994, 22; E. Altan, "1150-1250 yılları arasında Anadolu'da doğal afetler", in: İstanbul Üniversitesi Tarih Araştırmaları Merkezi. Tarih boyunca Anadolu'da doğal afetler ve deprem semineri (2002) 46.

<sup>120</sup> Boase 1978, 45.

<sup>121</sup> M. Seyirci, "Antalya Surları", *Türkiyemiz* 76, 1995, 59. It is to be noted that the interior of this tower was strengthened with reinforced concrete in the 2<sup>nd</sup> World War, to support an anti-aircraft battery.

<sup>122</sup> Edbury 1994, 14; Al-Maqrizi 1980, 146; Arık 1994, 22; E. Altan, *İstanbul Üniversitesi Tarih Araştırmaları* (2002) 46.

<sup>123</sup> Yılmaz 2002, 140-2.



1267 An earthquake on Cyprus<sup>124</sup>.

1269 Major quake struck Cilicia, which may have had an impact on Eastern Antalya Province, records show it killed 8,000 people<sup>125</sup>.

1302 A major earthquake struck the Eastern Mediterranean coast, Syria and Egypt, the sea retreated near Akko (Akko, Acre) a distance of 2 parasangs (7 miles) and then dashed with fury against the mainland. It is possible that the consequences of this earthquake and associated tidal wave were experienced on the coast of Antalya province<sup>126</sup>.

1303 An earthquake struck Cyprus<sup>127</sup>.

1326 The Mevlevi Sheiks Muhammed Çelebi and Davud Çelebi died of plague in Konya<sup>128</sup>.

1344 A great earthquake struck Egypt, Syria and Constantinople and probably impacted on Antalya Province<sup>129</sup>.

1347 In late summer-autumn, a major earthquake hit both Cyprus and Rhodes, followed by a tidal wave that destroyed the fishing fleets, contaminated the fresh water and ruined the olive groves on Cyprus, recorded by Nicephorus Gregoras, and this was compounded in the same year by the spread of the Plague pandemic (*Yersinia Pestis*)<sup>130</sup>. Similar tsunami events are recorded for Cos opposite Bodrum in: AD 554-8<sup>131</sup>, Feb., 14<sup>th</sup> 1672, when all the town's buildings collapsed followed by a tidal wave<sup>132</sup> and on the 23<sup>rd</sup> of April 1933<sup>133</sup> when an earthquake and tidal wave swept over the entire town of Cos, and also for example, at Akko in Palestine in 1302, Antalya in 1489 and 1743 and Finike in 1741.

This plague pandemic seems to have reached Anatolia from Central Asia, which was struck in 1338<sup>134</sup>. It reached India from Central Asia in 1342. It came to Anatolia via the Crimea, where in 1346, 85,000 people died, it then passed from the Black Sea port of Kaffa in 1347, where Genovese merchants became infected and who brought it unintentionally to İstanbul. Genovese and doubtless other traders seem to have spread it throughout the Eastern Mediterranean, to ports such as Messina, in Sicily the same year. It may be that Genovese traders brought it to Rhodes and Cyprus. It seems probable that it also moved along the caravan route overland into Anatolia in 1346-7 and then into the Middle East, as it seems to have reached the Italian ports of Genoa and Venice from the Levant rather than direct from the Black Sea<sup>135</sup> and the plague reached Mecca in 1348. The plague in Constantinople is reported by the Italian chronicler of Este to have killed nine tenths of

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<sup>124</sup> Edbury 1994, 14.

<sup>125</sup> Arik 1994, 22.

<sup>126</sup> Hitti 1963, 132.

<sup>127</sup> Edbury 1994, 14.

<sup>128</sup> Turan 1984, 45.

<sup>129</sup> Boase 1978, 47.

<sup>130</sup> Zeigler 1973, 111, Martin 2002, 16-17.

<sup>131</sup> Mediterranean 1994, 338-9.

<sup>132</sup> Ambraseys-Finkel 1995, 85.

<sup>133</sup> Deprem 1983, 857.

<sup>134</sup> Trade 1970, 94.

<sup>135</sup> Tuchman 1989, 93.

the population<sup>136</sup>, the Byzantine Emperor John VI Cantacuzene's son Andronicus died in this outbreak and it seems to have been a significant cause of the depopulation of the city in the years before its conquest by Sultan Mehmet II<sup>nd</sup>.

Of this plague pandemic Ibn Battutah records that only 20 of the 80 notaries of Ghazzah survived the plague and that all the leading theological-legal figures that he had met on his previous visits to Cairo were all dead from the plague<sup>137</sup>. Hitti records that 300,000 died in 3 months in Cairo<sup>138</sup>, that the plague lingered 7 years in Egypt, from 1348-55 and killed more than in any other plague, with 22,000 dying in Ghazza in a month and Aleppo 500 dead in a day in 1348<sup>139</sup> and the plague returned again to Egypt in 1381<sup>140</sup>. In Malta for example, a key port both for trade, warfare and piracy in the central Mediterranean, plague outbreaks are reported for the years: 1270, 1348, 1427-8, 1453, 1501, 1519, 1523, 1575, June 1592 to Sept. 1593, 1623, 1655, 1675-6 when between 8-10,000 of a population of 60,000 died, in 1813-14, 1917, 1936-7 and 1945-6<sup>141</sup>. The 1523 outbreak was caused through a captured Ottoman merchant ship being brought into the port of Birgu, Malta, as was the outbreak of 1592-3 when the galleys of the Grand Duke of Tuscany were infected through a captured Ottoman vessel and carried the plague to Malta<sup>142</sup>, and for the 1675-6 outbreak, 114-5. In Sicily half the population died between 1348 & 1377<sup>143</sup>.

The historian Abd al-Rahman Abu-Zayd ibn Khaldun, born in 1332 in Tunis, lost both his parents in this pandemic. His closest friend, Lisan al-Din ibn al-Kitab of Granada (1313-1374) was the first scientist to identify the type of contagious diseases and to record the plague as a contagious disease<sup>144</sup>. Ibn Khaldun described the plague (Arabic "Wa'ba", Turkish "Veba") and its consequences in his "Muqaddima": "In the middle of the 8<sup>th</sup> century Hicri (14<sup>th</sup> century AD) civilisation both in the East and the West was visited by a destructive plague which devastated nations and caused populations to vanish. It overtook dynasties at the times of their senility, when they had reached the limit of their duration. It lessened their power and curtailed their influence. Civilisation decreased with the decrease of mankind. Cities and buildings were laid waste, roads and way signs were obliterated, settlements and mansions became empty, dynasties and tribes grew weak. The entire inhabited world changed". Of the source of the decline of Egypt in the late 14<sup>th</sup>-15<sup>th</sup> centuries, modern historians write: "the decimations of the plague were undoubtedly the most important"<sup>145</sup> with 18 major outbreaks between 1348 and 1513. Likewise F. Braudel wrote that 'plague was a structure of the (16<sup>th</sup>) century'<sup>146</sup>, with 90% of the population of Rome and Naples dying of the plague in 1525, 50% of the population of Milan dying in 1530, in Venice between 30 and 50% dying in 1575-7, only 5,000 people left alive in Marseilles in

<sup>136</sup> Norwich 1996, 306 see also A. A. Vasiliev, *History of the Byzantine Empire 324-1453 II* (1980) 626.

<sup>137</sup> Smith 2002, 275.

<sup>138</sup> Hitti 1991, 696.

<sup>139</sup> op.cit., 681.

<sup>140</sup> Gibb 1939, 25.

<sup>141</sup> C. Savona-Ventura, *Outlines of Maltese Medical history* (1997) 22, 31.

<sup>142</sup> P. Bianchi - P. S. Inglott, *Encounters with Malta* (2000) 82, 114-5.

<sup>143</sup> T. Freller, *Encounters with Malta* (2000) 39.

<sup>144</sup> Hitti 1991, 576.

<sup>145</sup> Trade 1970, 119; Dols 1977, 185-192.

<sup>146</sup> F. Braudel, *The Mediterranean and the Mediterranean world in the age of Phillip II<sup>nd</sup>* (1972) 332, 593.



1581 and with the Venetian Bailo reporting that between 1561 and 1598 there were 94 months of plague in İstanbul. In the following century, from 1600 to 1650 there were only 11 plague free years in the Mediterranean and from 1650 and 1700 only 7 plague free years in the Mediterranean<sup>147</sup>.

Plague in 1347-8 in Egypt caused the closure of the Royal Tiraz factory, of markets, warehouses and customs posts; 900,000 people are reported to have died in Cairo alone, the death rate ranging between 300 and 30,000 per day and, “no one was left in parts of the Nile Delta to cultivate the land or to harvest crops”<sup>148</sup>. Ibn Battutah records in June 1348 of Ghazza (Palestine): that “the greater part of which we found deserted because of the number of those who died there of the plague. I was told by the qadi (Kadi) that the number of deaths reached 1,100 per day”, with a maximum of 2,400 per day dying in Damascus and at Hims, 300 dying per day; while from July 1348 Ibn Battutah records: in Alexandria 1080 dying per day and in Cairo and Fustat 21,000 to 24,000 dying per day<sup>149</sup>. Had the situation in Anatolia, in Antalya and Alanya, been any different in 1346-7?

A contemporary chronicler, Gabriel de Mussis stated that the plague settled in the tartar lands of Asia Minor in 1346, “that India was depopulated, Tartary, Mesopotamia, Syria, Armenia were covered in dead bodies; the Kurds fled in vain to the mountains. In Caramania (Caramania including Antalya Province) and Caesarea none were left alive”, which, while no doubt an exaggeration, paints a picture of the pandemic as relayed by travelers and merchants returning to Europe of the situation to the East<sup>150</sup>. Nicephoros Gregoras records that: “It invaded the Aegean Islands. Then it affected the Rhodians as well as the Cypriots and those colonising the other Islands. The calamity did not destroy men only, but many animals living with and domesticated by men. I speak of dogs and horses, and all the species of birds, even the rats that happened to live within the walls of houses. The second year (1347) came an earthquake and a tidalwave that entirely destroyed the fishing fleets and the olive groves on which the prosperity of the Cypriots largely depended. The islanders massacred their Arab slaves, for fear that these should somehow take advantage of the disturbances to get the upper hand, and (then) fled inland. A pestiferous wind (perhaps an expression describing pneumonic plague spread in droplets in the air, or the noxious gasses often recorded at a time of earthquakes) spread so poisonous an odor that many, being overpowered by it, fell down suddenly and expired in dreadful agony”<sup>151</sup>.

A Turkish calendar records for hicri 748, 1347/8, in a concise and non specific entry, that in this year there was: “plague, epidemics and death”, “Veba, taun ve ölüm”<sup>152</sup> and, given the trade and other connections with both Cyprus and Rhodes, there can be little doubt that Antalya, Alanya and Finike, along with smaller ports and the settlements along the caravan routes inland, were struck in this pandemic of the Black Death in 1347, confirmed by Gabriel De Mussis’s reference to Caramania. Consequences of the plague

<sup>147</sup> C. Casser, “Popular perceptions and values in Hospitaller Malta”, in: V. Mallia-Milanes (ed.), *Hospitaller Malta 1530-1798* (1993) 441.

<sup>148</sup> Trade 1970, 119; Dols 1977, 154-161.

<sup>149</sup> Gibb 1939, 69, 305-6, 374.

<sup>150</sup> Zeigler 1973, 15.

<sup>151</sup> Zeigler 1973, 111.

<sup>152</sup> Turan 1984, 71.

pandemics varied but there was often an increase in lawlessness and brigandage, population flight from an infected area, the reduction in trade after the pandemic with the loss of skilled artisans, leading to a loss of tax revenue and often to famine, due to the population and livestock loss.

Two excavated finds in Antalya Province in the last decade may be related to this outbreak of plague, although scientific confirmation and full publication are lacking. The discovery in 1998-9 of two Roman Dromos tombs in the East Necropolis at Antalya, filled with skeletons placed there at some later date, “Her iki mezar da kemik doludur”<sup>153</sup>, may be related to this epidemic or to some other, as there has unfortunately been no publication of the cause of death, nor of the age of these masses of human bones, found in these two Roman graves. At Patara, the excavation of the Liman (Hurma) bathhouse in 1993/4 produced a large number of skeletons buried in a mass grave<sup>154</sup>. From the stratigraphy, they were buried in the earth above the level of the tilework that had fallen from the roof of the abandoned frigidarium, they were dated to the 14<sup>th</sup> century, but there were no small finds found with these human bones to provide any further evidence towards establishing a firm date and, given the repeated reinfections of plague, amongst other epidemics, in the 14<sup>th</sup> century, with the lack of any further publication of subsequent research work on these human remains, if any, it is impossible today to be more specific, either to the cause or to the date of death.

Edbury suggests that the population loss through the plague of 1347 and subsequent plagues and epidemics resulted in the pre plague population of Cyprus not being equaled again for more than 200 years, until the Ottoman conquest of Cyprus in 1571<sup>155</sup>. This depopulation led to a surge after 1348 in the slave trade, particularly to Italy<sup>156</sup> and also to Mamluke Egypt as a consequence of the deaths in the ruling class of slave Mamlukes<sup>157</sup>, in the 1459 plague outbreak in Cairo one half of all Mamlukes died and had to be replaced, while many parts of rural France and some German towns did not reach the population recorded in the mid-14<sup>th</sup> century, before the plague reached them in 1348, until the 20<sup>th</sup> and the 19<sup>th</sup> centuries respectively<sup>158</sup>. Thus one can suspect a great loss of population in Antalya’s port cities<sup>159</sup>, and probably elsewhere in the province. However, the deliberate repopulation of important cities after plague and fire (termed “sürgün”), was common in Anatolia under Ottoman rule particularly for İstanbul, and may have occurred in the Beylik period in Antalya and Alanya, given their importance as a ports and sources of tax revenue to the ruling Emir, who, wisely in the case of Antalya, tended to be often resident inland at Korkuteli, where the climate is less hot and humid and was a considerable distance away from the diseases of the port.

<sup>153</sup> Nekropol 2000, 122-3.

<sup>154</sup> Personal communication from Prof. Dr. N. Çevik, in charge of the excavation of the Liman (Hurma) hamamı at Patara when the mass grave was excavated. A further unpublished mass grave, which may date to this 14<sup>th</sup> century pandemic, was discovered in construction work on the road directly to the east of the Doğu Garage, Antalya in 1990-1. A Roman Dromos tomb was opened centuries later and 100’s of bodies were then put into tomb which was then sealed up. the newly inserted bodies formed a column, extending up to this new entrance into the tomb. My thanks to K. Dörtlük for drawing my attention to this presently unpublished information.

<sup>155</sup> Edbury 1994, 15.

<sup>156</sup> Datini 1992, 99.

<sup>157</sup> Trade 1970, 127.

<sup>158</sup> Plague 1996, 61.

<sup>159</sup> see fn. 83.



1351 Pope Clement VI (1342-52) told the Latin clergy of Cyprus to stop preaching the crusade due to the population loss caused by the plague on the island<sup>160</sup>.

1362 Another outbreak of the plague on Cyprus<sup>161</sup>. In the 14<sup>th</sup> century Lebanon experienced 4 major outbreaks of plague, while Egypt suffered repeated plague outbreaks, every 5 to 8 years following the 1347 outbreak, and given the trade links between the ports on the Eastern Mediterranean coast and the absence of quarantine with the exception of Venice, there was the probability of plague outbreaks being passed, through shipping, to the ports on Cyprus, Rhodes and to those in Antalya province<sup>162</sup>.

1363 Another outbreak of plague on Cyprus<sup>163</sup>.

It may be that the protective formula that is invoked on a very small number of late Seljuq 13<sup>th</sup> and Beylik 14<sup>th</sup>-15<sup>th</sup> century coins, struck only it seems, at Eğridir (Felekabad) and Alanya ('Ala'iyya), refers to the earthquake and plague dangers, with the use of the word "calamity", "al-baliyya", in addition to "protected from misfortune" which also occurs on coins minted at Uluborlu (Borghulu), e.g.: "darb 'ala'iyya humiyat min al-'afat wal-baliyya" (Minted in 'Ala'iyya (Alanya) May she be safe (protected) from misfortunes and calamity)<sup>164</sup>. This formula seems to occur, only at these 3 mints. The first to mention "protection from misfortune" is from Eğridir under Sultan Alaeddin Keykubat III<sup>rd</sup> (1289-1301)<sup>165</sup>, at Uluborlu under the Ilkhanid Gazan Khan (1295-1304)<sup>166</sup>. Then the full text "protection from misfortune and calamity" which occurs on an Ilkhanid coin struck at Felekabad (1305-16)<sup>167</sup>; on a coin minted at Alanya in 1319 in the name of the Mamluke Sultan al-Nasir bin Muhammed<sup>168</sup> and on a coin minted at Alanya about 1423 in the name of Karaman b. Savci<sup>169</sup>.

1362/3 Massive loss of life in Anatolia from the plague, succinctly recorded in the calendar entry for hicri 764: "general deaths, plague and epidemics", "umumi ölüm, veba ve taun"<sup>170</sup>.

1381 Major outbreak of plague in Egypt recorded<sup>171</sup>.

1402 A major Aegean earthquake that may have had an impact on parts of Western Antalya province.<sup>172</sup>

1407 A major earthquake struck the area from Antakya to Erzincan and probably had an impact on the eastern parts of the province<sup>173</sup>.

<sup>160</sup> Edbury 1994, 160.

<sup>161</sup> op.cit., 160.

<sup>162</sup> Hitti 1963, 132; Irwin 1999, 247.

<sup>163</sup> Edbury 1994, 160.

<sup>164</sup> Llyod -Rice 1958, 65.

<sup>165</sup> Batur 1994, 50.

<sup>166</sup> op.cit., 51.

<sup>167</sup> op.cit., 53.54.55.

<sup>168</sup> op.cit., 67.

<sup>169</sup> op.cit., 1994, 69.

<sup>170</sup> Turan 1984, 73.

<sup>171</sup> Gibb 1939, 25.

<sup>172</sup> Boase 1978, 47.

<sup>173</sup> Turan 1984, 15.

1418 Quake struck Rhodes and damaged the Auberge of Provence of the Knights of St John of Jerusalem at Rhodes<sup>174</sup>.

1466 A major outbreak of plague in Ottoman territory, in İstanbul, the Black Sea region and in Bursa, the silk center that traded with Antalya. Bursa was depopulated with 600 people dying per day and again, plague struck İstanbul in: 1468, 1469 with 600 dying a day, in, 1471, 1472 and 1475, and it struck Venice in 1478 killing 40 people per day having struck the area from Rome to İstanbul in 1456<sup>175</sup>. There had been a major outbreak of plague in Florence in 1400<sup>176</sup> and in Egypt from 1422-38<sup>177</sup>, again in 1459, 1476, and 1497<sup>178</sup>. Some of these outbreaks may have reached into the Teke region (Antalya Province) either via the ports or overland. With the overland trade connections between İstanbul and Antalya in the 15<sup>th</sup> century, Antalya may have been infected, or have infected, İstanbul through its important trade with Egypt and Syria<sup>179</sup>, with exports of timber to Syria and Egypt and imports into Antalya of Indian goods and spices, dyes, rice, linen and sugar recorded in the 1472 register in this period. In the 15<sup>th</sup> century Lebanon experienced a total of 15 major epidemic including outbreaks of plague<sup>180</sup> and it is hard to believe that the ports of Antalya were unaffected in this period, although documentary evidence is lacking.

1489 Leonardo da Vinci (1452-1502) records in his notebooks the major quake to hit Antalya in 1489, he writes, "There was an earthquake in Sattaliya (Antalya), near Rhodes, which opened the sea, that is its bottom and into this opening such a torrent of water poured that for more than 3 hours the bed of the sea lay bare, because of the water that had been lost from it, and then it returned to its former level (i.e. a tsunami)"<sup>181</sup>.

Perhaps the clearest evidence in Antalya for this earthquake of 1489 is provided by Şehzade (Prince) Korkut (1470-1509) who was the ruler under Sultan Beyazıt II<sup>nd</sup> of the "Korkut Teke Sanjak" which included Antalya. Korkut Bey gave his name to the large Greek Orthodox Basilica of the Virgin Mary (Panaghia), which was changed into the "Korkut" or "Cuma" (Friday) Mosque, today called the "Kesik Minaret" Mosque in Kaleiçi. It seems from the conversion of this Christian church into a mosque at this time<sup>182</sup>, that there was substantial, probably total destruction of the main mosque of Antalya and so the need for a prayer hall was urgent, as had been the case in 1373-4, and, as a result, the

<sup>174</sup> L. A Zahra, "The Auberges of France in Vittoriosa", *Treasures of Malta* 25, 2002, 77. from the record provided of this quake in, Giacomo Bosio, *Istoria della Sacra religione militare di S. Giovanni Gerosolimitane*, Rome 1594-1602.

<sup>175</sup> İnalçık 1994, Vol. 1, 231; Babinger 1992, 146, 253-4, 273-4, 276, 299, 361, 365.

<sup>176</sup> Datini 1992, 149.

<sup>177</sup> Hitti 1991, 696; Trade 1970, 127.

<sup>178</sup> Trade 1970, 127.

<sup>179</sup> İnalçık 1994, Vol. 1, 95, 315, 317-9.

<sup>180</sup> Hitti 1963, 132.

<sup>181</sup> E. MacCurdy (ed.-trans.), *The notebooks of Leonardo da Vinci* (1954) Vol. I 323; I. Richter (ed.), *The Notebooks of Leonardo da Vinci* (1990) 307. These notebooks contain both first hand observations made by Leonardo of aspects of physical geography and related evidence and some reported contemporary accounts, such as that of the Antalya earthquake and tsunami of 1489.

<sup>182</sup> Aran 1970, 72, "At least until the period of Sultan Mehmet II<sup>nd</sup>, the church must have belonged to the Christians of the city. The style of the lower part of the minaret and the mihrap support this". Thus supporting a dating for the conversion to the second reign of Sultan Mehmet II<sup>nd</sup> at the earliest and, I suggest, to the reign of Sultan Beyazıt II<sup>nd</sup> 1481-1512.



mihrap is not aligned with the wall but set at an angle in the apse of the converted church. It is clear, given the numbers of Moslem garrison troops, guarding the inner fortress, the 80 towers, gates and walls of the post-Seljuks city etc., the Moslem officials, the Moslem inhabitants (and the many Moslem traders from Mamluke Egypt and Syria) within the city walls at this time, when added to the importance of Antalya to the Ottoman state in this period, being the main Ottoman port on the Mediterranean, that a large Ottoman Ulu-congregational Mosque was in existence in the city in the 15<sup>th</sup> century, probably built during the reign of Sultan Murat II<sup>nd</sup> (1403-51), and that this Ottoman Mosque was destroyed by the 1489 quake. Where it stood is a matter of speculation, perhaps on the site of the State Fine Art Gallery with the turbe of Zincirli Mehmet Bey beside it, or on the site of the later Tekeli Mehmet Paşa Mosque.

The Ulu mosque of Antalya in the mid-15<sup>th</sup> century was almost certainly not the building which had been converted into a mosque a century earlier in 1374 by Mubarriz-Din Mehmed Bey (d.1378), after the return by treaty in 1373 of Antalya to Turkish hands by the Cypriots, an action opposed by Pope Clement, but carried out by the Cypriots to prevent Antalya from falling into Genoese hands<sup>183</sup>, and which is today called the Yivli Mosque<sup>184</sup>, which survived this quake. This is because it is simply not large enough for the 15<sup>th</sup> century Moslem population of Antalya and the mihrap is misaligned with the mihrap wall. It seems to have been converted, almost as a temporary expedient in the hard times of the 2<sup>nd</sup> half of the 14<sup>th</sup> century, following the return of the city to Turkish rule, with population loss and the associated economic contraction and drop in trade and consequent loss of tax revenue to the Beylik as an inevitable result of the vast plague pandemic. The Turkish attempts to recapture Antalya in 1361, 1362 and 1370 were unsuccessful<sup>185</sup>, even though the Cypriot garrison had mutinied in May 1367, a mutiny which King Peter had to put down by coming to Antalya in person<sup>186</sup>. If the Yivli Mosque was the Ulu-Cumanun Camii of Antalya in 1489, serving the Moslem officials and others, there would have been no need for the conversion of this basilical church in the walled Christian section of the city, usually closed off on Fridays<sup>187</sup>. It is to be noted that Bali Bey Mosque, Antalya was probably begun after this quake<sup>188</sup>. Thus there were three main mosques in

<sup>183</sup> Edbury 1994, 203-4.

<sup>184</sup> It is to be noted that the original 1207 Seljuk Mosque in Antalya (whose staff and mihrap, müezzin etc. had been approved in person by Sultan Gıyased-Din Keyhusrev I<sup>st</sup> in 1207 as Ibn Bibi records: "Kadi, hatib, imam, müezzin ve hafızlar tayin edilip, mimber ve mihrablar kuruldu."; M. Öztürk, "El Evamiru'l-Ale'iyе Fi'l-Umuri'l-Ala'iyе (Selçuk-Name) I (1996) 119 was destroyed. The destruction of this mosque taking place either during the Cypriot aided revolt of 1210-16, Turan 1984, 77 for the date of recapture, 1216, and/or its subsequent Seljuk replacement after 1216, perhaps remodelled later by Emir Karatay, hence the occurrence of "Karatay Mosque-Karatay kulliyе" which survived into the 14<sup>th</sup> century (see İ. Numan, "Antalya Mevlevi hanesinin aslı hali hakkında bazı düşünceler", Vakıflar Dergisi XIV, 128, my thanks to K. Dörtlük of AKMED for drawing this article to my attention) in the period 1361-73. This Seljuk Ulu Cami of Antalya was destroyed by either arson or lightning during the Cypriot occupation of the city from 1361 to 1373. As a result, in 1373-4, the building that is today called the Yivli Mosque was converted into its present function as a mosque.

<sup>185</sup> Edbury 1994, 163.

<sup>186</sup> op.cit., 170.

<sup>187</sup> Smith 2002, 103, In 1332 Ibn Battutah reports that the gates in the inner walls of Antalya surrounding the Latin merchant quarter of al-Mina (the port) were shut at night, as they were on Fridays (The Moslem day of prayer) and that this, by inference, applied also to the Greek Orthodox and to the Jewish walled quarters of the city on Fridays.

<sup>188</sup> L. Yılmaz, suggests construction in the period 1486-95. Yılmaz 2002, 26.

Antalya in 1500, the Yivli Mosque, Korkut Mosque and Bali Bey (and probably the smaller Hünkâr Mosque within the 7 storey citadel).

1513-14 A major quake struck Adana, Tarsus and Malatya. It may have had an impact on the Eastern areas of Antalya province<sup>189</sup>.

1537-8 A great earthquake struck Antakya (Antioch) and probably had an impact on the East of Antalya province<sup>190</sup>.

1556 10<sup>th</sup> of May, a major quake struck the Hamid-ili (Sanjak) of Isparta - Uluborlu - Eğridir and "thousands of men perished"<sup>191</sup>.

During the reign of Sultan Süleyman Kanuni (1520-66) a main wall of the "Orta Kale" of Alanya Castle was brought down in an earthquake<sup>192</sup> and it seems that the 13<sup>th</sup> century Seljuck Ulu Mosque, the "Kale Cami" or "Sultan Alaed-Din Cami", which was built in 1231 by order of Sultan Alaed-Din Keykubat I<sup>st</sup>, was destroyed in this same earthquake of the first half of the 16<sup>th</sup> century. Parts of the Seljuck masonry from this Kale Cami, including inscriptions, were incorporated into the Sultan Süleyman Mosque, Süleymaniye<sup>193</sup> which was built around the mid-point of the 16<sup>th</sup> century to replace the destroyed Seljuck mosque. This earthquake destruction on Alanya Castle may have been a part of an otherwise unrecorded earthquake or, may have resulted from the earthquake of 1556.

1568 A major earthquake struck Cyprus and extensively damaged Limassol, Farmagusta and Nicosia<sup>194</sup>. There were doubtless also consequences from this earthquake on the Antalyan coastline.

1570 An earthquake was reported on Rhodes<sup>195</sup>.

In 1571, the 14<sup>th</sup> century Alaed-Din Cami at Korkuteli received from Murat Paşa a new minaret, one may suspect the earlier minaret was felled by an earthquake<sup>196</sup>.

1609 April, major earthquake on Rhodes, half of Rhodes town was destroyed and the castle was ruined. Thousands were killed by the tidal wave. This quake was felt as far away as Syria and Cairo and must have had an impact on Antalya Province in addition to the consequences of the tidal wave. All the people on Rhodes were ordered to give 3 days labor to the repair of the fortifications of the city<sup>197</sup>. It is to be noted that the earliest surviving mosque on the coastline West of Antalya is Hasköy Cami, 15 km East of Finike, from the end of the 16<sup>th</sup>-17<sup>th</sup> centuries and this has a somewhat elevated situation<sup>198</sup>. No earlier mosques survive along this coastline.

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189 Ambraseys-Finkel 1995, 44.

190 *op.cit.*, 46.

191 Ambraseys-Finkel 1995, 51.

192 Konyalı 1946, 158; Llyod - Rice 1958, 28.

193 Llyod - Rice 1958, 30 Pl. XVc, d, e, f; Vakıf 1983, 597.

194 Ambraseys-Finkel 1995, 52.

195 *op.cit.*, 1995, 52.

196 Vakıf 1983, 619-22.

197 Ambraseys-Finkel 1995, 59.

198 Vakıf 1983, 640.



1616 Earthquake on Rhodes in January, many houses destroyed<sup>199</sup>.

1659 Substantial repair work to Antalya city walls carried out.<sup>200</sup>

1660 October, slight earthquake at Rhodes<sup>201</sup>.

1685-6 Great earthquake struck Rhodes with Rhodes Castle damaged<sup>202</sup> and severe plague in Anatolia<sup>203</sup>.

Paul Lucas records that the Korkut Mosque in Antalya, Kaleiçi, was abandoned a few years ago (i.e. in the last decade of the 17<sup>th</sup> century) as: “a wall was built around it on account of an outbreak of plague in the immediate vicinity”<sup>204</sup>. The practice of walling up both plague victims and infected buildings dates back at least to the 1347-8 outbreak when the ruler of Milan, Archbishop Giovanni Visconti ordered the first 3 houses in the city to be infected, to be walled up with all the inhabitants, both sick and well inside, and it was reported that as a result, Milan suffered the least of all the cities of Italy from this plague pandemic<sup>205</sup>. The authenticity of Lucas’s report that a chapel in Korkut Mosque (the former church of the Virgin) in Kaleiçi, Antalya, was shut up because any Moslem who entered it died, due to a spell, or to the working of Christian holy relics, cannot be verified today, as the building was badly damaged by a fire in 1896<sup>206</sup>.

1713 Plague recorded in the area of Antalya<sup>207</sup>.

1713-14 A repair document for 1714 records the repair of Rhodes harbour’s Western tower built of stone which had been cracked in several places due to an earthquake<sup>208</sup>.

1719 Plague recorded in the area of Antalya<sup>209</sup>.

1728-9 Plague recorded in the area of Antalya<sup>210</sup>.

1739-43 Plague recorded in the Antalya area<sup>211</sup>.

1741 January 31<sup>st</sup>, a major quake on Rhodes. All the houses in towns and villages damaged, many totally destroyed. In Rhodes city more than 100 houses collapsed, the walls and fortifications were damaged and the port tower collapsed. This earthquake, like the one of 1609, caused a tidal wave that hit the Anatolian coastline 12 times, and destroyed 5 or 6 villages situated 1 kilometer inland on the Anatolian coast. The castle on Castellorizo (Meis) was badly damaged and Kum Burnu castle in Finike Kaza (district) collapsed as did Yılan Başlık castle<sup>212</sup>.

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<sup>199</sup> Ambraseys-Finkel 1995, 61.

<sup>200</sup> Moğol 1997, 126.

<sup>201</sup> Ambraseys-Finkel 1995, 72.

<sup>202</sup> op.cit., 1995, 90.

<sup>203</sup> S. J. Shaw, *The history of the Ottoman Empire and modern Turkey* (2000) 218-9.

<sup>204</sup> P. Lucas, *Voyage dans la Grece* (1714) 245.

<sup>205</sup> Tuchman 1989, 108.

<sup>206</sup> Vakıf 1983, 555.

<sup>207</sup> Panzac 1997, 260-1.

<sup>208</sup> Ambraseys-Finkel 1995, 100.

<sup>209</sup> Panzac 1997, 260-1.

<sup>210</sup> op.cit., 260-1.

<sup>211</sup> op.cit., 1997, 260-1.

<sup>212</sup> Ambraseys-Finkel 1995, 116-7.

1743 March 6<sup>th</sup> to 20<sup>th</sup> Great Antalya Earthquake. The commercial archives of the Marseille Chamber of Commerce at Marseille in Southern France contain a record of this great Antalya earthquake. It reads, "I have been informed from Sattalia (Antalya) that from the 6<sup>th</sup> to the 20<sup>th</sup> March, there were terrible earthquakes, as a result of which the port of Antalya dried up for sometime (as in the 1489 tsunami), many houses collapsed as well as parts of the city walls at different places. Parts of the city wall fell on the French Consul's house, destroying it. Many villages were lost in this earthquake, and a mountain opposite that which lies west of the islet of Rashat (today called "Fare", mouse or rat (sıçan) island in Antalya bay) sunk completely"<sup>213</sup>.

It is possible that this quake, or that of 1489, resulted in the formation of the Güverçurumu Vadi or valley, which runs towards the coast from Yukarı Karaman Köyü below Termessos, as there is almost no erosion of the lip and sides of this valley to be seen today, it seems to be the result of a relatively recent geological event. It was probably the shock-wave from this earthquake that brought down the Ulu Cami (Mosque) of Burdur, first built by Hamitoğlu Dünder Bey in 1300, and which was entirely rebuilt in 1749 by Çelik Mehmet Paşa<sup>214</sup>. It was probably this earthquake of 1743 which caused great destruction and the final 18<sup>th</sup> century abandonment of both Perge<sup>215</sup> and Aspendos<sup>216</sup>. Further, it is suggested that the upper level and the dome of Murat Paşa Mosque, Antalya (Fig. 1)<sup>217</sup>, was rebuilt in the 17<sup>th</sup>-18<sup>th</sup> centuries<sup>218</sup> and it is probable that this occurred after the 1743 or 1756 events. Evliya Çelebi's account of the 11 major mosques he saw in Antalya in 1671, with 5 minarets in the inner city<sup>219</sup>, suggests that 3: the Karatay Mosque inside the walls and the Yassı Minare and the Bakçızade Mosques outside the walls of Antalya were destroyed post 1671, probably in this quake or that of 1756, as there seems to be no record of them in the 19<sup>th</sup> century. It is probable that the Karatay Medrese was converted into a mosque with a minaret in the 17<sup>th</sup> century, as Yılmaz<sup>220</sup> suggests its conversion into a mescit. These 3 mosques are not recorded in the 1607 Maliyeden Müdevveder Defter<sup>221</sup> and so they must have been built or converted in the case of the Karatay Medrese post 1607, but were seen in 1671 by Evliya Çelebi.

1756 Feb. 13<sup>th</sup>, major quake affected Rhodes, damaged buildings in Antalya and Cairo<sup>222</sup>. It is to be noted that the Kasaba Cami by the harbour in Kaş was built in 1772, and is the earliest surviving mosque in the town<sup>223</sup>, Yet Kaş in the 14<sup>th</sup> century with Şeyh

<sup>213</sup> op.cit., 1995, 118.

<sup>214</sup> Erken 1997, 390-93.

<sup>215</sup> Pekman 1989, 105; Perge 1988, 15.

<sup>216</sup> Aspendos 1988, 16.

<sup>217</sup> Fig. 2 showing the Murat Paşa Mosque of 1570-71 in Antalya, from the exterior of the mihrap wall, showing the dome probably replaced after the quake of 1743 and the minaret with two şerefe that erected subsequent to the quake of 1911, replacing a single şerefe minaret.

<sup>218</sup> Vakıf 1983, 549.

<sup>219</sup> Erten 1948, 71-5

<sup>220</sup> Yılmaz 2002, 62.

<sup>221</sup> op.cit., 92-5.

<sup>222</sup> Ambraseys-Finkel 1995, 133.

<sup>223</sup> Vakıf 1983, 642-44.



Osman, Şeyh Bey and a Tekke<sup>224</sup>, almost certainly had a mosque in the 14<sup>th</sup> century and was an important Ottoman military and administrative settlement in the mid-16<sup>th</sup> century, see for example the references to Kaş in the Malta campaign register of 1556 and almost certainly had a Friday Mosque in the 16<sup>th</sup> century.

1759-65 Plague recorded in the Antalya area<sup>225</sup>.

1776 Sept. 18<sup>th</sup>, major earthquake on Rhodes<sup>226</sup>.

1784-86 Plague reported in the region of Antalya<sup>227</sup>.

1791-2 Plague in the region of Antalya<sup>228</sup>.

1809 A group of 4 Greek (Rum) travelling salesman carried plague from Antalya overland to İzmir<sup>229</sup>.

1815-1817/18 Sultan Mahmut II<sup>nd</sup> restored the city walls of Antalya, the inscription is in the Antalya Museum<sup>230</sup>. Further repairs to the city walls were carried out 1820-1, 1825-7 & 1835-6<sup>231</sup>; while Ahi Kızı Türbesi was repaired between 1819-20<sup>232</sup> and Eğridir's Hızırbey Camii was completely rebuilt from 1815 to 1819 (repaired again in 1885). It maybe that quakes struck the region in this period and there may possibly have been damage from the Antakya quake of 1822<sup>233</sup>.

1831 Plague reported in Karaman province, and also from Rhodes and from Makri (Fethiye)<sup>234</sup>, possibly from an outbreak in the Mut area of Karaman Province (350 km East of Antalya), where, like the area around Ardahan, plague was endemic within the rodent population. The followings statistics from Beirut provide some idea of the frequency of plague outbreaks at ports in the Eastern Mediterranean in the 19<sup>th</sup> century. A quarantine center was established in Beirut under Egyptian rule (1831-40) but it was too small and it was said to be a breeding center for diseases<sup>235</sup>. It was set up in addition to the lazaretto of 1830 which was said to be too small and too crowded for either comfort or health and there was also the occasional implementation of quarantine for infected ships<sup>236</sup>. Plague struck this East Mediterranean port city in 1813, 1816, in the early 1820's, 1826, 1827, 1829 and 1831. Plague was introduced to Beirut from Jerusalem in 1836, with another plague outbreak in 1837 that was contained in the lazaretto, again in 1838. In 1840 there was a

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<sup>224</sup> Moğol 1997, 54.

<sup>225</sup> Panzac 1997, 260-1.

<sup>226</sup> Ambraseys-Finkel 1995, 155.

<sup>227</sup> Panzac 1997, 260-1.

<sup>228</sup> op.cit., 260-1.

<sup>229</sup> Panzac 1997, 97.

<sup>230</sup> Moğol 1997, Ek 14, 127.

<sup>231</sup> op.cit., 127.

<sup>232</sup> Yılmaz 2002, 44.

<sup>233</sup> F. A. Neale, Eight years in Syria, Palestine & Asia Minor from 1842-1850 Vol. 2 (1851) 11.

<sup>234</sup> Panzac 1997, 56-7, 260-1.

<sup>235</sup> Fawaz 1993, 33-4.

<sup>236</sup> op.cit., 9.

<sup>237</sup> Fawaz 1993, 43.

major plague outbreak in Damascus and in 1841 plague was brought to Beirut from Acre (Akko). There was another plague outbreak in Beirut in 1842. In 1899 there was one case of plague on a steamer bound for Beirut and one case was reported in Beirut in 1902<sup>237</sup>. Perhaps the first quarantine station in the Mediterranean was set up on the Nazarethum in Venice, at some point after the 1348 outbreak, where all travelers and merchants from the Orient were confined for 40 days, to determine their health status, while in March 1348, when perhaps 600 Venetians were dying per day of the plague, regulations were passed, that any ship that tried to enter the port, suspected of carrying plague, was to be set on fire<sup>238</sup>. A quarantine system was introduced into the Ottoman Sultanate by Sultan Selim III 1792-1803, with the hospital in the Arsenal in İstanbul serving as an isolation hospital<sup>239</sup>.

1835 The English traveler Alexander William Kinglake (1809-91) traveled in 1834-5 in the Levant and recorded his experiences in "Eothen", published in London in 1844. He visited Cairo for 19 days in 1835 in the midst of a major outbreak of plague, when 700 people were dying per day and which killed 12,000 of the 25,000 people who inhabited Alexandria. He then traveled overland to Lebanon and Damascus and then took a ship in 1835 from the Syrian coast for İzmir, but was so delayed by the lack of wind, becalmed for 9 days by Cyprus, that the ship then headed for the port of Antalya, for the passengers to travel from Satalieh (Antalya) overland to Smyrna (İzmir). The following account relates his deliberate breaking of the quarantine regulations in force in the port of Antalya<sup>240</sup>: "The town of Satalieh is the chief place of the pashalik in which it is situate, and its citadel is the residence of the Pasha. We had scarcely dropped our anchor, when a boat from the shore came alongside with officers on board. These men announced that strict orders had been received for maintaining a quarantine of three weeks against all vessels coming from Syria, and they directed accordingly that no one from the vessel should disembark. In reply, we sent a message to the Pasha, setting forth the rank and titles of the General (a Russian General), and requiring permission to go ashore. After a while the boat came again alongside, and the officers, declaring that the orders received from Constantinople (İstanbul) were imperative and unexceptionable, formally enjoined us in the name of the Pasha to abstain from any attempt to land....I proposed that we (a party including the General) should set the Pasha at defiance...We determined to land...We ordered the boat to be got in readiness, and the officers on shore seeing these preparations, gathered together a number of guards; these they assembled upon the sands; we saw that great excitement prevailed, and that messengers were continually going to and fro between the shore and the citadel..... My instructions to the captain (of the ship) were attended to with the most perfect accuracy, for scarcely had my foot indented the sand when the four six-pounders of the brigantine quite gravely rolled out their brute thunder. Precisely as I had expected, the guards, and all the people who had gathered about them, gave way under the shock produced by the mere sound of guns, and we were allowed to disembark without the least molestation"<sup>241</sup>. Although Daniel Panzac reports that quarantine was instituted in Antalya

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<sup>238</sup> Zeigler 1973, 53.

<sup>239</sup> S. J. Shaw, *The history of the Ottoman Empire and Modern Turkey I* (2000) 264.

<sup>240</sup> Kinglake 1844, 235-240.

<sup>241</sup> *op.cit.*, 235-40.



and Alanya in 1838, it seems, from this account of 1835 that the Paşa of Antalya was already under instructions to institute a quarantine regime for the port, regarding ships coming from plague infected Syria.

1835-40 Plague in the Antalya region, reported to the west of the city of Antalya, in villages and in the Isparta area<sup>242</sup>.

At some point in the first half of the 19<sup>th</sup> century a superb work of kat'i was made by Mücellit Muhammed Rif'at, which is today in the Antalya Museum's ethnographic collection (No. 182). It may have been made in Antalya and was brought into the museum's collection by its first director Süleyman Fikri Erten. It is a prayer against the plague, giving the 5 names: Muhammed, Ali, Hassan and Hüseyin and Fatima, that proved efficacious in bringing down the plague fever and consist of 5 lines of text, each set within a decorative cartouche (Fig. 2).

It reads in transliteration: Line 1, "Lî hamsetün utfî bihâ harr'al-vebâ'il hâtime". Line 2. "El-Mustafâ ve'l-Murtezâ vebnâhümâ vel-Fatime," Line 3. "Tehassantü bi-bismillâhi ve bi-rasûlih'l-Kerîm" Line 4. "Şaziratün nasiratün (erîşa bedîşa?) emru ve e'azzü feyyâz" 5. Line 5. "Rıdvân'ullâhi teâlâ aleyhim ecmaîn". In translation it reads: Line 1. "There were 5 things for me and with them I overcame the plague fever. Line 2. They were El-Mustafa (the Name of the Prophet Muhammed), El-Murteza (The Name of the Martyr Ali, the son-in-law of the Prophet), The Names of the sons of the son-in-law of the Prophet, Hassan and Huseyin and Fatima, the daughter of the Prophet and wife of Ali. Line 3. In Allah's Name I found refuge and to his Exalted Prophet I turned. Line 4. I trusted in the Helper and God the willing Creator showed generous blessings. Line 5. May Allah give acceptance into Paradise to them all"<sup>243</sup>.

In 1840 the walls of Anamur Castle were restored, possibly following an earthquake. In the same year Sultan Abdul Mejid instituted for Cyprus, at Larnaka, a department headed by the French Doctor Michaud, to supervise the quarantine regulations and provide a weekly bulletin on the health situation of this Ottoman island<sup>244</sup>.

1842 Dinar-Isparta quake<sup>245</sup>.

The reason for the restoration of Tekeli Mehmet Paşa Mosque in 1850<sup>246</sup> paid for by İbrahim Ağa and for restoration to Bali Bey Mosque in Antalya in 1849-50 is not given<sup>247</sup>, nor for the restoration of the Agios Georgios Church in Antalya in 1863, but may have been caused by earthquake damage.

<sup>242</sup> Panzac 1997, 57, 260-61.

<sup>243</sup> My thanks to Doç Dr. İ. Özkeçici and Dr. M. L. Champagne for their help in translation. Note that the word "erîşa" seems today to be unknown, it may relate to the word "işari", meaning, "to demonstrate", and that the suffix "şa" of "erîşa", as of "badişa", relates to "will", as in "badişa", "the Creator wills". In Turkish the prayer reads: "Benim için beş şey vardır ki onunla hastalık (Veba) ateşini söndürürüm. Onlar: el-Mustafa (Hz. Peygamber A.S.), el-Mürteza (Hz. Ali RA.), oğulları (Hz. Hasan ve Hüseyin RA.) ve Fatima (Hz. Fatima RA.)'dır. Allah'ın ismiyle sığındım (korundum) ve O'nun Kerim (Kerim ve ihsan sahibi) Rasulü ile tevessül ettim (bağlandım). Güvenilir, yardımcıdır Erişa, Bedişa izzetli ve çok feyizli bir iştir. Allah (CC.)'ın rızası onların hepsinin üzerine olsun."

<sup>244</sup> Luke 1989, 173-4.

<sup>245</sup> Kayacan 1989, 16-17.

<sup>246</sup> Antalya 2000, 304.

<sup>247</sup> Yılmaz 2002, 27, 131 No 4.

1876 Dinar-Isparta quake<sup>248</sup>.

Clearly even some of the most well built structures in Antalya suffered substantial damage from earthquakes. Serious precautions were taken by Ottoman architects, note for example the iron clamps set in lead around the base of many Ottoman minarets in Antalya, including the 17<sup>th</sup> century Tekeli Mehmet Paşa Mosque in Antalya, to tie the blocks at the base of a minaret together<sup>249</sup>. Note the shock absorbers set beneath each column in the portico of Murat Paşa Mosque. Note also the wooden hatıls, today mostly gone, set in the wall below the Tophane above the harbour, in the walls of the Tekelioğlu Konak and the hatıls of wood, brick or tile, in other important, and not so important, buildings in Kaleiçi and elsewhere in the Province of Antalya. The almost complete absence of surviving early mosques, from the 14<sup>th</sup> century onwards in the western coastal regions of Antalya province, at important towns and ports such as Finike (earliest from the end of the 16<sup>th</sup>-17<sup>th</sup> century at Hasköy), at Myra/Demre and Kaş (earliest surviving from only 1772), provides clear evidence of the past earthquake damage to the western low lying regions of the Province from earthquakes and tsunami waves, centered on and around the island of Rhodes. While the rebuilding of the 14<sup>th</sup> century Alaaed-din Mosque in Korkuteli in 1571 by Murat Paşa, the building of the Ömer Paşa Mosque in Elmalı in 1602 and the building of the Ulu Cami in Akseki of 1894 are worth further investigation in respect to earthquake damage, which may have destroyed the earlier main mosques in these settlements.

From 1881, when official seismic records of earthquakes in the Ottoman Sultanate began, until 1986 there were 338 quakes in Antalya Province measuring 4 or more on the Richter scale. The major earthquakes of about 6 and above in the region were as follows:

1896 Cyprus quake on the 29<sup>th</sup> of April<sup>250</sup>.

1896 Rhodes quake on the 27<sup>th</sup> of October<sup>251</sup>.

1899 Isparta earthquake<sup>252</sup>.

1901 Dinar-Isparta quake<sup>253</sup>.

1910 Major repairs to Elmalı, Abdal Musa Tekkesi, probably caused in part by earthquake damage<sup>254</sup> as it had been restored in 1874.

1911 A quake of 6.1 with its epicenter in Antalya<sup>255</sup>. This quake smashed the top off the Yivli Minaret above the “şerefe”, then the tallest building in Antalya (Figs. 3 prior to the quake & 4 subsequent to the 1911 quake, AKMED photographic archive No 1620 & 382). The top part of the Yivli minaret is in the Ottoman style but is today a Republican period restoration of 1953<sup>256</sup>. There was an earlier replacement after the 1911 quake, prior

<sup>248</sup> Kayacan 1989, 16-17.

<sup>249</sup> Çelebi 2002, 84 for their use by Sinan in the Büyük Çekmece bridge foundations and in the Roman Bridge foundations at Aspendos; Aspendos 1998, 154.

<sup>250</sup> Deprem 1983, 120.

<sup>251</sup> op.cit., 123.

<sup>252</sup> Bayrak 1982, 239.

<sup>253</sup> Kayacan 1989, 16-17.

<sup>254</sup> Vakıf 1983, 638.

<sup>255</sup> Türkiye 1996; Deprem 1983, 317 situates this quake at Kaş rather than Antalya.

<sup>256</sup> Yılmaz 2002, 82.



to the 1931 quake (Fig. 5). It seems logical to suggest the original 1226 Seljuck tiled domed top to the Yivli Minaret was destroyed in the 1489 quake or earlier, as the late 18<sup>th</sup>-19<sup>th</sup> century European artists who visited Antalya and drew this minaret, show it with an Ottoman replacement conical top, similar to the Yivli minaret's appearance today e.g. Niemann's drawing of the Karatay Medrese, published by Lanckoronski in 1890<sup>257</sup>. It seems that the minaret of the Murat Paşa Mosque of 1570-1, was also brought down in this quake of 1911 and was rebuilt, with an additional "şerefe" in 1913-14<sup>258</sup> (Fig. 2). While, the in-section oblate window lantern light, crowning the apex to the domed roof of the mid-19<sup>th</sup> century Gavur Hamamı (former synagogue) in Yenikapı, Antalya, was destroyed in this quake and was replaced by a structurally sounder, octagonal window light<sup>259</sup>.

1914 A quake of 7.1 struck Burdur-Isparta on the 3<sup>rd</sup> and on the night of the 4<sup>th</sup>-5<sup>th</sup> of October and 2344 people were killed and in excess of 5000 buildings were damaged in this quake, with both cities entirely destroyed along with Keçiborlu and 60 villages<sup>260</sup>. The stone minaret of the Selimzade Mosque in Burdur, built in 1304 hicri (1885), was destroyed in this quake and it was replaced by one made of wood by Kahyaoğlu Hacı Osman and his brother Hacı Hüseyin<sup>261</sup>. It is noteworthy in this respect, that a number of mosques in the Akseki region have wooden minarets, including that of Süleymaniye Köy, while this district has many examples of the wooden hatıl built into traditional walls, at Akseki, İbradi, Ormana etc., which may hint at substantial quake damage in the area in the past. The Burdur Ulu Cami (Camii Kebir) was repaired after this quake and re-opened in 1919. In Isparta, this quake destroyed the hospital, many houses were destroyed and 248 people in Isparta were killed<sup>262</sup>. The Isparta Ulu Cami (Çarşı or Kutlubey Camii) built in 1417, was restored in 1901, probably following the quake of 1899, was totally destroyed in the 1914 quake and rebuilt in 1922<sup>263</sup>; while the Isparta Hızırbey Cami built in 1312, destroyed in 1714 and again in 1888, was damaged in the 1914 quake, and the Isparta İplik Cami built in 1550 was repaired in 1781, badly damaged in the 1914 quake, so that a new mosque was built in 1951.

1922 A quake of 6.9 struck the area to the south of Rhodes<sup>264</sup>.

1925 A quake of 5.9 struck Dinar on the 7<sup>th</sup> of August. Three people were killed and 2043 buildings were damaged<sup>265</sup>.

<sup>257</sup> Lanckoronski I Taf. XII. The repair of earthquake damage to state buildings sometimes occurred several years after the damage had occurred see N. N. Ambraseys - C. F. Finkel, The seismicity of the Eastern Mediterranean region during the turn of the 18<sup>th</sup> century, *IstMitt* 42, 1992, 325-6.

<sup>258</sup> Yılmaz 2002, 28.

<sup>259</sup> Güvenç 1997, 177 and personal communication.

<sup>260</sup> TMMOB 1997, 29; Deprem 1983, 352 gives its strength as 6.9; B. Çakıcı, "1914 Isparta ve Burdur depremi", in: İstanbul Üniversitesi. Tarih Araştırmaları Merkezi, Tarih boyunca Anadolu'da doğal afetler ve deprem semineri (2002) 219-248

<sup>261</sup> Erken 1997, 393-4.

<sup>262</sup> Kayacan 1989, 16-17.

<sup>263</sup> Bayrak 1982, 239.

<sup>264</sup> Deprem 1983, 503.

<sup>265</sup> TMMOB 1997, 29; Sırakaya 1991.

1926 A quake on the 18<sup>th</sup> of March of 6.9 off Kaş-Meis, Finike<sup>266</sup>, killed 27 people and damaged 190 buildings<sup>267</sup> and was followed by one of 5.5 on the 24<sup>th</sup> of March<sup>268</sup>. Both shocks were felt in Antalya<sup>269</sup>.

1930 A quake of the 11<sup>th</sup> of September at Sütçüler, Isparta of 5.9<sup>270</sup> totally destroyed the Ulu Camii of Burdur, built in 1299/1300, rebuilt in 1749 by Çelik Mehmet Paşa, repaired after the 1914 quake by 1919, rebuilt afresh by 1935 and again repaired after the 1971 quake<sup>271</sup>.

1931 A quake of 6.2 with its epicenter in Antalya<sup>272</sup> 200 km deep. The restoration of the Yivli Mosque in 1953<sup>273</sup> replaced the section above the “şerefe” which was knocked off once again in this earthquake<sup>274</sup> (Fig. 5 just prior to the quake and Fig. 6 subsequent to the event AKMED Photographic Archive No. 483 and No. 2894). The Murat Paşa Mosque restoration of 1932<sup>275</sup> seems to have been related to this quake; while the installation at Murat Paşa of a iron tie-beam joining the columns of the portico in 1960<sup>276</sup> seems to have been related to past quake damage.

1948 A quake struck Antalya’s bay, on the 23<sup>rd</sup> of April of 5.8, about 60 km south of Side and 100 km from Antalya<sup>277</sup>.

1957 Two quakes struck Rhodes on the 24<sup>th</sup> and 25<sup>th</sup> of April of 7.1 & 5.9<sup>278</sup>.

1957 25<sup>th</sup> of May, a quake of 7.1 hit Fethiye-Rhodes<sup>279</sup>, which destroyed much of the ancient Lycian city of Telmessos (old Fethiye) including burying the classical theatre in a rockfall, caused substantial subsidence and killed 67 people and damaged 3100 buildings. Sırakaya<sup>280</sup> likewise gives a date of the 25<sup>th</sup> of May, and a strength of 7.1 for this quake and records that 3796 houses, 20 schools, 3 mosques, 23 official buildings and 124 workshops as destroyed. G. Bean<sup>281</sup> records that virtually every building which was not built on the rocky slopes of Fethiye was destroyed, flattened, and the ruins of these buildings were then bulldozed to form today’s quay and esplanade at Fethiye. The Kaymakam after the initial mild earthquake shock warned the inhabitants to leave their houses and so saved many lives that would have otherwise been lost when the main quake subsequently struck the town.

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<sup>266</sup> Türkiye 1996.

<sup>267</sup> TMMOB 1997, 29.

<sup>268</sup> Deprem 1983, 598. 604.

<sup>269</sup> Uysal 1986, 26; Uysal 1995, 29.

<sup>270</sup> Deprem 1983, 780.

<sup>271</sup> Erken 1997, 390-93.

<sup>272</sup> Türkiye 1996.

<sup>273</sup> Yılmaz 2002, 12.

<sup>274</sup> photo Kelly 1951, 78.

<sup>275</sup> Yılmaz 2002, 28.

<sup>276</sup> Vakıf 1983, 543.

<sup>277</sup> Deprem 1983, 1189.

<sup>278</sup> op.cit., 1508. 1510.

<sup>279</sup> Türkiye 1996, TMMOB 1997, 29; Deprem 1983, 1507 gives 24/5/57 of 6.8.

<sup>280</sup> Sırakaya 1991

<sup>281</sup> Bean 1989, 38.



1959, 25<sup>th</sup> of April, a quake of 5.7 struck Köyceğiz, killed six people and damaged 266 buildings<sup>282</sup>.

1961, 23<sup>rd</sup> of May, a quake of 6.5 struck Marmaris and damaged 1000 buildings<sup>283</sup>.

1963, 22<sup>nd</sup> of November, a quake of 5.1 struck Tefenni and damaged 362 buildings<sup>284</sup>. It may be that as a result of this quake, Elmalı's Ömer Paşa Cami, having been repaired in 1938, was again repaired in 1968.

1969, January 1<sup>st</sup>, a quake of 6.2 hit Kalkan (Fethiye). Nobody was killed but 1000 buildings were damaged<sup>285</sup>.

1971, May 12<sup>th</sup>, a quake of 6.2 struck Burdur and killed 57 people and damaged 1389 buildings<sup>286</sup>. The Ulu Cami of Burdur was again damaged in this earthquake<sup>287</sup>.

1975 April 30<sup>th</sup> a quake of 5.9 struck by Rhodiapolis, Kumluca<sup>288</sup>.

1977 June 1<sup>st</sup> a quake of 5.9 in Antalya's bay, 100 km SSW of Antalya, 60 km from Side-Alanya<sup>289</sup>. It is reported that as a result of this earthquake, the harbour arm and harbour light at Kaş was damaged, the support for the harbour light being bent to an angle of 45 degrees.

A landslide in spring 1986 led to the collapse of the theatre and odeion at Silliön. It seems to have been caused by an earlier quake that had split the theatre away from the stage building and weakened the structure, but there is no record of the earlier quake<sup>290</sup>.

1995, October 1<sup>st</sup> a quake of 5.9, with its epicenter 100 km from Dinar, struck the city and 45% of the buildings of the city were damaged, 94 people died and 4,909 buildings were damaged<sup>291</sup>. A series of initial shocks led to a major evacuation of Dinar and to a much reduced death toll. The shock of this quake was felt in Antalya.

The earthquake threat to Antalya province was officially revised in 1996 and is today zoned as follows (1 is maximum risk, 5 is negligible risk): Antalya Bölge (Province): Antalya Merkez (city) 2, Aksu 2, Çakırlar 2, Dağ 2, Döşemealtı 2, Akseki 3, Cevizli 3, Geriş 3, Güzelsu 3, Alanya 4, Avçalar Bel. 3, Konaklı Bel. 3, Okurçalar Bel. 3, Payallar Bel. 3, Türkler Bel. 3, Elmalı 2, Akçay 2, Gölöva 2, Finike 1, Gazipaşa 4, Gündoğmuş 4, Güzelbağ 3, Köprülü 4, İbradı 3, Kale 1, Kaş 1, Kalkan 1, Kemer 1, Korkuteli 2, Bozova 1, Kızılcadağ 1, Kumluca 1, Altınyaka 2, Manavgat 2, Beşkonak 2, Taşağıl 2, Serik 2.

<sup>282</sup> TMMOB 1997, 29; Deprem 1983, 1593 gives its strength as 5.9 as does Sırakaya 1991.

<sup>283</sup> TMMOB 1997, 29.

<sup>284</sup> TMMOB 1997, 29; Sırakaya 1991 gives a date of 30<sup>th</sup> of January 1964 and a strength of 5.7 for a quake at Tefenni.

<sup>285</sup> Türkiye 1996; TMMOB 1997, 29.

<sup>286</sup> TMMOB 1997, 29; Kayacan 1989, 17-18 reports 62 people killed; Deprem 1983, 2311 gives its strength as 5.9 as does Sırakaya 1991.

<sup>287</sup> Erken 1997, 390-93.

<sup>288</sup> Deprem 1983, 2544.

<sup>289</sup> op.cit., 2666.

<sup>290</sup> Freely 1998 ; Sagalassos 2000, 797 for the earthquake trigger for landslips.

<sup>291</sup> TMMOB 1997, 29.

The earthquake threat to the provinces adjoining Antalya Province: Muğla, Burdur, Isparta, Mersin (İçel) were listed in 1996 as follows: Muğla ili (Province), the entire province is in zone 1. Burdur ili (Province): Burdur Merkez (city) 1, Ağlasun 1, Altınyayla 1, Bucak 1, Kızılkaya 1, Kocaaliler 2, Çavdır 1, Çeltikçi 1, Gölhisar 1, Karamanlı 1, Kemer 1, Tefenni 1, Yeşilova 1. Isparta ili (Province): Isparta Merkez (city) 1, Aksu 1, Atabey 1, Eğirdir 1, Barla 1, Gelendost 1, Gönen 1, Keçiborlu 1, Şehir Kent 1, Sütçüler 2, Ayvalıpınar Bel. 1, Kasımlar 2, Şarkıkaraağaçı 1, Uluborlu 1, Yalvaç 1, Bağkonak 1, Kumdanlı 1, Yenişarbademli 2. İçel ili (Province): İçel Merkez (city) 3, Aslanköy 4, Gözne 3, Kazanlı 3, Fındıkpınarı Bel. 4, Tepeköy Bel. 4, Anamur 5, Aydınçık 5, Bozyazı 5, Çamlıyayla 3, Erdemli 4, Elvanlı 4, Güzeloluk 4, Gülnar 5, Ovacık 5, Mut 5, Silifke 4, Kirobası 4, Taşucu 3, Gülek 3 and Yenice 3<sup>292</sup>.

A note on the hatıl and other traditional building techniques that have been employed in Antalya Province to reduce the damage caused to buildings by earth tremors

The architectural-constructional response to earthquakes over the centuries in Antalya province, until the 1950's and the arrival of modern concrete skeletal construction methods, was formed in the knowledge that Antalya was in an earthquake region, and upon using those building traditions which had been developed over the course of centuries of experience, designed to respond to this problem of seismicity, displaying the development of an "anti-seismic culture"<sup>293</sup>. Techniques such as: building settlements on rock rather than in areas of alluvial deposition, for example with the ground floor walls cut from solid rock wherever possible, as at Arycanda, where these 2 storey houses were reoccupied after the quake of 240 AD which had flattened the newer houses built on lower lying ground; as well as having a relatively dispersed settlement pattern (compared to the density of modern high-rise settlements of 100's of people per dönüm/1000 sqm), and a low density of settlement in all those low lying areas which have been struck in the past by tsunami, by building low-rise housing and by using in building construction the traditional techniques, for example, the "hatıl", of brick, tile or wood. Also of importance is the size of the population, in an area that might be affected by an earthquake. The population of the entire province at the end of the 19<sup>th</sup> century was 172,854, by 1926 the total population of the province had increased to 226,704<sup>294</sup> while the population of the city of Antalya in 1927 was 17,256. In the 2000 census the population of Antalya city was 714,129 and the population of the province 1,719,751.

Firstly, the hatıl

From settlement at Troy onwards, as at Knossos in the Palace at Minos, at the Syrio-Hittite site of Tainat on the Orontes and elsewhere, builders in Anatolia have responded to

<sup>292</sup> Bayındırlık ve İskan Bakanlığı, Afet İşleri Gen. Müd. Deprem Araştırma Dairesi Baş., Türkiye Deprem bölgeleri haritası (18.04.1996) (1996) Yerleşim Birimleri ve Deprem Bölgeleri, İndeks 2, 4, 7, 13.

<sup>293</sup> Mediterranean 1994, 79 and for example, Q. Hughes, "The architectural development of Hospitaller Malta", in: V. Mallia-Milanes (ed.), Hospitaller Malta 1530-1798 (1993) 498-9, 497 and Q. Hughes, The building of Malta 1530-1795 (1986) 126.

<sup>294</sup> Güçlü 1997, 43-44. It is to be noted that the 2000 census was not carried out in summer, and counted neither foreign residents or foreign tourists and thus records a much lower figure than if the census was held in June-September.



the earthquake threat by employing a variety of building techniques, including the “hatıl” in its various forms, over the past 7,000 years. Of late Bronze Age Anatolia, J. G. Macqueen writes, “timber reinforcement, both horizontal (hatıl) and vertical, was, as in other periods, a characteristic feature. The value of such reinforcement as a cushion against earth tremors was certainly recognised by Anatolian builders”<sup>295</sup>. This type of construction was found at the excavations of Hittite Boğazköy, Kültepe-Kaniş and at Beycesultan from the 19<sup>th</sup> century BC. The Beycesultan excavation report records: “The average thickness of the walls, then, was between 80 and 90 cms. First came a substructure approximately 65 cms high, built of fairly large undressed stones and reinforced at one or more points in its height, pairs of runner beams, flush with the faces of the wall on either side. Another pair of beams, tied together with short cross pieces (forming a model of the later Seljuck and Ottoman hatıl) made a seating on top of the stone for the brick structure above”<sup>296</sup> and in this earthquake prone region of Denizli, the report continues: “timber elements strengthen the mud brick walls, including the meter wide fortifications in level XIX with 4 parallel runner-beams laid between the stones”<sup>297</sup>. While Sir Leonard Woolley, writing of his excavations at Atchana (Alalakh) in the earthquake prone region of Antakya, recorded the presence of the wooden hatıl, which he terms “half-timber”, in the walls of the palace of Niqmepa and in other structures dating from 1450 BC onwards, “above the stones (of the palace) the walls are carried up in half timber construction”<sup>298</sup>. Lloyd writes: “The outline and extent of the countries in which this “half timber” (hatıl) construction is practiced, will be found on the map to correspond most strikingly with the limits of the geographical area most affected by earthquakes”<sup>299</sup>, and further, “It is a matter of common knowledge to modern architects in that part of the Middle East, that the traditional frame buildings of Anatolia have an impressive elasticity, which often prevents them from total collapse in the severest earth tremor. There is little reason to doubt that the system was originally adopted and has persisted from the earliest times for this reason”<sup>300</sup>.

In the classical period, Hellenistic to Roman, courses of thin stone, with larger courses of ashlar masonry above and below these thinner courses, which can be seen at many sites: Olympos, Perge etc., seem to have been designed to absorb part of the earthquake shock wave, together with the use of iron clamps set in lead, joining stone blocks together, with the lead acting as a shock absorber, and the deploying of large stone blocks, not joined together by mortar, where the frictional drag of these large stone blocks absorbs much of the lateral movement in an earthquake. This system of building for earthquakes was further developed by Roman and Byzantine builders, so that courses of different material, usually brick or tile, were laid between the stonework or rubble mortar walls, as

<sup>295</sup> Macqueen 1999, 82.

<sup>296</sup> Beycesultan 1965, 8.

<sup>297</sup> op.cit., 60.

<sup>298</sup> Woolley 1953, 104, 107, 158.

<sup>299</sup> Lloyd 1963, 87.

<sup>300</sup> op.cit., 86 also Beycesultan 1965, 64 and TDN for a series of articles on this matter by the author: Turkish Daily News: October 29<sup>th</sup> & 30<sup>th</sup>, 2003, “The modern destruction of Kaleiçi, Antalya”; October 6<sup>th</sup>, 2003, “Modern folly and traditional solutions”; August 25, 1999, “The Hatıl and the lessons of history” and in Cumhuriyet Dergisi 710, 31<sup>st</sup> Ekim 1999 (trans. H. Uğurlu), 12-13; TDN “The ancient city of Sagalossos - the restorations” Part 2, re “Hatıl”, Sept 28<sup>th</sup>, 1997; TDN “Fakery and folly in Kaleiçi” Sept. 10<sup>th</sup> 1997; Çağdaş Akdeniz 2, 2002, 18-19 and İMO Antalya Bülten 34, 2002, 28 n. 1489, Antalya quake wrongly published as occurring in 1452, and bibliography truncated in İMO publication.



in many Late Roman bath houses, Byzantine churches or in the walls of İstanbul<sup>301</sup>. These courses were designed to absorb the shockwave from an earthquake, through the combination of stone, brick, tile and mortar and to provide, through the use of brick or tile *hatıl*, a series of bands of relative isolation within the walls of a structure (Fig. 7). The practice of inserting wooden joints into walls, and wooden beams into the arches above pulvins as anti-seismic measures, is also noted in the literature<sup>302</sup>.

This system of built in, constructional shock-absorbers was further developed throughout the Islamic world, including in Anatolia under Seljuck, Beylik and Ottoman rule, with the use not only of a brick or a tile "*hatıl*", but also, of one made of wood, perhaps reinforced by the example of the Kaa'ba in Mecca, in addition to the tradition of wooden *hatıls* which probably continued in some forms of vernacular architecture from before 5000 BC into the 20<sup>th</sup> century AD in Anatolia. The Kaa'ba was rebuilt in 608 AD and Azraqi, the earliest historian of Mecca, reports that the walls of the Kaa'ba were built from alternating courses of stone and wood, in 31 courses to a height of 9.6 meters, the wall then being covered by stucco<sup>303</sup>. In addition, the Umayyads used brick *hatıl* and stone for the walls at Anjar, Dar-Rosafa of 728 in an earthquake prone region, and this use of brick *hatıls* built in stone walls continued in the earthquake prone region between Beirut and Damascus, in the Bekka valley of the Lebanon, until the end of the Ottoman Sultanate.

The wooden *hatıl*, in Anatolia usually of *ardıç* (juniper), was laid horizontally and spaced every 1 to 2 meters up the walls to the full height of a building. Ahmad Y. al-Hassan and Donald R. Hill mention "in one type of (building) construction, timber beams were built into the walls"<sup>304</sup>. The wooden *hatıl* was laid on the inner and outer faces of the wall with a series of ladder-like wooden rungs joining either side through the thickness of the wall, attached either below or above the thick horizontal timbers, as was the case in the walls of Beycesultan 3,100 years before the Seljucks arrived in Antalya Province. This use of the *hatıl* is visible on the remaining Seljuck period tower by the Seljuck period entrance to the Aspendos Theatre (Fig. 8), on the Seljuck hunting lodge by Kemer (Fig. 9), on the north flanking tower of Hadrian's gate which seems to have been repaired using wooden *hatıl*, after an earthquake in late Ottoman times, in the walls of many of the Ottoman period buildings in Antalya Province, in Kaleiçi (Fig. 10), and in the wall below the Tophane, in the walls of the İki Kapalı Han, Antalya, at Bademağaç and at Kovanlık, at Alanya in the walls of the houses on the citadel, at Akseki, İbradi, Ormana (Figs. 11 & 12), and in many towns and villages elsewhere in the province. It is to be seen at the Kılıç Arslan Köşk at Konya and the Kubadabat Küçük Saray, Beyşehir<sup>305</sup> from the Seljuck period, at Tlos in the Beylik period castle etc.

In civil engineering terms the Seljuck-Beylik-Ottoman wooden *hatıl* in Anatolia served the following functions:

1. As a vertical and horizontal shock absorber as its more compressible and resilient than the surrounding masonry in an earthquake.

<sup>301</sup> For example see Foss 1996, V 145-205, VI 297-320.

<sup>302</sup> Mediterranean 1994, 80-81.

<sup>303</sup> Creswell 1958, 1-4. This structure was replaced after it was destroyed by fire in 683.

<sup>304</sup> Technology 1986, 76 the *hatıl*.

<sup>305</sup> Yavuz 2002, 276.



2. As a slip plane within the walls to prevent frictional drag in the superstructure from the foundation and masonry below the hatıl in an quake. This minimizes the tensile and compressive forces generated in the walls by lateral ground movement and so minimizes damage to the structure.
3. As a horizontal tie-member all around the building at a common level to resist tensile forces.
4. As a rigid horizontal “girder” member, to maintain plan configuration of the buildings wall’s, even if a degree of lateral shift were to occur<sup>306</sup>.

These characteristics are, although to a far lesser extent, present in the earlier Roman and Byzantine, and in the Ottoman brick-tile hatıl, with the exception of 1.

## Secondly, walls made of composite materials

The use of varied materials including wooden hatıl’s, rubble infill, ashlar masonry, earth infill, bricks, tiles and mortar in a traditional wall, allows for far greater shock absorbency than using a single material, as with a modern concrete structure, which cracks and snaps under the compressive and tensile forces released in a quake. Examples range from the unrestored buildings of Kaleiçi, Antalya, to the surviving Ottoman hans of the province (Figs. 13 & 14).

## Thirdly, the “Mütemadi - radial temel” or “continuous foundation”

Most official Seljuck, Beylik and Ottoman structures (like those of Bronze Age Anatolia), have very shallow foundations called a “mütemadi temel”, even vast mosques such as Sultan Ahmet in İstanbul. This allows much of the shock wave to pass beneath the building. The large 15<sup>th</sup> century “İki Kapılı Han” in Antalya for example has foundations only 1.5 meters deep<sup>307</sup>. This traditional foundation supports most of the larger state and religious buildings built in Turkey over the last 1000 years (For further research on this matter of the history of building techniques and changes in building construction to take account of past and possible future earthquakes see<sup>308</sup> and various articles in Archaeoseismology).

## Fourthly

In many of the larger traditional Ottoman period buildings in the province and elsewhere, the great weight of terra cotta tiles on the roof, in the case of the İki Kapılı Han for example amounting to several tons, is supported, on three sides by the walls of the building and on the fourth side, by a series of cedar wood columns, resting on stone bases.

<sup>306</sup> My thanks to Tristram E. J. Hope Meng, Ceng MİStruct E, AMICE, civil engineer of Ove Arup and Partners (International Consulting Engineers) for technical advice concerning the hatıl.

<sup>307</sup> My thanks to M. Topaloğlu (İnşaat Müteahhiti) one of the few architects in Antalya to build with a mütemadi-radial temel, for his willingness to pass on his knowledge gained from his extensive restoration work on Seljuck and Ottoman buildings for the Vakıf Gen. Müd., and to his son L. Topaloğlu for information obtained from the restoration work carried out at the İki Kapılı Han in Antalya in 1995/6.

<sup>308</sup> Mediterranean 1994, 54-79.

These stone bases are frequently reused carved classical and Byzantine column capitals. The columns rest on these stone bases for at least two reasons, firstly to prevent the wooden columns rotting and secondly, to allow these wooden columns supporting the weight of tiles on the roof to flex and move in an earthquake, moving on the flat stone surface upon which they rest, rather than being a rigid, fixed support for the weight of the roof. The whole structure, of walls built of composite materials with *hatıl* of brick, tiles or of wood, and of wooden columns supporting the roof, thereby exhibits in structural terms a remarkable flexibility in the event of an earthquake. Many of the surviving unrestored two storey buildings of Kaleiçi, Antalya, the Ottoman houses in Alanya castle and elsewhere in the province exhibit this feature of “anti-seismic culture”. The precedent for this, like the *hatıl*, may also stretch back thousands of years, as a similar feature, of free-standing wooden columns resting on stone bases that seem to have supported some heavy structure, are found in earthquake prone regions, at Beycesultan, Kültepe and Gordion, dating from the Bronze Age to the 8<sup>th</sup> century BC<sup>309</sup>.

### Acknowledgements

In addition to those mentioned in the footnotes, my thanks go also to Prof. J. des Courtils for earthquake and population information revealed by excavations at Xanthos, to Prof. Dr. N. Çevik and his team from Akdeniz University for information relating to the Lycian cities of Kelbessos, Neapolis and Trebenna; to Dr. K. Bilici and to AKMED (The Suna & İnan Kıraç Research Institute on Mediterranean Civilisations, Antalya) for access to important reference material and to Antalya Governor, H. Tuğlu (1996-99), for his encouragement in 1996 of my research in this area. My thanks also to my father, S. T. Duggan, geophysical engineer AMICE, who introduced me to the world of seismology.

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<sup>309</sup> Beycesultan 1965, 64-5, fn. 295. 296, 299.



## Abbreviations and References

- Al-Magrizi 1980 Al-Magrizi, A history of the Ayyubid Sultans of Egypt, R. J. C. Broadhurst (trans.) (1980).
- Ambraseys-Finkel 1995 N. N. Ambraseys - C. F. Finkel, The seismicity of Turkey and adjacent areas. A Historical review 1500-1800 (1995).
- Antalya 2000 L. Yılmaz, "Antalya-Tekeli Mehmet Paşa Camii ve tarihlendirilmesi", *Adalya V*, 1999-2000, 301-317.
- Aran 1970 B. Aran, "Antalya Cumanun Camisi", *Anadolu Sanatı Araştırmaları 2*, 1970, 77-83.
- Arık 1994 F. Ş. Arık, "Selçuklular zamanında Anadolu'da meydana gelen depremler", *Tarih Araştırmaları Dergisi* (1992-4) Cilt XVI, Sayı 27, 1994, 13-32.
- Aspendos 1988 M. E. Özgür, *Aspendos* (1988).
- Aspendos 1998 P. Kessener - S. Piras, "The Aspendos Aqueduct and the Roman-Seljuk bridge across the Eurymedon", *Adalya III*, 1998, 149-169.
- Babinger 1992 F. Babinger, *Mehmed the Conqueror and his times*, W. C. Hickman (ed.) 1992.
- Batur 1994 E. Batur (ed), *The wind blowing from Asia to Anatolia. An exhibition of Beylik period coins* (Exhibition Cat., İstanbul 1994).
- Bayburtluoğlu 2003 C. Bayburtluoğlu, *Yüksek Kayalığın yanındaki yer Arykanda* (2003).
- Bayrak 1982 M. O. Bayrak, *Türkiye Tarihi Yerler Kılavuzu* (1982).
- Bean 1989 G. E. Bean, *Lycian Turkey* (1989).
- Beycesultan 1965 S. Lloyd - J. Mellart, *Beycesultan II* (1965).
- Boase 1978 T. S. R. Boase (ed.), *The Cilician Kingdom of Armenia* (1978).
- Borchhardt 1975 J. Borchhardt, "Der Tempel der Artemis Eleuthera nach den Münzen von Myra", in: J. Borchhardt (ed.), *Myra. Eine lykische Metropole in antiker und byzantinischer Zeit* (1975).
- Browning 1987 R. Browning, *Justinian and Theodora* (1987).
- Cassola 1998 A. Cassola (ed.), *The 1556 Ottoman campaign register* (1998).
- Clayton - Price 1998 P. A. Clayton - M. J. Price (ed.), *The 7 wonders of the Ancient World* (1998).
- Cremna 1995 S. Mitchell, *Cremna in Pisidia. An ancient city in peace and in war* (1995).
- Creswell 1958 K. A. C. Creswell, *A short account of early Moslem architecture* (1958).
- Cyprus 1985 D. Soren - Th. Davis - R. C. Jensen, "Seismic archaeology at Kourion the 1984 campaign", in: *The report of the Department of Antiquities, Cyprus* (1985) 293-311.
- Cyprus 1986 D. Soren - R. Gardiner - Th. Davis, "Archaeological excavation and analysis of the earthquake affected strata at Roman Kourion, Cyprus" in: *The report of the Department of Antiquities, Cyprus* (1986) 202-212.
- Çelebi 2002 S. M. Çelebi, "Book of Buildings" - *Tezkiretül-Bünyan ve Tezkiretül-Ebniye. Memoirs of Sinan the architect* (2002).
- Datini 1992 Francesco di Marco Datini, *Merchant of Prato - Daily life in a medieval Italian city*, Marchesa Iris Origo (trans.) (1992).
- Deprem 1983 E. Ayhan - E. Alsan - N. Sancaklı - S. B. Üçer, *Türkiye ve dolayları Deprem Kataloğu 1881-1980* (1983).
- Dols 1977 M. W. Dols, *The Black Death in the Middle East* (1977).

- Duggan 2003 T. M. P. Duggan, "A 14<sup>th</sup> century account of Antalya's sunken cities - A historical context and a literary tradition", *Adalya VI*, 2003, 305-336.
- Earthquake 2000 M. Waelkens - M. Sintubin, et all, "Archaeological and geological evidence for a major earthquake at Sagalassos (SW Turkey) around the middle of the 7<sup>th</sup> century AD", in W. J. McGuire - D. R. Griffiths - L. S. Stewart (eds.), *The archaeology of geological catastrophes* (2000) 373-83
- Edbury 1994 P. W. Edbury, *The Kingdom of Cyprus and the Crusades 1191-1374* (1994).
- Ergin 1967 K. Ergin, *A catalogue of earthquakes for Turkey and surrounding areas (13 AD-1964 AD)* (1967).
- Erken 1977 S. Erken, *Türkiye'de Vakıf Abideler ve Eski Eserler II. Balıkesir-Bilecik, Bingöl-Bitlis-Bolu-Burdur* (1977).
- Erten 1948 S. F. Erten, *Antalya Tarihi. Üçüncü Kısım* (1948).
- Faroqi et all. 1997 S. Faroqi - B. McGowan - D. Quataert - Ş. Pamuk, *An economic and social history of the Ottoman Empire II, 1600 - 1914* (1997).
- Fawaz 1993 L. T. Fawaz, *Merchants and migrants in nineteenth-century Beirut* (1983).
- Fleet 1999 K. Fleet, *European and Islamic trade in the early Ottoman State. The merchants of Genoa and Turkey* (1999).
- Foss 1996 C. Foss, *Cities, Fortresses and villages of Byzantine Anatolia* (1996).
- Freely 1997 J. Freely, *The Western Mediterranean Coast of Turkey* (1997).
- Freely 1998 J. Freely, *The Eastern Mediterranean Coast of Turkey* (1998).
- Gibb 1939 H. A. R. Gibb, *Ibn Battuta - Travels in Asia and Africa (1325-54)* (1939).
- Goitein 1993 V. S. D. Goitein, *A Mediterranean Society, Vols. II-V* (1993).
- Güçlü 1997 M. Güçlü, *XX Yüzyılın ilk yarısında Antalya* (1997).
- Güvenç 1997 Ş. Güvenç, "Antalya Kaleiçi'nde Yenikapı Gavur Hamam Restorasyon Projesi", (Yayınlanmamış Yüksek Lisans Tezi, 1997 İstanbul).
- Haldon 1997 J. F. Haldon, *Byzantium in the 7<sup>th</sup> century. The transformation of a culture* (1997).
- Harrison 2001 M. Harrison, *Mountain and Plain* (2001).
- Haynes 1974 S. Haynes, *Land of the Chimaera. An Archaeological Excursion in the South-West of Turkey* (1974).
- Heredotus 1972 A. de Selincourt - A. R. Burn (ed.), *Herodotus. The Histories* (1972).
- Hillenbrand 1999 C. Hillenbrand, *The Crusades - Islamic perspectives* (1999).
- Hitti 1963 A short history of the Lebanon (1963).
- Hitti 1991 P. K. Hitti, *History of the Arabs* (1991).
- Irwin 1999 R. Irwin, "Islam and the Crusades 1096-1699", in: J. Riley-Smith (ed.), *The Oxford History of the Crusades* (1999).
- İnalçık 1994 H. İnalçık, *An economic and social history of the Ottoman Empire I, 1300-1600* (1994).
- Kayacan 1989 İ. Kayacan, *Burdur Hatırlamaları* (1989).
- Kelly 1951 M. N. Kelly, *Turkish Delights* (1951).
- Keşik 2002 M. Keşik, "XII yüzyılın ilk yarısında Anadolu'da meydana gelen doğal afetler ve depremler", in İstanbul Üniversitesi. Tarih Araştırmaları Merkezi. *Tarih boyunca Anadolu'da doğal afetler ve deprem semineri* (2002) 29-40.
- Keys 1999 D. Keys, *Catastrophe* (1999).



- Kinglake 1844 A. W. Kinglake, Eothen (1844).
- Konyalı 1946 I. H. Konyalı, "Alanya (Alaiyye)" (1946).
- Lanckoronski K. G. Lanckoronski - G. Niemann - E. Petersen, Städte Pamphyliens und Pisidiens I (1890) II (1892).
- Lighfoot 1994 C. Lightfoot, Amorium. A brief guide to a late Roman and Byzantine city in Central Anatolia (1994).
- Llyod - Rice 1958 S. Llyod - D. S. Rice, Alanya ('Ala'iyya) (1958).
- Llyod 1963 S. Lloyd, Mounds of the Middle East (1963).
- Luke 1989 Sir Harry Luke, Cyprus under the Turks 1571-1878 (1989).
- Lycia 2000 R. L. Vann - R. L. Hohlfelder - K. Shedrik, "The church beneath the sea at Aperlae Lycia", Adalya IV, 1999-2000, 207-221.
- Macqueen 1999 J. G. Macqueen, The Hittites and their contemporaries in Asia Minor (1999).
- Mansel 1978 A. M. Mansel, Side 1947-66 yılları Kazıları ve araştırmalarının sonuçları (1978).
- Martin 2002 S. Martin, Black Death (2002)
- Mayer 1990 H. E. Mayer, The Crusades (1990).
- Meade 2001 M. Meade, Elenor of Aquitaine (2001).
- Mediterranean 1994 E. Guidoboni (ed.), Catalogue of ancient earthquakes in the Mediterranean area up to the 10<sup>th</sup> century (1994).
- Moğol 1997 H. Moğol, Antalya Tarihi (1997).
- Myra 1998 The Church of St. Nicholas in Myra. Andriake, Teimiussa (Üçağız), Simena (Kale), Kekeova (1998).
- Nekropol 2000 F. Büyükyörük - C. Tibet, "1998-9 yılı Antalya Doğu Nekropolü Kurtarma Kazıları", Adalya IV, 1999-2000, 115-173.
- Norwich 1996 J. J. Norwich, Byzantium - The decline and fall (1996).
- Öner 1998 E. Öner, "Zur Geomorphologie der Esen-Deltaebene und des Antiken hafens von Patara in der Südwest Türkei", Adalya III, 1998, 207-220.
- Ötüken 1996 S. Y. Ötüken, "Ortaçağ Araştırmaları ve Aziz Nicholas Kilisesi Kazısı", Adalya 1, 1996, 73-87.
- Panzac 1997 D. Panzac, Osmanlı İmparatorluğu'nda Veba 1700-1850 (1997).
- Pekman 1989 A. Pekman, Perge Tarihi (1989).
- Perge 1988 M. Edip Özgür, Perge (1988).
- Peters 1994 F. E. Peters, The Haj - The Muslim pilgrimage to Mecca and the holy places (1994).
- Pirazzoli 1996 P. A. Pirazzoli, "Uplift of ancient Greek Coastal sites", in: S. Stiros - R. E. Jones (ed.), Archaeoseismology, British School of Archaeology at Athens, Fitch Occasional Papers No 7 (1996) 237-244.
- Plague 1996 C. Wills - H. Collins Plagues, their origin, history and future (1996).
- Prokopius 2001 Prokopius, Bizans'ın Gizli Tarihi, O. Duru (çev.) (2001).
- Polimenakos 1996 L. C. Polimenakos, "Thoughts on the perception of the earthquake in Greek antiquity", in: S. Stiros - R. E. Jones (ed.), Archaeoseismology. British School of Archaeology at Athens, Fitch Occasional Papers No 7 (1996) 253-257.
- Rheidl 1996 K. Rheidl, "The 1296 earthquake at Pergamum and Chliara" in: S. Stiros - R. E. Jones (ed.), Archaeoseismology, British School of Archaeology at Athens, Fitch Occasional Papers No 7 (1996) 93-104.

- Sagalassos 1994 E. Paulissen - J. Poesen - G. Govers - J. de Ploey, "The physical environment at Sagalassos (Western Tauros, Turkey) a reconnaissance survey", in M. Waelkens - J. Poblome (ed.), *Acta Archaeologica Lovaniensia Monographiae* 6, Sagalassos II, A report on the third excavation campaign of 1992 (1994).
- Sagalassos 1995 M. Waelkens - E. Paulissen - E. Owens, et all., "The excavations in the fountain house - library area", in, *Acta Archaeologica Lovaniensia Monographiae* 7, Sagalassos III, report on the fourth excavation campaign of 1993 (1995).
- Sagalassos 1997 M. Waelkens - E. Paulissen - H. van Haverbeke et. all, "Surveys on the territory of Sagalassos", *Acta Archaeologica Lovaniensia Monographiae* 9, Sagalassos IV, report of the survey and excavation campaigns of 1994 and 1995 (1997).
- Sagalassos 2000 G. Verstraeten - E. Paulissen et all. "Limestone platforms around Sagalassos results from giant mass movements", in, *Acta Archaeologica Lovaniensia Monographiae* II/B, Sagalassos V, report of the survey and excavation campaigns of 1996 and 1997 (2000).
- Sırakaya 1991 N. Sırakaya, Türkiye'de 1900 yılından sonra meydana gelmiş olan VIII ve daha fazla şiddetindeki depremler, Ankara D.T.C. Fak. Dergisi Cilt XXXV, Sayı 2, 1991, 257-71.
- Smith 2002 Tim Mackintosh-Smith (ed.), *The Travels of ibn Battutah* (2002).
- Technology 1986 A. Y. al-Hassan - D. R. Hill, *Islamic technology* (1986).
- TMMOB 1997 TMMOB. Antalya şubesi adına İnşaat Mühendisleri Odası, Ağustos-Eylül 1997, 16.
- Tuchman 1989 B. Tuchman, *A Distant mirror. The Calamitous 14<sup>th</sup> century* (1989).
- Turan 1984 O. Turan, İstanbul'un Fethinden önce yazılmış tarihi takvimler (1984).
- Trade 1970 R. Lopez - H. Miskimin - A. Udovitch, "England to Egypt, 1350-1500: Longterm trends and long distance trade", in: M. A. Cook (ed.), *Studies in the economic history of the Middle East* (1970).
- Türkiye 1996 Türkiye'nin Deprem Tehlikesi. T.C. Devlet Deprem Catalogue (1996).
- Uysal 1995 N. Uysal - M. Uysal, *Antalya Yaşadığımız Kent* (1986) (1995)<sup>2</sup>.
- Vakıf 1983 Türkiye'de Vakıf Abideler ve Eski Eserler<sup>2</sup> I. Adana-Adıyaman-Afyon-Ağrı-Amasya-Ankara-Antalya-Aydın-Artvin (1983).
- Vanderput 1993 L. Vanderput "The reuse of Hadrianic architectural elements in Basilica E1 at Sagalassos" *Sagalassos* 1. First general report on the survey (1986-89) and excavation (1990-91). (1993)
- Waelkens 1993 M. Waelkens, "Sagalassos history and archaeology", in: M. Waelkens (ed.) *Sagalassos* 1. First general report on the survey (1986-89) and excavation (1990-91). (1993)
- Woolley 1953 Sir Leonard Woolley, *A forgotten Kingdom - being a record of the results obtained from the excavation of 2 mounds Atchana and al-Mina, in the Turkish Hatay* (1953).
- Wörle 1975 M. Wörle, "Zum Wiederaufbau von Myra mit Hilfe des Lykiarchen Opramoas nach dem erdbaben von 141 n. Chr.", in: J. Borchhardt (ed.), *Myra. Eine lykische Metropole in antiker und byzantinischer Zeit* (1975).
- Yavuz 2002 A. T. Yavuz, "Anadolu Selçuklu mimarisinin yapı özellikleri", in: "Selçuklu Çağında Anadolu Sanatı" (2002), 271-289.
- Yılmaz 2002 L. Yılmaz, *Antalya. 16. Yüzyılın Sonuna Kadar* (2002).
- Zeigler 1973 P. Zeigler, *The black Death* (1973).



## Özet

### Antalya İli ile Komşu ve İlgili Bölgelerdeki Kayda Geçmiş Afetlerin (Salgın ve Deprem) Kronoloji Denemesi

Bu yazı, Antalya İli'nde yaşanmış depremler, tsunami dalgaları, bu afetlerin neden olduğu zararlar ve de 2000 yıldan daha uzun bir süredir Antalya kıyı şeridindeki limanlarla ticari ilişkisi bulunan yerler de dahil olmak üzere ilde ve ilgili bölgelerde ortaya çıkan salgınlara ilgili eldeki tarihsel belgelerin ve bilimsel raporların bir derlemesini içermektedir.

İ.S. 542 ve 1346-47 yıllarında patlayan büyük veba salgınları, yalnızca Lykia ve Pamphylia bölgelerinde değil, aynı zamanda o gün bilinen tüm dünyada büyük oranda nüfus kaybına yol açmıştı. 542 yılından 8. yy.'a kadar olan dönem için il çapında bir yerleşim modeli değişikliği çeşitli örneklerde gözlenmektedir: örneğin, salgına bağlı olarak, Arykanda terk edilmiş ve çok daha küçük ölçekteki Arif yerleşimi kurulmuş ve Side'nin yerleşim alanı 6. yy.'da büyük oranda daralmıştı. İkincil etkenler olarak da şunlar sayılabilir: 6. yy.'dan 11. yy.'a kadar devam eden Pers ve Arap saldırıları, 11. yy.'dan itibaren Türkler'in yöreye akın etmeleri ve de 7. yy.'da Kekova gibi "batık kent"lerin batmasına yol açan büyük depremler. Bu iki büyük salgın sırasında liman yerleşimlerinde belki de % 50'yi bulan nüfus kaybı, iç kesimlerdeki yerleşimlerde en az % 30 düzeyindeydi. İzleyen asırlarda nüksederek devam eden bu iki büyük afet, Antalya İli'nin modern çağa kadar olan tarihindeki en büyük demografik olgulardır. Son on yıldaki arkeolojik çalışmalar sırasında Patara ve Antalya'da bulunan toplu mezarlar, her ne kadar insan kalıntıları hakkındaki bilimsel yayınlar henüz yoksa da, bu iki afetle ilgili olabilir. 1830'larda Antalya, Alanya ve Kıbrıs'ta karantina istasyonları kurulmasına karşın, kısmen Yersinia Pestis'in Mut (Mersin) yöresindeki kemirgen popülasyonuna endemik olmasına bağlı olarak, salgınlar ortaya çıkmaya devam etti.

Çalışmada 6. yy. ortasından 16. yy.'a kadar olan dönemde Antalya İli için deprem ve salgınlar hakkında çok az sayıda kayıt bulunduğu dikkat çekilmektedir.

Depremler sonucu oluşan dev dalgalarla ilgili İ.S. 68, 293-306, 365, 1347, 1489, 1609, 1741 ve 1743 yıllarına ait kayıtlar bilinmektedir. Yakın tarihe ait en önemlisi, 1741 yılında Finike sahiline 12 kere vurmuş ve 1 km içeriye kadar ulaşıp köyleri ve iki kaleyi tahrip etmişti; daha da yakın bir geçmişte ise, 1933 yılında, Bodrum'un karşısında İstanköy (Kos) adasını vuran dalgalar, Kos liman kentinin alçaktaki binalarını yutmuştur. Bu bağlamda, Antalya kentinin batısındaki alçak sahil şeridindeki en eski cami 1772 yılına ait olup Kaş'tadır; halbuki Finike, Demre, ve 14. yy.'da bir tekkenin de bulunduğu Kaş'ta daha erken tarihli camilerin varlığı bilinmesine karşın bunlardan günümüze ulaşan olmamıştır.

Yörede meydana gelen büyük depremlerden bilinenler şunlardır: İ.Ö. 227, İ.S. 68, 365, 529-30, 1204, 1222, 1347, 1489, 1556, 1609, 1741, 1743, 1756 ve 1911 (Figs. 15, 16). Çalışmada daha lokalize olaylarla ilgili raporlar da listelenmekte ve bu sismik olayların yöredeki binalar üzerindeki etkileri kazı raporları, bina onarım kitabeleri, fotoğraf arşivleri ve diğer kaynaklara dayanarak anlatılmaktadır. 1489 yılındaki büyük bir deprem sonucu erken Osmanlı camisinin tahrip olmasıyla Antalya Kaleiçi'ndeki Panagia Kilisesi'nin Korkut Bey tarafından camiye çevrildiği; 1570/71 tarihli Murat Paşa Camisi'nin kubbesinin yeniden inşa edilmesinin 1743 yılındaki deprem sonucu gerçekleştiği öne sürülmektedir. 1911 ve 1931 yıllarındaki depremler sonrası Yivli Minare'nin üst kısımlarındaki tamiratlara ve 1911 (Figs. 3, 4, 5, 6) depremi sonrasında da Murat Paşa Camisi'nin tek şerefeli minaresinin yerine iki şerefeli bir minare inşa edildiğine dikkat çekilmektedir.

Yine Anadolu'da 7000 yıllık bir süreçte "anti-sismik (depreme dayanıklı) bina kültürü" nün gelişimi ve tarihine değinilmekte ve bu anti-sismik kültürün il dahilindeki binalarda görülen uygulamaları sıralanmaktadır. Bu kültürün parçaları olarak tuğla ve ahşap hatıllar ile mütemadi temeller öne çıkmaktadır (Fig. 7-13).



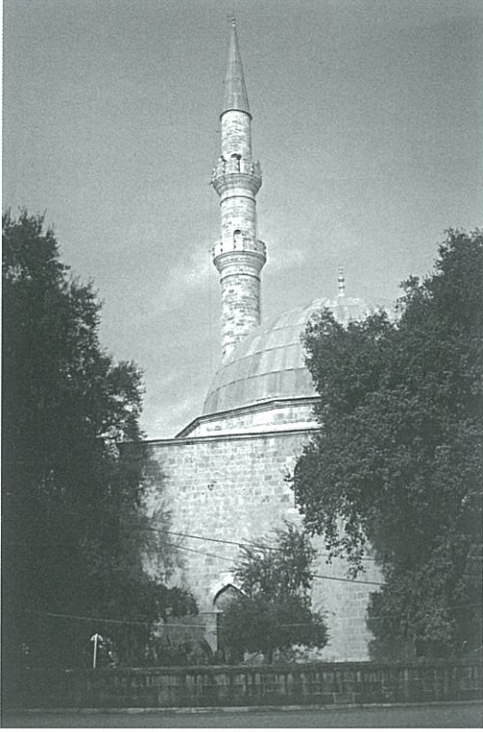


Fig. 1 Photograph of the Murat Paşa Mosque.

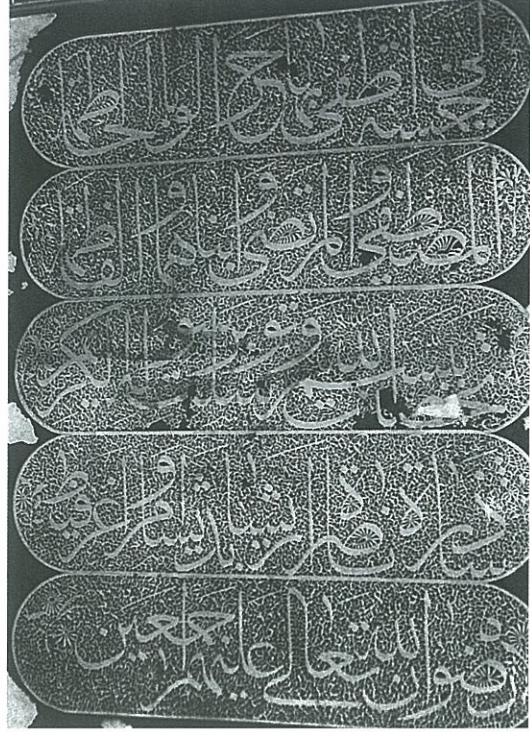


Fig. 2 The cut paper plague prayer made in the first half of the 19<sup>th</sup> century by Mücellit Muhammed Rif'at, Antalya Museum No 182.



Fig. 3  
Postcard of the Yivli Minaret  
prior to the quake of 1911  
(AKMED Photographic  
Archive No. 1620).

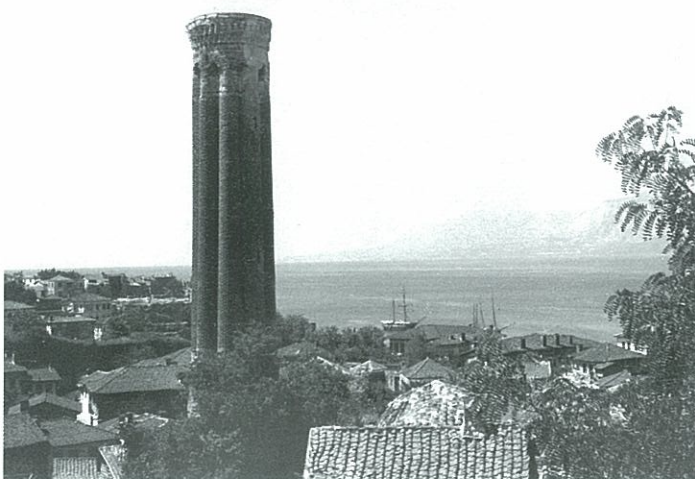


Fig. 4  
Photograph of the Yivli Minaret  
subsequent to the quake of 1911  
(AKMED Photographic  
Archive No. 382).



Fig. 5  
Photograph of the Yivli Minaret  
restored, just prior to the quake  
of 1931  
(AKMED Photographic  
Archive No. 483).

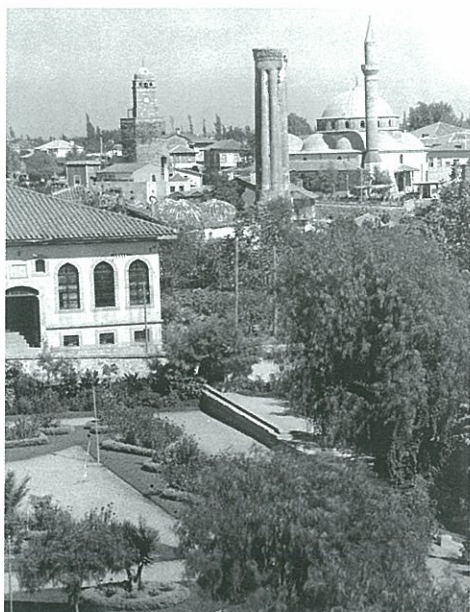


Fig. 6  
Photograph of the Yivli  
Minaret subsequent to the  
quake of 1931  
(AKMED Photographic  
Archive No. 2894).





Fig. 7 Photograph of Byzantine period brick hatıl built into the walls of a building on the acropolis of Aspendos.



Fig. 8 Photograph of the 13<sup>th</sup> century Seljuk tower to the left of the Seljuk entrance built onto the façade of the Roman theatre at Aspendos, evidence of the horizontal wooden hatıl formerly set into the rubble walls of this tower.



Fig. 9 Photograph showing the spaces where juniper hatıl were formerly built into the exterior of the Seljuk 13<sup>th</sup> century Köşk by Kemer, Antalya.





Fig. 10 Photograph of a Konak in Kaleiçi, Antalya, showing 4 horizontal lines of wooden hatıl built into the ground floor walls of this Ottoman building.

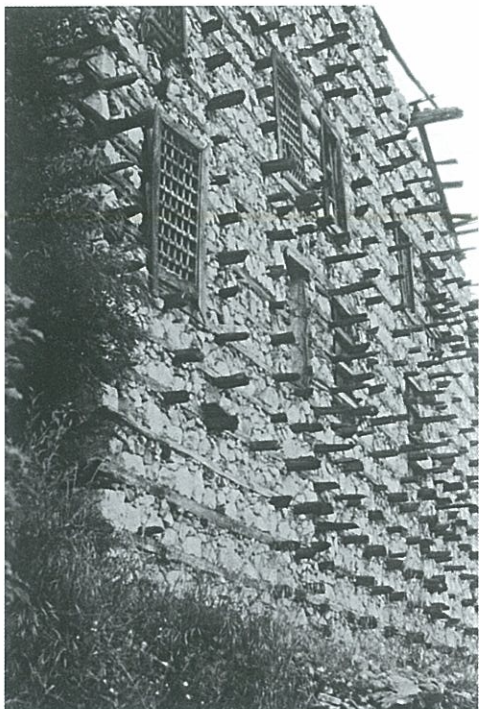


Fig. 11 Photograph showing the large number of wooden hatıl built into the walls of an Ottoman house at Cevizli by Ormana, Akseki.

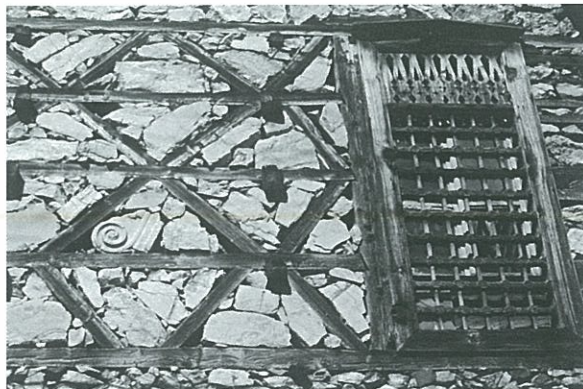


Fig. 12 Photograph of a wall with hatıl at Ormana, Akseki.





Fig. 13 Photograph of a wall in Kaleiçi, Antalya, showing the wooden hatıl set into the face of the wall and the ends of the rungs connecting it with that on the inner face of the wall. Note the use of composite materials, brick, stone, tile, wood and mortar.



Fig. 14 Photograph of a partly demolished building in Kaleiçi, Antalya, note the wooden rungs running through the wall joining the inner and outer wooden runners.

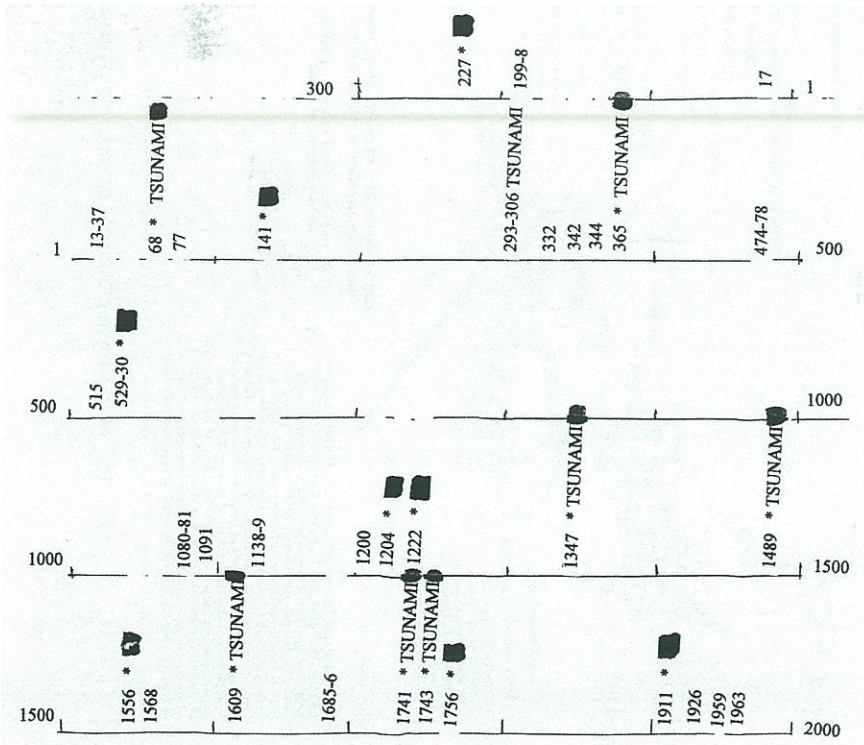


Fig. 15 Timechart, 300 BC to 2000 showing the frequency of major dated earthquakes to strike the province or reports of damage-rebuilding.

