

Epidemic waves of the Black Death in the Byzantine Empire (1347-1453 AD)

Ondate epidemiche della Morte Nera nell'Impero Bizantino (1347-1453 d.C.)

Costas Tsiamis¹, Effie Poulakou-Rebelakou², Athanassios Tsakris³, Eleni Petridou¹

¹Department of Hygiene, Epidemiology and Medical Statistics, Athens Medical School, University of Athens, Greece;

²Department of History of Medicine, Athens Medical School, University of Athens, Greece;

³Department of Microbiology, Athens Medical School, University of Athens, Greece

INTRODUCTION

The completeness of the Byzantine historiography of the plague epidemics in the 14th and 15th century cannot be compared with that of the West. References made to the plague are often in conjunction with other concurrent historical events. The political turmoil and the decline experienced by the Empire in the 13th and 14th century gradually changed the mentality of Byzantine scholars. Military defeats, civil wars, earthquakes and natural disasters were joined by the plague, which exacerbated the people's sense that they were doomed by God [1].

Lack of valid demographic data and the literary ambiguities raise questions about the actual size and mortality rate of these epidemics in the Byzantine Empire. Literary excesses aside however, these descriptions are an invaluable source for the study of the disease outbreaks in Byzantium in the 14th and 15th century.

The "Byzantine World" during the Black Death period

The 14th and 15th century could be characterized as the deathbed anxiety of an empire that is only a shadow of its glorious past. The empire is dismembered and now holds only a few islands, some territories and castles scattered all over mainland Greece. In the South-eastern Mediterranean, the political and military situation is complex, with ever changing alliances. The complexity and political instability of such

a small geographical area is impressive; it is basically a case of "all against all". The Republics of Venice and Genova held strategic and economically important areas in the region after the 4th Crusade (1204) and were in permanent conflict with the Byzantines for control of the Aegean Sea and the trade roads [2, 3].

In the east, the Ottoman Turks of Asia Minor exert pressure on the Empire of Trebizond, invading the Balkan Peninsula, detaching Greek territories of the Byzantine Empire, while fighting with Venice, Genova and the Knights of Saint John of Rhodes for control of the sea [4, 5]. In South Greece, the Frankish principality of Achaia and the Byzantine Despotate of Mistras are interlocked in permanent battle for control of the region [6]. In the west, wars between the Byzantine Despotate of Epirus, the Serbs, the Albanian warlords, the Kings of Taranto, the French Royal House of D'Anjou and Venice, are also regular. It is characteristically reported that only in Western Greece and the Ionian Islands, in the period from 1300 to 1453, there were more than 50 short or long term campaigns [7]. Trying to save the Frankish Duchy of Athens, the Catalan and the Florentine dukes of Athens served the interests of the Ottomans and at the same time their relations with Venice and the Byzantine emperors are at the edge [8, 9].

During the period 1347-1453, all the rival parties in the region were affected by plague. Yet, the historical events and military operations show that the regular occurrence of the disease

was not an obstacle to decisions and plans for controlling such an important strategic and economic region as the south-eastern Mediterranean.

The plague epidemics of the Byzantine Empire during the 14th century

After the outbreak of the plague in the Genoese colony of Caffa in Crimea in 1346, Constantinople was the first city to be affected in 1347 AD [10, 11]. At this time, the Byzantine civil war between the Empress Zoe and Viceroy John Kantakouzenos was over with winner Kantakouzenos as the new emperor (1346-1355). When Kantakouzenos was dethroned in 1355, he became a monk; alongside political events, his writings described the great epidemic of 1347 AD. The disease spread like lightning, and death affected all ages and social strata, according to historians of the plague, the deposed Emperor Kantakouzenos and the historian Nikephoros Gregoras [12-14]. It is interesting to note the absence of other diseases before the appearance of the epidemic, according to Kantakouzenos' narrative [12]. Kantakouzenos describes the disease's symptoms in detail, notably the lung infection, strong chest pains, haemoptysis and intense thirst, the lethargy and death of patients; many believe this description matches the pulmonary form of the disease [13-15].

In 1347, apart from Constantinople, the plague was spread to the islands of Aegean (Limnos and Euboea), the island Crete, the second largest city of the empire Thessaloniki in Northern Greece, Trebizond in Minor Asia and the Venetian naval bases of Methone and Koroni in the Peloponnese [14-17]. In 1348 the situation showed no signs of improving with "the unexpected sword of death" falling on the new possession of the Order of the Knights of Saint John (the island Rhodes), the Venetian ports of Cyprus and the inner Peloponnese in southern Greece [18]. After fourteen years, the plague would return to Constantinople in 1361, when the Ottomans occupied part of Thrace and prepared to besiege Adrianopolis (today Edirne in Turkey) and the capital. Trade relations with the Empire of Trebizond carry the disease from Constantinople to the Black Sea in 1362. In the same year, epidemics broke out in Crete, Cyprus, Limnos and Peloponnese [18-20]. The plague of Constantinople did not recede before 1364, while in the Peloponnese, Adrianopolis and Crete it dominated until 1365 [19, 21]. In 1368, the disease would affect the Despotate of

Epirus. The Despotate was a Byzantine state in western Greece, which was conquered by the Czar of Serbs, Stefan Dusan, in 1347-48 taking advantage of the anarchy and disruption caused by the first major plague epidemic in 1347. In 1368, the death toll would rise dramatically in Ioannina, the capital of the Despotate; according to the Chronicle of Ioannina, it left thousands dead and many Greek widows, which the Serbian despot Thomas Preliubovic forced to marry Serbian soldiers [22].

From the correspondence of the scholar Dimitrios Kydonis we learn of the existence of plague in Thessaloniki and around areas in 1372 [18]. During this period the Byzantines refused the alliance with the Serb warlord Ugljesa against Ottomans. After the death of Ugljesa at the battle of Chernomen, the Byzantines besieged his capital Seres, near Thessaloniki, during the epidemic. The next report, in 1374, concerns the Despotate of Epirus again and the spread of the epidemic to the Peloponnese [18, 19, 21, 22]. While the epidemic in Ioannina is at its peak, the Albanian warlord Liossa, conquered the neighbouring town Arta, which also suffers from the plague, creating an Albanian Despotate and attacking Preliubovic's Ioannina without being deterred by the disease. In 1375, the plague appears in Crete and tortures its population until 1376, while in 1378 it reigns in the monastic community of Mount Athos [23].

The years from 1376 to 1381 were a period of intense warfare in the Aegean between Venice and Genova, in connection with the claim of Tenedos, a small island that controlled the entry to the straits of Gallipolis and was granted by the Byzantines to Venice following an agreement [8]. During this Italian war, in 1379-80, the epidemic appears to have hit the Genoese colony Peran in Constantinople, introduced by the Genoese fleet. Six years after the last outbreak, the Principality of Achaia in the Peloponnese was hit again in 1381-82 [18, 24]. During the plague of Peloponnese, a group of mercenaries from Navarra (Spain) and Gascony (France), changed their plans about the siege of the Catalan Duchy of Athens and decided to attack the Frankish Principality of Achaia in the midst of the epidemic. Their plan proved effortlessly fruitful and after few weeks they conquered the Principality.

A series of letters by Dimitrios Kydonis denotes spread of the epidemic in Constantinople in 1386. Kydonis complains that he can not get to Italy, where he seeks to negotiate aid from the Catholic Church against the Turkish threat and

the capital seems to be cut off from the rest of the world [18]. Kydonis' correspondence offers few clues to allow us to understand if this inability to leave Constantinople was due to a detention of all departures or to a lack of sailors for manning ships. In 1388, an outbreak is suspected in the Duchy of Athens and, the following year, Crete will be once again tortured by the plague [19, 25]. During the epidemic, the army of the dethroned, by the Catalans, Florentine Duke of Athens, Nerio Acciaoli, re-occupied Athens, but was unable to establish his power. The inhabitants escaped to the Venetian colony of Negroponte (Halkida) in order to save their lives from the disease and actually, Nerio was a lonely Duke in a devastated town. In 1390, the Byzantine Despotate of Peloponnese suffered under a new epidemic and a civil war between the Byzantine despot and his brother, with the involvement of the Venetians [19].

In 1391, Constantinople experienced a series of consecutive disasters: the emperor Ioannes V Palaeologos died in February and a tremendous earthquake shook the city on 15 August, while in February it was besieged by the Turks after emperor's death. Throughout autumn and winter the entire city was prisoner of the Turks and the plague [19, 21]. In 1393 we have information on an epidemic in Cyprus, while, at the end of the 14th century (1397-98) Venetian sources report the outbreak of the plague in Crete where the Venetian garrison is completely decimated [26-28]. The century closes with another attack of the disease in Venetian twin naval bases Koroni and Methone of the Peloponnese in 1399 [19, 21, 27].

The plague epidemics of the Byzantine Empire during the 15th century

Following the epidemic of 1399, the plague continues to torture Koroni, and, as suggested by a Venetian document, in 1400, it may have struck island Corfu on the Ionian Islands at the western Greece [29]. Since the Venetian commercial convoys (armata) and the military fleet moved in the Ionian Sea to Crete and Cyprus via Koroni and Methone, it is likely that the disease was transferred from one naval base to another, in 1402 [29]. In 1403, the head of the Spanish embassy to the Mongol Chan Tamerlane, Clavijo, inform us that he had to remain for long in the Genoese colony of island Chios because a great epidemic had broken out in Gallipolis [30]. The next reference to the plague comes from 1408 AD, in Crete [28]. The next year, 1409, we

have reports indicating the existence of the epidemic in Cyprus and Constantinople [19, 26, 28]. We also have a reference to the existence of the plague in Cyprus in the following year, while the disease travels back to Koroni and Methone and from there to Corfu in 1410, together with the Venetian fleet [19, 21, 31]. A request by the *Provveditore* of Corfu to the Venetian Senate in 1410 for the emergency mission of archers raises suspicions of many victims amongst the ranks of the soldiers on the island. The disease appears to still until 1411, while we assume that the epidemic lost its hold on Corfu circa 1413 [20, 32]. Another plague epidemic is noted in another Venetian colony of Ionian Sea, Cephalonia, in 1416 [29]. In 1417, Constantinople, where the epidemic spread to the shores of the Black Sea suffers a great death toll [33]. In 1418 and 1419, the disease will spread to Crete, the Peloponnese, Epirus and in 1419, reappear in Cyprus, where it stayed until 1420 [21, 26, 27, 34].

A new wave of the plague begins from Constantinople in 1421-22, to extend to Cyprus, the Peloponnese and perhaps Thessaloniki [19, 21, 26, 35]. The epidemic of 1422 coincides with the new siege of Constantinople by the Ottomans. The plague struck beleaguered and besiegers alike, while the Turks continued the siege until the time they were forced to withdraw due to their extensive losses from the disease. This cycle of the plague ends in 1423 at the Duchy of Athens, while in the same year an epidemic broke out in Thessaloniki during the Venetian-Ottoman conflict [36]. When the Republic of Venice bought Thessaloniki from the Byzantines, the Ottoman Sultan Murat besieged it during the epidemic until its new defenders agreed to pay a substantial tribute. In 1426 it would be the turn of the Venetian colony of Negroponte (Halkida) to join the long list of the Greek cities struck by the plague [37].

In 1431, the Black Death will strike in the Peloponnese, and more specifically Patras, and Constantinople [35]. The blow will be felt in its full force in Constantinople and Trebizond in 1435 [20, 36]. This year the plague will loom over the negotiations between Greeks and Italians on the organization of the forthcoming Synod of Ferrara for the union of the two churches in return for the Pope's help against the Turks. Among the many who died was the papal envoy Simon Fréron while the other envoy, John from Ragusa (today Dubrovnik in Croatia) fled to the countryside to save his life. In 1438, an epidemic is noted near the capital of

the empire, and another in Nicosia, Cyprus [26]. The last reference to the plague in Byzantine Constantinople and its environs dates from 1441, which coincides with the epidemic that occurred the same year in the Peloponnese [19, 35]. In 1445, we have a reference to an epidemic in the Genoese colony of Chios, in 1448 in Thrace, the Peloponnese and Negroponte and in 1450 in Corfu [20, 35, 37].

Grouping the epidemic waves from 1347 to 1453

As shown in Table 1, the epidemics in the Byzantine Empire during the 14th and 15th centuries, can be distinguished into 9 major epidemic waves, 11 local outbreaks and 16 periods free of the disease, as inferred by the lack of any reference (period of silence of the Greek or Italian sources). More specifically, we have no references to epidemics in the region relating for the following periods: 1349-60, 1366-67, 1369-71, 1377, 1383-85, 1392, 1394-96, 1404-07, 1414-15, 1424-25, 1427-30, 1436-37, 1439-40, 1442-44, 1446-47, 1449 and 1451-1453.

Table 2 summarizes the geographical distribution of the epidemics in Constantinople (1347, 1361-1364, 1379-1380, 1386, 1391, 1397, 1403, 1409-1410, 1421-1422, 1431, 1435, 1438, 1441, 1448) and the Peloponnese (1347-1348, 1362-1363, 1375, 1381-1382, 1390-1391, 1397-1402, 1410-1413, 1418, 1422, 1431, 1441, 1448), which are the areas mostly affected by the plague, followed by Crete (1347, 1362-1365, 1375, 1388-1389, 1408-1411, 1418-1419), Cyprus (1348, 1393,

Table 1 - Average of epidemic waves' duration during 14th - 15th century and the reported local outbreaks.

<i>Epidemic Waves (14th century)</i>	<i>Duration (in years)</i>	<i>Epidemic Waves (15th century)</i>	<i>Duration (in years)</i>
1347/48	2	1408/1413	5
1361/64	3	1417/1423	6
1372/76	4	1435	1
1378/82	4		
1386/1391	5		
1397/1402	5		
Average	2.3		4.2
Reported local outbreaks	1368, 1393, 1403, 1416, 1426, 1431, 1438, 1441, 1445, 1448, 1450		

1409-1411, 1419-1420, 1422, 1438) and the Ionian islands (1400, 1410-1413, 1416, 1420, 1450).

Consequently, Constantinople was the city most often affected by the disease, suffering a wave at a frequency of 11.1 years on average. These outbreaks in Constantinople are deemed to confirm the view of the historians that the capitals were always vulnerable to the disease because of their extensive trade [38-40]. As for the naval superpower of that era, Venice pays hard her Oriental commerce. According to the reports, totally 23 times, the deadly disease visited the Venetian possessions in the East Mediterranean. The particular maritime geography of Greece - which gradually came to correspond to the size of the shrinking Byzantine Empire - and the organized military and commercial maritime network of the Aegean Sea contributed to the spread of plague (Figure 1). Actually, the Aegean Sea, as a "close sea" with too many ports in short distances between them, gave those deadly opportunity. The marine network was developed with standard routes to Constantinople via Aegean (Venice-Ragusa-Corfu-Methone-Koroni-Cerigo-Negroponte-Thessaloniki-Lemnos Constantinople) or the typical route of the Venetian armata to the Middle East via Cyprus (Venice-Ragusa-Corfu-Methone-Koroni-Candia-Rhodes-Famagusta) [41, 42]. The plague travelled by sea with the galleons' speed. According to the estimations of the researchers, in good weather conditions, the medieval ships in the East Mediterranean had the possibility to cover an average of 75 n.m./day [43]. This fact means that in the special cases of the short distance ports of Aegean and Ionian Sea, the duration of a journey in the Byzantine territories was less than the incubation period of plague. The most typical example is the "ping-pong" phenomenon of the two Venetian military bases in the Peloponnese, Methone and Koroni. All four times that they were affected, the epidemic spread simultaneously between them.

The first wave hit the empire in 1347-48, affecting Constantinople, Euboea, Crete, Limnos, Thessaloniki, Trebizond, Methone, Koroni, the inner part of the Byzantine Peloponnese, Rhodes and Cyprus. Twelve years of silence would elapse, with subsequent reports covering the period of the second wave in 1361-65. This second wave will hit almost the same regions as the first, starting in 1361 from Constantinople to gradually extend to Edirne, Trebizond, Limnos, Crete, Cyprus and the Peloponnese but also the interior of Asia Minor.

The third wave appears to have started from Thessaloniki in 1372 and by 1376 had extended to Epirus, the Peloponnese and Crete. Subsequent references place the fourth wave in the period 1378-1382, when it affected the monasteries of Mount Athos, Galatas and Genoese colony Peran in Constantinople and the Peloponnese. In 1386 the fifth wave breaks out and lasts until 1391, starting again from Constantinople and then hitting Athens, the Peloponnese and Crete.

The sixth wave of the epidemic in 1397-1402 once again involved Constantinople, but this time the plague will only strike in the Venetian possessions in the Aegean and Ionian seas. One of the most deadly waves, the seventh, took place in 1408-1413, affecting mainly the islands and the capital. Once more, the Venetian areas will be affected intensely; apparently one naval base infected the other, as happened in Cyprus,

Crete, Koroni, Methoni and Corfu. The eighth epidemic wave was also amongst the worst, in the period 1417-1423, falling upon Constantinople, almost all mainland Greece, and, once again, the Venetian areas. The ninth and last major wave occurred in 1435 in Constantinople, from where the epidemic reached Trebizond in Asia Minor.

As regards outbreaks of a local nature, such occurred in 1368 in Epirus, in 1393 in Cyprus, in 1403 in Gallipolis, in 1416 on the island of Cephalonia and in 1426 in Negroponte (Halkis). From the 1430s and until 1453 a series of outbreaks are noted in various regions of the Byzantine Empire. Such outbreaks occurred in 1431 in Patras and Constantinople, in 1438 in the outskirts of Constantinople and Nicosia, in 1441 in Peran and the Peloponnese and finally during 1448 in Thrace, the Peloponnese and Negroponte. Finally, two more of the total of

Table 2 - Geographic expansion of Black Death and major military events.

<i>Epidemic waves</i>	<i>Geographic expansion</i>	<i>Major war events in the afflicted areas</i>
1347-1348	Constantinople Aegean Sea Cyprus Northern Greece Peloponnese	Serbs vs. Byzantines
1361-1364	Constantinople Minor Asia Crete Cyprus Peloponnese	Ottoman invasion in Thrace Cretan revolution against Venice
1372-76	Northern Greece Western Greece Crete	Serbs vs. Ottomans Byzantines vs. Serbs Albanians vs. Serbs
1378-1382	Constantinople Thrace Peloponnese	Venice vs. Genova Navarra's mercenaries vs. Principality of Achaia
1386-1391	Constantinople Southern Greece Peloponnese	Ottoman siege of Constantinople Florentines vs. Catalans Byzantine Civil War
1397-1402	Constantinople Aegean Sea Ionian Sea	
1408-1413	Southern Greece Aegean Sea	
1417-1423	Constantinople Northern Greece	Ottoman siege of Constantinople Ottomans vs. Venetians
1435	Constantinople Minor Asia	

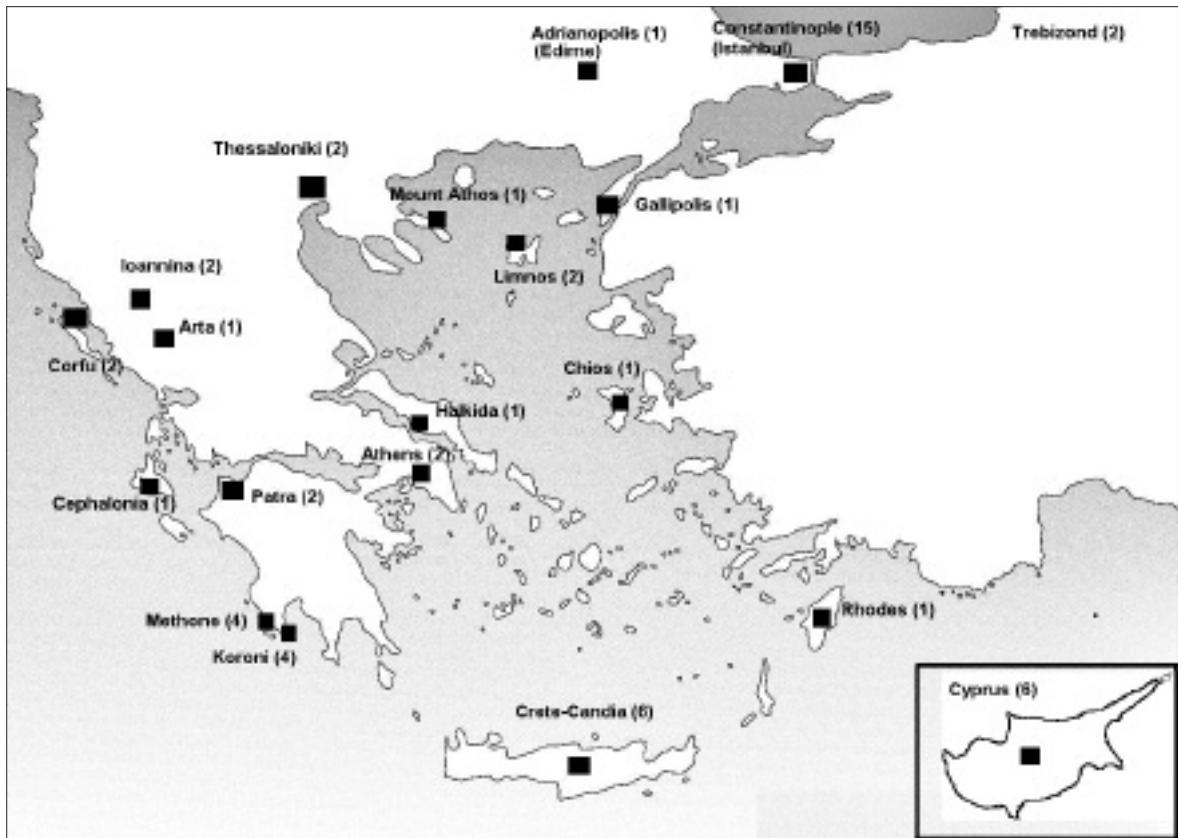


Figure 1 - Geographic location of the afflicted towns and the number of plague's appearances.

eleven outbreaks of the period we noted in the island of Chios in 1445 and in Corfu in 1450.

CONCLUSIONS

During the 107 years of the Black Death in the Byzantine Empire, a total of 61 cases of plague epidemics were noted. Of course, an *ex-post facto* diagnosis is always a debated issue. In our search, we include the historical reported cases of plague, but the danger of misdiagnosis by writers of that era is always a concern. During the 14th century, the average duration of epidemics was 2.3 years while in the 15th century the average was 4.2 years. Actually, the latter figure is more speculative as we took into consideration the year 1453 (fall of Constantinople and the end of the Byzantine Empire) and not the year of the last reported wave (1435). It can be roughly estimated, however, that according to the historical sources the epidemic waves of the Black Death in Byzantium, from 1347 until 1453, had a total average duration of 3.2 years.

The capital of the empire, Constantinople, and the Venetian possessions in the islands of the area, were the most vulnerable to the disease. After the fall of Constantinople, the Black Death continued to periodically affect the Ottoman Empire and until the end of the 16th century, plague epidemics present an upsurge in the European and Asian provinces of the Ottoman Empire. The study of the Ottoman sources will be a useful tool in order to understand the evolution of the disease in the East Mediterranean after 1453. Actually, the major problem of the historiography of the East is the lack of demographic data. The Empire lives in total decline and sepsis, the territories changes repeatedly rulers and the unfilled mercenary armies destroy the towns. Unfortunately, is difficult for this era and region to construct a temporal-space model or to use and estimate an initial reproduction number (R_0) about the hypothetical danger of disease's expansion. Even the lack of morbidity and mortality data, the application of a single-level quantitative analysis according historic and geographic data can also provide, always in the frame of

a multidisciplinary historical epidemiologic study, useful alternative information about the evolution and dynamic of a disease.

Finally, the brief mention of some historical events of the rich medieval history of the region shows that the ambition for power was greater than the fear of plague. This may indicate a gradual familiarization of people with the disease which was now considered as part of life. Obviously, it now seems inconceivable that armies would organize campaigns and sieges in the midst of a plague epidemic, which they often help to spread. Typical examples of plague's spreading during war campaigns of the Ancient World were the plague of Philistines during

their invasion in Judea and the Antonine plague during the Parthian and Marcomanni Wars [40, 44]. This phenomenon could be explained mainly by ignorance of the disease's nature but also by another factor, a human characteristic, the vanity of some rulers who would sacrifice everything for more power and authority. As Karl von Clausewitz states in his famous treatise *On War*: "As War is no act of blind passion, but is dominated by the political object, therefore the value of that object determines the measure of the sacrifices by which it is to be purchased" [45].

Key words: Black Death, Byzantium, epidemiology, plague

SUMMARY

The lack of valid demographic data and the literary ambiguities of the Byzantine chroniclers raise questions about the actual size and mortality rate of the Black Death in the Byzantine Empire. This study presents for the first time a quantitative overview of the Black Death in Byzantium for the period 1347-1453. Our data were obtained from descriptions of the plague, by prominent Byzantine historians and scholars, grouped by time of appearance and geographical spread. During the period 1347-1453, a total of 61 plague reports were noted, which can be distinguished in nine major epidemic waves, 11 local outbreaks and 16 disease-free periods. The capital Constantinople

and the Venetian colonies of the Ionian and Aegean Sea were the areas most affected by the plague. The epidemic waves of the Black Death in Byzantium had a total average duration of 3.2 years. Scientific ignorance of the nature of the disease, a turbulent period of warfare and an organized maritime network seem to have contributed to the spread of the disease. Employing quantitative analysis, our multidisciplinary study sheds light from various standpoints on the evolution and dynamic of the plague in the South-eastern Mediterranean during the 14th and 15th centuries, despite the lack of sound morbidity and mortality data.

RIASSUNTO

La mancanza di dati demografici validi e le ambiguità letterarie degli annalisti bizantini sollevano non poche incertezze sulla dimensione reale e sul tasso di mortalità della Morte Nera nell'Impero Bizantino. Questo studio presenta, per la prima volta, dati quantitativi inerenti alla Morte Nera nell'Impero bizantino nel periodo compreso tra il 1347 e il 1453.

Lo studio si è basato sui dati derivati da descrizioni della peste, effettuate da eminenti storici bizantini, raggruppati in base al tempo di pubblicazione e alla diffusione geografica. Nel periodo compreso tra il 1347 e il 1453, furono effettuati 61 rapporti, che riferiscono di 9 principali ondate epidemiche, 11 epidemie locali e 16 pe-

riodi liberi da malattia. La capitale, Costantinopoli, e le colonie veneziane del mare Ionio e del mare Egeo furono le zone maggiormente colpite. In media, le ondate epidemiche di Morte Nera durarono 3,2 anni.

I dati riportati sembrano suggerire che alla diffusione della malattia abbiano contribuito l'ignoranza scientifica circa la natura della malattia, il tumultuoso periodo bellico e una rete marittima organizzata. Uno studio multidisciplinare, avvalendosi di analisi quantitative, offre interpretazioni alternative in merito all'evoluzione e alle dinamiche della peste nel sud-est del Mediterraneo durante i secoli XIV e XV, nonostante la mancanza di dati certi sui tassi di morbilità e mortalità.

REFERENCES

[1] Congourdeau M-E. La peste noire à Constantinople de 1348 à 1466. *Med. Secoli.* 2, 377-389, 1999.

[2] Borsari S. Studi sulle Colonie Veneziane in Romania nel XIII secolo. Napoli. 15-48, 1966.

[3] Kirk T. Genoa and the Sea. The John Hopkins University Press, Baltimore. 3-11, 2005.

- [4] Balard M. La Romanie Génoise (XIIe-début du XVe siècle). Società Ligure di Storia Patria, Genova. Vol. 1, 45-104, 1978.
- [5] Shaw S. History of the Ottoman Empire and Modern Turkey. Cambridge University Press, Cambridge. Vol. 1, 15-54, 1976.
- [6] Bury J. The Chronicle of Morea. Verlag Bouma's Boekhuis, Groningen. 1967.
- [7] Synkellou E. War in Western Greece in the late Middle Ages (13th-15th centuries). National Hellenic Research Foundation/Institute for Byzantine Research, Athens. 103-106, 2008.
- [8] Cessi R. Storia della Repubblica di Venezia. Ed. Martello G. Firenze. 327-340, 367-372, 1981.
- [9] Lowe A. The Catalan Vengeance. Routledge & Kegan, London. 136-151, 1972.
- [10] Derbes V. De Mussis and the great plague of 1348. *JAMA*. 196, 179-182, 1966.
- [11] Wheelis M. Biological Warfare at the 1346 Siege of Caffa. *Emerg. Infect. Dis.* 8 (2), 971-975, 2002.
- [12] Bartsocas C. Two fourteenth century greek descriptions of the black death. *J. Hist. Med.* 21, 394-400, 1966.
- [13] Miller T. The plague in John VI Cantacuzenus and Thucydides. *GRBS*. 17, 385-395, 1976.
- [14] Nikephoros Gregoras. *Historia Byzantina*. Vol. II. Schopen L., Bekker J. Ed. Weber, Bonne. 797-798, 1830.
- [15] Kantakouzenos J. *Historia Libri IV*. Vol. III. Schopen L. Ed. Weber, Bonne. 49-52, 1832.
- [16] Kostis K. During the times of plague. Perspectives for the communities of the Greek peninsula, 14th-19th century. University of Crete Publication; Heraklion. 30-48, 1995.
- [17] Thiriet F. *Régestes des délibérations du Sénat de Venise concernant la Romanie*. Vol. 1 (1329-1399), 63-64, 1958, Paris.
- [18] Loenertz R. Démétrius Cydonès correspondance.. Vol. I, 122, 145-149, 278, 1956. Vatican.
- [19] Schreiner P. Die byzantinischen Kleinchroniken. *Chronica Byzantina Breviora*. Corpus Fontium Historiae Byzantinae 12 Vol. I, 1975, 66, 242-247, 249, 253, 397, 619. Wien.
- [20] Thiriet F. *Délibérations des assemblées vénitienes concernant la Romanie*. Vol.1. 1956; 253. Vol. 2, 1959; 129, Vol. 3, 1961; 50. Paris.
- [21] Lambros S. *Short Chronicles*. 1932, 36, 41, 47, 61. Athens.
- [22] Vranousis L. The Chronicle of Ioannina. 1962, 12:57-115. Anniversary of Medieval Archive, Athens.
- [23] Lamerle P. *Archives d'Athos*, Vol. II Actes de Kutlumu. 1946, 135. Paris.
- [24] Lymberopoulos V. The Byzantine pontus: the empire of Trebizond (1204-1461). *Researches of Byzantine Greek History*. Athens. 1999, 11, 32-40.
- [25] Setton K. *Catalan domination of Athens, 1311-1388*, 147-148, 181-183, 1975, London.
- [26] Machairas L. Explanation of the sweet country Cyprus, named as Cronaca or Chronicon. 51-409, 1873, Venice.
- [27] Noiret H. Documents inédits pour servir à l'histoire de la domination Vénitienne en Crète de 1380 à 1485. 92-96, 101, 266, 1892, Paris.
- [28] Detorakis T. The plague in Crete. *Archive of the Athens Philosophical School*, Athens. 21, 118-136, 1970-71.
- [29] Sathas K. *Monuments of Greek History*. Vol. 1880-1882, 1, 39, Vol. I II 140, 313-314. Paris.
- [30] Clavijo R. Narrative of the embassy to the court of Timour at Samarcand A.D. 26, 1403-1406, 1859, New York.
- [31] Doukas. *Historia Byzantina*. *Corpus Scriptorum Historiae Byzantinae*. Ed. Bekker, Bonne. 517, 98, 1834.
- [32] Krekic B. Dubrovnik (Raguse) et le Levant au Moyen Âge. 262-263, 1961, Paris.
- [33] Congourdeau M-E. La société Byzantine face aux grandes pandémies. In: Patlagean E. *Maladie et Société à Byzance*. Centro Italiano di Studi sull'alto Medioevo, Split. 21-41, 1993.
- [34] Colin C. Cyriaque d'Ancône. Humaniste, grand voyageur et fondateur de la science archéologique. 98-99, 1981, Paris.
- [35] Sfranze G. *Chronicon*. *Corpus scriptorum historiae byzantinae*. 3-453, 1838,
- [36] Lambros S. *Palaiologian kai Peloponnesian*. Vol. II, 284-285, 289, 1924. Athens.
- [37] Chalkokondyles L. *Historiarum demonstrationes*. *corpus scriptorum historiae byzantinae*. Ed. Bekker, Bonne. 341, 1843.
- [38] Stathakopoulos D. Famine and pestilence in the late roman and early byzantine empire - a systematic survey of subsistence crises and epidemics birmingham byzantine and ottoman monographs, aldershot. Vol. 9, 113-124, 2004.
- [39] Duncan-Jones R. The impact of the Antonine Plague. *JRA*. 9, 108-136, 1996.
- [40] Sabbatani S., Fiorino S. The Antonine plague and the decline of the Roman Empire. The role of the Parthian and Marcomanni Wars between 164 and 182 AD in spreading contagion. *Infez. Med.* 4, 261-275, 2009.
- [41] Koder J. Maritime trade and the food supply of Constantinople in the Middle Ages. In: Macrides R, ed. *Travel in the Byzantine World*. 109-124, 2002, Aldershot.
- [42] Lane F. *Venice - A maritime republic*. The Johns Hopkins University Press, Baltimore. 66-85, 1973.
- [43] Koder J. *Der Lebenstraum der Byzantiner*. Historisch-geographischer Abriß ihres mittelalterlichen Staates im östlichen Mittelmeerraum. Byzantinische Geschichtsschreiber. Verlag Styria, Graz/Wien/Köln. 1984.
- [44] Sabbatani S., Fiorino S. The plague of the Philistines and other pestilences in the Ancient World: exploring relations between the religious-literary tradition, artistic evidences and scientific proofs. *Infez. Med.* 3, 199-207, 2010.
- [45] Klausewitz von K. *On War*. Ed. Rapoport A. Penguin Classics. London. 125, 1968.