Laying the Corpses to Rest: Grain, Embargoes, and *Yersinia pestis* in the Black Sea, 1346–48

By Hannah Barker

Abstract:
When, how, and why did the Black Death reach Europe? Historians have relied on Gabriele de' Mussi's account of Tatars catapulting plague-infested bodies into the besieged city of Caffa on the Crimean Peninsula. Yet Mussi spent the 1340s in Piacenza; he had no direct knowledge of events in Caffa. Sources by people present in the Black Sea during the Second Pandemic, including Genoese colonial administrators, Venetian diplomats, Byzantine chroniclers, and Mamluk merchants, offer a different perspective. They show that the Venetian community at Tana played an important role in plague transmission; that it took over a year (from spring 1346 to autumn 1347) for plague to cross the Black Sea to Constantinople; that people crossed the Black Sea in 1346 but commodities did not because of a series of trade embargoes; that grain was one of the most important Black Sea commodities in both volume and strategic value; and therefore that the embargoes of 1346 delayed plague transmission by temporarily halting the movement of grain with its accompanying rats, fleas, and bacteria. When Venice, Genoa, and the Golden Horde made peace and lifted their embargoes in 1347, both the grain trade and the spread of plague resumed.

Current knowledge about the early spread of the Black Death is limited. Phylogenetic studies of *Yersinia pestis*, the bacterium that causes plague, indicate that the strain that caused the fourteenth-century Second Pandemic may have evolved as early as 1196.[1]

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[1] In 2013, it was shown that a polytomy, a sudden divergence of several new genetic strains of *Y. pestis*, including the one responsible for the Black Death, occurred around 1268. Yujun Cui, Chang Yu, Yanfeng Yan, et al., "Historical Variations in Mutation Rate in an Epidemic Pathogen, *Yersinia pestis*," *Proceedings of the National Academy of Sciences of the United States* 110/2 (2013): 577–82 at 580, Table 1; and Monica H. Green, "Editor's Introduction to *Pandemic Disease in the Medieval World: Rethinking the Black Death*," *The Medieval Globe* 1 (2014): 9–25, at 13. Since then, geneticists using a different mathematical model have dated the polytomy to around 1196. Maria A. Spyrou, Rezeda I. Tukhbatova, Chuan-Chao Wang, et al., "Analysis of 3800-Year-Old *Yersinia pestis* Genomes Suggests Bronze Age Origin for Bubonic Plague," *Nature Communications* 9/1 (2018): 1–10 at 8, Supplementary Table 9 (dates BP are counted backward from 1950). A plague genome one SNP (single nucleotide polymorphism) prior to the polytomy, i.e., an immediate ancestor of the strain that caused the Black Death, has recently been found in Laishevo, Russia. It has been dated to 1300–1400 based on archaeological context. Maria A. Spyrou, Marcel Keller, Rezeda I. Tukhbatova, et al., "Phylogeography of the Second Plague Pandemic Revealed through Analysis of Historical *Yersinia pestis* Genomes," *Nature Communications* 10 (2019): 1–13, Table 1 and Figure 2.

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Tombstones refer to a disease outbreak near Lake Issyk Kul in 1338–39; they have often been cited as early evidence of the Second Pandemic.[2] In summer 1346, there was plague in Urgench and the eastern cities of the Golden Horde.[3] By October–November 1346/Rajab 747 H., it had spread to Solgat, the seat of the Golden Horde's governor in Crimea.[4] In 1346–47/747–48 H., it was present in Azerbaijan near Tabriz, and in summer 1347 it reached Baghdad.[5] It then began to affect major ports in the eastern Mediterranean: Constantinople, Alexandria, Messina, Genoa, Marseille, Ragusa, and Venice. So far, the evidence gathered by archaeologists and geneticists has confirmed that all of the 1347–48 outbreaks were caused by the same strain of *Y. pestis*.[6] Yet precisely when, how, and why the bacteria moved from one place to another remain matters of conjecture, especially since plague is an enzootic disease, residing primarily in animal—not human—populations.[7]

In this article I seek to account for the movement of plague from the territory of the Golden Horde, north and east of the Black Sea, to Constantinople and then into the eastern Mediterranean between spring 1346 and spring 1348. Current scholarship about this early phase of the Second Pandemic relies heavily on Gabriele de' Mussi's *Historia de morbo*, one of the few medieval treatises devoted entirely to the subject of plague.[8] According to Mussi, the first Europeans to contract the plague were Genoese colonists besieged by a Tatar army in the Crimean port of Caffa. After the siege had lasted almost three years, a disease began to spread in the Tatar camp. Soon

[2] Michael W. Dols, *The Black Death in the Middle East* (Princeton, 1977; repr. 1979), 49. Since Lake Issyk Kul is located near a plague reservoir, this outbreak may have no causal connection with the Second Pandemic.

[3] "в лето 6854 . . . подь въсточною стороною." Timur Khaydarov, "Epidemii chumy v kaspiyskom regione (konets XIV – nachalo XV vv.)," *Zolotoordynskaya tsivilizatsiya* 10 (2017): 304–9, at 305, citing a fifteenth-century Muscovite chronicle. Also see Joseph Hammer-Purgstall, *Geschichte der Goldenen Horde in Kiptschak, das ist: Der Mongolen in Russland* (Pest, 1840), 308, citing the Nikon Chronicle; Janos of Eger, "Chronicon dubnicense," in Flórián Mátyás, *Historiae hungaricae fontes domestici*, 4 vols. (Leipzig, 1881–85), 3:148; and Peter Jackson, *The Mongols and the Islamic World: From Conquest to Conversion* (New Haven, 2017), 407–8.

[4] Zayn al-Dīn ʿUmar ibn al-Wardī, *Tatimmāt al-mukhtaṣar fī akhbār al-bashar*, ed. Ahmad Rif'at al-Badrawi, 2 vols. (Beirut, 1970), 2:489.

[5] Dols, *Black Death*, 45 citing the Jalarayid chronicler Abu Bakr al-Qutbi al-Ahri, *Ta'rikh-i Shaikh Uwais*, ed. Johannes Baptist van Loon (The Hague, 1954), 73.

[6] Research has focused on European sites; evidence from other parts of the world is much desired. The most recent study is Spyrou, Keller, Tukhbatova, et al., "Phylogeography." Amine Namouchi, Meriam Guellil, Oliver Kersten, et al., "Integrative Approach Using *Yersinia pestis* Genomes to Revisit the Historical Landscape of Plague during the Medieval Period," *Proceedings of the National Academy of Sciences of the United States* 115/50 (2018): 11, 790–97, argue that the *Y. pestis* genome from Abbadia San Salvatore is a distinct strain, but they do not explain how they dated that sample to the 1347–48 outbreak. The common 1347–48 strain was certainly present in Venice and Genoa. Thi-Nguyen-Ny Tran, Michel Signoli, Luigi Fozzati, et al., "High Throughput, Multiplexed Pathogen Detection Authenticates Plague Waves in Medieval Venice, Italy," *PLoS ONE* 6/3 (2011): 1–5; and D. Cesana, O. J. Benedictow, and R. Bianucci, "The Origin and Early Spread of the Black Death in Italy: First Evidence of Plague Victims from 14th-Century Liguria (Northern Italy)," *Anthropological Science* 125/1 (2017): 15–24.

[7] Vladimir M. Dubyanskiy and Aidyn B. Yeszhanov, "Ecology of *Yersinia pestis* and the Epidemiology of Plague," in *Yersinia pestis: Retrospective and Perspective*, ed. Ruifu Yang and Andrey Anisimov, Advances in Experimental Medicine and Biology 918 (Dordrecht, 2016), 101–70, at 109–14.

[8] A. W. Henschel, "Document zur Geschichte des schwarzen Todes," *Archiv für die gesammte Medicin* 2 (1842): 26–59; and A. G. Tononi, "La peste dell'anno 1348," *Giornale lingustico di archeologia, storia e*

it was claiming thousands of victims per day. The Tatars decided to lift the siege, but first they catapulted the corpses of their plague-infected comrades into the walled city of Caffa "in the hope that the intolerable stench would kill everyone inside."[9] The Caffans threw the corpses into the sea, but their air and water were nevertheless contaminated. They too fled the city, carrying the plague with them into the Mediterranean. On the basis of this narrative, scholars interested in the Black Death have attributed its early spread to the siege of Caffa in 1347,[10] often interpreting it as an act of biological warfare or bioterrorism.[11]

Yet Mussi was not particularly well informed about events in the Black Sea. He was a notary by profession, and the dating clauses of his documents reveal that he did not leave Piacenza between 1344 and 1356.[12] Thus he could not have witnessed the

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letteratura 11 (1884): 139–52. The sole surviving manuscript has been digitized: Warsaw, Uniwersytetu Wrocławskiego, Biblioteka Cyfrowa, MS R 262, fols. 74–77, http://www.bibliotekacyfrowa.pl/dlibra/publication/39280/edition/42426 (last accessed 20 December 2018).

[9] Gabriele de' Mussi, "Historia de Morbo," in *The Black Death*, ed. and trans. Rosemary Horrox (Manchester, 1994), 17.

[10] The following works rely on Mussi's narrative but do not consider it evidence of biological warfare. Dols, *Black Death*, 52; Gabriele Zanella, "Italia, Francia e Germania: Una storiografia a confronto," in *La peste nera: Dati di una realtà ed elementi di una interpretazione. Atti del XXX Convegno storico internazionale, Todi, 10–13 ottobre 1993*, Atti dei Convegni dell'Accademia Tudertina e del Centro di Studi sulla Spiritualità Medievale Nuova Serie 7 (Spoleto, 1994), 49–135, at 15; Steven A. Epstein, *Genoa and the Genoese, 958–1528* (Chapel Hill, NC, 1996), 212; William H. McNeill, *Plagues and Peoples* (New York, 1998), 177; Ole J. Benedictow, *The Black Death, 1346–1353: The Complete History* (Woodbridge, UK, 2004), 52–53; John Aberth, *The Black Death: The Great Mortality of 1348–1350. A Brief History with Documents* (New York, 2005), 13; Nicola Di Cosmo, "Black Sea Emporia and the Mongol Empire: A Reassessment of the Pax Mongolica," *Journal of the Economic and Social History of the Orient* 53 (2010): 83–108, at 97–98; Nükhet Varlik, *Plague and Empire in the Early Modern Mediterranean World: The Ottoman Experience, 1347–1600* (Cambridge, UK, 2015), 98; Lars Börner and Battista Severgnini, "Genoa and Venice: Traders of Prosperity, Growth, and Death," in *Union in Separation: Diasporic Groups and Identities in the Eastern Mediterranean (1100–1800)*, ed. Georg Christ et al., Viella Historical Research 1 (Rome, 2015), 105–22, at 114; Bruce M. S. Campbell, *The Great Transition: Climate, Disease and Society in the Late-Medieval World* (Cambridge, UK, 2016), 300; Hans Ditrich, "The Transmission of the Black Death to Western Europe: A Critical Review of the Existing Evidence," *Mediterranean Historical Review* 32/1 (2017): 25–39, at 26–28; Guido Alfani and Tommy Murphy, "Plague and Lethal Epidemics in the Pre-Industrial World," *Journal of Economic History* 77/1 (2017): 314–43 at 327; Khaydarov, "Epidemii," 305–6; and Moshe Grinberg, "Janibeg's Last Siege of Caffa (1346–1347) and the Black Death: The Evidence and Chronology Revisited," *Turkological Sudies* 1/2 (2018): 19–32.

[11] The following works frame Mussi's narrative in terms of biological warfare or bioterrorism: Vincent Derbes, "De Mussis and the Great Plague of 1348: A Forgotten Episode of Bacteriological Warfare," *Journal of the American Medical Association* 196/1 (1966): 59–62; Jean-Noël Biraben, *Les hommes et la peste en France et dans les pays européens et méditerranéens*, 2 vols., Civilisations et Sociétés 35 (Paris, 1975–76), 1:53; Philip Ziegler, *The Black Death* (Dover, NH, 1969; repr. Stroud, UK, 1991), 5; Horrox, ed. and trans., *Black Death*, 9; David Herlihy, *The Black Death and the Transformation of the West* (Cambridge, MA, 1997), 24; Mark Wheelis, "Biological Warfare at the 1346 Siege of Caffa," *Emerging Infectious Diseases* 8 (2002): 971–75; Virgil Ciocîltan, *The Mongols and the Black Sea Trade in the Thirteenth and Fourteenth Centuries*, trans. Samuel Willcocks, East Central and Eastern Europe in the Middle Ages, 450–1450 20 (Leiden, 2012), 201; and Uli Schamiloglu, "The Impact of the Black Death on the Golden Horde: Politics, Economy, Society, Civilization," *Golden Horde Review* 5/2 (2017): 325–43, at 329.

[12] Tononi, "La peste," 142. Henschel was not sure whether Mussi had been involved in the siege of Caffa. He did not consult the archive of the Basilica di Sant'Antonino in Piacenza, which holds Mussi's documents for 1344–56. Henschel, "Document," 28–29 vs. 34–35.

plague outbreak in Caffa himself. On the other hand, though most Tatar records were lost during Timur's invasion of the Golden Horde at the end of the fourteenth century,[13] Byzantine, Genoese, Venetian, and Mamluk residents and travelers in the Black Sea region wrote letters, diplomatic reports, legal documents, chronicles, and memoirs that have survived. These sources are not new discoveries; they have simply never been used to tell the story of the Black Death before. What they show is that transmission of the Black Death across the Black Sea was delayed by roughly one year because of trade embargoes on Tana, a Golden Horde port frequented by Venetian and Genoese merchants. They also indicate that grain exports were the principal (though perhaps not the only) means by which plague was carried onward into the Mediterranean. In other words, overreliance on Mussi's treatise has misled scholars about the geography, chronology, and human intentions behind early plague transmission. The *Historia de morbo* directed attention to Caffa, the Crimean Peninsula, connections with Genoa, fast transmission, and intentional bioterrorism rather than to Tana, the Sea of Azov, connections with Venice, delayed transmission, and the unintended consequences of long-distance grain shipment.[14] A better explanation of how, when, and why *Y. pestis* crossed the Black Sea and entered the Mediterranean must combine a detailed understanding of chronology and geography with a global perspective on commerce and politics in the mid-fourteenth century.

The ideal source for checking the reliability of Mussi's narrative would come from Caffa itself around the time of the initial plague outbreak. Luckily, such a source exists. The residents of Caffa, appealing to the doge of Genoa as their shepherd and protector, sent a petition urging him to suspend the collection of certain debts, name a castellan to defend the neighboring port of Cembalo, and ask the pope to send them a new bishop. Even though peace had recently been concluded with Jānībek Khan[15] of the Golden Horde, Caffa was still badly in need of money:

> Since the place Caffa was besieged for a long time with every method by which terror can be instilled and, God granting, we arrived at an honorable end with the one who believes himself to rule the whole world, from which followed a peace, although uncertain and not secure . . . because the Tatars watch for nothing except precisely that the expenses run short and the place be stripped of soldiers, especially because they expect an endless plague of death, which laid low endless soldiers, and they were consumed in such a way that few men remain.[16]

[13] Charles J. Halperin, "The Missing Golden Horde Chronicles and Historiography in the Mongol Empire," *Mongolian Studies* 23 (2000): 1–15.

[14] Grinberg connects plague movement across the Black Sea with peace and the resumption of trade but does not mention grain shipment: "Janibeg's Last Siege," 26.

[15] I use the UNESCO transliteration system for the proper names of Mongol rulers.

[16] "Cum locus Caffa fuerit longevis temporibus expugnatus omni artificio quo terror potest incuti et, dante Deo, ad finem honorabilem pervenimus cum illo qui toto mondo dominari se credit, ex quo sequuta est pax, licet incerta et non secura . . . quia Tartari oculum non habent nisi dumtaxat quod expensse deficiant et locus bellatoribus denudetur, maxime quia sperant de infinita pestilencia mortalitatis, que infinitos bellatores prostravit, et taliter sunt consumpti quod pauci remaneant viri." Giovanna Petti Balbi, "Caffa e Pera a metà del Trecento," *Revue des études sud-est européennes* 16 (1978): 217–28, at 226, citing Genoa, Archivio di Stato di Genova (ASG), Notai Antichi 364 (Oberto Musso), doc. 93 (renumbered 144). This register is a jumble, likely a consequence of French shelling of the archive in 1684. It includes documents composed by eleven or twelve notaries with dates ranging from 1262 to 1360. Thanks to Padraic Rohan for helping to confirm these details.

In other words, although the Caffans had survived Jānībek's siege, their soldiers needed to be paid, and their opponents expected them to be decimated soon by a disease that had already killed many Tatar soldiers. With funds from Genoa, the Caffans could pay their defenders and recruit more, warding off the threat of another siege. Renewing their military defenses was thus the chief concern of the residents of Caffa during the brief window between plague's arrival in the Golden Horde and its arrival in their own city.

This petition is the earliest direct reference to the Black Death in a European source, but it comes with two interpretive challenges. First, the sole surviving copy in the state archive of Genoa is missing its final lines, including the dating clause. Based on references in the text, Giovanna Petti Balbi has nevertheless dated it to 1347.[17] Simone Fieschi was dispatched to Caffa as its new bishop in that year, and Jānībek's second siege of Caffa ended then, as distinct from his first one in 1344 or his third in 1350. Caffa also seems to have received some financial support in that year, enabling repairs to the city walls and funding a brief attack on Kerasunt (Giresun) in 1348.[18] Because of the winter shipping hiatus (explained later), a message sent by sea as early as possible in 1347 would have left Caffa no earlier than mid-March and arrived in Genoa no earlier than mid-May. Therefore, the petition was probably written in February or March 1347.

Second, what did the Caffans mean when they said that their city was besieged using "every method by which terror can be instilled"? It is tempting to read this as a reference to Mussi's catapults and plague-infested corpses. However, in an intellectual world where disease was understood to arise from humoral imbalance or from sin, the use of chemical or biological agents to poison air and water was not a common siege tactic.[19] Corpses or severed heads were sometimes thrown into besieged cities, but the goal in such cases was psychological rather than biological disturbance. A different horror, starvation, was the trope most frequently associated with sieges by medieval writers. The defenders of Caffa certainly suffered hunger in 1346–47, as explained later, and it is likely that plague entered the city with the return of local food supplies *after the siege was lifted*.[20]

In light of the Caffan petition, it seems that Mussi compressed the events of the first two sieges of Caffa into one. A contemporary Genoese chronicler mentioned the use

[17] Balbi, "Caffa," 217–22. Ciocîltan accepts this date: *Mongols*, 212.

[18] Giorgio and Giovanni Stella, *Annales genuenses*, ed. Giovanna Petti Balbi, *Rerum Italicarum Scriptorum* Nuova Edizione 17/2 (Bologna, 1975), 156 n. 3; Chronicle of Michael Panaretos in Charles Lebeau, *Histoire du Bas-Empire*, 2nd ed., 21 vols. (Paris, 1824–36), 20:482–509, at 488.

[19] Benedictow, *Black Death*, 52–53; Tzafrir Barzilay, "Well Poisoning Accusations in Medieval Europe: 1250–1500" (PhD diss., Columbia University, 2016), section 2.3; and Grinberg, "Janibeg's Last Siege," 23–24.

[20] Li Gao, a physician of the Jin dynasty in northern China, claimed to have witnessed a disease outbreak just after the Mongols lifted their siege of Daliang (Kaifeng) in 1232. He connected this outbreak with similar ones after the Mongol sieges of Dongping, Taiyuan, and Fenxiang during the period 1213–22. Robert Hymes, "Epilogue: A Hypothesis on the East Asian Beginnings of the *Yersinia pestis* Polytomy," *The Medieval Globe* 1 (2015): 285–308, at 289–91. Hymes suggests that post-siege transmission may have occurred through human-to-human contact (291) or through changes in the behavior or diet of commensal rodents during the siege (300). I argue that post-siege transmission occurred through commensal rodents accompanying an influx of food supplies when the siege was lifted. Post-siege transmission may also have occurred in Baghdad in summer 1347, although this instance requires further study. Taqī al-Dīn Aḥmad al-Maqrīzī, *Kitāb al-sulūk li-maʿrifat duwal al-mulūk*, ed. M. M. Ziyāda and Saʾīd ʿAbd al-Fattāḥ ʿAshūr, 4 vols. (Cairo, 1934–1973), 2:774; and Dols, *Black Death*, 45.

of trebuchets for their ordinary purpose by a Tatar army besieging Caffa, but only during the first siege in 1344.[21] Two contemporaries interested in the Second Pandemic, Ibn Khātima in Almería and Gilles li Muisis in Tournai, mentioned the second siege of Caffa in 1347 in connection with the early spread of the plague, but they did not mention the first siege in 1344 or the use of catapults or trebuchets by the besiegers.[22]

Identifying the role of the second siege of Caffa in the overall process of plague dissemination in the Black Sea requires more attention to local context. Those best placed to observe the spread of plague in the region were the Byzantine chronicler Nicephoros Gregoras and John VI Kantakouzenos, the reigning emperor of Byzantium during the Second Pandemic. Although, as emperor, Kantakouzenos would have been aware of the second siege of Caffa, he did not connect it with plague. Instead, "the invading plague . . . starting first from the Hyperborean Scythians, attacked almost all the sea coasts of the world."[23] Nicephoros Gregoras did not connect the second siege of Caffa with plague either. Instead, "starting from Scythia and Maeotis and the mouth of the Tanais, just as spring began, it lasted for that whole year, passing through and destroying, to be exact, only the continental coast, towns as well as country areas, ours and those that are adjacent to ours, up to Gadera [Cádiz] and the columns of Hercules. During the second year it invaded the Aegean Islands."[24]

References to the coast in both Gregoras and Kantakouzenos imply transmission by ship; references to Scythia imply a connection to the steppe and mountains north of the Black Sea, the territory of the Golden Horde. Gregoras was more specific: he identified the plague's departure point as the Maeotidean marshes in the delta of the Tanais (Don) River, where it flows into the Sea of Azov.[25] This was the location of Tana, the Golden Horde's most important port. Gregoras's description of the plague's subsequent leaps from the mouth of the Don to the western Mediterranean (the Pillars of Hercules in Iberia) and then back to the east (the Aegean islands) makes more sense as an expression of its severity than its chronology. According to this reading, an outbreak began in Tana in early spring 1346, one so severe that it devastated the entire Mediterranean from uttermost east to uttermost west. It reached the Aegean in its second year, 1347, and the rest of the Mediterranean thereafter.

The Byzantine sources indicate that Tana could have served as a route of plague transmission from the Golden Horde to Constantinople in addition to or instead of Caffa. In order to assess the relative importance of Tana and Caffa in plague transmission, a more sophisticated understanding of their commercial and political roles is needed. Caffa was first inhabited by Genoese merchants in 1266–70. By 1281, it had become a Genoese colony governed by a consul.[26] Genoa had been given

[21] Stella and Stella, *Annales*, 139.

[22] Taha Dinānah, "Die Schrift von Abī Ǧaʿfar Aḥmed ibn ʿAlī ibn Moḥammed ibn ʿAlī ibn Ḫātimah aus Almeriah über die Pest," *Archiv für Geschichte der Medizin* 19 (1927): 27–81, at 42; and Gilles li Muisis in Horrox, ed. and trans., *Black Death*, 46.

[23] Christos S. Bartsocas, "Two Fourteenth Century Greek Descriptions of the 'Black Death,'" *Journal of the History of Medicine and Allied Sciences* 21/4 (1966): 394–400, at 395.

[24] Bartsocas, "Two Fourteenth Century Greek Descriptions," 395.

[25] Giovanni Villani also located early plague outbreaks in Tana and Trebizond. Aberth, *Black Death*, 20.

[26] Michel Balard, *La Romanie génoise (XIIe–début du XVe siècle)*, 2 vols., Atti della Società Ligure di Storia Patria, new series 18 (Genoa, 1978), 1:115–18.

privileged access to the Black Sea in 1261 as a reward from Michael VIII Palaiologos for supporting his campaign to restore Byzantine rule in Constantinople.[27] Yet Caffa was not Byzantine territory: it belonged to the Golden Horde, one of the four states that emerged from the Mongol conquests of the early thirteenth century. It was the khan of the Golden Horde who permitted the Genoese to govern Caffa. He reserved only the rights to collect a customs tax and to appoint judges for the Tatar population. The terms of this arrangement were apparently never recorded in writing, and the ambiguity seems to have suited both the Genoese and the Golden Horde.

Because Venice had sided with the Latin Emperor of Constantinople against Michael VIII Palaiologos, Venetian merchants were not granted access to the Black Sea until 1265. After a failed attempt in the 1290s to drive the Genoese out of Caffa, they chose Tana as their regional base. The first Venetian consul of Tana was appointed in 1326, but, unlike the Genoese consul of Caffa, he governed only the Venetian community there.[28] When Uzbek Khan chose to recognize the Venetian presence in Tana in 1333, he did so in a written document that did not cede sovereignty or jurisdiction over the city.[29]

Genoa and Venice desired a commercial presence in the Black Sea in the early fourteenth century for several reasons. The most important reason, the grain trade, had political as well as economic significance. Venice, located in a lagoon, and Genoa, located on a mountainside, were unable to grow grain locally, so their citizens depended on grain imports for subsistence.[30] The western and northern hinterlands of the Black Sea produced enough grain to play a significant role in their grain supply networks; Romania (the collective designation for the Aegean and Black Seas, the shipping zones associated with Constantinople) became a regular source of grain alongside Sicily, Naples, North Africa, Provence, Catalonia, and Flanders.[31] Black Sea grain was abundant and cheap.[32] In 1349, the Great Council of Venice noted that "from that same voyage of Tana and the Black Sea, we gain the greater part of

[27] Camillo Manfroni, "Le relazioni fra Genova, l'Impero Bizantino e i Turchi," *Atti della società ligure di storia patria* 28/3 (1896): 575–856.

[28] Sergei Karpov, "Génois et byzantins face à la crise de Tana de 1343 d'après les documents d'archives inédits," *Byzantinische Forschungen* 22 (1996): 33–51.

[29] George Martin Thomas, ed., *Diplomatarium veneto-levantinum, sive acta et diplomata res venetas graecas atque levantis illustrantia*, 2 vols., Monumenti Storici 5, 9 (Venice, 1880–99), 1:243–44, doc. 125.

[30] Records of the Genoese tax farm on grain imports indicate that 278,000 mines (about 22.9 million kilograms) of grain were imported in 1341. Other estimates for the total annual volume of fourteenth-century Genoese grain imports range from 185,000 mines to 350,000 mines. Balard, *La Romanie*, 2:750.

[31] Sergei Karpov, "The Grain Trade in the Southern Black Sea Region: The Thirteenth to the Fifteenth Century," *Mediterranean Historical Review* 8 (1993): 55–73, at 58; Michel Balard, "Le commerce du blé en mer Noire (XIIIe–XVe siècles)," in *La mer Noire et la Romanie génoise (XIIIe–XVe siècles)*, Collected Studies 294 (London, 1989), 64–80, at 68; George Dameron, "Feeding the Medieval Italian City-State: Grain, War, and Political Legitimacy in Tuscany, c. 1150–c. 1350," *Speculum* 92/4 (2017): 976–1019, at 998; Jacques Heers, *Gênes aux XVe siècle: Activité économique et problèmes sociaux*, Affaires et Gens d'Affaires 24 (Paris, 1961), 329–46, 349; Balard, *La Romanie*, 2:749–69; Gian Giacomo Musso, *Navigazione e commercio genovese con il Levante nei documenti dell'Archivio di Stato di Genova (secc. xiv–xv)*, Pubblicazioni degli Archivi di Stato 84 (Rome, 1975), 141–66; and Reinhold Mueller, "Aspetti sociali ed economici della peste a Venezia nel Medioevo," in *Venezia e la peste, 1348/1797* (Venice, 1979), 71–92, at 72.

[32] In Genoa, Caffan grain was cheaper than Iberian or Sicilian grain. Balard, *La Romanie*, 2:766–67.

the substance of our nourishment, and especially with regard to grain."[33] In 1384, Romania was the destination of every grain ship chartered by the Genoese authorities.[34] The port of Caffa alone supplied Genoa with 31,344 mines (about 2.6 million kilograms) of grain that year, 36 percent of its total supply.[35] In other years for which documentation has survived, Caffa provided between 10 and 36 percent of Genoa's grain.[36] Inconsistency in the volume of grain imports from year to year reflects effective risk management: if one grain-producing region was experiencing disruption or harvest failure, there were many other grain-producing regions to which to turn.[37]

A second reason for Genoese and Venetian interest in the Black Sea was the trade in other local products, mainly bulk goods. In addition to grain, Genoese and Venetian merchants exported honey, wax, wood, fur, leather, salt, salted fish, and slaves. Moreover, Caffa, Tana, and Trebizond served as western outposts for the long-distance trade in low-volume, high-value commodities associated with the Silk Road network.[38] When Venice began sending official galley convoys, known as the Romania galleys, to Constantinople and the Black Sea in the early fourteenth century, they mainly carried luxury goods such as silk, spices, jewels, and silver.[39] In exchange, Genoese and Venetian merchants imported cloth, iron, wine, oil, and gold from the Mediterranean.

Among these commodities, grain merits further attention because of the well-established causal links between grain shipment and plague transmission. *Y. pestis*, the plague bacterium, is enzootic; it normally resides in animal populations rather than human ones. Although *Y. pestis* can infect many species of mammals, its hosts are usually ground-burrowing rodents such as marmots, great gerbils, and prairie dogs.[40] Individual humans may contract plague through contact with wild rodents, but the danger of a widespread human outbreak arises when *Y. pestis* enters a population of commensal rodents, those that live near humans and consume their food. Brown rats (*Rattus norvegicus*), today's dominant urban rat species, did not reach the Mediterranean until the sixteenth century, but black rats (*Rattus rattus*) were present from the Roman period or earlier.[41]

[33] "De ipso viagio Tane et Maris Maioris maiorem partem substantacionis victus nostri et presertim de blado percipimus." Balard, "Le commerce," 70.

[34] Musso, *Navigazione*, 151–52. Compared to Tuscan cities, Genoa was late to intervene in the grain trade. Its Officium Victualium was established in 1350. Balard, *La Romanie*, 2:751, 759.

[35] Balard, "Le commerce," 74.

[36] Balard, *La Romanie*, 2:762, 764; Karpov estimates 10–15% from the Black Sea: "Grain Trade," 62.

[37] Di Cosmo, "Black Sea Emporia," 101–4; and Balard, *La Romanie*, 2:760–61.

[38] Balard, *La Romanie*, 2:719–33; and Janet L. Abu-Lughod, *Before European Hegemony: The World System A.D. 1250–1350* (Oxford, 1989).

[39] Sergei Karpov, *La navigazione veneziana nel Mar Nero, XIII–XV sec.* (Ravenna, 2000), 155–56, 191; and Doris Stöckly, *Le système d l'incanto des galées du marché à Venise (fin XIIIe–milieu XVe siècle)*, Medieval Mediterranean 5 (Leiden, 1995), 102–8.

[40] Dubyanskiy and Yeszhanov, "Ecology," 105–7.

[41] Michael McCormick, "Rats, Communication, and Plague: Toward an Ecological History," *The Journal of Interdisciplinary History* 34/1 (2003): 1–25; Emily E. Puckett, Jane Park, Matthew Combs, et al., "Global Population Divergence and Admixture of the Brown Rat (*Rattus norvegicus*)," *Proceedings of the Royal Society B: Biological Sciences* 283/1841 (2016), http://rspb.royalsocietypublishing.org/content/283/1841/20161762 (last accessed 15 July 2017); and Tarek Oueslati, Mohamed Kbiri Alaoui, Abdelfattah Ichkhakh, et al., "1st Century BCE Occurrence of Chicken, House Mouse and Black Rat in Morocco: Socio-economic Changes around the Reign of Juba II on the Site of Rirha," *Journal of*

Fleas are the vectors through which *Y. pestis* usually moves among rodents, its preferred hosts.[42] Although many species of flea can transmit the bacterium, fleas of the genus *Xenopsylla* play the greatest role. When these fleas feed on the blood of a plague-infected host, they immediately become able to transmit *Y. pestis*.[43] If a rodent is not available, the flea will seek to feed on another nearby mammal, perhaps a human, thereby spreading *Y. pestis* across species. Various methods have been used to estimate the time between the introduction of *Y. pestis* into a population of commensal rats and human awareness of an outbreak among humans. Ole Benedictow has estimated 39–49 days.[44] Mathematical models yield longer intervals: one based on the 1801 Cairo outbreak indicates 50 days;[45] another based on the 1613 Freiberg outbreak indicates about twenty weeks (140 days);[46] and a third based on two fifteenth-century Cairo outbreaks indicates about 250 days.[47] In other words, a human epidemic might become evident anytime from five to thirty-five weeks after the first local rat was infected with *Y. pestis*.

Black rats tend to live in stable territories around grain and cotton warehouses, docks, slaughterhouses, garbage dumps, and other human-generated food sources.[48] When edible cargo is transported in ships or carts, black rats often ride along. Even their fleas can survive on a diet of grain or grain debris when mammalian hosts are not available. Several twentieth-century plague outbreaks have been tied to the grain trade, including shipments to Ipswich, UK, in 1910 and from Vietnam in the 1960s.[49] While furs[50] or textiles might also sustain rats and fleas, these commodities provide less nutrition than grain. Moreover, in the fourteenth-century Black Sea, the volume of furs and textiles shipped was far smaller than the volume of grain. Grain shipments across the Mediterranean have been proposed as a mechanism of transmission

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Archaeological Science: Reports 29 (2020): 1–10, https://doi.org/10.1016/j.jasrep.2019.102162 (last accessed 8 January 2020).

[42] Dubyanskiy and Yeszhanov, "Ecology," 108–10.

[43] Rebecca Eisen, Aryn Wilder, Scott Bearden, et al., "Early-Phase Transmission of *Yersinia pestis* by Unblocked *Xenopsylla cheopis* (Siphonaptera: Pulicidae) Is as Efficient as Transmission by Blocked Fleas," *Journal of Medical Entomology* 44/4 (2007): 678–82.

[44] Cesana, Benedictow, and Bianucci, "Origin," 16.

[45] Xavier Didelot, Lilith K. Whittles, and Ian Hall, "Model-based Analysis of an Outbreak of Bubonic Plague in Cairo in 1801," *Journal of the Royal Society Interface* 14 (2017): 1–10, at 6. This model factors in human-to-human as well as rat-flea-human modes of transmission.

[46] Stefan Monecke, Hannelore Monecke, and Jochen Monecke, "Modelling the Black Death: A Historical Case Study and Implications for the Epidemiology of Bubonic Plague," *International Journal of Medical Microbiology* 299/8 (2009): 582–93, at 590.

[47] Stuart Borsch and Tarek Sabraa, "Plague Mortality in Late Medieval Cairo: Quantifying the Plague Outbreaks of 833/1430 and 864/1460," *Mamluk Studies Review* 19 (2016): 115–48, at 120.

[48] Varlik, *Plague*, 24–26, 47; Benedictow, *Black Death*, 20–21; and G. Girard and F. Estrade, "Faits nouveaux concernant la biologie de la 'X. cheopis' et son rôle dans la persistance de l'endémo-épidémie pesteuse en Emyrne: Technique et appareil pour la capture des puces dans les poussières et débris de céréales," *Bulletin de la société de pathologie exotique* 28 (1934): 456–58. Barbara Bramanti, Nils Chr. Stenseth, Lars Walløe, and Xu Lei, "Plague: A Disease Which Changed the Path of Human Civilization," in *Yersinia pestis*, ed. Yang and Anisimov, 1–27, at 10, shows rat guards now used by commercial shippers to prevent plague transmission.

[49] David Van Zwanenberg, "The Last Epidemic of Plague in England? Suffolk 1906–1918," *Medical History* 14/1 (1970): 63–74; and J. D. Marshall Jr., R. J. T. Joy, N. V. Ai, et al., "Plague in Vietnam 1965–1966," *American Journal of Epidemiology* 86/3 (1967): 603–16.

[50] Namouchi, Guellil, Kersten, et al., "Integrated Approach," 11,795.

for the First Pandemic (the Justinianic Plague, which began in 541);[51] grain shipments within Europe have been proposed as a mechanism of transmission for the Second Pandemic in 1348.[52] Might grain shipment also have served as a mechanism of transmission for the Second Pandemic across the Black Sea in 1346–47?[53]

Fortunately, the circulation of Black Sea grain through regional and long-distance trade networks is well documented. Within the region, grain normally moved from north to south.[54] Circassia, Zichia, the Sea of Azov, Crimea, Dobrudja, and the lower Danube were all grain exporters. Constantinople, Trebizond, and the other ports along the mountainous coast of Turchia were grain importers. The Anatolian interior also produced grain, but transporting it overland to coastal cities was expensive and inefficient. In addition, relations between the inland Turkish emirates and the coastal Byzantine empires of Trebizond and Constantinople were not always friendly, so inland grain supplies were unreliable.

Details of the regional grain trade in the first half of the fourteenth century are clarified by two Florentine merchant manuals, one composed anonymously in 1315[55] and the other by Francesco di Balduccio Pegolotti between 1310 and 1340.[56] The anonymous manual listed the Black Sea ports where grain was available (see Fig. 1): Taro (Dolgaya Spit), Porto Pisano, Lo Vosporo (Kerch), Caffa (Feodosia), and Lifetti (Yevpatoria) to the north as well as Moncastro (Maurocastro, Akkerman), Vicina, Varna, Sozopolis, and Asilo (Anchialos, Pomorie) to the west. It also explained that grain from Sozopolis and Varna was of mediocre quality while grain from Moncastro and Asilo was better. Caffa exported the best grain of all, but its supply depended on good relations with the Golden Horde's governor in Solgat (Qirim, Eski Kirim). Venetian price-fixing legislation of the 1320s also valued northern Black Sea grain more highly than western grain,[57] but consumers in Constantinople preferred Thracian grain and paid 6–8 carats more for it than for Caffan grain.[58]

Pegolotti agreed with the author of the anonymous merchant manual about the overall contours of the Black Sea grain trade. His list of western grain ports matched the anonymous list, with the addition of Rodosto (Tekirdağ).[59] To the north, he focused on Tana, Caffa, and Lifetti, and he agreed that Caffan grain was the best. Going beyond the scope of the anonymous manual, Pegolotti also described clusters of local northeastern ports that relied on cabotage by Tatar ships to bring their grain to regional hubs. One cluster was located in Gazaria, along the shallow north shore

[51] McCormick, "Rats."

[52] Börner and Severgnini, "Genoa and Venice," 113; Kristina Lenz and Nils Hybel, "The Black Death: Its Origin and Routes of Dissemination," *Scandinavian Journal of History* 41/1 (2016): 54–70, at 61; and Cesana, Benedictow, and Bianucci, "Origin," 22.

[53] Campbell and Karpov suggest this possibility without citing any evidence. Campbell, *Great Transition*, 324; and Sergei Karpov, "Black Sea and the Crisis of the Mid XIVth Century: An Underestimated Turning Point," *Thesaurismata* 27 (1997): 65–78, at 68.

[54] Karpov, "Grain Trade"; and Balard, "Le commerce," 65–67, 77–79.

[55] Balard, "Le commerce," 67, 79.

[56] Francesco Balducci Pegolotti, *La Pratica della mercatura: Book of Descriptions of Countries and of Measures of Merchandise*, ed. Allan Evans, The Medieval Academy of America Publication 24 (Cambridge, MA, 1936), xiv, 42, 54–55. See also Balard, *La Romanie*, 2:752–54.

[57] Karpov, "Grain Trade," 58.

[58] Balard, *La Romanie*, 2:752.

[59] Zaorra (Zagora) referred to inland Bulgaria, not to a port.

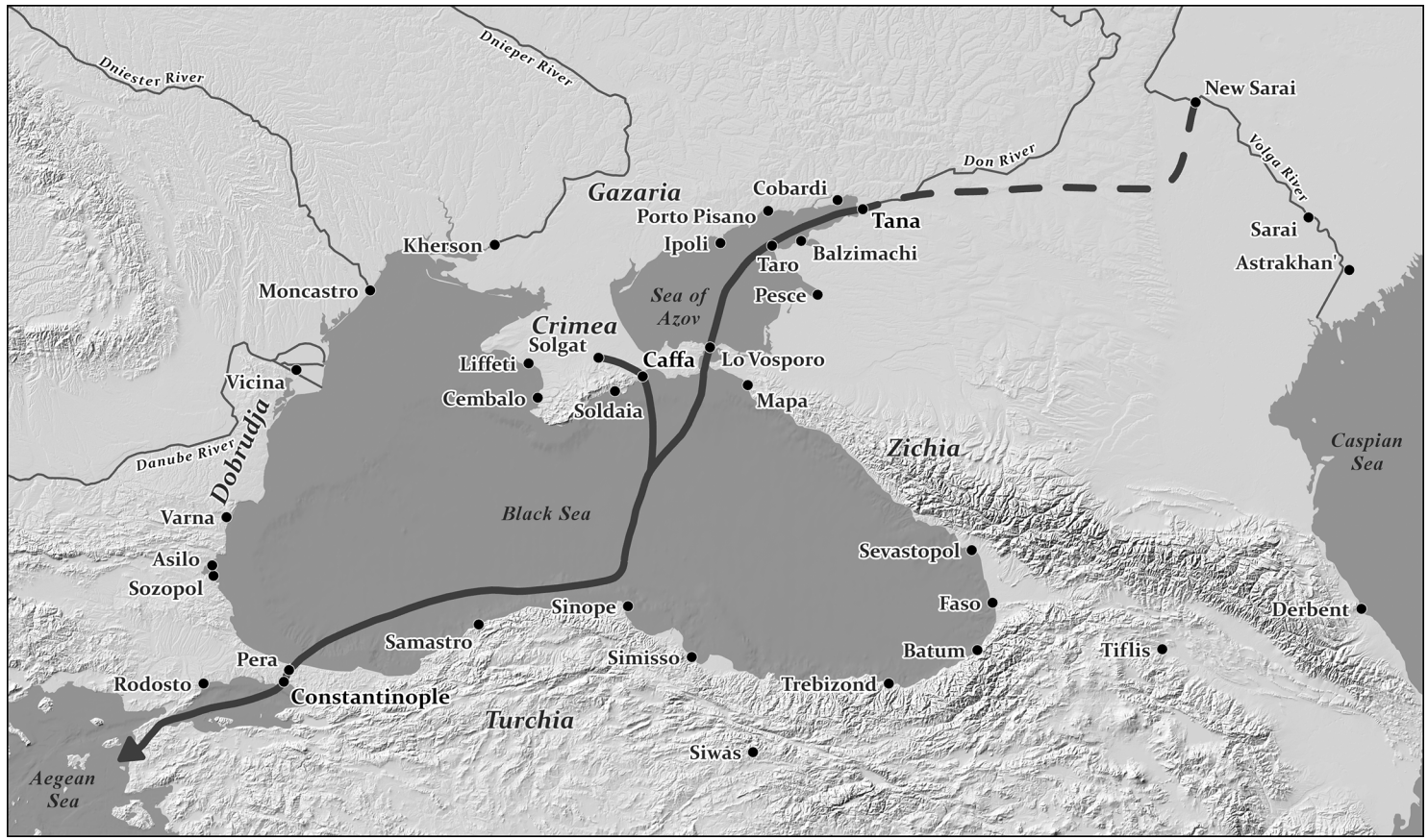

Fig. 1. Movement of *Yersinia pestis* in the Black Sea region.

of the Sea of Azov; it consisted of Porto Pisano, Cobardi (Taganrog), Lobuosom (at the mouth of the Mius River), and Ipoli. Grain from those ports was taken to Tana, Lo Vosporo, or Caffa, where deeper harbors could accommodate large Italian ships. The other cluster was located in Zichia, along the south shore of the Sea of Azov: it included Balzimachi (in the Yeya delta), Taro, Pesce (in the Beysug delta), and San Giorgio.[60] Pegolotti did not say where this grain was taken for export, but Mapa (Anapa) is a likely candidate along with Caffa, Tana, and Lo Vosporo.[61] Contemporary notarial acts from Caffa mentioned all of these ports except Lubuosom and Ipoli; they also mentioned grain shipments through Matrega, Calinimeno, and Aziachon, as well as Faso (Poti) and Sevastopol (Sukhumi) on the Circassian coast.[62]

Ships departing from the major grain ports headed first for Constantinople or its commercial suburb of Pera. This leg of the journey could take up to four weeks.[63] Some of the grain would be sold there: by the late thirteenth century, Genoese and Venetian merchants had come to dominate Constantinople's grain trade, though Byzantine merchants continued to operate in their shadow.[64] Yet even ships bound for the Mediterranean would stop there to pay taxes, renew supplies, gather information, and take on additional passengers and cargo.

Shipments of grain from Pera to Genoa had already begun in 1267.[65] The duration of a particular voyage depended on the weather, the type of ship (galley, nef, or cog), the presence of enemies, the route chosen by the captain, and the number and duration of stops along the way.[66] The minimum duration for a round-trip voyage between Genoa or Venice and Romania was six months. From Genoa, it took one or two months to sail to Pera. It took at least sixty days from Genoa to Caffa; a thirty-six-day voyage from Caffa to Venice was remarkably fast.[67]

[60] E. S. Zevakin and A. Penčko, "Ricerche sulla storia delle colonie genovesi nel Caucaso occidentale nei secoli XIII–XV," trans. Maria Teresa Dellacasa, in *Miscellanea di studi storici*, Collana Storica di Fonti e Studi 1 (Genoa, 1969), 7–98, at 29–30.

[61] Balard, "Le commerce," 67.

[62] Balard, *La Romanie*, 2:754. They also mentioned Cubacuba and Cavalari, whose locations are unknown.

[63] Ruy González de Clavijo, *Narrative of the Embassy of Ruy González de Clavijo to the Court of Timour, at Samarcand, A.D. 1403–6*, trans. Clements R. Markham, Works Issued by the Hakluyt Society 26 (London, 1859), 56–60 and 198–99. He took twenty-two days to sail from Pera to Trebizond and twenty-five days to return from Trebizond to Pera.

[64] G. I. Bratianu, "La question de l'approvisionnement de Constantinople à l'époque byzantine et ottomane," *Byzantion* 5/1 (1929): 83–107, at 96–97; G. I. Bratianu, "Nouvelles contributions à l'étude de l'approvisionnement de Constantinople sous les Paléologues et les empereurs ottomans," *Byzantion* 6/2 (1931): 641–56, at 642–46; Zevakin and Penčko, "Ricerche," 44–45; Fabien Faugeron, *Nourrir la ville: Ravitaillement, marchés et métiers de l'alimentation à Venise dans les derniers siècles du Moyen Âge* (Rome, 2014), 426–27; Balard, "Le commerce," 69; Balard, *La Romanie*, 2:754–58; and Angeliki E. Laiou, "The Byzantine Economy in the Mediterranean Trade System: Thirteenth-Fifteenth Centuries," and "The Greek Merchant of the Palaeologan Period: A Collective Portrait," in *Gender, Society and Economic Life in Byzantium*, Collected Studies 370 (Aldershot, 1992), 177–222, at 192–95, and 96–124, at 103–5.

[65] Balard, *La Romanie*, 2:759; Balard, "Le commerce," 73–74.

[66] Karpov, *La navigazione*, 39–65; Balard, *La Romanie*, 2:576–85.

[67] Balard, *La Romanie*, 2:577; Clavijo, *Narrative*, 199; and Roberto Cessi and Fanny Bennato, eds., *Venetiarum historia vulgo Petro Iustiniano Iustiniani filio adiudicata*, Monumenti Storici Nuova Serie 18 (Venice, 1964), 214.

As for timing, ship captains avoided winter sailing in the Black Sea because of dangerous winds.[68] The winter hiatus for Genoese ships lasted from 1 December to 15 March. For Venetian ships, it lasted from mid-November to the first of April. Therefore, the Venetian *muda* galleys, the fastest and securest way to sail to Romania, generally departed from Venice in July and returned in late December or early January.[69] The Genoese Office of Gazaria attempted to organize similar convoys in the mid-fourteenth century, with mixed success. In 1343, two Genoese galley convoys sailed to Romania, the first departing in April (to return in the autumn) and the second departing on 3 August (to return the next spring).[70] In 1348, the Office of Gazaria again organized two galley convoys for Romania, the first departing in March and the second in July. Private nefs and galleys usually returned from Caffa in two waves, the first in February or early March to reach Genoa in late April or early May and the second in early August to reach Genoa in October.[71] In the late fourteenth century, cogs commissioned by the Officium Victualium to import grain departed from Genoa in the spring and returned between October and early February.[72] This staggered schedule emerged because grain was not warehoused in the Black Sea. Instead it was loaded and shipped as soon as it reached the major ports after the harvest.

Plague was first reported in the Golden Horde, including Tana, in spring 1346. It had reached the hinterland of Caffa by October or November 1346. If the Black Sea grain trade were operating normally, one would expect infected rats and fleas to accompany grain shipments from Tana to Pera and Constantinople and thence into the Mediterranean. If the first grain shipments departed in early August 1346, by early September they should have reached Constantinople, and by October or November they should have reached Genoa and Venice.[73] A human plague outbreak should have been reported five to thirty-five weeks later, i.e., between October 1346 and May 1347 in Constantinople, and then between November 1346 and June 1347 in Genoa and Venice.

That is not what happened. Plague did not affect the people of Constantinople until August or September 1347. It did not reach the Genoese until November or December 1347, six to twelve months later than one might expect. Venetians were not affected until February or March 1348, eight to fifteen months later than one might expect. Evidence to support these dates is presented below. What matters is that *Y. pestis* was slow to cross the Black Sea and enter the Mediterranean. This suggests either that plague was not transmitted by infected rats and fleas riding in grain shipments, or that the Black Sea grain trade was not operating normally in 1346.

[68] Karpov, *La navigazione*, 39, 41; and Balard, *La Romanie*, 2:579.

[69] Karpov, *La navigazione*, 86–88; and Niccolò da Poggibonsi, *A Voyage beyond the Seas (1346–1350)*, trans. T. Bellorini and E. Hoade, Publications of the Studium Biblicum Franciscanum 2 (Jerusalem, 1945), viii, 130.

[70] Balard, *La Romanie*, 2:583.

[71] Balard, *La Romanie*, 2:581.

[72] Balard, *La Romanie*, 2:760.

[73] *Y. pestis* spreads overland through rodents in the western United States at a rate of about sixteen miles per year. Benedictow, *Black Death*, 47. At that rate, *Y. pestis* would require seventy-seven to eighty-five years to travel from Tana to Constantinople.

In fact, the Black Sea grain trade was not operating normally in 1346. At that time Genoa and Venice were at war with the Golden Horde and all three parties had instituted trade embargoes. Tana had been temporarily abandoned by the Venetians, and Caffa had been temporarily cut off from its agricultural hinterland by Jānībek Khan's second siege. Thus, it is not surprising that *Y. pestis* paused on the north coast of the Black Sea in autumn 1346. Grain shipments, with their accompanying rats and fleas, were at a standstill. (Table 1 provides the timeline.) This directly contradicts the scenario presented by Mussi and accepted by most historians: the second siege of Caffa in 1346 delayed the spread of plague rather than hastening it.

To explain why the second siege of Caffa disrupted the entire northeastern grain trade network and delayed the spread of *Y. pestis*, a deeper understanding of the political context is needed.[74] In the 1340s, Venice, Genoa, and the Golden Horde were engaged in a three-way conflict. Its roots stretched back to the late-thirteenth-century competition between Genoa and Venice for trade privileges, jurisdiction, and colonial sovereignty that could be granted only by the khan of the Golden Horde. The relevant episode began in 1342 when Jānībek Khan became ruler of the Golden Horde.[75] Jānībek's father, Uzbek Khan, had cultivated good relations with both Genoa and Venice, so Genoa hoped to maintain favored status under Jānībek while Venice hoped to expand its privileges relative to Genoa.[76] This jockeying for influence meant that tensions were running high in 1343. When the official Romania galleys departed from Venice, the senate required its captains to sleep on their ships in Tana to ensure their safety.[77] This was a precaution against the Genoese as much as the local Tatars.

The trouble began in September 1343.[78] Andriolo Civrano, a visiting Venetian, was insulted by Khoja Omar, a resident Tatar, and killed him with a sword. A crowd of Tatars gathered and began to attack Italians (Venetians, Genoese, and others) along with their houses and warehouses. This resulted in more deaths on both sides as well as losses of 300,000 florins for the Venetians and 350,000 florins for the Genoese. Those Italians able to flee sailed to Caffa. Jānībek Khan blamed the riot on the Venetians and retaliated by imprisoning the Italian residents (Venetians, Genoese, and others) of his capital and other major cities of the Golden Horde. His reaction is often portrayed as a fit of rage, but Jānībek was acting according to a clear political logic.[79] Venice and Genoa had been wrong to assume that he wanted to renew the close relationships cultivated by his father. The riot in Tana offered Jānībek a pretext

[74] Balard, "Le commerce;" Bratianu, "La question;" and Karpov, "Génois." Biraben overstates Genoa's dominance of Black Sea shipping in the 1340s: *Les hommes*, 1:53 n. 52. Benedictow (*Black Death*, 49) and Ziegler (*Black Death*, 5) overstate the Golden Horde's hostility toward generic "Italians" and ignore the long-standing hostility between Venetians and Genoese. For a more nuanced portrayal, see Ciocîltan, *Mongols* and Di Cosmo, "Black Sea Emporia."

[75] Ciocîltan, *Mongols*, 202.

[76] Thomas, ed., *Diplomatarium*, 1:261–63, doc. 135.

[77] Stöckly, *Le système*, 107.

[78] Cessi and Bennato, eds., *Venetiarum historia*, 226; Antonio Morosini, *The Morosini Codex*, ed. Michele Pietro Ghezzo, John R. Melville-Jones, and Andrea Rizzi, Archivio del Litorale Adriatico 3 (Padua, 1999), 111, 117; Stella, *Annales*, 138; Thomas, ed., *Diplomatarium*, 1:268; Karpov, "Génois," 35; and Raimondo Morozzo della Rocca, "Notizie da Caffa," in *Studi in onore di Amintore Fanfani*, 6 vols. (Milan, 1962), 3:265–95, at 267.

[79] Ciocîltan, *Mongols*, 203; and Di Cosmo, "Black Sea Emporia," 98.

TABLE 1
Timeline of events leading up to the Black Death outbreak.

Date	Event	Date	Event
1343 Sept.	Riot in Tana; Jānībek arrests Italian merchants	1346 summer	Plague in Urgench, New Sarai, Astrakhan', Beldjamen; first harvest failure in Italy
1344 Feb.	First siege of Caffa; first Venetian embargo	1346 Aug.	Pope issues trade license to fund defense against second siege of Caffa
1344 June	Venetian-Genoese alliance, joint embargo	1346 Oct.–Nov.	Plague in Solgat; Ibn al-Wardī's merchant informant crosses the Black Sea
1344 Aug.	Venetian, Genoese ambassadors meet in Caffa	1347 Jan.–Mar.	Genoa-Golden Horde peace without treaty; plague mentioned in Caffa's petition to Genoa
1344 Oct.	First Venetian protest of Genoese embargo violations	1347 Apr.	Venice allows grain exports from Tana
1344 Nov.	Jānībek's embargo against Genoese, Venetians, Byzantines	1347 May	Rumors of Venice-Golden Horde peace
1344 Dec.	Second Venetian protest of Genoese embargo violations	1347 summer	Plague in Baghdad; second harvest failure in Italy
1345 Jan.	Jānībek prepares second siege of Caffa	1347 Aug.–Sept.	Plague in Constantinople
1345 Feb.	Genoa promises better embargo enforcement	1347 Sept.	Plague in Trebizond
1345 Mar.	Genoa sends first fleet to defend Caffa from Jānībek's new fleet	1347 Oct.	Plague in Messina
1345 July	Renewal of Venetian-Genoese alliance, joint embargo; second siege of Caffa begins?	1347 Nov.	Plague in Alexandria
1345 Dec.	Pope issues crusade indulgence for defenders in second siege of Caffa	1347 Nov.–Dec.	Plague in Genoa, Marseille
1346 spring	Plague in Golden Horde, Tana; Jānībek releases Venetian prisoners	1347 Dec.	Venice-Golden Horde peace treaty
1346 Apr.	Venetian ambassadors in Caffa return home	1348 Jan.	Plague in Ragusa; major earthquake in Friuli; Caffans attack Kerasunt
1346 May	Genoa sends second fleet to Caffa, diverted to Chios	1348 Feb.–Mar.	Plague in Venice

to change the terms of his diplomatic relationships. Collective punishment of merchants was a common tactic in late medieval disputes about international trade. In this case, Jānībek used it to remind both Genoa and Venice that their commercial activities in the Black Sea were subject to his power, and that his benevolence could not be taken for granted.

In the immediate aftermath of the riot, all three parties used the situation to advance their own interests.[80] It quickly became clear that Jānībek's goal was not only to remind Venice and Genoa of his power but also to oust the Genoese from Caffa. The flight of the Italians from Tana to Caffa gave him an excuse to reclaim Caffa. Restoring his sovereignty there would support his claim to universal rulership (a claim inherited from the era of Chinggis Khan) and enable him to resist Italian pressure in other areas. It would also fill his treasury, since the Genoese had established customs and staple rights in Caffa that generated substantial revenue. Because Genoa had no written document stating the terms of its sovereignty over Caffa, it had no legal basis to resist Jānībek's decision. From this perspective, relations with the Venetians were an afterthought except to the extent that they could be used against the Genoese.

Meanwhile, Genoa also saw the riot as an opportunity to pursue its own chief aim in the Black Sea: maintaining its advantage over Venice. Genoa did not want Venice to have colonies in the Black Sea or to trade without going through Genoese middlemen. In practical terms, this meant keeping the Venetians out of Tana by any means necessary. The riot and its aftermath presented Genoa with an opportunity to lure displaced Venetian merchants to Caffa, where they would have to work with Genoese middlemen and pay Genoese taxes as long as Genoa was able to defend the city from the Golden Horde.

Venice's chief aim in the Black Sea was to erase Genoa's advantage by establishing colonies of its own. After the riot, this meant placating Jānībek Khan and regaining its privileges in Tana as soon as possible. On 25 October, therefore, the Venetian senate sent two messengers to Jānībek to request letters of safe-conduct for two ambassadors.[81] The messengers departed by land in late November; the ambassadors would follow by sea after the winter shipping hiatus ended. While waiting for news, the senate authorized the Romania galley convoy to sail to Constantinople in 1344. There its captains could assess the situation before deciding whether to enter the Black Sea or return via Cyprus.[82] The senate also petitioned the pope for permission to send galleys to Alexandria to make up for the lost trade in luxury goods.[83] It seems that the Venetians hoped for a swift resolution to the conflict.

Jānībek Khan had not yet achieved his objective though. In February 1344 he besieged Caffa with twelve trebuchets. The Caffans were prepared: they had already

[80] Ciocîltan, *Mongols*, 203–5; Di Cosmo, "Black Sea Emporia," 98–101; and Şerban Papacostea, "'Quod non iretur ad Tanam': Un aspect fondamental de la politique génoise dans la mer Noire au XIVe siècle," *Revue des études sud-est européennes* 17/2 (1979): 201–17.

[81] Karpov, "Génois," 36–37; Morozzo della Rocca, "Notizie," 268; and Thomas, ed., *Diplomatarium*, 1:266–67, 320.

[82] Thomas, ed., *Diplomatarium*, 1:275–76, 323–25.

[83] Permission was received in 1344 and galleys went to Alexandria in 1345. Raphainus de Caresinis, *Raphayni de Caresinis cancellarii Venetiarum Chronica AA. 1343–1388*, ed. Ester Pastorello, *Rerum Italicarum Scriptores* Nuova Edizione 12/2 (Bologna, 1922), 4; Lorenzo de' Moniacis, *Laurentii de Monacis Veneti Cretae cancellarii Chronicon de rebus Venetiis*, ed. Flaminius Cornelius, *Rerum Italicarum Scriptores* 8 (Venice, 1758), col. 311; and Morosini, *Morosini Codex*, 111.

arranged grain imports to feed the defenders, and they broke the siege quickly by slipping out at night and setting the trebuchets on fire.[84] Nevertheless, they realized that the conflict had only just begun. In March, they allotted funds to recruit a hundred crossbowmen in Pera.[85] At the same time, the Venetians realized the true severity of the situation. On 21 February 1344, the senate announced an embargo (*devetum*): let no one dare "go or send through themselves or another person anything of theirs under any pretext or cause to areas subject to Emperor Jānībek, understanding that Caffa is among the places and lands prohibited."[86] In April the senate also concluded its proceedings against Andriolo Civrano, whose murder of Khoja Omar had caused the riot. He was exiled from Venice for five years and from Gazaria permanently. Though Jānībek Khan received the Venetian messengers and agreed to meet the ambassadors, he would not issue letters of safe-conduct for them.

In spring 1344, the doge of Genoa, Simon Boccanegra, contacted the doge of Venice, Andrea Dandolo, to propose an alliance. A joint Genoese-Venetian embassy would go to Jānībek and negotiate for the release of prisoners, the return of confiscated goods, and the renewal of commercial privileges, "because strength united is stronger than divided and separated."[87] By working together, they might win more generous concessions. Dandolo agreed, and a one-year alliance was sealed on 18 June 1344. In deference to Genoese interests, the treaty stipulated that the joint embassy must not cede control of Caffa. In deference to Venetian interests, the treaty stipulated that Genoa would participate in the embargo against Jānībek. Specifically, "neither of the said parties of the said communes can or ought to do business or trade or enter a contract for themselves or for others in the empire of the said lord Emperor Jānībek."[88]

Two months later, in August 1344, the Venetian and Genoese ambassadors met in Caffa.[89] They could not proceed to Jānībek's court without letters of safe-conduct, so they waited in Caffa while two Franciscans and a Turkish ambassador interceded on their behalf.[90] During this time, the terms of the embargo emerged as a source of conflict between the allies.[91] In its initial statement of February 1344, Venice

[84] Stella, *Annales*, 139; and Giovanna Petti Balbi and Silvana Fossati Raiteri, eds., *Notai genovesi in oltremare: Atti rogati a Caffa e a Licostomo (sec. XIV)*, Collana storica di fonti e studi 14, Collana storia dell'Oltremare ligure 2 (Genoa, 1973), 28–29, 110. The contract must have been made between September and December 1343.

[85] Thomas, ed., *Diplomatarium*, 1:336; and Balbi and Raiteri, eds., *Notai*, 75–76, doc. 35.

[86] "Ire seu mitere per se vel alium aliquid de suo sub aliquo colore vel causa ad partes subditas Imperatori Zanibech, intelligendo quod Gaffa sit de locis et terris prohibitis." Morozzo della Rocca, "Notizie," 268. The embargo had both practical and symbolic signficance. Stefan K. Stantchev, *Spiritual Rationality: Papal Embargo as Cultural Practice* (Oxford, 2014); and Dameron, "Feeding," 989.

[87] "Quod uirtus unita forcior est quam dispartita et separata." Thomas, ed., *Diplomatarium*, 1:279–285, doc. 148.

[88] "Neutra dictarum parcium dictorum comunium possit seu debeat negociari, mercari, seu contractum inire per se nec per alios in imperio predicti domini imperatoris Ianibech." Thomas, ed., *Diplomatarium*, 1:283.

[89] Marco Ruzzini and Giovanni Steno for Venice; Lanfranco Cattaneo, Gualvanus Embrono, and Giorgio de Monte Alto for Genoa. Morozzo della Rocca, "Notizie," 289–95; and Cessi and Bennato, eds., *Venetiarum historia*, 226.

[90] Morozzo della Rocca, "Notizie," 270, 277–78; and Ciocîltan, *Mongols*, 210.

[91] Thomas, ed., *Diplomatarium*, 1:329–32; Morozzo della Rocca, "Notizie," 270–71, 278–79, 289–95; and Papacostea, "'Quod non iretur,'" 206–7.

had named Caffa among the embargoed ports, but the treaty of June 1344 specified only the empire of Jānībek. Genoa asserted that Caffa was not part of the empire of Jānībek, and while halting Caffan trade would certainly have hurt the Golden Horde's economy, it would also have hurt Genoa's. Therefore, Caffa's trade with its Crimean hinterland was allowed to continue into August 1344.[92] On 22 August, the Venetian ambassadors witnessed a galley, loaded with "linens, sugar, and other merchandise" from the Mediterranean, leaving Caffa to trade in Cembalo and other embargoed ports.[93]

In response, the frustrated Venetian ambassadors had a notary and a set of French and German witnesses draw up a formal complaint about Genoese embargo violations.[94] In late September, according to the Venetians, reports indicated that the embargo was having an effect on Solgat, the Golden Horde's regional capital.[95] The merchants of Solgat were complaining, goods were piling up, and there was significant pressure for peace. In fact, peace might already have been achieved if the embargo had not been violated in three ways. First, Genoese ships were sailing from Caffa and Pera to embargoed ports, where they exchanged cotton cloth, linens, and camlets for grain and hides. The Genoese argued that the grain was to supply their own colonists, but the Venetians replied that the grain was going to markets in Trebizond and Constantinople. Second, brokers traveled freely from Solgat to Caffa to buy linens, camlets, and other goods. The Genoese argued that trade within the city of Caffa was permitted because Caffa was not part of Jānībek's empire, but the Venetians replied that Genoa held Caffa from Jānībek. Third, Taycoga, the commander of Jānībek's army in Gazaria, was profiting from indirect trade through the embargoed port of Tossi. Genoese ships exchanged linens, camlets, and other goods from Caffa for furs and silks from Solgat. The Genoese said that this trade was not conducted by Genoese subjects. The Venetians replied that if the Genoese could stop Turkish ships sailing from Sinope to the Golden Horde, they could also stop their own ships sailing from Caffa to Tossi. The Venetian senate forwarded this complaint to Genoa in November 1344.

Around the same time, Jānībek Khan instituted his own embargo. No written document stating the terms of the embargo has survived, but it affected Byzantine merchants as well as Genoese and Venetians.[96] Combined with the crusade of Smyrna, which disrupted the trade network for Anatolian grain, Jānībek's embargo raised grain prices and contributed to food shortages throughout the Aegean.[97] Constantinople suffered shortages of grain, salt, and salted fish, while the prices of silk and spices in Italy rose sharply.[98]

[92] The surviving portion of the register of Nicolò Beltrame, a Genoese notary in Caffa, ends in August. Balbi and Raiteri, eds., *Notai*; and Morozzo della Rocca, "Notizie," 295.

[93] "Telle, zuchari et alie mercationes." Thomas, ed., *Diplomatarium*, 1:329–31.

[94] Morozzo della Rocca, "Notizie," 290.

[95] Morozzo della Rocca, "Notizie," 278, 292.

[96] Laiou, "Byzantine Economy," 192–93.

[97] Mike Carr, "Humbert of Viennois and the Crusade of Smyrna: A Reconsideration," *Crusades* 13 (2014): 237–51, at 246, 248.

[98] Zevakin and Penčko, "Ricerche," 45; Bratianu, "La question," 102; Balard, *La Romanie*, 1:76 n. 230; and Mike Carr, "Crossing Boundaries in the Mediterranean: Papal Trade Licenses from the Registra Supplicationum of Pope Clement VI (1342–52)," *Journal of Medieval History* 41/1 (2015): 107–29, at 118, and doc. 13.

High prices encouraged smuggling. In December, the Venetian ambassadors complained again that Genoese merchants were violating Jānībek's embargo and their own, openly trading with Tatars in Caffa, Tossi, Cibano, Pesce, and San Giorgio.[99] The Genoese consul responded that trade was necessary to sustain the city and that the Venetians should relax the embargo: "if they restrict their ships and their merchants, [the consul] cannot hold the land of Caffa, and that which they do, they do for the preservation of the said land of Caffa."[100] The Venetian ambassadors were persuaded and respectfully advised the senate to accept the consul's advice. For the time being, Venetian merchants could join the Genoese in smuggling: "in these neighborhoods there is much wheat, both new and old, but the lord Emperor [Jānībek] does not send it for export in any way, but it is exported by a certain ship of the Genoese at night and secretly."[101] When peace was made, Venetian merchants would be present in the region and ready to return to Tana.

In January 1345, the situation worsened.[102] Jānībek Khan was gathering an army in Solgat for a second siege of Caffa, and he had taken the unique step of creating a navy to prevent Caffa from receiving assistance by sea. Thirty Tatar galleys had been sent to Cibano, Calamita, and Gotia. The Venetian ambassadors recommended allowing the alliance with Genoa to expire, since Jānībek's intention was clearly to take Caffa and not to seek revenge for the death of Khoja Omar. They closed their report with this remark: "concerning grain, according to what we hear, there is enough in these parts; it is not possible to name any price because a ban has been placed by the Emperor concerning persons and possession [so] that no one dares to export it."[103] In other words, the grain harvest of 1344 had been plentiful but its export was prevented by Jānībek's embargo.

At this sensitive juncture, factional conflict brought Genoa to the brink of civil war. It was a new Genoese doge, Giovanni da Murta, who finally addressed the Venetian complaints about embargo violations in February 1345: "on the word of God we reply that [the smugglers] carried it out against the will, the order already given, the knowledge, and the approval of our commune, and when we heard the report of your ambassadors, the hearts of our other citizens, still less our [own] mind, were disturbed with bitterness."[104] He promised to punish the smugglers and order the Caffan officials to enforce the embargo more diligently. In addition, he dispatched a

[99] Morozzo della Rocca, "Notizie," 279.

[100] "Si extringerent sua navigia et suos mercatores, terra Gaffe non posset retinere, et illud quod faciunt pro conservacione dicte terre Gaffa faciunt." Morozzo della Rocca, "Notizie," 280.

[101] "In istis contratis est multa blada, et de nova et de vetera, sed dominus Imperator non premittit eam traere aliquo modo, sed per aliquod navigium Genuensium extraitur de nocte et furtive." Morozzo della Rocca, "Notizie," 281.

[102] Morozzo della Rocca, "Notizie," 281–85; and Ciocîltan, *Mongols*, 209.

[103] "De furmentum [*sic*], per illud quod sentimus, satis est in istis partibus; precium aliquod non potest nominari quia bandum est positum per Imperatorem de persona et havere quod aliquis non audeat ipsum extraere." Morozzo della Rocca, "Notizie," 285.

[104] "In uerbo Dei respondemus, quod illa contra uoluntatem, mandatum propterea factum, conscientiam et assensum nostri comunis fuerunt perpetrata, et dum illa audiuimus relatione dicti uestri sindici, nedum mentem nostram, ymmo aliorum nostrorum ciuium corda turbarunt amare." Thomas, ed., *Diplomatarium*, 1:288. Two grain shipments from Romania totalling 9,400 mines arrived in Genoa in 1345, but they must have come from Anatolia or the Danube. Balard, *La Romanie*, 2:759, citing ASG, Antico Comune, Massaria Communis Ianue no. 3, fols. 49v, 53r.

naval squadron in March 1345 to destroy Jānībek's newly built galleys.[105] The Venetian ambassadors were not satisfied: they considered the squadron's plan to raid (*corsizare et derobare*) the coast of Gazaria as another violation of the embargo.[106]

On 16 March 1345, Caffans received their first hint that something was amiss in Central Asia. A ship arrived with two Genoese men who had escaped imprisonment in the Golden Horde. They made their way to Zichia and waited almost two months for a ship to Caffa. Among other news, they reported that the "way of the Middle Empire" (*chamin de llo Imperio de Mezo*) was closed, though spices and silk were still available in Urgench.[107] The Middle Empire was the Chagatai Khanate.[108] In October 1344, "the way of the Middle Empire" (*caminum luperii* [*sic*; read *linperii*] *de medio*) had been open.[109] No explanation was offered for its closure, but this could indicate a plague outbreak affecting the western leg of one of the major east-west trade routes in winter 1344–45.

When the time came for Genoa and Venice to renew their alliance in July 1345, there was debate.[110] Jānībek was still preparing to besiege Caffa. Some Venetians argued for a separate peace so that they could return to Tana; others argued that Venice was obligated to cooperate with Genoa and protect Caffa. From a Genoese perspective, it was enough for Venice to remain neutral so that Genoa could dedicate its entire Black Sea fleet to Caffa's defense. In the end, the alliance was renewed and a compromise was reached on the embargo policy:

> No one of the said parties, with property or goods, with or without ships or navigable vessels, for the entire said duration of the said happy unity and league, can go, approach or sail, send or convey, or cause to be sent or conveyed, property or goods to any lands or places of the said Emperor Jānībek or [places] subject to the Emperor himself and his rule, either placed or located in his empire, except to the place and city of Caffa, and from there along to the west or to Pera, including that place or that city of Caffa . . . No one of the said parties can, by any method or clever trick that can be said or imagined, go, approach, or sail beyond the said place or city of Caffa, directly or obliquely, having sought any excuse, toward the east or Tana.[111]

In this way, Genoa and Venice tried to resolve their dispute about smuggling. The new embargo clause sidestepped the question of sovereignty over Caffa while tacitly

[105] Under Federico Pichamiglio. Ciocîltan, *Mongols*, 210.

[106] Morozzo della Rocca, "Notizie," 289.

[107] Morozzo della Rocca, "Notizie," 286.

[108] Dai Matsui, "Dumdadu Mongγol Ulus 'The Middle Mongolian Empire,'" in *The Early Mongols: Language, Culture and History*, ed. Volker Rybatzki, Alessandra Pozzi, Peter W. Geier, and John R. Krueger, Uralic and Altaic Series 173 (Bloomington, IN, 2009), 111–19.

[109] Morozzo della Rocca, "Notizie," 279.

[110] Morozzo della Rocca, "Notizie," 272; and Ciocîltan, *Mongols*, 209.

[111] "Nec per totum dictum tempus dicte felicis unitatis et lige possit aliquis dictarum partium cum rebus uel mercibus, seu cum lignis, seu uasis nauigabilibus uel sine, ire, accedere uel nauigare, mittere seu deferre, uel mitti seu deferri facere res uel merces ad aliquas terras uel loca dicti imperatoris Ianibech siue ipsi imperatori et suo imperio subietas uel subiecta, siue positas siue posita seu sita in suo imperio, saluo ad locum et ciuitatem Caffa, et ab inde infra uersus occidentem siue uersus Peyram, ipso loco siue ipsa ciuitate de Caffa comprehensa . . . Nec possit aliquis dictarum partium modo aliquo siue ingenio, qui dici uel cogitari possit, ultra dictum locum siue ciuitatem de Caffa, directe uel per obliquum, aliquo colore quesito, uersus orientem siue Tanam, ire, accedere uel nauigare." Thomas, ed., *Diplomatarium*, 1:302; Morozzo della Rocca, "Notizie," 271; and Papacostea, "'Quod non iretur,'" 207–8.

recognizing Genoa's claim. It tightened the terms of the embargo while explicitly channeling Venetian trade through Caffa. To compensate Venice for this concession, Genoa granted Venetian citizens the same tax privileges as Genoese citizens in Caffa. Venice was also allowed to choose a consul to oversee the internal affairs of its community there, and the Genoese consul appointed officials to ensure that Venetians were not overcharged for renting houses or warehouses.

It is not known when Jānībek Khan began his second siege of Caffa, though it must have occurred between July and December 1345. The Venetian ambassadors felt that peace was unlikely. They decided to leave Caffa in April 1346, after the winter shipping hiatus and the expiration of the renewed alliance with Genoa.[112] Although there is no indication that the Venetians communicated their intention to Jānībek, he released a group of Venetian prisoners in spring 1346, perhaps as a reward for their break with Genoa. Meanwhile, in December 1345 Genoa had persuaded the pope to grant indulgences to the defenders of Caffa, positioning their cause as part of the crusade movement.[113] On 3 May 1346, Genoa dispatched a second fleet to relieve Caffa, but it was diverted to Chios.[114] The siege was still in progress on 4 August 1346, when the pope also permitted Genoa to send two round ships and five galleys to Mamluk Egypt and to apply their profits to the defense of Caffa. This was a common strategy to fund crusade campaigns. The permit also mentioned a Brother Ladislaus who had petitioned for funds for a "crusade and relief of Caffa."[115]

It was at this time that the Black Death struck the Golden Horde. Venetian sources reported plague in distant Tatar lands or in the far north between March 1345 and February 1346;[116] Byzantine sources reported it in Tana in spring 1346;[117] Russian sources reported it in Urgench and the eastern cities of the Golden Horde (New Sarai on the Volga, Astrakhan' at the mouth of the Volga, and Beldjamen/Bezdej) in summer 1346;[118] and Mamluk sources reported it in Solgat (Qirim) in October–November 1346/Rajab 757 H.[119] The effect on Jānībek's empire was demographically, economically, and culturally devastating, though it seems that the long-term consequences were more serious in the western territories than in the eastern ones.[120]

During this period, numerous people crossed the Black Sea from north to south, but *Y. pestis* did not accompany them. The Venetian ambassadors who departed from Caffa in April 1346 should have reached Constantinople in May and Venice in June, but their arrival did not herald the plague. Venetian prisoners released from New Sarai and other cities of the Golden Horde in spring 1346 should also have

[112] Morozzo della Rocca, "Notizie," 272–74; and Thomas, ed., *Diplomatarium*, 1:333–35.

[113] Mike Carr, *Merchant Crusaders in the Aegean, 1291–1352* (Woodbridge, UK, 2015), 152.

[114] Under Simon Vignoso. Carr, "Humbert," 243; and Stella, *Annales*, 146–47.

[115] "Passagio et subsidio de Caffa." Carr, "Crossing Boundaries," 116, and doc. 18. The Caffans later requested Brother Ladislaus as their bishop. Balbi, "Caffa," 221.

[116] The Venetian year began on 1 March. Caresinis, *Chronica*, 5; and Moniacis, *Chronicon*, 313.

[117] Bartsocas, "Two Fourteenth Century Greek Descriptions," 395.

[118] Khaydarov, "Epidemii," 305; Hammer-Purgstall, *Geschichte*, 308; and Janos of Eger, "Chronicon," 148.

[119] Michael Dols, "Ibn al-Wardī's *Risālah al-naba' ʿan al-waba'*: A Translation of a Major Source for the History of the Black Death in the Middle East," in *Near Eastern Numismatics, Iconography, Epigraphy, and History: Studies in Honor of George C. Miles*, ed. Dickran K. Kouymjian (Beirut, 1974), 443–55, at 448; and Ibn al-Wardī, *Tatimmāt al-mukhtaṣar*, 2:489.

[120] Schamiloglu, "Impact," 329.

reached home in the summer, but they did not bring plague with them either.[121] Messengers, as well as the Genoese ambassadors who finally negotiated an unwritten peace with Jānībek, visited the Golden Horde in late 1346 without spreading plague upon their return. Ibn al-Wardī, the Mamluk chronicler in Aleppo who reported the plague outbreak in Solgat, got his information from a Mamluk merchant returning from Crimea via eastern Anatolia. The merchant observed the beginning of Solgat's plague outbreak in the month of Rajab 747 H., which corresponds to 18 October–16 November 1346. He must have departed shortly after the outbreak began in order to avoid the winter shipping hiatus. His goods were probably low-volume, high-value Black Sea commodities such as furs or slaves; long-distance luxuries such as silk and spices were more easily available via the Red Sea, and bulk goods such as grain and salted fish would be very inefficient to transport overland through Anatolia.[122] Yet neither the merchant nor his goods brought plague to Aleppo.[123]

What did not cross the Black Sea from north to south in 1346 was grain. Jānībek's embargo was still in effect, so there was no reason for Genoese, Venetian, or Byzantine grain ships to visit the ports of the Golden Horde. As a result, Constantinople suffered from food shortages in winter 1346–47. Cut off from grain producers in Gazaria and Zichia because of Jānībek's embargo as well as grain producers in Thrace and Turchia because of a civil war, the Byzantine capital relied entirely on grain from the lower-Danube ports.[124] Northern Italy experienced a harvest failure in 1346 due to excessive rain, but Venice and Genoa sought to import grain from other parts of their networks.[125] Venetian galleys visited Trebizond in 1346, but they did not dare venture north to Tana.[126]

Meanwhile, Caffa remained under siege by Jānībek. Though cut off from its agricultural hinterland, it could still be supplied by ship.[127] During a similar siege in 1386, Caffans received grain from Pera, the lower Danube, Illice (at the mouth of the Dnieper), Zichia, Faso and Sevastopol (in Circassia), Trebizond, and Samastro and Simisso (in Turchia).[128] During a war in 1394, the Genoese authorities went so far as to ship grain to Caffa from Sicily. And finally, in 1474, a besieged Caffa received grain from Moncastro, Lo Vosporo, and Zichia.[129] Yet, in 1346, Pera was experiencing

[121] Jānībek continued to release prisoners in 1348. Nicoletto Gata, a Venetian imprisoned in Sarai, returned to Caffa in April 1348 and promptly wrote to his business partner in Crete for funds to pay his ransom. Raimondo Morozzo della Rocca, ed., *Lettere di mercanti a Pignol Zucchello (1336–1350)* (Venice, 1957), 118, doc. 63.

[122] Janet Martin, *Treasure of the Land of Darkness: The Fur Trade and Its Significance for Medieval Russia* (Cambridge, UK, 1986); and Hannah Barker, *That Most Precious Merchandise: The Mediterranean Trade in Black Sea Slaves, 1260–1500* (Philadelphia, 2019), 161–64, 178–83.

[123] Plague reached Aleppo from the south in October 1348. Dols, *Black Death*, 60–61.

[124] Laiou, "Byzantine Economy," 184; Carr, "Crossing Boundaries," 119, doc. 21; and Carr, "Humbert," 246, 248.

[125] Faugeron, *Nourrir*, 188; Dameron, "Feeding," 1007, 1017; and Bruce M. S. Campbell, "The European Mortality Crises of 1346–52 and Advent of the Little Ice Age," in *Famines during the "Little Ice Age" (1300–1800): Socionatural Entanglements in Premodern Societies*, ed. Dominik Collet and Maximilian Schuh (Cham, Switzerland, 2018), 19–41, at 31–32.

[126] Stöckly, *Le système*, 107; and Thomas, ed., *Diplomatarium*, 1:335.

[127] Mussi in Horrox, ed. and trans., *Black Death*, 17.

[128] Karpov, "Grain Trade," 65, 67; and Balard, "Le commerce," 76–77.

[129] Zevakin and Penčko, "Ricerche," 45–46.

food shortages of its own, Genoa and other Italian cities were importing Sicilian grain for themselves, and all of the northern and eastern Black Sea ports were embargoed. Caffa must have received some grain from the lower Danube or Turchia, but it would have been competing with Constantinople and Pera for those resources. In other words, the defenders of Caffa probably experienced severe hunger in 1346, but what grain they received came from plague-free areas. In contrast, Jānībek's besieging army would have been provisioned with high-quality Crimean grain. It is therefore likely that *Y. pestis* reached the army in October–November 1346, around the same time that it reached the city of Solgat, because both would have been drawing on the same local grain supplies.

The exact date when Jānībek abandoned his second siege of Caffa has not been recorded, but it must have occurred between autumn 1346 and spring 1347, once the plague began to affect his army as well as the major cities of his empire.[130] Likewise, although Genoa and the Golden Horde had certainly made peace and lifted their embargoes by March 1347, no written document recording the date of their agreement or its terms has survived. Nevertheless, it was during this period immediately after the siege that the residents of Caffa petitioned Genoa for help and mentioned the prospect of a plague outbreak.[131] They were probably correct: infected rats and fleas probably entered Caffa when deliveries of local grain resumed.

In spring 1347, therefore, all the northern and northeastern grain ports including Caffa were probably affected by plague, but the outbreak had not yet spread to the southern or western shores of the Black Sea. The next harvest, which would not be ready for export until July or August 1347, was of course eagerly awaited in Constantinople, Genoa, and Venice, all of which were still suffering food shortages. Venice was the only state that had yet to negotiate a peace agreement with Jānībek. As a stopgap measure, the senate ordered its Adriatic fleet along with the armed galleys that would normally have traded in Romania, Cyprus, and Alexandria to proceed instead to Sicily and buy grain.[132] Their mission was successful, but the senate still felt that "it would be useful that grain and wheat be brought to Venice from every part [of the world]."[133]

Therefore, on 24 April 1347, the Venetian senate modified its embargo. Venetian ships could visit Jānībek's ports "for the purpose of taking on wheat or other grain . . . with this condition, that they return with the ships with which they sailed to the afore-mentioned parts loaded with wheat or grain, or else let them sail away empty from the lands and parts of Jānībek."[134] In other words, when the winter 1346–47

[130] Thomas, ed., *Diplomatarium*, 1:336–38; and Ciocîltan, *Mongols*, 211–14.

[131] Balbi, "Caffa"; and Ciocîltan, *Mongols*, 212.

[132] Moniacis, *Chronicon*, 310; Cessi and Bennato, eds., *Venetiarum historia*, 229; Caresinis, *Chronica*, 4; and Morosini, *Morosini Codex*, 117.

[133] "Et utile sit, quod de omni parte frumentum et bladum Venecias conducantur." Thomas, ed., *Diplomatarium*, 1:336.

[134] "Occasione caricandi frumentum uel aliud bladum . . . cum ista condicione, quod cum nauigiis, cum quibus nauigabant ad partes predictas, redeant Venecias caricati frumento uel blado, uel uacui exeant de terris et partibus Zanibech." Thomas, ed., *Diplomatarium*, 1:336; Balard, "Le commerce," 71. The Tana convoy of 1347 consisted of three galleys captained by Marco Morosini. Cessi and Bennato, eds., *Venetiarum historia*, 229; and Caresinis, *Chronica*, 4. Antonio Morosini, Marco's son, incorrectly reported the Venetian return to Tana in 1348. Morosini, *Morosini Codex*, 117.

shipping hiatus ended and a convoy of Venetian galleys returned to Tana for the first time since 1343, grain was the *only* commodity that they were allowed to export.

By mid-May, the Venetian senate had dispatched two new ambassadors to Jānībek, and rumors of a Venetian-Tatar peace were spreading.[135] Pignol Zucchello, a merchant based in Crete, wrote to a correspondent that "now the market for grain and enough other things is improving because the peace of Tana has been made and many ships have gone in, so that grain that was worth eight or nine hyperpers per *moggio* in Romania has gone back to five or six hyperpers."[136] Grain from the 1347 Black Sea harvest would not be available until July, and a formal peace treaty would not be concluded until December, but the expectation of these things was enough to lower grain prices in the Aegean by about 35 percent.[137]

It was during the period of renewed grain trade, about six months after the second siege of Caffa had been lifted, that *Y. pestis* crossed the Black Sea. According to the Byzantine chronicler Nicephoros Gregoras, plague appeared first in Constantinople. According to the Andalusi physician Ibn Khātima, it appeared first in Pera.[138] According to chroniclers in Ferrara and Bologna, it affected both cities at the same time.[139] In either case, the outbreak did not begin in early July, as is commonly assumed.[140] All the Byzantine sources that describe the onset of the Black Death are vague about its timing, but three do provide datable reference points. According to Emperor John VI Kantakouzenos, his daughter Helena was married to John V Palaiologos on 21 May 1347.[141] During the summer, his wife, Eirene, visited their eldest son, Matthaios, to dissuade him from conspiring against his father and brother-in-law. When she returned, she found that their youngest son, Andronikos, had died on the third day of the plague outbreak.[142] John VI met with papal ambassadors and wrote a letter to Pope Clement VI on 22 September.[143] Then, after the rise of Arcturus (mid-September 1347), he went to Didymoteichus to reconcile with Matthaios. Therefore, the Black Death outbreak in Constantinople

[135] Goffredo Morosini and Giovanni Querini. Cessi and Bennato, eds., *Venetiarum historia*, 229 and Caresinis, *Chronica*, 4.

[136] "Ora megliora merchato di formento e d'asai altre cose peroche' la pacie da la Tana è fatta, e molte navi so' andate dentro, per la qual cosa quello formento che valeva i' Romania perperi .VIII. in .VIIII. el mogio si è tornato a perperi .V. in .VI." Morozzo della Rocca, ed., *Lettere*, 73, doc. 36. By June 4, Zuchello had arranged to ship 100 measures of grain to Venice in September. He followed through on 18 September with 120 measures, though he complained about the high price. Morozzo della Rocca, ed., *Lettere*, 75, 91.

[137] Thomas, ed., *Diplomatarium*, 1:311–13, doc. 167; Morozzo della Rocca, "Notizie," 275–76.

[138] Dinānah, "Die Schrift," 42.

[139] Giulio Bertoni and Emilio Paolo Vicini, eds., *Chronicon estense, cum additamentis usque ad annum 1478*, *Rerum Italicarum Scriptores* Nuova Edizione 15/3 (Città di Castello, 1908), 160; and Cronaca B in Albano Sorbelli, ed., *Corpus chronicorum Bononiensum*, *Rerum Italicarum Scriptores* Nuova Edizione 18/1, vol. 2 (Città di Castello, 1910), 585.

[140] All references to an early July outbreak can be traced to an article written for a popular audience without citations: Jean-Noël Biraben, "La Peste Noire en terre d'Islam," *L'Histoire* 11 (1979): 30–40. This article included a short bibliography of works by Michael Dols, Jacqueline Sublet, and Gaston Wiet, none of which dates the Constantinople outbreak to July. In his scholarly writing, Biraben said only that Pera and Constantinople were affected "in the middle of 1347." Biraben, *Les hommes*, 1:53.

[141] Timothy S. Miller, "The History of John Cantacuzenos (Book IV)" (PhD diss., The Catholic University of America, 1975), 166.

[142] Miller, "History," 188.

[143] Miller, "History," 308.

must have begun between 21 May and 22 September. Moreover, two short plague chronicles list the first outbreak under the Byzantine year 6856.[144] Since the Byzantine year began on 1 September, a later date (August or early September) within the range indicated by Kantakouzenos is more plausible than an early date (June or July). A later date also matches the evidence from Trebizond, where the plague began in September.[145]

If *Y. pestis* reached Constantinople, Pera, and Trebizond through shipments of northern grain from the 1347 harvest, it makes sense that the disease would affect the human populations of all three cities at about the same time. Allowing four weeks for shipment and five weeks for zoonotic transmission from rats to humans, it is possible that the first grain shipments from the 1347 harvest in July could lead to a human epidemic in September. If the first grain shipments did not occur until August, then a second, faster, human-to-human mode of transmission may have played a role as well.[146] This possibility will be discussed below.

The spread of *Y. pestis* into the Mediterranean is better documented than its spread across the Black Sea. Intriguingly, it seems to have moved differently through Genoese, Venetian, and Alexandrian shipping networks. A full account of plague transmission to Alexandria requires additional research, though it is clear that it arrived by sea. According to the Mamluk historian al-Maqrīzī, the Egyptian outbreak began in November 1347, "in the last days of greening, and that was in autumn in the course of the year '48."[147] His dramatic description of a plague-infested ghost ship sailing into the harbor at Alexandria is often cited as the source of the outbreak, but this claim should be treated with skepticism. First, al-Maqrīzī did not witness the outbreak in Alexandria. He was born eighteen years later, in 1364/65, and wrote his

[144] Peter Schreiner, *Die byzantinischen Kleinchroniken*, 3 vols., Corpus Fontium Historiae Byzantinae 12 (Vienna, 1975–79), 1:242 and 3:63 (Chronicle 33), 1:619 (Chronicle 89). The chroniclers might have chosen to record an August outbreak under the new year in order to avoid discussing the plague twice across two entries, but this strategy is less likely if the outbreak did not begin close to the new year. Thanks to Brian McLaughlin for this suggestion.

[145] Chronicle of Michael Panaretos in Lebeau, *Histoire*, 20:488. From there it seems to have spread inland to Siwas and Kayseri. Varlik, *Plague*, 107.

[146] Bertoni and Vicini, eds., *Chronicon estense*, 160, and Cronaca A and B in Sorbelli, ed., *Corpus chronicorum Bononiensum*, 584–85, all described fast human-to-human transmission of plague through breath or conversation in Constantinople and Pera. Gregoras, Kantakouzenos, and Ibn Khātima did not.

[147] اخر أيام التخضير و ذلك في فصل الخريف في أثناء سنة ثمان وأربعين.

Al-Maqrīzī, *Kitāb al-sulūk*, 2:772. Agricultural land was allocated to villagers as the Nile flood receded. During the flood, irrigation was managed through a complex system of basins, dams, and canals so that the level in state canals remained high enough for village canals to draw water. In the Nile delta, the irrigation rotation system took effect in mid-August and continued until late October or early November. Once the final set of basins were draining or had drained, the land allocation process began. As in al-Maqrīzī's text, *taḥḍīr* (allocation of land to cultivators) was sometimes misspelled *takhḍīr* (greening) in reference to the beginning of cultivation after irrigation and land allocation. In surviving texts of Egyptian water laws from the late twelfth century, the final basin was scheduled to start draining on the Coptic date 10 Hatūr. In 748 H./1347 CE, 10 Hatūr fell on 15 November. The last days of land allocation should therefore have occurred in November 1347. Thanks to Stuart Borsch for helping me interpret this reference. For the irrigation schedule, see Stuart Borsch and Tarek Sabraa, "Qānūn al-Riyy: The Water Law of Egypt," *Sophia Journal of Asian, African, and Middle Eastern Studies* 35 (2017): 87–124, esp. Table 5 and Figure 20. For the connection between irrigation and land allocation, see Nicolas Michel, *L'Égypte des villages autour du seizième siècle*, Collection Turcica 23 (Louvain, 2018), 237–38, 243 n. 198.

account in 1415–17.[148] Second, he recorded this story as one in a series of ghost ship stories associated with plague. He did not present it as the first instance of plague in Alexandria; rather, he used it to illustrate how plague devastated shipping networks throughout the eastern Mediterranean. Finally, al-Maqrīzī described the ship as carrying "thirty-two traders and three hundred men, including traders and slaves. They all died. None of them remained except four traders and one slave and about forty sailors, and they died together in the port."[149] Scholars have therefore described it as a slave ship, connected it with the trade in slaves from the Golden Horde, and occasionally suggested that the slaves may have transmitted the disease.[150] Yet the slave trade between the Golden Horde and Mamluk Egypt was mostly conducted on mixed-cargo ships with relatively small numbers of slaves per ship;[151] non-human cargo likely played the greater role in plague transmission. Moreover, the term al-Maqrīzī used for the slaves, *ʿabd*, usually denoted black slaves of African origin. Thus, the slaves on this ship had probably been exported from the Maghrib; slaves exported from the Black Sea would probably have been referred to as *mamlūk* or *jāriya*.

In the Genoese network, plague revealed its presence quickly. Ships returning from Romania to Genoa often stopped in Chios, Sicily, Naples, and Gaeta along the way. Since it took at least two months to sail from Caffa to Genoa, a ship departing in August with grain from the 1347 harvest was likely to reach the Tyrrhenian Sea in late September or early October. According to the Sicilian chronicler Michele da Piazza, it was in October 1347 that twelve Genoese galleys returning from Romania delivered the plague to Messina. The surprising aspect of his account is the manner and speed by which the infection spread: "if anyone so much as spoke with one of [the Genoese] he was infected with the deadly illness and could not avoid death . . . breath spread the infection among those speaking together, with one infecting the other, and it seemed as if the victim was struck all at once by the affliction."[152] In other words, there seems to have been no delay between the arrival of ships and the first human plague cases during which *Y. pestis* could have spread among local rats and undergone zoonotic transmission to humans. Instead, it seems to have spread swiftly and directly from human to human.

As the galleys continued up the Tyrrhenian Sea from Messina, rumors spread about the disease they carried. According to the monks of St. Victor in Marseille, plague arrived "around these parts" on 1 November.[153] According to Giovanni Cornazano

[148] Frédéric Bauden, "Taqī al-Dīn Aḥmad ibn ʿAlī al-Maqrīzī," in *Medieval Muslim Historians and the Franks in the Levant*, ed. Alex Mallett, The Muslim World in the Ages of the Crusades 2 (Leiden, 2014), 161–200, at 161, 181.

[149] اثنان وثلاثون تاجراً وثلاثمائة رجل، ما بين تجار وعبيد، فماتوا كلهم، ولم يبق منهم غير أربعة من التجار وعبد واحد، ونحو أربعين من البحارة، فماتوا جميعاً بالثغر.

Al-Maqrīzī, *Kitāb al-sulūk*, 2:776.

[150] Dols, *Black Death*, 56–57; and Benedictow, *Black Death*, 63.

[151] Barker, *That Most Precious Merchandise*, 167–73.

[152] Michele da Piazza in Horrox, ed. and trans., *Black Death*, 36; and Zanella, "Italia," 29–31. Alexandria was affected at about the same time (Jumāda al-Thānī, 748 H., equivalent to 8 September–7 October 1347): Dols, *Black Death*, 57–58 citing an unpublished section of al-ʿAynī's chronicle *ʿIqd al-jumān fī taʾrīkh ahl al-zamān*.

[153] "Circa partes istas." "Annales S. Victoris Massiliensis, 1000–1542," ed. George H. Pertz, MGH SS 23 (Hannover, 1874), 6.

in Parma, the infected galleys reached Genoa itself in November; according to Agnolo di Tura del Grasso in Siena, they arrived between 21 November and 11 December; and according to Louis Heyligen in Avignon, they arrived on 31 December.[154] The only contemporary Genoese chronicle, that of Giorgio Stella, listed the plague outbreak under the Genoese year 1348, which began on 25 December.[155]

Grain shipments arriving in Genoa in November could have caused a human plague outbreak in December through zoonotic transmission alone. However, all along the Genoese shipping routes and throughout northern Italy, observers connected the arrival of the Black Death with the crews of specific ships, either commercial galleys or the armed galleys sent to lift the siege of Caffa. They described contagion spreading swiftly from the sailors via breath, touch, or even sight.[156] Only one contemporary, Louis Heyligen, was willing to consider a slow-acting contagion via cargo. In Avignon, he said, "no kinds of spices are eaten or handled, unless they have been in stock for a year, because men are afraid that they might have come from the galleys of which I speak."[157] Since spices were among the luxury goods traded through Black Sea ports, it is quite possible that Genoese ships returning from Caffa in 1347 had spices as well as grain among their cargo. Neither spice nor grain shipments, however, can account for the reports of fast human-to-human plague transmission.

In the Venetian shipping network, plague revealed its presence more slowly. Ships returning from Romania to Venice tended to stop at Crete, Modon or Coron, and Ragusa (Dubrovnik). As in the Genoese case, Venetian ships carrying the first grain of the 1347 harvest would have left Tana in August and reached Venice no earlier than late September or early October. Ragusa, however, did not report a human plague outbreak until 15 January 1348, and Venice itself was not affected until late February or early March.[158] Contemporary observers linked the outbreak with a major earthquake that occurred on 25 January 1348.[159] Two Venetian chronicles, the anonymous *Venetiarum historia* and Antonio Morosini's chronicle, claimed that "from that day onward" Venice suffered from plague.[160] However, according to

[154] Giovanni Cornazano, "Historia Parmensis," ed. Ludovico Muratori, in *Rerum Italicarum Scriptores*, vol. 12 (Milan, 1728), cols. 725–54, at 746; Agnolo di Tura del Grasso, "Cronaca senese," in *Cronache senesi*, ed. Alessandro Lisini and Fabio Iacometti, *Rerum Italicarum Scriptores* Nuova Edizione 15/6 (Bologna, 1939), 552; and Louis Heyligen (Louis Sanctus) in Horrox, ed. and trans., *Black Death*, 42.

[155] Stella, *Annales*, 150.

[156] Mussi, Cortusi, Heyligen, and Muisis in Horrox, ed. and trans., *Black Death*, 18–19, 34, 42, 46; and Cornazano, "Historia Parmensis," 746.

[157] Heyligen in Horrox, ed. and trans., *Black Death*, 45; and Zanella, "Italia," 43.

[158] Natko Nodilo, ed., *Annales ragusini anonymi, item Nicolai de Ragnina*, Monumenta Spectantia Historiam Slavorum Meridionalium 14, Scriptores 1 (Zagreb, 1883), 227. A chronicler from Ferrara recorded plague in Modon and Coron without naming the month. Bertoni and Vicini, eds., *Chronicon estense*, 160. News of the outbreaks in Venice, Chioggia, and Pisa reach him late, between April 4 and 13. Bertoni and Vicini, eds., *Chronicon estense*, 162.

[159] Medieval chroniclers often reported plague, famine, and earthquake together because of their association in Matthew 24.7. Zanella, "Italia," 2, 5. There was, however, a major earthquake with its epicenter in Friuli on 25 January 1348. Christa Hammerl, "Das Erdbeben vom 25. Jänner 1348: Rekonstruktion des Naturereignisses" (PhD diss., University of Vienna, 1992).

[160] "E da puo' da quel ziorno in navanti." Morosini, *Morosini Codex*, 116–17. "Ab illa die in antea." Cessi and Bennato, eds., *Venetiarum historia*, 229. See also Guglielmo and Albrigeto Cortusi, "Historia de

Francesco de Grazia, prior of the monastery of San Salvatore, it was "in the month of February [that] local mortality began to spring forth."[161] An inscription at the entrance of the Scuola della Carità said that after the earthquake of 25 January, "the earth did not stop shaking for about forty days, and then after this a great mortality began," dating the outbreak to the second week of March.[162] According to chronicler Lorenzo de' Moniacis, plague "entered the city of Venice in 1348 in the month of March."[163] Since the Venetian year began on 1 March, chronicler Raphayni de Caresinis also dated the outbreak to March by listing it under the year 1348 instead of 1347.[164] The Venetian state first acknowledged the outbreak on 30 March, when the Great Council nominated a commission to protect public health.[165]

This timetable fits comfortably with the patterns of grain shipment and zoonotic plague transmission. Grain from the 1347 harvest exported in August would have arrived in Venice no earlier than October. An outbreak in February or March, sixteen to twenty weeks later, falls well within the range for zoonotic transmission. Yet the only contemporary observer to connect the plague outbreak in Venice with Black Sea shipping rather than with the 25 January earthquake was none other than Gabriele de' Mussi:

> Among those who escaped from Caffa by boat were a few sailors who had been infected with the poisonous disease. Some boats were bound for Genoa, others went to Venice and to other Christian areas . . . We Genoese and Venetians bear the responsibility for revealing the judgements of God. Alas, once our ships had brought us to port we went to our homes. And because we had been delayed by tragic events, and because among us there were scarcely ten survivors from a thousand sailors, relations, kinsmen and neighbours flocked to us from all sides. But, to our anguish, we were carrying the darts of death.[166]

Although Mussi could not imagine the epidemiological complexities linking grain shipments, rats, fleas, and bacteria, he did recognize the parallels between Genoese and Venetian activities in the Black Sea and therefore held both cities responsible for plague transmission.

Y. pestis affected the human population of Venice about three months after that of Genoa, though infected grain shipments from the 1347 Black Sea harvest should have arrived in both ports at around the same time. Many factors, including

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novitatibus Paduae et Lombardiae," ed. Felix Osius, *Rerum Italicarum Scriptores*, vol. 12 (Milan, 1728), col. 737–954, at 926. Padua was part of Venice's terrestrial empire.

[161] "De mense februarii, curialis mortalitas pullulare cepit." Francisco de Gratia, *Chronicon monasterii S. Salvatoris Venetiarum* (Venice, 1766), 69; and Mueller, "Aspetti," 78. Cronaca A in Sorbelli, ed., *Corpus chronicorum bononiensum*, 584 also dates the Venice plague outbreak to February.

[162] "Non stete, la tera de termar cerca dì XL; e può driedo questo començà vna gran mortalitade." Mueller, "Aspetti," 82; Alfonso Corradi, *Annali delle epidemie occorse in Italia dalle prime memorie fino al 1850: Compilati con varie note e dichiarazione*, 5 vols., Biblioteca di Storia della Medicina 1–5 (Bologna, 1972–73), 5:197. The building is now the Galleria dell'Accademia museum.

[163] "In 1348 de mense Martii Civitatem Venetiarum invasit." Moniacis, *Chronicon*, 313.

[164] Caresinis, *Chronica*, 5.

[165] This was the Tre Savi alla Sanità. Venice, Archivio di Stato di Venezia, Maggior Consiglio, Deliberazioni 17 (Spiritus), fol. 154v, http://www.archiviodistatovenezia.it/web/index.php?id=215 (last accessed 30 October 2018).

[166] Mussi in Horrox, ed. and trans., *Black Death*, 18–19.

variations in the routes taken and the weather encountered by specific ships, could have contributed to this discrepancy. It is also possible that different transmission mechanisms may have been operating in the two shipping networks. In addition to zoonotic modes of transmission such as the one described earlier—from black rat to *Xenopsylla* flea to human—*Y. pestis* has been shown to move directly from human to human in its pneumonic form: one person's coughing can spread infected droplets into the airways of another person.[167] Another mode of indirect human-to-human transmission via ectoparasites such as human fleas (*Pulex irritans*) or body lice (*Pediculus humanus humanus*) has been proposed but not observed.[168] Moreover, it is possible for more than one transmission mechanism to operate within the same population at the same time.[169] While these possibilities are certainly intriguing, the transmission mechanisms at work on Italian ships in autumn 1347 do not seem to have been documented.

To conclude, the explanation usually given for the transmission of plague to western Europe in 1347, the story of plague-infested bodies catapulted over the walls of a besieged city, is based on a single text by Gabriele de' Mussi, a Piacenzan notary with no direct knowledge of events in the Black Sea. When emphasis is placed on texts written by people who lived in or passed through the Black Sea in the 1340s, a different narrative emerges of the chronology, geography, and human intentions behind the transmission of plague. First, a petition from the inhabitants of Caffa to their colonial rulers in Genoa shows that plague reached the city after Jānībek's second siege, not during it. Second, the accounts of Byzantine observers, especially Nicephoros Gregoras, highlight the role of Tana and its links to Venice as opposed to Caffa and its links to Genoa. Searching for references to Tana in Venetian and Genoese diplomatic, administrative, and mercantile sources reveals that the siege of Caffa in 1345–46 was merely one episode in a long and complex struggle between the Golden Horde, Genoa, Venice, and Byzantium for the upper hand in Black Sea trade, especially the grain trade. In the mid-1340s, trade embargoes were strategically employed by Genoa, Venice, and the Golden Horde as part of this conflict.

[167] Mahery Ratsitorahina, Suzanne Chanteau, Lila Rahalison, et al., "Epidemiological and Diagnostic Aspects of the Outbreak of Pneumonic Plague in Madagascar," *The Lancet* 355 (2000): 111–13; Elizabeth M. Begier, Gershim Asiki, Zaccheus Anywaine, et al., "Pneumonic Plague Cluster, Uganda, 2004," *Emerging Infectious Diseases* 12/3 (2006): 460–67; Jacob L. Kool, "Risk of Person-to-Person Transmission of Pneumonic Plague," *Clinical Infectious Diseases* 40/8 (2005): 1166–72; Didelot, Whittles, and Hall, "Model-based Analysis," 8; and Campbell, *Great Transition*, 234–35.

[168] Human fleas and body lice carrying *Y. pestis* have been found in the homes of infected humans, and human fleas have been shown to transmit plague among rabbits, but neither human fleas nor body lice have yet been shown to transmit plague among humans. Michel Drancourt, Linda Houhamdi, and Dider Raoult, "*Yersinia pestis* as a Telluric, Human Ectoparasite-borne Organism," *Lancet Infectious Diseases* 6/4 (2006): 234–41, at 237–39; Saravanan Ayyadurai, Florent Sebbane, Didier Raoult, et al., "Body Lice, *Yersinia pestis* Orientalis, and Black Death," *Emerging Infectious Diseases* 16/5 (2010): 892–93; Renaud Piarroux, Aaron Aruna Abedi, Jean-Christophe Shako, et al., "Plague Epidemics and Lice, Democratic Republic of Congo," *Emerging Infectious Diseases* 19/3 (2013): 505–6; Katharine R. Dean, Fabienne Krauer, Lars Walløe, et al., "Human Ectoparasites and the Spread of Plague in Europe during the Second Pandemic," *Proceedings of the National Academy of Sciences of the United States* 115/6 (2018): 1304–9; Varlik, *Plague*, 31–33; Ditrich, "Transmission"; and Campbell, *Great Transition*, 232–34.

[169] Didelot, Whittles, and Hall, "Model-based Analysis"; and Drancourt, Houhamdi, and Raoult, "*Yersinia pestis*."

However, although a considerable number of people (diplomats, messengers, released prisoners, and merchants) crossed the sea from north to south in 1346, their movements cannot be connected to the spread of plague beyond the Golden Horde. It was only when peace was restored, the embargoes were lifted, and shipment of the 1347 grain harvest began that the Black Death crossed the Black Sea and entered the Mediterranean. Plague's movement across the Black Sea was certainly not a matter of bioterrorism during the siege of Caffa. Instead, it was an unintended consequence of peace.

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