This is the author's final version of an article that has been accepted for publication in *Journal of Interdisciplinary History* published by MIT Press. The final published version is available at: https://doi.org/10.1162/jinh_a_01376

Death by the Lake: Mortality Crisis in Early Fourteenth-century Central Asia

The Geographic Origins of the Black Death: Current State of Debate

The question of the geographic origins of the Black Death is one of the most pressing and hotly debated topics in the historiography of the Second Plague Pandemic , involving not only historians, but (in recent years) also palaeogeneticists. Roughly, speaking the history of the debate can be summarized as follows. In his *The Black Death of 1348 and 1349* (1893), Cardinal Aidan Gasquet situated the origins of the plague in China, from where it was imported in Europe, through Crimea, by Italian merchants by trading caravans. In 1951, Pollitzer brought our attention to the existence of two East Syriac Christian (Nestorian) cemeteries in Chu Valley (in the Issyk-Kul' region of northern Kyrgyzstan), excavated in 1885-6, and containing 10 inscriptions from 1338-9 indicating 'death through pestilence'. Although Pollitzer himself never studied the epigraphic evidence from the Issyk-Kul' cemeteries, he 'relocated' the initial outbreak of the plague to Central Asia, from where, according to him, it carried on to Crimea, and later to Europe. The 'Central Asian origin' hypothesis has been adopted by Dols in his 1977 monograph of the plague in the Middle East. Conversely, the 'Chinese origin' hypotheses has been advocated by Ziegler (1969), who was not aware of the Issyk-Kul' evidence, McNeill (1979) and Campbell (2016), who both saw Issyk-Kul' as an intermittent station in the pathogen's journey from China to Europe. In his 2014 paper, Hymes suggested that the plague may have been carried into China by the Mongols through Gansu Corridor, in the course of the conquest of Jin (northern China) as early as the first half of the thirteenth century. An altogether different geography has been proposed by Norris, who, in his 1977 article postulated that the Issyk-Kul' outbreak was unrelated to the European outbreak a few years later and that the disease originated in the Caspian basin (and not China), from where it then spread to the west into the Golden Horde, the east into Central Asia and the south into the Middle East. Norris' arguments were rejected, in the following year by Dols, who criticised the former's thesis as unsubstantiated by any historical evidence. In his rejoinder to Dols, Norris reaffirmed his original position about the Caspian origin of the plague.[1]

The Chinese origin hypothesis deserves some attention here. On the one hand, there is no reference to plague mortality on a *pandemic* scale in any Chinese source from the Yuan period, be it *Yuan Shi* chronicle, or local history gazetteers. On the other hand, as Robert Hymes has recently shown, there are indeed references to sporadic outbreaks of epidemic mortality among Mongol soldiers campaigning in the Jin state in the early thirteenth century, as well as two outbreaks of mass mortality in the south: in 1333 (the prefectures of Songjiang, Jiaxing, and Hangzhou) and 1344-5 (Fujian, Fuzhou, Yanping, Shaowu, and Tingzhou prefectures). To these, we may also add a 1353 outbreak in Datong route (in the Shanxi province, north-western China), which was designated as 'pestilence' (疫'Yì') and is said to have killed more than a half of local inhabitants. There is nothing to suggest – at least at present - that these mortality crises were caused by plague. Although some scholars, including McNeill and Cao, see the 1333 outbreak as a prelude to the outbreaks in Europe in the late 1340s-early 1350s, scholars of the Yuan and Ming periods remain sceptical about such interpretation. At the same time, the remarkably high mortality rates during the Datong mortality should discourage us from rejecting the possibility of localized/regional outbreaks of plague in

[1] Francis A. Gasquet, The Black Death of 1348 and 1349, London, 1908, 2-3; Robert Pollitzer, Plague, Geneva, 1954, 14; Michael W. Dols, The Black Death in the Middle East, Princeton, 1977, 35-8; William H. McNeill, Plagues and peoples, New York, 1976, 43; Bruce M. S. Campbell, The Great transition: climate, disease and society in the late-medieval world, Cambridge, 2016, 246-7; Robert Hymes, A Hypothesis on the East Asian beginnings of the Yersinia pestis polytomy, The Medieval Globe, I, 2014, 285-308; John Norris, East or west? The Geographic origin of the Black Death, Bulletin of the History of Medicine, LI, 1977, 1-24; Michael W. Dols, Geographical origin of the Black Death: comment, Bulletin of the History of Medicine, LII, 1978, 112-3; John Norris, Response, Bulletin of the History of Medicine, LII, 1978, 114-20.

different parts of China, as long as we are aware that these differed in their scale from the pandemic mortality of the Black Death and were not related to the former. What we lack is evidence of plague pandemic, which would engulf vast territories of the Yuan Empire and later move into western Eurasia through Central Asia.[2]

Recent advances in palaeogenetics shed some important light on the controversy regarding the geographic origins of the plague. In the 2010 study, Morelli and her colleagues established a global phylogeny of *Yersinia pestis* and suggested that the bacillus originated and evolved in or near China. In 2013, Cui and his collaborators identified the four-lineage 'big bang' polytomy of *Yersinia pestis*, which they dated to some point between 1142 and 1339 (median date of 1268, which was in 2018 re-calibrated to 1238), and found that the Qinghai-Tibet Plateau has the largest diversity of strains, thus meaning that this region could have been the original *focus* of the pathogen polytomy. Most recently, in 2017, Eroshenko and her colleagues sequenced 56 modern samples of *Yersinia pestis* that have been collected from three plague *foci* of Kyrgyzstan (Tien-Shan' [itself consisting of three autonomous *sub-foci*: Sarydzhaz, Upper-Naryn, and Aksai], Alai and Talas) over the past 50 years, of which 15 samples came from the vicinity of the Issyk-Kul' region (the Tien-Shan' *focus*, in eastern Kyrgyzstan). Of particular importance is the identification of an additional and previously unknown strain of Branch 0 (0.ANT5), which is unique to the Tien-Shan' *focus* of eastern Kyrgyzstan and south-eastern Kazakhstan, and is older than most other known pre-Black Death strains of the same clade (except 0.ANT4, responsible for the sixth-century Justinianic plague in Bavaria, which just precedes 0.ANT5). In addition to 0.ANT5 the Issyk-Kul' region is also dominated by three additional strains of *Y. Pestis*: 0.ANT2, 0.ANT3 and 2.MED1. This remarkable diversity of strains points out to the possibility that it was Tien-Shan' focus in eastern Kyrgyzstan (which covers Issyk-Kul') that was the original location of the great 'Big Bang' of the plague lineages (contrary to Cui et al's situation of the polytomy in the Qinghai-Tibet Plateau). Such reasoning replicates and expands upon Monica Green's 2014 analysis and historical application of the Cui's team work.[3]

The present paper does not (and cannot) pretend to solve the mystery of the geographic origins of the Black Death. Instead, it focuses on an intriguing, yet unstudied, instance of a mortality crisis, which exhibited clear signs of plague and which preceded the Black Death outbreak in the Caspian/Crimea in late 1346 by some 7-8 years. The outbreak in question occurred in East Syriac (Nestorian) communities of the Chu Valley, not far from Issyk-Kul' lake in northern Kyrgyzstan. Our information about the outbreak derives from a rich epigraphic corpus consisting of about 620 tombstone inscriptions from three East Syriac cemeteries in the Chu Valley. The corpus of the Issyk-Kul' inscriptions has been known to scholars, but it was philologists, rather than historians that duly explored it. To be sure, it did attract some attention of historians of the East Syriac church, who used it to reconstruct the socio-religious aspects of local Christian communities. All the same, no historian of the health and disease attempted to analyse the corpus, in order to reconstruct the demographic and mortality patterns of local population, in conjunction with an outbreak of harsh mortality, which occurred in the region in 1338-9. The present paper attempts to fill up this gap, by analysing the trends in mortality, by subjugating the epigraphic corpus to both linguistic and quantitative analysis. The Issyk-Kul' mortality seems to be the earliest instance of quantifiable mortality crisis during the

[2] Hymes, Hypothesis, 288-94, 299-300; McNeill, Plagues and peoples, 43; Cao's arguments have been cited in Hymes, Hypothesis, 287; see also Paul D. Buell, Qubilai and the rats, Sudhoffs Archiv, XCVI, 2012, 127–44; Yuanshi, Beijing, 1976, Chapter 43, p. 912 (I am grateful for Dr. Ilya Mozias, who translated the relevant entry for me).

[3] Giovanna Morelli, et al., Yersinia pestis genome sequencing identifies patterns of global phylogenetic diversity, Nature Genetics, XLII, 2010, 1140-45; Yujun Cui et al., Historical variations in mutation rate in an epidemic pathogen, Yersinia pestis, PNAS, CX, 2013, 577-82; Galina Eroshenko et al., Yersinia pestis strains of ancient phylogenetic branch 0.ANT are widely spread in the high-mountain plague foci of Kyrgyzstan, PLoS ONE, XII, e0187230. For Green's historical application of Cui et al.'s work, see Monica Green, Taking "Pandemic" Seriously: Making the Black Death Global, The Medieval Globe, I, 2014, 35-41.

so-called Second Plague Pandemic. Moreover, it is the only quantifiable plague crisis in Central Asia during the Second Plague Pandemic. In absence of palaeogenetic data from the same cemeteries, the paper will not attempt to establish any direct causal (let alone genetic) connection between the Issyk-Kul' mortality and the ensuing 'Black Death' that hit Eurasia and North Africa in 1346-53. Neither will it deny such possible connection. Instead, it will treat the Issyk-Kul' crisis as a local plague crisis that *preceded* the Black Death. To appreciate the timing and contours of its outbreak, the paper will scrutinize the environmental, climatic and socio-economic context of the Issyk-Kul' region in particular and Central Asia in general, and wrap the outbreak this wider context.

The Mortality Crisis around Issyk-Kul', 1338-9

The epigraphic corpus consisting of about 620 tombstone inscriptions from three East Syriac (Nestorian) cemeteries in the Chu Valley. The sites in question are Karadzhigach, on the outskirts of Bishkek (42°48'28", 74°42'30"), Tokmak/Burana (42°49'07", 75°18'28") and Krasnaya Rechka (42°54'00", 74°57'36"). Almost three quarters of the inscriptions (439) are dated, with the chronology spanning from 1248 to 1345. The first two cemeteries were excavated in 1885-6 by Pantusov (1849-1909), who reckoned that the total number of East Syriac tombstones in the area was around 3,000. The inscriptions, 548 in number and almost all in Syriac, have been meticulously edited and published by Chwolson (1819-1911), one of the great Semiticists of his days. Additional 72 or so inscriptions have been discovered in due course and published, at various stages, by Kokovtsev (1905-9), Dzhumagulov (1968, 1971, 1982 and 1987) and Klein (2000 and 2009).[4]

Of 439 dated inscriptions, 114 (26 per cent) are dated 1337-8 and 1338-9 (years 1649 and 1650, according to East Syriac reckoning, beginning, according to the Seleucid calendar with 312 BCE and with each year running from 1 October of the previous year to 1 October of the next year). That this remarkable spike was connected to an acute mortality crisis is corroborated by the fact that 10 inscriptions provide additional details, recording that people 'died of pestilence' (*mīt[ā] bi-mawtānā* in Syriac). For instance, one tombstone inscription reads 'In the Year 1649 / this is the tomb / of the maiden Qïz Terim / who died of pestilence' (*ba-shnath taw-resh-mim-tet / hādā hay qabrāh / Qïz Terim ʿlaymtā / di-mīt[ā] bi-mawtānā*). The Syriac term *mawtānā* has an unambiguous meaning of 'pestilence' or 'great mortality'. Yet, the presence of this term alone is by no means sufficient to suggest that the mortality crisis of 1338-9 was caused by *Yersinia pestis*. In theory, palaeogenetic analysis, involving sequencing genomes from one of the *mawtānā* graves could be a definitive answer – as it has been most recently done in the case of several Black Death (and subsequent late- fourteenth-century outbreaks') cemeteries in England, the Netherlands, Spain and Tatarstan. In the case of the Issyk-Kul' cemeteries, however, such exercise is not, at present, forthcoming, on the account of the fact that the tombstones have been removed from the graves during the 1885-6 excavations. Therefore,

[4] Daniel A. Chwolson, 'Syrisch-nestorianische Grabinschriften aus Semirjetschie,' Memoires de l'Academie Imperiale des Sciences de St. Petersbourg, XXXVII, 1890, 10-168; idem, Syrischnestorianische Grabinschriften aus Semirjetschie. Neu Folge. St. Petersburg, 1897; P.K. Kokovtsev, 'Khristiyansko-siriyskiya nadgrobnyya nadpisi iz Almalyka, Zapiski Vostochnogo Otdeleniya Imperatorskogo Russkogo Arkheologicheskogo Obshchestva 16, 1904-5, 190-200; idem, 'Neskol'ko novykh nadgrobnykh kamney s khristiyansko-siriyskimi nadpisyami iz Sredney Azii,' Izvestiya Imperatorskoy Akademii Nauk, 12, 1907, 427-58; idem, 'K siro-turetskoy epigrafike Semirech'ya,' Izvestiya Imperatorskoy Akademii Nauk, 1909, 773-96; C. Dzhumagulov, C. Die syrisch-türkischen (nestorianischen) Denkmäler in Kirgisien, Mitteilungen des Instituts für Orientforschung, 14, 1968, 470-480; idem, Yazyk siro-tyurkskikh (nestorianskikh) pamyatnikov Kirgizii, Frunze, 1971; idem, Epigrafika Kirgizii, Vypusk 2, Frunze, 1982; idem, Epigrafika Kirgizii, Vypusk 3, Frunze, 1987; Wassilios Klein, *Das nestorianische Christentum an den Handelswegen durch Kyrgyzstan bis zum 14. Jh.*,Turnhout, 2000; Wassilios Klein and Kuvatbek Tabaldiev, 'Zwei neu gefundene syrische Grabsteine aus Kyrgyzstan,' Hidden treasures and intercultural encounters. Studies on East Syriac Christianity in China and Central Asia, eds. Dietmar W. Winkler and Li Tang, Münster, 2009, 87-90; John Stewart, Nestorian missionary enterprise, Edinburgh, 1928, 198-213; Klein, Nestorianische Christentum

there is no way to identify the original locations of the *mawtana* graves, or indeed any graves from the mortality years. To make things even worse, however, a good proportion of skulls have been removed from the graves in the course of the excavations and their current whereabouts are yet to be determined. Therefore, any identification of *mawtana* with the Black Death of a few years later cannot be established without a palaeogenetic analysis.[5]

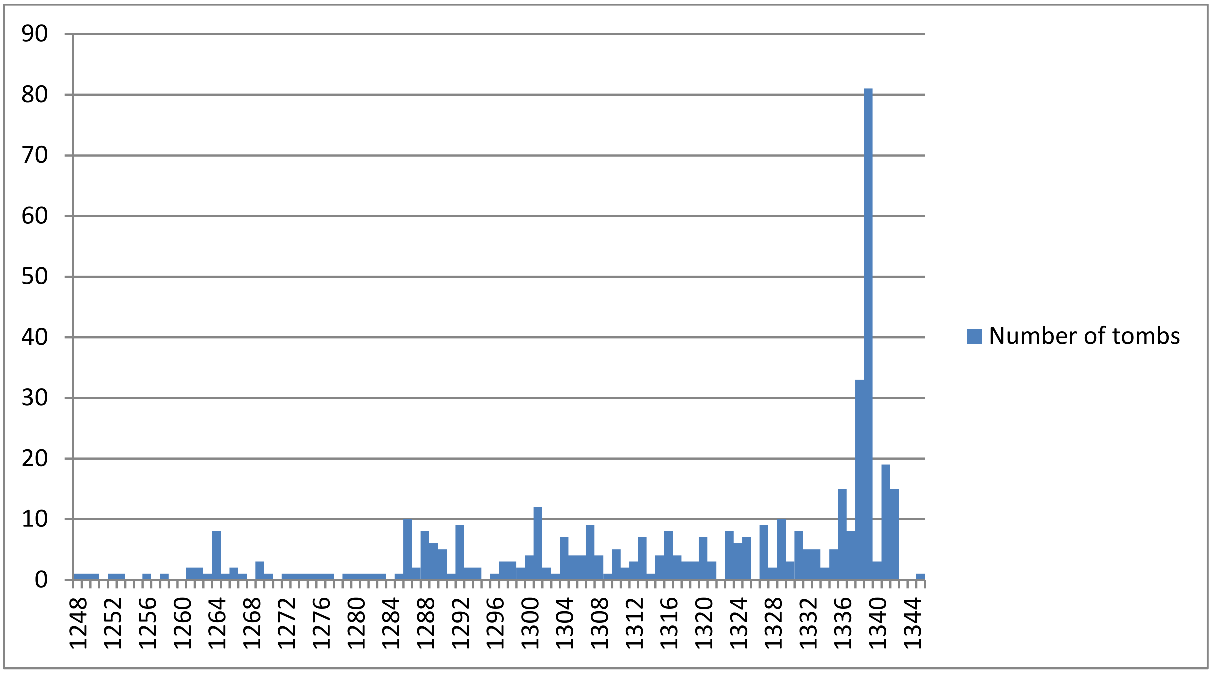

Figure 1. Chronology of Christian Burials on the Issyk-Kul', 1248-1345

Source: See footnote 4

All this, however, does not mean that we cannot get closer to having a 'smoking gun' to show that the 1338-9 outbreak was, in fact, the earliest *documented* and *quantifiable* instance of fourteenth-century plague in Central Asia. This can be done by closely scrutinizing the epigraphic evidence, together with its wider bio-environmental and socio-economic contexts. The first necessary step in this direction would be to consider the ratio between mortality in 'normal' years and that in 1338-9. Over the entire period of 1295-1345, an average number of Issyk-Kul' tombstones in a single year was 4.4. The figure rose to 31 in 1337-8 and further to 74 in 1338-9. This may indicate that the mortality crisis seems to have started sometime in the second half of 1337-8, namely around spring/summer 1338. The ratios between the crisis years (and in particular, the second crisis year) and 'normal' (that is, non-plague) years is strongly comparable with figures from different parts of Europe and the Middle East during the Black Death, deriving largely from probated wills (in the case of Givry in Bourgogne, from a local parish register, and in the case of Baghdad, annual counts of mortality of scholars). As Figure 2 indicates, the ratio for Issyk-Kul' was nearly 17:1. The

[5] Chwolson, Grabenschriften 1897, 32 (no. 142). The removal of the stones and skulls is surveyed in T. W. Thacker, "A Nestorian gravestone from Central Asia in the Gulbenkian Museum, Durham University, The Durham University Journal, 59, 1967, 94-107.

comparable ratios for locations, where the plague peaked in 1348, 1349 and 1350 were, respectively, around 15:1, 15:1 and 16:1. This similarity is indeed striking.[6]

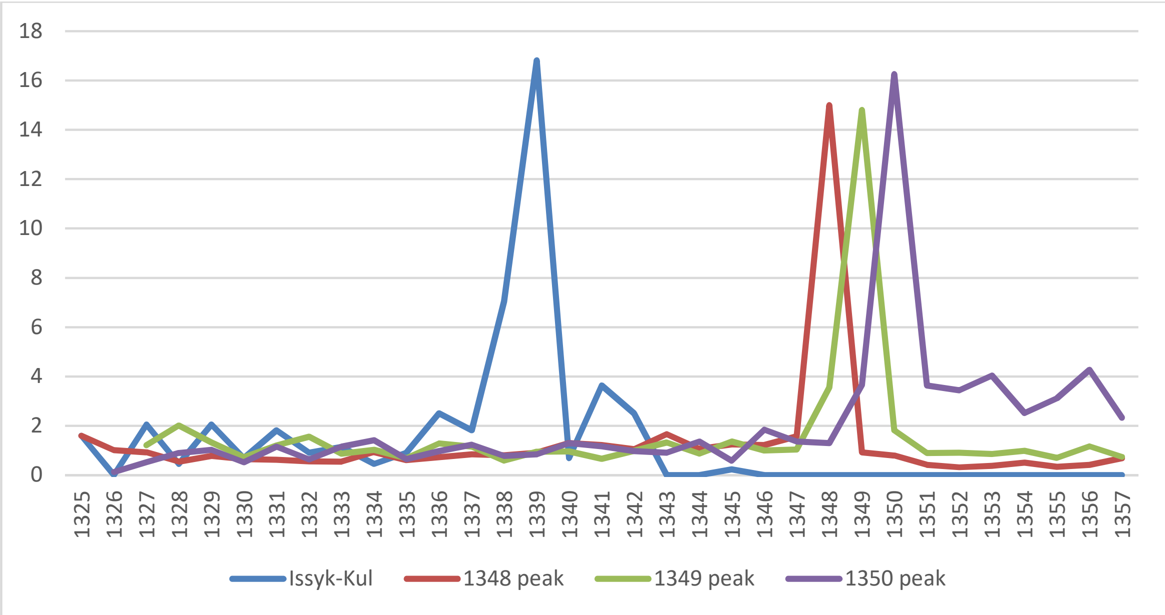

Figure 2. Annual Mortality Levels in Issyk-Kul' and Europe (indexed on pre-plague levels), 1325-57

Source: See footnote 6

Note: the '1348 peak' sample includes Baghdad, Barcelona, Lyon, Givry, Arezzo, Assisi, Florence, Perugia, Pisa, Siena, Bologna and Dubrovnik (Ragusa); the '1349 peak' sample includes Besançon, Lausanne, Tournai and London; the '1350 peak' sample includes Lübeck and Stralsund. All figures are indexed on pre-plague years average. For instance, for the '1348 peak' sample, 1= average mortality rates for pre-1348 years.

---

[6] Stuart Borsch and Tarek Sabraa, Refugees of the Black Death: quantifying rural migration for plague and other environmental disasters, Annales de démographie historique, CXXXIV, 2017, 85; Jordi Gunzberg Moll, Epidemias y mortalidad en la Cataluña medieval: 1300-1500, in Economic and biological interactions in pre-industrial Europe, In Le interazioni fra economia e ambiente biologico nell'Europa preindustriale secc. XIII-XVIII, ed. Simonetta Cavaciocchi, Florence, 2010, 57-80; Marie-Thérèse Lorcin, Vivre et mourir en Lyonnais à la fin du Moyen Age, Paris, 1981, 192; P. Gras, Le registre paroissial de Givry (1334-1357) et la peste noire en Bourgogne, Bibliothèque de l'école des chartes, C, 1939, 295-308; Samuel K. Cohn Jr., The Black Death: End of a paradigm, The American Historical Review, CVII, 2002, 728-33; Martin Bertram, Bologneser Testamente. Erster Teil: Die urkundliche Überlieferung, Quellen und Forschungen aus italienischen Archiven und Bibliotheken, LXX, 1990, 208-12; Državni arhiv Dubrovnik (The State Archive of Dubrovnik), Testamenta notariae, Vols. 1-5 (I am grateful for Dr. Gordan Ravančić, who kindly made a digital copy of the Dubrovnik registers available for me); Ulysse Robert, Testaments de l'officialité de Besançon, 1265-1500, Paris, 1902, 24-52; Bernard Andenmatten and Jean-Daniel Morerod, La Peste à Lausanne au XIVe siècle (1348/9, 1360): étude du Chapitre cathédral et des testaments vaudois, Etudes de lettres, II-III, 1987, 19-49; A. de la Grange, Choix de testaments Tournaisiens antérieurs au XVIe siècle, Annales de la Société historique de Tournai, II, 1897, 47-80; Calendar of wills proved and enrolled in the Court of Husting, London: Part 1, 1258-1358, ed. R R Sharpe, London, 1889; Regesten der Lübecker Bürgertestamente des Mittelalters, Band I: 1278-1350, ed. A. Von Brandt, Lübeck, 1964; Regesten der Lübecker Bürgertestamente des Mittelalters, Band II: 1351-1363, ed. A. Von Brandt, Lübeck, 1973; Stadtarchiv Stralsund, Testamente 1-331.

Another aspect of comparison between the Issyk-Kul' mortality and the Black Death in Europe is the distribution of deaths across genders. One theory holds that in non-epidemic years, testosterone reduces the resistance to pathogens, while estrogen, by contrary, increases it, which explains why men are normally frailer than women. Whether this rule works in the case of plague outbreaks remains an unsolved question, as the available evidence is contradictory. Sex-ratios from different skeletal assemblages vary from place to place. For instance, at the Black Death burial site at East Smithfield (London), adult female skeletons accounted for 40 per cent of the total assemblage of sexed adult skeletons, while at Hereford Cathedral and Dreux (north-western France), the respective figures stood at 56 and 58 per cent, respectively. The preponderance of one sex at one burial site does not, however, mean that the same sex was at a higher risk of mortality than the other. As Sharon DeWitte has established, applying the bio-statistical Gompertz Model of mortality, the East Smithfield evidence does not necessarily indicate that the Black Death in London was sex-selective. Likewise, Castex and Kacki concluded that the sheer number of sexed skeletons at both Hereford and Dreux was too small to be reflective of the Black Death sex-selectivity. Conversely, most recently, Daniel Curtis and Joris Roosen's work sex distribution of mortality in Hainault (Belgium) between 1349 and 1450, and based on the analysis of almost 22,000 death duties ('mortmains'), have found that the Black Death and the recurrent outbreaks tended to kill higher proportions of women than in non-crisis years. Here, the sex ratio in mortality stood at 0.89:1.00 during the 1349-50 outbreak – in contrast with 1.07:1.00 for non-plague years (Table 1). Although it is possible that the contradiction between these sets of data may have something to do with regional differences, much new work, based on fresh archival and skeletal data alike, needs to be done, to solve this conundrum. In other words, while it is possible that the Issyk-Kul' data may corroborate Curtis and Roosen's recent findings, without the actual skeletal data to be subjugated to robust bio-statistical analysis based on the Gompertz Model of mortality, the conclusion that the 1338-9 mortality was selective remains purely hypothetical.[7]

Table 1. Mortality Distribution across Genders, Issyk-Kul' (1248-1345) and Hainaut (1349-1450)

		Male	Female	Ratio
Issyk-Kul'	All years (1248-1345)	232	200	1.16
Issyk-Kul'	Non-plague years	178	140	1.27
Issyk-Kul'	Plague years (1337/8-1338/9)	54	60	0.90
Hainaut (S. Belgium)	All years (1349-1450)	11,292	10,559	1.07
Hainaut (S. Belgium)	Non-plague years	6,960	5,925	1.17
Hainaut (S. Belgium)	Plague years (1349-51)	342	383	0.89

Source: Curtis and Roosen, Sex-selective impact (see footnote 7)

[7] Sharon N. DeWitte, The Effect of sex on risk of mortality during the Black Death in London, A.D. 1349–1350, American Journal of Physical Anthropology, CXXXIX, 2009, 222-34; DeWitte, 'Effect of Sex,' p. 228; D. Castex and S. Kacki, 'Demographic Patterns Distinctive of Epidemic Cemeteries in Archaeological Samples, Microbiology Spectrum, IV, 2016, 7-8; DeWitte, 'Effect of Sex,' 230-1; Castex and Kacki, 'Demographic Patterns ,' 8; Daniel Curtis and Joris Roosen, The Sex-selective impact of the Black Death and recurring plagues in the Southern Netherlands, 1349-1450, American Journal of Physical Anthropology, 164, 2017, 246-59

Issyk-Kul' as a Plague *focus*

The three cemeteries are located in-between two *sub-foci* of the Tien-Shan' plague *focus*: the 'Talas High Mountain' *sub-focus* to the west and the 'Sarydzhaz High Mountain' *sub-focus* to the east. Each sub-focus is dominated by different several strains of *Yersinia pestis*. The former is dominated by 0.PEt4 (which does not cause mortality in humans) and 2.MED1, while the latter is dominated 0.ANT5 (by far, the most widespread one in that sub-focus), as well as 0.ANT2, 0.ANT3 and 2.MED1. The Branch 0 strains all predate both the Branch 1 (which was responsible for the outbreak of the Black Death) and the 'Great Big Bang' (the polytomy). Such a long perseverance of the ancient strains can, at least, in part be explained by the environmental conditions of the Issyk-Kul' area. The Issyk- Kul' region (and other parts of the Chu Valley) is characterised by the predominance of salty soil of different kinds. As some recent research has shown, *Yersinia pestis* boasts a strong halotolerance (adaptation to salinity conditions) and as such, it tends to persevere in salty soil areas.

In theory, the bacterium can survive in soil for weeks and even months. But all the same, the pathogen cannot survive longer periods without vectors and hosts. The Tien-Shan' *focus* boasts a rich faunal bio-diversity, consisting of several species of sylvatic rodents, hosts of the plague bacillus. Although the main host is the grey marmot (*Marmota baibacina*), we should also account for susliks, gerbils, and pikas, as well as some rodents of the *Mustelidae* family (including steppe polecats, ferrets and stoats). Apart from sylvatic rodents, Bactrian camels, too, can be hosts of the pathogen, as it was indeed the case in a number of plague outbreaks in late-Imperial and Soviet Central Asia and Siberia. In particular, they were responsible for local outbreaks in in Kyrgyzstan (1917-8) and Kazakhstan (1926, 1945 and 1947). As far as vectors are concerned, the Tien-Shan' *focus* is a natural habitat to over 35 types of rodent fleas that are known to have been the carriers of the pathogen, and at least as many types of rodent lice and *acari*, whose role in the transmission of the plague is less apparent.[8]

Issyk-Kul's Changing Environment under the Mongol Rule

In 1218, the Issyk-Kul' region, a part of the Qara Khitai Empire, fell to the Mongol forces. With the death of Chinggis Qan in 1227, the eastern part of his empire, which included the Issyk-Kul' area, was inherited by his second son, Chagatai Qan, who ruled over his *ulus* (the Chaghadaid khanate) until his death in 1242. The Chaghadaid khanate was initially an integral part of the Mongol Empire, but with the fragmentation of the empire after 1259, it became one of four co-existing Mongol khanates, with its territories covering Central Asia. The Mongol conquest of the Semirechye region brought about not only a political change, but also some pronounced environmental shifts. The Mongols were pastoralist nomads and, as such, they had to ensure a steady supply of pasturage for their livestock, comprised of horses, camels, cattle, sheep and goats. The degree of the 'pastoralization' of the conquered landscape may have been somewhat exaggerated by contemporaries. For instance, in 1230, Yelü Chucai (1190-1244), an

[8] Yu. Z. Rivkus and A. G. Blyummer, Endemiya chumy v pustynyakh Sredney Azii i Kazakhstana, Voronezh, 2016, 27-8; Eroshenko et al., Yersinia pestis strains; https://www.open.kg/about-kyrgyzstan/nature/soil-and-minerals/313-pochva-chuyskoy-doliny.html (last accessed 2 May 2018); Maliya Alia Malek et al., Yersinia pestis halotolerance illuminates plague reservoirs, Scientific Reports, VII, 2017, DOI: 10.1038/srep40022; Saravanan Ayyadurai et al., Long-term persistence of virulent Yersinia pestis in soil', Microbiology, CLIV, 2008, 2865–71; Rebecca Eisen et al., Persistence of Yersinia pestis in soil under natural conditions', Emerging Infectious Diseases, XIV, 2008, 941–3; Kenneth L. Gage and Michael Y. Kosoy, Natural history of plague: perspectives from more than a century of research, Annual Review Entomology, L, 2005, 505–28; Kyrre Linné Kausrud et al., Modeling the epidemiological history of plague in Central Asia: palaeoclimatic forcing on a disease system over the past millennium, BMC Biology, VIII, 2010, 1-14; Rivkus and Blyummer, Endemiya chumy, 20-1, 61, 138-9, 150-1, 155-69 and *passim*

energetic Khitan administrator under both Chinggis and Ögedei, was said to have convinced the latter to spare the recently conquered Jin lands from being converted into pasturage and woodland via the imposition of taxation on agricultural and mercantile income. Similarly, when ibn Faḍl Allāh al-ʿUmarī described the Trans-Volga lands of the Qipchaks during the reign of Özbeg Qan (1313-41), he noted that once those lands used to be abundant in arable, but ever since the Mongol conquest they all became pastures, with little arable landscape left to be seen.[9]

While those references may well have been somewhat apocryphal in their nature, there is enough evidence about the piecemeal pastoralization of Central Asian landscape, and the Issyk-Kul' region in particular. When Qiu Chuji (1148-1227), a notable Taoist alchemist, visited the region in 1222, shortly after its conquest by Chinggis from the Qara Khitai in 1218, he described the local land as fertile, full of mulberry-trees, crops, wine and fruits, producing good harvests, without mentioning pastoral husbandry. An altogether different picture was painted by the Franciscan diplomat Giovanni del Pian Carpini, in the course of his travels through the region in 1246. According to Carpini, there was a multitude of ruined and deserted cities and villages. Carpini's narrative is corroborated by a no less pessimistic report of William de Rubruck, a Flemish Franciscan missionary, who passed through the Issyk-Kul' area in 1253 and asserted that there used to be many cities in the valley, but they were destroyed by the Mongols, in order to make a way for rich pastures, upon which they could graze their livestock. In the similar vein, a biographer of Yahballaha III, Patriarch of the Church of the East from 1281 to 1317, narrates that in the course of his travels in 1280 in Central Asia, the future patriarch saw the desolation of the local landscape, which included the devastation of the once-prosperous city of Loton (most likely, Khotan in Uyghuristan/Xinjiang) and crops growing in its hinterland and the reduction of the surviving population to hunger and flight. Ḥamdallāh Mustawfī Qazvīnī, a Persian geographer, who visited the region c.1320, reported that most people were nomads, having lots of cattle and horses, praised the good quality of hay crop and noted that little grain was grown there. The richness and good quality of pastureland in Issyk-Kul' was certainly valued by Chaghadaid rulers. Thus, al-Qāshānī in his *History of Öljaitü* (c.1325) noted that Esen-Buqa Qan (1310-8) had his winter pasture near Issyk-Kul, while his summer pasture was in Taraz, and it is likely that Qaidu Qan (d. 1301) had his pastures between Taraz and the Chu River.[10]

Climatic Shifts in the Issyk-Kul' Region: Evidence from Dendrochronology

It is unclear how great was the impact of the Mongol conquest on the transformation of the Issyk-Kul' landscape, it is clear that by the early fourteenth century, it was predominantly pastoral one, supplying both native Turkic population and Mongol rulers and settlers with abundant grassland for their livestock, which included horses, cattle, sheep, goats and, to a more limited extent, Bactrian camels (notorious herbivores and plague pathogen transmitters). Pasturage growth strongly depends on rainfall levels. The dependence of the pastoral society on rainfall is clearly indicated in several contemporary sources. For instance, al-Qāshānī, in noting the unusual drought in Spring 1282 in the Sarakhs area (in north-eastern

---

[9] N.Ts. Munkuyev, Kitayskiy istochnik o pervykh Mongol'skikh khanakh. Nadgrobnaya nadpis' na mogile Yeluy Chu-Tsaya, Moscow, 1965, 12b; Istoriya Kazakhstana v Arabskikh istochnikakh I, trans. V. G. Tizengauzen, Almaty, 2005, 173

[10] The Travels of an alchemist, trans. A. Waley, London, 1931, 88; The Texts and versions of John de Plano Carpini and William de Rubruquis, ed. C. Raymond Beazley, London, 1903, 97; The Mission of Friar William of Rubruck. His journey to the court of the Great Khan Mongke, 1253-1255, transl. P. Jackson, London 1990, 147-148; The Monks of Kublai Khan, Emperor of China, London, 1928, 44; The Geographical part of the Nuzhat-al-qulūb, trans. G. Le Strange, Leiden, 1919, 249; Maryam Parvisi-Berger, Die Chronik des Qāšānī über den Ilchan Ölǧäitü (1304-1316). Edition und kommentierte Übersetzung, Unpublished PhD Dissertation, University of Göttingen, 1968, 181 (138a); Michal Biran, Rulers and city life in Mongol Central Asia (1220-1370), In Turko-Mongol rulers, cities and city life, ed. David Durand-Guedy, Leiden, 2013, 267

Khorasan province of Iran), reported that the steppe soil was black and dark and people despaired because of the lack of fodder for their livestock. Two months of extreme drought were followed by a sudden torrential rain that yielded abundant grass for animals. The same author narrates that in late 1307 in Tabriz, the rain saved people and animals from starvation, by producing grains and fodder. Likewise, in 1303, after three years of drought in parts of the Golden Horde, many horses and sheep died because of the lack of pasture, while people were doomed to starvation on the account of the animal murrain, according to al-Maqrīzī.[11]

Obviously, sylvatic rodent population profited from the abundance of grassland as much as domesticates. Marmots, susliks, gerbils, tarbagans, pikas all thrive on grass and they prefer burrowing either in grassland or under shrubs. The rodent population levels are determined by the availability of grassland resources, which, in turn, are determined by precipitation levels. In the twentieth-century, local outbreaks of plague in Kazakhstan and Kyrgyzstan often occurred in the context of damp and mild weather, which encouraged grass growth, expansion of rodent population, aggressive behaviour of fleas and consequently pathogen activity.[12]

There are no contemporary records of annual weather and precipitation patterns in Chaghadaid Central Asia. To reconstruct these patterns, we need to turn to dendrochronological record, deriving from chronology of tree-rings of Schrenk spruce (*Picea schrenkiana*) from the Tien-Shan' region in Kyrgyzstan, most recently compiled by Wang and her colleagues (Figure 3). As the figure indicates, the period between 1301 and 1360 saw several piecemeal episodes of piecemeal rise and fall in precipitation levels. After a decade or so of a rise of precipitation levels, the years of 1314-22 witness a gradual decline in rainfall, with 1322 being a particularly dry year. The period of 1323-7 was characterised by an increased dampness, with 1327 standing out as the second wettest year on record. The next phase (1327-34) was a renewed episode of a decline in precipitation levels, with 1334 being the second driest year during that period. After a short-lived damper episode of 1334-6, there were two back-to-back extreme episodes of excessive drought (1336-9) and wetness (1339-43). The 1339, the second year of the plague, was also the single driest year on record, with precipitation levels standing at about 36 per cent below average. Conversely, 1343 represents the single wettest year in that period, with rainfall levels peaking at 41 per cent above average. The next seven years (1344-50) saw a piecemeal decline in precipitation, only to briefly rise again between 1351 and 1354 and then fall down anew (1355-60).[13]

[11] Parvisi-Berger, Chronik des Qāšānī, 32 (11a-11b), 72-3 (50b); Istoriya Kazakhstana v Arabskikh istochnikakh I, trans. V. G. Tizengauzen, Almaty, 2005, 308

[12] Rivkus and Blyummer, Endemiya chumy, 197, 218

[13] Hui-Qin Wang et al, 'Comparison of drought-sensitive tree-ring records from the Tien Shan of Kyrgyzstan and Xinjiang (China) during the last six centuries,' Advances in Climate Change Research, VIII, 2017, 21-2

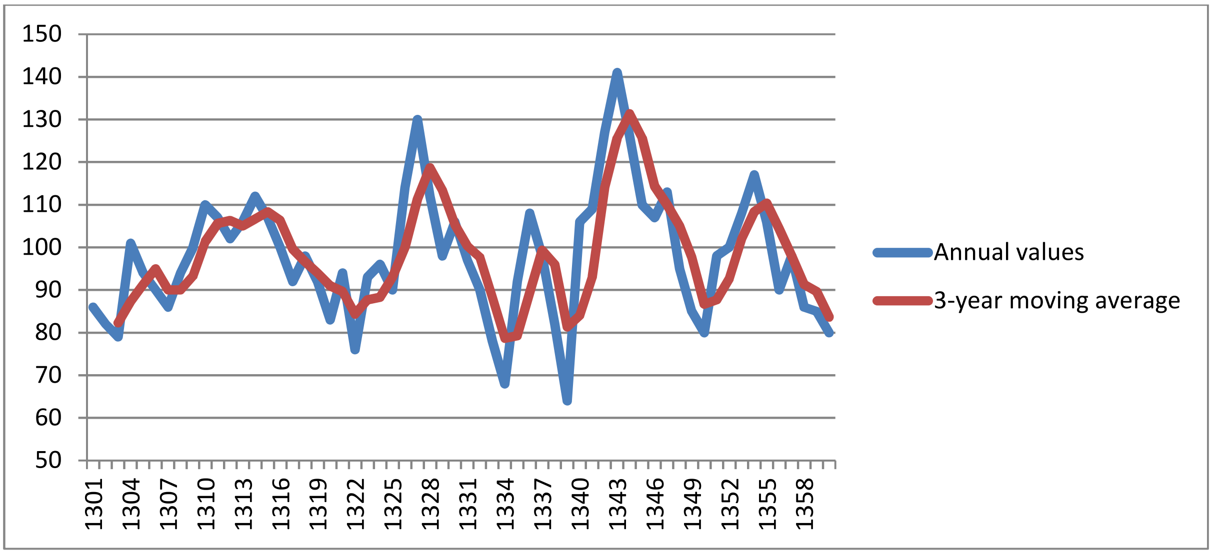

Figure 3. Reconstructed precipitation levels from the Tien-Shan' region in Kyrgyzstan, 1301-60 (indexed on 1311-20; 1311-20=100)

Source: See footnote 13

How does this chronology fit into the context of the plague outbreak? The damp and humid weather of the early 1310s and 1323-7 produced more grass fodder for rodents and optimal conditions for flea larvae hatching and survival. Taken together, the growth of population levels of both hosts and vectors would have also increased the levels of population density of *Yersinia pestis*, thereby elevating the risks of mortality outbreak in the rodent population. Indeed, as the evidence from Soviet Kazakhstan suggests, plague mortality in rodents tended to break out in warmer springs and wetter summers. Conversely, the extreme drought episode of 1336-9 meant the sharp decline in the levels of vegetation, to the point that it could no longer maintain the sufficient levels of surviving rodent population. Drought can have a devastating impact on the levels of rodent mortality and fertility. At the same time, the surviving rodents may have become increasingly susceptible to fleas (and thus to the pathogen), with their immune system being compromised on the account of the lack of fodder and water. As one recent research has shown, prairie dogs of New Mexico prairies were infested with plague-carrying fleas much more prominently during the dry 2011, compared with the wet 2010 and 2012. It could well be that it was in this context of the 1336-9 drought and the decline in rodent population levels that we witness the zoonotic crossover from sylvatic rodents to humans (either through commensal rodents or directly), with fleas actively seeking an alternative host to spread the bacterium. This hypothesis is corroborated by evidence from early twentieth century. In Kazakhstan, between 1904 and 1945 outbreaks of plague in rodents seem to have occurred in wetter years, while human plague mortality tended to break out in dry years (chiefly in 1910-29 and 1945).[14]

[14] Nils Ch. Stenseth et al., Plague dynamics are driven by climate variation, PNAS, CIII, 2006,13110-13115. doi: 10.1073/pnas.06024471032006; K. Armitage, Climate change and the conservation of marmots, Natural Science, V, 2013, 36-43. doi: 10.4236/ns.2013.55A005; David A. Eads et al., Droughts may increase susceptibility of prairie dogs to fleas: incongruity with hypothesized mechanisms of plague cycles in rodents, Journal of Mammalogy, XCVII, 2016, 1044–1053. Year-to-year precipitation in Kazakhstan variations derives from Feng Chen et al., Drought variations in Almaty since AD 1785 based on spruce tree rings, Stochastic Environmental Research and Risk Assessment, 2016. doi 10.1007/s00477-016-1290-y; the yearly volume of plague outbreaks derives from Kausrud et al., Epidemiological history

The Zoonotic Stage: Possible Modes of Transmission

During the twentieth century outbreaks in Central Asia, three main mammal hosts were responsible for the transmission of the plague bacillus to humans: (1) sylvatic rodents (primarily, marmots, but also susliks, gerbils, and pikas, and, in some instances, steppe polecats, ferrets and stoats); (2) commensal rodents; (3) Bactrian camels. Obviously, the relationship between the old and new hosts, and the transmission mode, was by no means straightforward. In some instances, the zoonotic stage involves a direct transmission of the pathogen from an old to a new host. Thus, given the pastoral nature of Central Asian settlement, society and economy, the direct contact between sylvatic rodents and humans can often be direct: in particular, through hunting. Also, in dry years, with pasture resources dwindling, rodents may migrate closer to human habitat, in search of alternative food resources. There were numerous recorded cases of plague transmission through the consumption of rodents by humans in parts of Central Asia (Mongolia, as well as the Altai and Transbaikal regions of the Russian Empire, during the Third Human Pandemic in the early twentieth century. In some instances, the pathogen is getting transmitted from sylvatic rodents to humans through commensal rodents, that is mice and rats, although this mode seems to be uncommon in the Central Asian context.[15]

Although rodent consumption by humans is uncommon in Muslim and Christian communities of Central Asia, it is prevalent among Buddhist Mongols, Buryats, Tuvans and Kalmyks. That rodents (and especially marmots) were widely consumed by the Mongols – at least those, who did not convert (at a later stage) to Islam or Christianity - is confirmed by a variety of contemporary sources from diverse origins. It is reported by thirteenth-century Europeans, including Polish C. de Bridia (1247), Flemish William Rubruck (1253), and Venetian Marco Polo (travelling in Central Asia c.1271-5), Chinese Peng Daya (1233), and Armenian Kirakos Gandzakets'i's (1250s-60s). Marmot meat is also mentioned in a Chinese dietary treatise *Yinshan Zhengyao*, compiled in 1330 by Hu Sihui, a Yuan court therapist and dietitian. Although widespread among the Mongols, and other Buddhist and Shamanist inhabitants of fourteenth-century Central Asia, rodent consumption was certainly not encouraged by local Christian and Muslim communities by the time of the plague outbreak. Although direct evidence from Central Asia is lacking, there are several references to the rejection of 'unclean food' by Christian communities elsewhere. For instance, Kirakos Gandzakets'i's reports that during the Mongol conquest of Armenia in the 1230s, subjugated Christians refused to eat unclean animals and drink *kumys*. Similarly, Rubruck narrated that Orthodox subjects of the Ulus Juchi did not drink *kumys*. The consumption of marmots in medieval Central Asia, the bio-ecological peculiarities of marmots and their interaction with humans has been studied by Hymes.[16]

Bactrian camels, too, should be, at least in theory, taken into account. Thus, during the Third Human Pandemic in Central Asia, as well as a more recent outbreak in Mauritania (1973-5), camels played

[15] Gerald Chikozho Mazarire, The burrowed earth: rodents in Zimbabwe's environmental history, Critical African Studies, VIII, 2016, 109-35; A.K. Belyavskiy, O Chume tarbaganov. Zapiska po povodu 7 smertnykh sluchayev ot upotrebleniya v pishchu surkov, porazhennykh chumoyu v poselke Sok-tusvskom, Vestnik obshchestvennoy gigieny, sudebnoy i prakticheskoy meditsiny, XXVI, 1895, 1-6

[16] P.S. Pallasa… puteshestvie po raznym mestam Rossiyskoy Imperii, I, St. Petersburg, 1773, 471; Khristiyanskiy mir i 'Velikaya Mongol'skaya Imperiya'. Materialy Frantsiskanskoy missii 1245 goda, St. Petersburg, 2002, 96 and 122 (Ch. 54); Mission of Friar William of Rubruck, 84; The Book of Ser Marco Polo, I, trans. and ed. Henry Yule, London, 1903, 252; Hei Da Shi Lyue. Istochnik po istorii mongolov, trans. Ye. R. Nesterova, Moscow, 2016, 24; Kirakos Ganjaks'i's History of the Armenians, trans. R. Bedsorian. New York, 1986, 212; A Soup for the Qan, trans. Paul D. Buell and Eugene N. Anderson, Brill, 2010, 513; Smith, John Masson, Mongol campaign rations: milk, marmots and blood?,' In Turks, Hungarians and Kipchaks: A Festschrift in Honor of Tibor Halasi-Kun, ed. Pierre Oberling, Washington, 1984, 223-8; Kirakos Ganjaks'i's, 219; Mission of Friar William of Rubruck, 101; Hymes, Hypothesis, 298-303.

an important role as plague pathogen hosts. Camels can become infected directly via fleas, because of their habit to graze and rest in the proximity to rodents' burrows. Having contacted the disease, camels would then transmit it to humans via back-riding or meat processing and/or consumption. That Mongols stocked camels and ate their flesh is reflected in contemporary sources. Thus, one Latin report from around 1330, previously (and erroneously) attributed to Dominican John de Cora, narrates that Mongols consumed camel meat on great feasts. However, as we shall see later, camels may not have been as numerous and prominent in the Issyk-Kul' region as elsewhere in the Chaghadaid khanate. Moreover, the connection between human-camel interaction and the spread of plague should not be taken for granted: for instance, during the Black Death outbreak in Damascus and Cairo, corpses were carried to their graves by camels, while local chroniclers did not mention an outbreak of the disease in camels.[17]

Trade, tribute and warfare: the anthropogenic context of the Issyk-Kul' outbreak

Despite several suppositions above, with no palaeogenetic data, we will not be able to establish the geographic origins of the Issyk-Kul' outbreaks. Likewise, we cannot establish the means of its spread to and from Issyk-Kul'. All we can do, at this point, is to sketch, in a tentative manner, a wider anthropogenic context, in which the Issyk-Kul' mortality took place, in order to its potential modes of transmission. In the context of the Mongol Empire, two main anthropogenic factors to be accounted for are trade and military activities. As numerous studies of historical plague outbreaks have shown, international and regional trade played an instrumental role in spreading the disease across time and space. During the Black Death of 1346-53, it was Genoese merchants from Caffa that imported the plague into Constantinople in July 1347 and then to Messina (in Sicily) in October of the same year; it was wine-carrying cargoes from Gascony that brought the pathogen to Dorset in south-west England in late June 1348; and it was merchant vessels that imported the disease from England to Bergen in Norway in autumn 1349, before it made it to the north of Scotland, Shetland and the Faeroe Islands. Likewise, the impact of warfare on the spread of plague (and other diseases) cannot be overstated. The Siege of Caffa in late 1346 is too well known example to be repeated here. In 1380, amidst the Genoese-Venetian war, the plague was imported by Genoese fleet into Constantinople. The 1533-5 plague outbreak in the eastern Ottoman Empire coincided with a military campaign into northern Iran. More examples can be added. The same paradigm can be applied to Central Asia, and the Issyk-Kul' region in particular.[18]

Around the time of the 1338-9 outbreak, Issyk-Kul' and other parts of the larger Semirechye region (Zhetysu) played an important role in international trade. It was situated along the northern branch of long-distance trans-Asian trade routes connected by mercantile traffic (often referred, in a mistaken manner, as the 'Silk Road'), which stretched all the way from the Ulus Juchi to Yuan China (and, in effect, connecting the two *uluses*). Although the Mongol conquest of Semirechye (together with other parts of the future Chaghadaid *ulus*) in the early thirteenth century, brought some devastation and decline to urban life and international trade in the region, there seems to be a remarkable urban revival in the first half of the fourteenth century, after the death of Qaidu Qan in 1301 and the return of the Chaghadaid dynasty. Thus, Almaliq (in western Uyghuristan/Xinjiang, on the modern-day Kazakh-Chinese border), was a vibrant and multi-religious city, a home to Christians (both East Syriac and Catholics), Muslims, Buddhists and

[17] Rivkus and Blyummer, 198 and *passim*; J. M. Klein et al., La peste en Mauritanie, Medecine et Maladies Infectieuses, V, 1975, 198-207; Cathay and the way tither, I, trans. and ed. Henry Yule, London, 1866, 246; Dols, Black Death in the Middle East, 237

[18] Nükhet Varlik, Plague and Empire in the Early Modern Mediterranean World. The Ottoman Experience, 1347–1600, Cambridge, 2015, 99-107, 171-4; Ole J. Benedictow, The Black Death, 1346-1353, Woodbridge, 2004, 127-8; Ole J. Benedictow, The Black Death and later plague epidemics in the Scandinavian countries: perspectives and controversies, Berlin, 2016, 136-46

Shamanists, and an important centre of international trade and the Chaghadaid rule. Similarly, Jand (presumably today's Zhan-Kala), situated 115km west of Kyzylorda in south Kazakhstan, was an important hub of international trade, as mentioned by both Jamal al-Qarshi (d. c.1303) and Shihāb ibn Faḍl Allāh al-'Umarī (d. 1348/9). William Rubruck also mentioned 'a big town called Qayaligh' (near Qapal, in south-eastern Kazakhstan), whose markets were frequented by many merchants. One city that played a particularly important role along the trans-Asian long-distance trade routes was Otrar (in south-western Kazakhstan). After its destruction and the massacre of its inhabitants in 1218, the city was rebuilt anew by the mid-thirteenth century. But it was during the reign of Erzen Qan (c.1310/5-20) that Otrar saw its true revival and expansion. Around that time, it became a key hub of international commerce, bringing together merchants from the western and eastern parts of Eurasia. The city is mentioned by Francesco Balducci Pegolotti in his handbook of trade *Pratica della Mercatura* (written c.1340, but reflecting the situation in the 1320s and 1330s), as a place frequented by merchants. The international trade in Central Asia was undoubtedly facilitated further by Tarmashirin Qan's (1331-4) conversion to Islam, whereby he abolished tariffs and customs for Muslim merchants, in accordance with the Sharia Law. As a result, Syrian or Egyptian merchants flocked in large numbers to Chaghadaid Khanate, as reported by al-'Umari. This preferential policy, however, may have been short-lived, perhaps ending with the ascent of Changshi Qan (1335-8), who was either East Syriac Christian, or at the very least pro-Christian. Finally, the importance of the northern route, passing through the Chu Valley, seems to have increased further with the disintegration of the Ilkhanate after the death of Abu Sa'id Qan in 1335, which made the southern route passing through Transoxania, connecting Central Asia with Iran, less secure.[19]

The Christian settlements in the Chu Valley were situated exactly at the heart of this trade context. To be more specific, they were situated halfway between the two linked trade emporia Otrar and Almaliq and to make it between the two points, one had to traverse along the north coast of the lake, through the Chu Valley. If eastbound, travellers would have passed through or near the settlements of Sauram (on the outskirts of Shymkent; 42°19'0"N, 69°35'45"E), Aktobe (43°27'55"N, 70°24'14"E), Sharvashlyk (Kendjak-Sangir near Taraz; 42°54'N, 71°22'E), Sadyr-Kurgan (near Kyzyl-Adyr; 42°37'12"N, 71°35'24"E), before reaching Karadzhigach, Krasnaya Rechka and Burana, after which they would have carried on through Almaty (43°16'39"N, 76°53'45"E) and finally arrive at Almaliq (44°14'12.60"N, 80°32'7.79" E). The route from Tana in Crimea to Cathay during the 1320s and 1330s was described by Pegolotti in his *Pratica della Mercatura* as perfectly safe (*sicurissimo*) by night and day. The situation rapidly deteriorated from 1340 onwards, in conjunction with a conflict between a pagan Yisun Temür Qan (1338-42) and a Muslim pretender to the throne 'Alī Sulṭān (reigned 1342/3), a short-lived persecution of Christians by 'Alī Sulṭān in 1339/40 and a war between the Chaghadaid Qazan Qan (1343-6) and Qazaghan, the emir of Qara'unas (1345-58). By March 1345, two Venetian envoys in Caffa complained that 'the road of the Middle Empire is totally ruined and it is way worse than it used to be before'. But this deterioration reflects the post-1338/9 reality; whether the 1338-9 outbreak contributed to the decline in international trade along the northern branch of trans-Asian trade routes is another question, which cannot be dealt with here.[20]

Although no written sources indicate any large-scale movement of goods passing through the Chu Valley in the 1330s, there is enough numismatic evidence pointing otherwise. Coin hoards from different

[19] Biran, Rulers and city life, 269-74; W. Barthold, Almaligh, Encyclopaedia of Islam, New edition, Vol. I, Leiden, 1986, 418-9; Istoriya Kazakhstana v Persidskikh istochnikakh I, trans. Sh. Kh. Vokhidov and B.B. Aminov, Almaty, 2005, 156; Istoriya Kazakhstana v Arabskikh istochnikakh I, trans. V. G. Tizengauzen, Almaty, 2005, 175; Mission of Friar William of Rubruck, 148; K.A. Akishev, K. M. Baypakov and L.B. Yerzakovich, Drevniy Otrar, 1972, 37; Francesco Balducci Pegolotti, La Pratica della mercatura, ed. Allan Evans, Cambridge, Mass., 1936, 21; Das Mongolische Weltreich: al-'Umari's Darstellung der mongolischen Reiche in seinem Werk Masālik al-abṣār fī mamālik al-amṣār, ed. and trans. K. Lech, Wiesbaden 1968, 119

[20] K.M. Baypakov, Srednevekovye goroda Kazakhstana na Shelkovom Puti, Almaty, 1998; Handbook of Christianity in China, Vol. I: 635-1800, ed. Gary Tiedermann, Leiden, 2009, 109-10; Pegolotti, Pratica della mercatura, 21

parts of the Mongol Empire have been repeatedly found at various sites. Thus, nearly 200 datable coins, mostly from the Ulus Juchi, from the 1290s until the 1360s (with the majority minted in the 1340s, notwithstanding the reported decline of trade in the region), have been found on the ruins of Zhan-Kala, the presumed site of Jand (Dzhend), at various points. The monetary exchange between the Chaghadaids and other parts of the Mongol Empire is also evidenced in other hoards. In particular, several non-Chaghadaid coins have been discovered in the Chu Valley, and in particular in the immediate vicinity of the Issyk-Kul' cemeteries. This indicates a prominent place of the Issyk-Kul' region in international exchange of goods.[21]

It should be borne in mind that the coin hoards mentioned above indicate not only the mercantile, but also military context. Thus, silver bullion was received as campaign booty and tribute from the Delhi Sultanate, a dependency of the Chaghadaid khanate, and it played an important role in the Chaghadaid monetary system. In other words, the same trans-Asian was serving not only international trade, but also Mongol armies during their campaigns and raids, as well as the movement of qans' *ordos* (mobile courts). Although the 1330s was a decade of a relative peace and stability in Central Asia, the same route would still be taken by Mongol armies, in conjunction with ongoing campaigns elsewhere. It would certainly been trodden by the armies of both Özbeg Qan of the Golden Horde (1313-41) and Chaghadaid Changshi Qan (1335-8) (during whose reign the plague broke out around Issyk-Kul'), when dispatching Russian captives to the Yuan court of Tugh Temür Qa'an (1328-32) in Qanbaliq. Likewise, it may have been utilized by the moving *ordo* of Changshi, as it was indeed utilized by his predecessors. As we have seen, both Qaidu and Esen-Buqa had their pastures around Issyk-Kul'. Esen-Buqa's pasture was captured and plundered by the Yuan forces of Buyantu Qa'an (1311-20), under the command of Chongur in 1316/7, in the course of the Chaghadaid-Yuan war of 1314-8.[22]

What goods were travelling along the northern branch of trans-Asian trade routes? First and foremost, luxury goods travelling westwards: primarily spices and silk, but also cotton, linen and exotic jewellery. These goods would have been of been of little (if any) interest to bacterial hosts, namely sylvatic rodents. If anything, the smell of spices repels rodents, not attracts. Conversely, silk, and especially cotton and linen may have attracted bacterial vectors, namely fleas. Here, infected fleas would find a perfect hiding place, to jump on and bite humans that would be found nearby. Furthermore, the bacterium could, in theory, survive in contaminated cloths, without live fleas, for a long period: dead fleas can sustain *Y. pestis* for up to 427 days. That plague can be transmitted via clothes is indicated in numerous plague accounts, from different chronological and geographic settings. Thus, it is hinted in one passage in Gabrielle de Mussis' contemporary *Historia de Morbo*. Here, de Mussis narrates how four soldiers camping outside of Genoa in 1348 stole a fleece and used it as their overnight bedding, only to die the morning after. Likewise, according to the *Report of the Indian Plague Commission*, describing the Indian outbreak of 1896-9, the

---

[21] D. Voyakin and A. Pachkalov, Monetnye nakhodki na gorodishche Dzhan-Kala, Istoriko-kul'turnoe nasledie Aralo-Kaspiyskogo regiona. Materialy II mezhdunarodnoy nauchno-prakticheskoy konferentsii, Aktau, 2010, 55-63; P.N. Petrov and A.M. Kamyshev, Chuyskaya dolina po numizmaticheskim dannym (XIII-pervaya polovina XIV vv.), In Tsentral'naya Aziya ot Akhemenidov do Timuridov. Arkheologiya, istoriya, etnologiya, kul'tura. Materialy mezhdunarodnoy konferentsii, posvyashchennoy 100-letiyu do dnya rozhdeniya A.M. Belenitskogo, St Petersburg, 2005, 286-90; P.N. Petrov, Numizmaticheskaya istoriya Chagatayskogo gosudarstva 668/1270-770/1369 gg. Unpublished PhD Dissertation, Kazan State University, 2009; V.G. Koshevar, O nakhodkakh Dzhuchidskikh monet v Chuyskoy Doline, Numizmatika Zolotoy Ordy, I, 2011, 121-3; Arsenio Martinez, 'The Use of mint-output data in historical research on the western appanages," in Aspects of Altaic Civilization III, ed. Denis Sinor, Bloomington, 1990, 87-127.

[22] Emil Bretschneider, Rusy i Asy na voyennoy sluzhbe v Kitaye, In Zhivaya Starina, ed. V.I. Lamanskiy, St. Petersburg, 1894, 67-73; Parvisi-Berger, Die Chronik des Qāšānī, 181 (138a).

transportation of contaminated clothing was a paramount channel of the disease transmission. All the same, without active presence and participation of rodents, the pathogen would have spread at a slower pace.[23]

Contrary to other parts of the Mongol Empire, arable agriculture was practiced on a very limited scale in Central Asian steppe, with some pockets cultivating millet and sorghum for domestic consumption, rather than markets. This was in a sharp contrast with the situation in the Crimea/Caspian basin, a zone of intense arable farming, producing large surpluses of wheat, to be consumed domestically and exported to Paphlagonia and Pontos. Yet, this does not mean that grain was not moving across the steppe, along the Chu Valley. Again, this was related to both the commercial and military context. In his handbook, Pegolotti instructed Italian merchants travelling from Tana to China to furnish themselves with flour and salt fish, on the account of their deficiency in the steppe. Likewise, the movement of Mongol armies or *ordos* would involve setting up special stations with flour, which would then be transported to the next one. This fact was mentioned in several sources, including Qoṭb-al-Din Širāzi's *Akhbār-i Mughūlān*, and Juvayni's *Tarīkh-i Jahān-gushā* (History of the World Conqueror). Rodents are notorious consumers of crops in any form, causing much damage and loss of post-harvest grains in developing countries. In theory, sylvatic rodents could thrive on flour in a number of ways. They could concentrate around the flour stations; they could be moved in merchant or army carts, or, alternatively, in waggons accompanying *ordos*. To make things even worse, infected fleas can be transported in grain and flour. As Michael McCormick contended, international grain trade centred on the Mediterannean, which involved the movement of grain across Europe, facilitated the spread of plague during the active period of the First Pandemic, from 541 onwards. Could the same situation prevail in early fourteenth-century Chaghadaid Central Asia?[24]

Both cloth- and grain-movement was closely connected with human along the north branch of the trans-Asian routes. Apart from qans' *ordos*, soldiers and captives, there were also slaves. There are several references to slave markets in Chaghadaid Central Asia. In particular, we hear about the trade in young Turkic and Mongol slaves sold on slave-markets of Tana (Azov) and Cairo. Similarly, Ibn- Baṭūṭah described slave-caravans travelling from India to Central Asia. A Bukhara document from 1333 talks about Mongol field-slaves. All this implies mass movement of people along the Chu Valley and its vicinity. Could slave-caravans be another possible mode of plague dissemination in that area? Poor hygienic conditions of captives and slaves could potentially cause the infestation of lice. As some recent studies have shown, human ectoparasites are important vectors of plague transmission and, as such, they are to be taken seriously. Moreover, slaves had to be both fed and clothed; as we have seen, grain and flour could attract both rodents and fleas, while clothes could sustain plague in both live and dead fleas.[25]

Finally, we have to take into account the modes of transportation in the Issyk-Kul' region. According to Pegolotti, the common method of transportation around Issyk Kul' was donkeys, rather than camels. As he stated, merchants would travel on the camelback all the way from Crime to Otrar, only to

---

[23] Peter Jackson, Mongols and West, London, 2005, 290-328; L.F. Hirst, The Conquest of plague, Oxford, 1953, 303–455; Jeffrey Wimsatt and Dean E. Biggins, A review of plague persistence with special emphasis on fleas, Journal of Vector Borne Diseases, XLVI, 2009, 91; The Black Death, trans. and ed. Rosemary Horrox, Manchester, 1994, 20; The Report Of The Indian Plague Commission, The British Medical Journal, I, 1902, 1093-1098

[24] Michael McCormick, Rats, Communications, and plague: toward an ecological history, Journal of Interdisciplinary History, XXXIV, 2003, 1–25; Benedictow, What disease was plague?, 115; Lorenzo Pubblici, Il pane nella storia dell'Asia Centrale: secoli VIII-XVI, In La Cività del pane. Storia, tecniche e simboli dal Mediterraneo all'Atlantico, ed. G. Archetti, Spoleto, 2015, 1826-7; S.P. Karpov, The Grain trade in the southern Black Sea region: the thirteenth to the fifteenth century, Mediterranean Historical Review, VIII, 1993, 55-73; Hirst, 311-20; Pegolotti, Pratica della mercatura, 22; Akhbār-i Mughūlān (650-683) dar anbānah-'i Mullā Quṭb, Qum, 2010, 23-4; Genghis Khan: The History of the World Conqueror by Ata-Malik Juvaini, trans. John Andrew Boyle, Manchester, 1997, 609 and 621.

[25] Olga Chekhovich, Bukharskie dokumenty XIVgo veka, Tashkent, 1965; Katharine R. Dean, et al., Human ectoparasites and the spread of plague in Europe during the Second Pandemic, CXV, 2018, 1304-1309, DOI: 10.1073/pnas.1715640115

change there to donkeys, to carry on to Almaliq and beyond. The reliance on donkeys, rather than camels in Uyghuristan/Xinjiang, is well attested by contemporary Uyghur documents. As one recent study has shown, of 70 documents from the Turpan region (western Uyghuristan/Xinjiang) dealing with postal system of the Mongol Empire, not a single document mentions camels. Further to the east, the Dunhuang region (in eastern Uyghuristan/Xinjiang) only two documents mention camels involved in local postal system. This indicates that the role of camels as pack-animals in the Issyk-Kul' region was rather limited and it appears that it was the donkey that dominated local and trans-regional transportation there. Unlike Bactrian camels, donkeys neither contact nor spread plague, and this fact may hint that camels may have not played any significant role in spreading the disease in the Issyk-Kul' region.[26]

Placing the Issyk-Kul' outbreak into a wider palaeogenetic context

Recent palaeogenetic studies have advanced our knowledge about the history of plague to a new level. In particular, it partially revealed the history of plague in those areas, where written evidence was not being produced. Clearly, the available palaeogenetic data cannot help determining the phylogenetic position of the Issyk-Kul' outbreak; nor can it help determining its possible relation, or lack of such, to the Black Death of 1346-53. Such exercise is, naturally, not feasible without the extraction, sequencing and analysis of the aDNA from one of the victims of this outbreak. Yet, our growing corpus of palaeogenetic data of the history of *Yersinia pestis*, both before and after the Black Death (and indeed, the 'great polytomy', discussed below), can raise some important questions regarding the wider genetic and biological context of the Issyk-Kul' outbreak and about some crucial genetic developments in the 'Age of the Great Polytomy', that is in the thirteenth and fourteenth centuries.

To begin with, it is necessary to contextualize the Issyk-Kul' outbreak both geographically and chronologically. Its outbreak seems to have occurred sometime after the so-called 'Big Bang', or the great polytomy. Cui and his colleagues placed the polytomy origins in the Qinghai-Tibet Plateau, which has the largest diversity of strains, and, thus, was likely to have been the original focus of the polytomy. But the 2017 study of Eroshenko and her colleagues have found an even more remarkable diversity of *Yersinia pestis* strains in the Tien-Shan' focus of eastern Kyrgyzstan (which covers Issyk-Kul'). This, as we have seen, may imply that it was the Tien-Shan' mountains that may have been the original home of the polytomy. The precise dating of the polytomy is unclear. Thus, Cui et al.'s 2013 study dated it to c.1142-1339, with the median date of c.1268. A most recent study by Spyrou and her colleagues recalibrated the dating of the divergence of the Black Death strain from Branch 1 to the median date of c.1238, which would imply that the actual polytomy had occurred even earlier: perhaps in the late twelfth century.[27]

The post-polytomy history of the new four branches can be summarized as follows. Branch 1 was responsible for the Black Death of 1346-53. At some point between the Black Death and the subsequent *pestis secunda* of 1358-64, Branch 1 split into two sub-lineages: Branch 1A, which persisted exclusively in Europe and became extinct after the Plague of Marseille of 1720-2, and Branch 1B, which caused the *pestis secunda* of 1358-64, which seems to have broken out in Northern Germany in 1358, before spreading into all four directions. Today, various phylogenetic branches of the Branch 1B lineage persist in East Asia, western United States, but also in Sub-Saharan Africa. Branch 2, too, is marked by its phylogenetic diversity, having been attested in virtually all of Eurasia, from the Russian Steppe to the Pacific Ocean, as well as in

[26] Pegolotti, Pratica della mercatura, 21; Márton Vér, The Postal system of the Mongol Empire in northeastern Turkestan, Unpublished PhD Dissertation, University of Szeged, 2016, 278-80.
[27] Cui et al., Historical variations; Eroshenko et al., Yersinia pestis strains; Maria A. Spyrou et al., Analysis of 3800-year-old Yersinia pestis genomes suggests Bronze Age origin for bubonic plague, Nature Communications, IX, 2018, DOI: 10.1038/s41467-018-04550-9

Libya. The earliest phylogenetic branch of Branch 2 is 2.MED0, which seems to have originated shortly after the Great Polytomy and which is currently found in Caucasus. Conversely, Branches 3 and 4 are characterised by a lack of phylogenetic diversity; the former is found in China and Mongolia, while the latter is confined to eastern Siberia and Mongolia. In addition to the 'new' lineages, there is a dozen of phylogenetic branches of pre-polytomy Branch 0 (represented by two main clades, 0.PE and 0.ANT), which still prevail in Eurasia, all the way from the Caucasus to China.[28]

What is the relevance of these genetic developments to our understanding of the Issyk-Kul' outbreak, on the eve of the plague's arrival in Europe? The existence of pre-Black Death strains and their persistence in the post-polytomy era, as well as the appearance of four new branches, and their subsequent diversification in the aftermath of the polytomy, indicates an incredibly complicated situation. Although it is tempting to connect the Issyk-Kul' outbreak to the arrival of the Black Death in Crimea some seven or eight years later – and hence, shift the geographic origins of the Black Death outbreak eastwards to Central Asia – we cannot, with any confidence, establish any genetically direct link between the two outbreaks. In absence of palaeogenomic data from one of the Issyk-Kul' cemeteries, we cannot regard the Issyk-Kul' outbreak as an early episode of the spread of the Black Death. After all, there is no evidence that the Issyk-Kul' mortality was caused by Branch 1; nor is there any palaeogenetic data, at least at this point, about what phylogenetic branch of *Yersinia pestis* was responsible for it. Moreover, there is no palaeogenetic evidence that Branch 1 existed in the Issyk-Kul' area, or indeed anywhere east of Crimea, by the time of the arrival of the Black Death in 1346. Conversely, the phylogenetic analysis of plague strains prevalent in the vicinity of Issyk Kul', extracted from modern strains (from both vectors and hosts, rodent and human), reveals that the region has been dominated by other phylogenetic branches: especially, 0.ANT5, but also 0.ANT2, 0.ANT3 (all three are the pre-polytomy ones) and 2.MED1 (the post-polytomy one).

Obviously, the presence of these branches around Issyk-Kul' in the last seventy years or so (when their modern strains were isolated in local labs) does not imply their existence in the early fourteenth century. Strains and branches can 'migrate' to different areas at a late stage, much after their initial appearance. Conversely, strains may seed a temporary reservoir in a certain area, only to 'disappear' sometime after an outbreak, or several outbreaks of mortality. Hence, it is equally possible that the Issyk-Kul' outbreak may have been caused by a phylogenetic branch, no longer found or observed in Kyrgyzstan. For instance, phylogenetic branch 2.MED0 is currently found only in the Caucasus highlands. It seems to have branched off the main Branch 2 lineage shortly after the Great Polytomy. The remarkable diversity of Branch 2, comparable to that of Branch 1, indicates that its multiple strains, including 2.MED0, could have caused numerous mortality crises in different parts of Asia, of which we would not hear otherwise, because written records were not being produced there. 2.MED0's positioning right after the polytomy may qualify this phylogenetic branch as one possible candidate for Issyk-Kul' mortality. In any event, without a genome from Issyk-Kul' plague graves, it is impossible to determine whether the local 1338-9 outbreak was an early Black Death event (caused by Branch 1, which *may* have been present around Issyk-Kul' around 1338, only

[28] That Branch 1 split into Branch 1A and 1B was discovered by Monica Green, who detected that one skeletal sample from the Museum of London (Sample 6330), originally thought to be from the East Smithfield burial of 1349, comes, in fact, from St Mary Graces burial of 1361. This finding was subsequently announced in 'Plague Dialogues: Monica Green and Boris Schmid on plague phylogeny' (https://contagions.wordpress.com/2016/06/29/plague-dialogues-monica-green-and-boris-schmid-on-plague-phylogeny-ii/). For other branches, see G.N. Odinokov et al., Analiz polnogenomnoy posledovatel'nosti stammov Yersinia pestis na osnove stupenchatogo 680-SNP algoritma, Problemy osobo opasnykh infektsiy, 2013, 49-54; N.Yu. Nosov et al., Filogeneticheskiy analiz stammov Yersinia Pestis srednevekovogo biovara iz prirodnykh ochagov Rossiyskoy Federatsii i sopredel'nykh stran, 2016, 75-8; Cui et al., Historical variations. I am currently in progress of studying the outbreak and movement of the *pestis secunda* in its wider Eurasian and North African context.

to disappear later and not to be found presently in that area), or an unrelated plague outbreak, caused by another strain (say, 0.ANT5 or 2.MED0). Both scenarios are possible.

Equally puzzling are the geographic origins of the Issyk-Kul' outbreak. Did it break out in or around the Issyk-Kul' region? Or did it arrive there from elsewhere? As we have seen, the remarkable diversity of different strains of *Yersinia pestis* in the Tien-Shan' focus of eastern Kyrgyzstan could imply that the great polytomy may have occurred in that area. This, in turn, may imply, at least in theory, that the Issyk-Kul' outbreak may have originated somewhere around or not far from Issyk-Kul'. Moreover, the climatic conditions of the 1330s, characterised by excessive drought (and, thus, potential reduction of biomass and decline in rodent population), and natural salinity of soil and water reservoirs in the Issyk-Kul' area, which would help the bacterium persevere off host for weeks or even months, may strengthen the hypothesis that the 1338-9 outbreak, at least in a human form, may have broken in the vicinity of the Chu Valley – or at least, in some proximity in Central Asia. In theory, the plague may have prevailed somewhere in Central Asia for decades since the 'Big Bang', ravaging sylvatic rodent populations, before crossing over to humans in the 1330s.

Although the Big Bang may have indeed occurred in a proximity to Issyk-Kul', it does not necessarily imply that the 1338-9 outbreak also originated in the same area. There is always a possibility that the same strain responsible for the Issyk-Kul' outbreak may have left its native home after the polytomy, before travelling back at a later point to cross over from rodents to humans. Moreover, there is no evidence that the Issyk-Kul' outbreak was caused by a post-polytomy strain: it could have, in fact, been caused by one of Branch 0 strains, which preceded the Big Bang.

Some historians, as we have seen, have long postulated about the 'Chinese' origins of the fourteenth century pandemic. Although there are indeed, as discussed above, several reports of mass mortality among Mongol soldiers campaigning in the Jin state in the early thirteenth century, as well as an outbreak in the prefectures of Songjiang, Jiaxing, and Hangzhou in 1333, there is nothing to suggest that these outbreaks were anyhow related to the Issyk-Kul' one. Moreover, these seem to have been outbreak on a regional, rather than a pandemic scale and there is no evidence that the pathogen was moving from these prefectures north-westwards, into Central Asia. Finally, whether these outbreaks were caused by plague or not is a question, which cannot, at least at this stage, be answered. A very indirect hint that the Issyk-Kul' outbreak may not have been imported from Yuan China is the fact that there is neither any evidence of mortality spikes similar to the 1338-9 one from Issyk-Kul', nor any references to 'pestilence' (*mawtana*) in other surviving East Syriac cemeteries east of the Chu Valley. True, the sheer number of the surviving inscriptions is considerably lower than the Chu Valley ones: there are about 21 in Almaliq, 28 in Inner Mongolia and just 10 in Zaitun (Quangzhou, in Fujian Province). Consequently, the paucity of the surviving inscriptions does not allow any *argumentum ex silentio* that these regions were not devastated by mortality crises before or around the time of the Issyk-Kul' outbreak. At the same time, however, the fact that some Almaliq graves are dated to the 1350s, 1360s and early 1370s (the latest tombstone is from 1371-2), indicates that the local East Syriac community continued flourishing after the likely demise of the Issyk-Kul' communities in or shortly after 1345.[29]

An additional hypothesis may, however, be offered here: that the Issyk-Kul' outbreak may have come from the north, rather than the east. Ibn al-Wardī (1292-1349), himself a victim of the plague, reported that the pandemic began in the 'Land of Darkness', where it allegedly prevailed for 15 years, before spreading into all directions. The 'Land of Darkness' is what is now western Siberia, namely areas closer to the Arctic Circle, reachable by rivers such as Angara, Yenisey, Ob, Chulym, Irtysh and Tom'. The 'Land of

[29] Hymes, Hypothesis, 288-94, 299-300; Kokovtsev, Khristiyansko-siriyskiya nadgrobnyya nadpisi, 196; Ruji Niu, La croix-lotus : inscriptions et manuscrits nestoriens en ecriture syriaque decouverts en Chine, Shanghai, 2010, 149-278

Darkness' was described by Marco Polo on his homeward journey from China (1293), as well as by Ibn Baṭūṭah (1332), al-ʿUmarī (c.1342-9) and other authors. These distant territories were settled by Ugric tribes that were commonly referred to by some travellers as *Yughra*. These peoples maintained their contact with the outside world largely through fur trade, or through tribute and raids, conducted by the Mongols from the south and the Novgorodians from the west. As Polo, Ibn Baṭūṭah, al-ʿUmarī and several earlier authors indicate, merchants and raiders would import exotic and valuable stoat- and sable-furs. Stoats, alongside with polecats and weasels, common inhabitants of western Siberia, are also happen to be potential carriers of *Yersinia pestis*.[30]

Although no *Yersinia pestis* genomes have been sequenced, up until now, from those northern regions, recent genetic studies have established that the Altai region, to the south of the 'Land of Darkness', boasts several natural plague *foci*. Between 2015 and 2018, 18 full genomes from the Gorno-Altai high mountain focus have been sequenced, two of which being from two Bronze Age sites (Kytmanovo, dating to c. 2887-2667 BCE and Afanasyevo Gora, dating to c.1746-1626 BCE). The Bronze Age strains belong to the so-called LNBA (Late Neolithic Bronze Age) lineage, while modern samples belong to 0.PE4a (which does not cause plague in humans), 0.ANT4 (the same strain that caused the Justinianic plague in sixth-century Bavaria), 2.ANT3 and 4.ANT. Although the possibility of the migration of plague from western Siberia to Issyk-Kul' and other regions in Central Asia remains, at this stage, highly speculative, Ibn al-Wardī's statement should not be dismissed either. This is especially in light of the fact that western Siberia is a habitat of plague-transmitting rodents, some of which were imported to the south around the time of the Issyk-Kul' outbreaks, and the presence of several plague strains in the neighbouring Altai region.[31]

Conclusions

A close analysis of the epigraphic evidence from the Issyk-Kul' tombstones and their wider environmental, socio-economic, political and palaeogenetic context reveals that the sudden spike in burial levels in 1338-9 reflects an outbreak of plague mortality in local communities. The absence of palaeogenetic data, to confirm the point, could be partially rectified by both textual and palaeoclimatological data. As we have seen, the mortality rates ratio between 'normal' and plague years in the Issyk-Kul' communities was favourably comparable with that in Europe in 1348-50. To appreciate the timing of the outbreak of the pandemic, it was necessary to establish its wider climatic context. After two pluvial episodes in the 1310s and 1320s, one witnesses a sharp decline in precipitation levels in the 1330s (in particular, during the severe drought of 1336-9). This would mean that after a period of abundance of biomass fodder for sylvatic rodents, the latter would have found themselves deprived of sufficient grass to sustain their high population

---

30 Michael Dols, Ibn al-Wardī's Risālah al-naba' 'an 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, ed. Dickran K. Kouymjian, Beirut, 1974, 448; various descriptions (mostly Muslim) of the 'Land of Darkness' are found in Ibn Fadlān and the Land of Darkness. Arab travellers in the Far North, trans. Paul Lunde and Caroline Stone, London, 2011; Robbie A. McDonald and Serge Lariviere, Diseases and pathogens of Mustela spp, with special reference to the biological control of introduced stoat Mustela erminea populations in New Zealand, Journal of the Royal Society of New Zealand, XXXI, 2001, 721-744; Julia M. Riehm et al., *Yersinia pestis* lineages in Mongolia, PLos ONE, VII, 2012, DOI:10.1371/journal.pone.0030624.g001 (Supporting information, Table 1)

31 Simon Rasmussen et al., Early divergent strains of *Yersinia pestis* in Eurasia 5,000 Years Ago, Cell, CLXIII, 2015, 571–582, DOI: http://dx.doi.org/10.1016/j.cell.2015.10.009; Aida Andrades Valtueña et al., The Stone Age plague and its persistence in Eurasia, Current Biology, XXVII, 2017, DOI: https://doi.org/10.1016/j.cub.2017.10.025; Vladimir V. Kutyrev et al., Phylogeny and classification of *Yersinia pestis* through the lens of strains from the plague foci of Commonwealth of Independent States, Frontiers in Microbiology, IX, 2018, DOI: 10.3389/fmicb.2018.01106; Angelina A. Kislichkina et al., Nine whole-genome assemblies of *Yersinia pestis subsp. microtus bv. Altaica* strains isolated from the Altai Mountain natural plague focus (No. 36) in Russia, Genome Annoucements, VI, 2018, DOI: https://doi.org/10.1128/genomeA.01440-17

density levels. With the declining levels of rodent populations on the one hand, and the compromised immune system of the surviving rodents, the pathogen and its vectors would need to seek an alternative host, to maintain their activity. It was in these climatic circumstances that the mortality in the Issyk-Kul' communities broke out.

The paucity of written documents from the Chu Valley region makes any reconstruction of possible channels of the pathogen spread tentative. Nevertheless, it is essentially important to consider anthropogenic factors, which may have contributed to the spread of the pathogen. In particular, we have to take into account local dietary habits and communication networks. As we have seen, although it is unlikely that local Christian communities would have a habit of consuming the meat of rodents, there is abundant evidence that marmot meat was widely eaten by Mongol nomads. Reports from late-Imperial and Soviet Central Asia, during the Third Human Pandemic, reveal that sylvatic rodents played a major role in spreading plague among humans and it is unlikely that the biological interaction between the bacillus and the host was different during the Second Plague Pandemic. Communications, too, may have played a role in facilitating the spread of the disease. As we have seen, around the time of the plague outbreak, Chu Valley was still involved in international trade along the northern branch of the trans-Asian mercantile routes. However, as we have seen, it was donkeys, rather than camels that were utilized in transporting goods between Almaliq and Otrar, passing through the Chu Valley; therefore, even if camels were occasionally deployed as pack-animals in between the two points, their importance as plague transmission vectors was insignificant. Conversely, silk merchandise could potentially attract plague-infected fleas. The same routes would have been trotted not only by merchants, but also by soldiers, captives and slave-caravans. Flour stationed and transported by soldiers and grain given to slaves could allure rodents, while the likely poor hygienic conditions of captives and slaves could lead to the infestation of lice, another possible plague vector. All these could potentially facilitate the outbreak and spread of human plague around Issyk-Kul' in 1338-9.

This brings us to one crucial point. Although never studied in its deserved detail, the Issyk-Kul' plague was interpreted by some scholars, including Pollitzer, McNeill and Campbell, as an early Black Death outbreak, moving westwards into Ulus Juchi, where it broke out in 1345/6. The present paper did not attempt to fill a gap in this debate, by linking the two outbreaks. All it did was to study the Issyk-Kul' mortality as a local outbreak, by scrutinising all the available environmental, palaeoclimatic, socio-economic and palaeogenetic evidence, which places the outbreak into a wider Central Asian context. As we have seen, there is nothing in the surviving evidence to suggest that the two outbreaks were related, contrary to some scholarly views. The Big Bang, occurring at some point in the twelfth or the thirteenth century, created four new branches, meaning that each new lineage could potentially unfold into a deadly outbreak in humans. The Black Death is now known to have been caused by Branch 1; indeed, Branch 1 is marked by a remarkable diversity of sub-branches and strains that were responsible for numerous outbreaks. But the same diversity also characterises the pre-polytomy Branch 0 and post-polytomy Branch 2, whose strains dominate, at present, the Tien-Shan' *sub-foci* of Kyrgyzstan (in particular, 0.ANT2, 0.ANT3, 0.ANT5 and 2.MED1 lineages). Conversely, not a single Branch 1 genome has been detected or sequenced in the Issyk-Kul' region. This, of course, does not preclude the possibility that Branch 1 strains *may have existed there historically*, but without aDNA evidence from the Issyk-Kul' region (or indeed anywhere in Central Asia), such claim does not go beyond the level of speculation. In short, to either prove or disprove the possible link between the Issyk-Kul' mortality and the Black Death we need aDNA evidence. Regardless of whether the Issyk-Kul' aDNA would reveal that the outbreak was caused by a Branch 1 or by another lineage, the results would be of a great scientific importance, for both humanists and scientists. If it turns out to be a Branch 1 strain, then historians, archaeologists and palaeoclimatologists will need to explore a wider palaeoenvironmental and socio-economic context of Eurasia, to account for a possible spread from Central Asia to Ulus Juchi. If the palaeogenetic analysis render different results, pointing out to a different lineage, then it will open a door to even bigger historical questions, related to potentially a multitude of undocumented plague outbreaks in Central Asia and beyond, territories, where written records was an uncommon or non-existing practice.

The existence of pervasiveness of the Second Plague Pandemic outside of its traditionally known European and Middle Eastern territories should, in turn, be appreciated only by placing the history of the fourteenth-century plague into a wider global picture. Until most recently, the Second Plague Pandemic has been studied almost exclusively from the Eurocentric perspective, leaving other continents out, and thus neglecting the wider Afro-Eurasian roots and extent of the medieval plague. Thanks to some recent scholarly efforts, there is now much more awareness of the need to place the outbreak of the Second Plague Pandemic into the global bio-environmental, and socio-political environment. To understand the pandemic, we need first to have a good understanding of its proliferation. The question of geographic extent of the pandemic remains one of the most pressing questions in this field. Only by diverting from the traditional Eurocentric perspective and focusing on a much wider geo-chronological environment can we start to understand the sudden appearance of the single deadliest killer of the human race of all times.[32]

But no such novel approach to the study of the plague can be truly ground-breaking without the collaboration not only between humanists and archaeologists working on different cultures and civilizations, but also between humanists, archaeologists and palaeoscientists. The history of plague is an incredibly complex topic; although words and bones can tell us about many of aspects of the disease, there are even more questions that cannot be answered without constantly new palaeoenvironmental and palaeogenetic data. This is especially true in the case of civilizations, where written evidence is patchy or lacking and, as a result, where *matter* has to step in and take the place of *word*, to shed light on the complexity of the situation. The case of the Issyk-Kul' plague outbreak of 1338-9 is just one such example. There were no Chaghadaid chronicles reporting on year-to-year weather variations in the Chu Valley; nor can we expect local mid-fourteenth-century *literati* to be aware about the genetic differences between the outbreaks in different plague *foci*. It is only with the help of dendrochronological and palaeogenetic evidence that one may appreciate the timing, geography and environment of seems to be the earliest documented outbreak of the Second Plague Pandemic. The future of the plague study is, therefore, in the hands of trans-disciplinary teams of humanists, archaeologists and scientists.

[32] Monica H. Green, Taking "Pandemic" Seriously: Making the Black Death Global, The Medieval Globe, I, 2014, 27-61