'Sparing the weak and feeble': was the Black Death the cause of population ageing in medieval England?

Writing of the Black Death, the chronicler Geoffrey Le Baker noted that 'the pestilence seized especially the young and strong, commonly sparing the weak and feeble'.[1] Quite simply, he was wrong. The enfeebled elderly had little hope of surviving the calamitous plague years, a tragedy which cut down at least a third of the English population. But in the coming years, life expectancy reached unprecedented highs as medieval England began to undergo major demographic, economic and social shifts; previously stagnant, life expectancy saw a sharp rise near the end of the 14th century.[2] Efforts have been made to undermine the role of the plague, to take the *longue duree* and suggest that these dramatic changes during and after the 14th century were simply a continuation of deep-rooted trends.[3] Refusal, especially by Marxist historians, to give inhuman forces like the plague 'the dignity' of a position as a turning point in human history has led to a rejection of the idea that long-term change could spring from this short-term catastrophe.[4] Some have pointed to the beginnings of change in the pre-plague era to support this argument, and others have highlighted the spike in life expectancy significantly after the plague at the end of the 14th century.[5] But it would be simply wrong to neglect one of the single most devastating events in European history, whose myth is so enduring, it retains its vigour even today. It is therefore necessary to fully evaluate the impact of this tragedy, not just as an inhuman force but an all-consuming engine of change; its role in prolonging the life expectancy of the medieval population was both pivotal and enduring. Most significantly, the heights of plague mortality provided genetic selectivity, creating a stronger and healthier population. At the same time, the disease could be found at the root of a number of environmental changes, including improvements in diet and medicine. In short, the catastrophic plague years infringed upon the very fabric of the medieval population, embedding itself in their identity, their environment, and even their genes.

---

[1] Beidler, P. "The Plague And Chaucer's Pardoner". *The Chaucer Review*, vol 16, no. 3, 1982, pp. 260. *JSTOR*, http://www.jstor.org/stable/25093795. Accessed 29 May 2020.

[2] For example, the average age at death of noble adults increased from 48 for those born 800–1400, to 54 for 1400–1650. Cummins, N. "Lifespans Of The European Elite, 800-1800". *Journal Of Economic History*, vol 77, no. 2, (2017), pp. 406 - 439. *Cambridge Core*, doi:https://doi.org/10.1017/S0022050717000468. Accessed 15/07/2020

[3] A summary of such arguments is provided by Aston, T. H., and C. H. Philpin. "The Brenner Debate : Agrarian Class Structure And Economic Development In Pre-Industrial Europe". *Past And Present*, vol 107, no. 1, 1985.

[4] "We must really not raise the plague to the dignity of a constant economic force" Vinogradoff, P, "review of Page, T. W., *The End of Villeinage in England* (New York, 1900).'' *English Historical Review,* vol 15, (1989), pp. 776.

[5] Cummins, N. "Lifespans Of The European Elite, 800-1800". *Journal Of Economic History*, vol 77, no. 2, (2017), pp. 406 - 439. *Cambridge Core*, doi:https://doi.org/10.1017/S0022050717000468. Accessed 15/07/2020

Analysing demographic trends such as population ageing in the medieval period is complicated by a number of factors, mostly rooted in the limited source material that has survived, described by one historian as 'barely adequate'.[6] Traditionally, documentary evidence such as wills, censuses or tax records have been used, but the deficiencies of these sources in their preferment of certain socioeconomic groups are widely acknowledged. As a result, such studies have produced conflicting results: Nightingale's analysis of the deaths of creditors (generally wealthy men) found a rise in longevity in the centuries after the Black Death, whereas several studies of monastic records have indicated that life expectancy actually fell in the monasteries of Christ Church Canterbury, Durham and Westminster Abbey in the final centuries of the medieval period.[7] [8] More recently, however, the rise of bioarchaeology has allowed for a far more comprehensive view of the medieval population, using sources such as analysis of skeletal remains to examine cross-sections of medieval society. These have provided significant concrete evidence for a rise in life expectancy, such as comparisons of a number of medieval cemeteries to demonstrate a rise in average age at death across the period.[9] As a whole, research on the demographic change through the medieval period clearly indicates population ageing, especially across the 14th century, most of all around 1400.[10] Although documentary studies such as the aforementioned monastic records and Röhrkasten's study of wills have conflicted with this apparent rise in life expectancy, such sources are skewed by their heavy focus on the privileged orders, unlike bioarchaeological data which can access a more representative sample.[11] In fact, the presence of the change amongst the commoners studied in bioarchaeology but not the elites represented in documentary research indicates that this change was sparked by the plague itself rather than more general trends, for the common people suffered far more greatly than their elite counterparts during the plague years.[12] Therefore, bioarcheology can be used alongside traditional documentary research to provide a more precise and targeted approach and reveal the direct role of the plague in driving population ageing.

---

[6] Smith, R. "'Human Resources' in Grenville Aston'' *The Countryside of Medieval England* (Oxford; Oxford University Press.1988)

[7] Nightingale, P. ''Some New Evidence of Crises and Trends of Mortality in Late Medieval England.'' *Past and Present* vol 187, (2005). pp. 33–68.

[8] Harvey B and Oeppen J. ''Patterns of Morbidity in Late Medieval England: A Sample from Westminster Abbey.'' *Econ Hist Rev*, vol 54, (2001): pp 215–239.

[9] DeWitte, S. ''Age Patterns of Mortality During the Black Death in London, A.D. 1349–1350'' *J Archeol Sci*, vol 37, no 12, (2010), *PubMed Central*, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3094018, Accessed 20/06/2020

[10] Cummins, N. "Lifespans Of The European Elite, 800-1800". *Journal Of Economic History*, vol 77, no. 2, (2017), pp. 406 - 439. *Cambridge Core*, doi:https://doi.org/10.1017/S0022050717000468. Accessed 15/07/2020

[11] Röhrkasten, J. ''Trends of Mortality in Late Medieval London.'' *Nottingham Medieval Studies* vol 45, (2001) pp 172–209

[12] DeWitte. S, Kowaleski, M. ''Black Death Bodies'' *Fragments: Interdisciplinary Approaches to the Ancient and Medieval Past*, vol 6 (2017) https://quod.lib.umich.edu/f/frag/9772151.0006.001/--black-death-bodies?rgn=main;view=fulltext#N81 Accessed online 26/06/20

Despite the overall rise in life expectancy, a sudden drop was recorded in the mid-14th century, the result of colossal plague mortality. Contrary to the arguments of those who label the plague an 'indiscriminate killer' in light of this extraordinary virulence, the Black Death was in fact highly selective.[13] As is true of almost any disease, the plague proved most fatal to the elderly, thus slashing the average age of the population.[14] Considerable research has demonstrated the connection between age and mortality during the plague, including a number of paleodemographic studies of the East Smithfield cemetery, a site chosen because of documentary evidence proving its almost exclusive use during the 1349 epidemic.[15] Age estimation based on these skeletons has strongly indicated that vulnerability to the pestilence increased with age, with the Gompertz hazard level more than doubling between the ages of 40 and 80.[16] As well as old age itself, a number of risk factors for the plague were prominent amongst the elderly. The poor were often more susceptible; the higher nobility had a mortality rate of only 4.5%, and even wealthy peasants fared better than their landless counterparts - a trend demonstrated well by the post-plague drop in landless men paying an annual *chevagium* in the manorial records of Glastonbury Abbey.[17] Similarly, comparisons of the prevalence of skeletal lesions between the East Smithfield cemetery and a control pre-plague Danish cemetery have demonstrated an unsurprising link between 'frailty' and vulnerability, further indicating selection for the often frail older generation.[18] Understandably, a number of contemporaries were initially overwhelmed by the seemingly unavoidable infection: the Italian chronicler Michele da Piazza described the death rate as 'so heavy that sex and age made no difference, but everyone died alike'.[19] Nevertheless, the label 'indiscriminate killer' must be rejected in light of the considerable evidence demonstrating plague selectivity and the flaws in supporting research; the researchers who have drawn contrasts between East Smithfield and cemeteries such as the

---

[13] Gowland, R. 'Detecting plague: palaeodemographic characterisation of a catastrophic death assemblage.' *Antiquity* vol 79, no 303, (2005): pp 146-157; Margerison, B and Knüsel, C. 'Paleodemographic comparison of a catastrophic and an attritional death assemblage.' *Am J Phys Anthropol* vol 119, no 2, (2002): pp 134–143.

[14] De Witte, S. ''Age Patterns of Mortality During the Black Death in London, A.D. 1349–1350'' *J Archeol Sci*, vol 37, no 12, (2010), *PubMed Central*, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3094018, Accessed 20/06/2020

[15] The Smithfield cemetery was in use between 1348-1350, an emergency measure established to deal with the excess plague mortality. Grainger, I. *The Black Death Cemetery, East Smithfield* (London, Museum of London Archeology Service, 2008)

[16] See Figure 2. DeWitte, S. ''Age Patterns of Mortality During the Black Death in London, A.D. 1349–1350'' *J Archeol Sci*, vol 37, no 12, (2010), *PubMed Central*, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3094018, Accessed 20/06/2020

[17] Ecclestone, M. "Mortality of Rural Landless Men before the Black Death: The Glastonbury Head-tax Lists." *Local Population Studies* vol 63 (1999): pp 6–29

[18] DeWitte, S and Wood, J. ''Selectivity of Black Death mortality with respect to preexisting health'' *Proceedings of the National Academy of Sciences USA* vol 105, no 5 (2008) https://doi.org/10.1073/pnas.0705460105 Accessed online 08/07/20

[19] 'The mortality was so heavy that sex and age made no difference, but everyone died alike' Michele de Piazza's Cronaca cited in Horrox, R. *The Black Death*: *Medieval Source Book* (Manchester, Manchester University Press, 1994) pp. 41 https://www.manchesterhive.com/view/9781526112712/9781526112712.xml

St-Helen-on-the-Walls cemetery in York to argue for indiscriminate mortality have since been shown to be based on flawed age estimation techniques and problematic life cycle tables, now replaced in bioarchaeology by Bayesian transition analysis and the Gompertz model.[20] The number of victims who succumbed to the plague was unprecedented and must have seemed incomprehensible, but the Black Death was a selective killer, targeting especially the old and weak layers of the post-1349 population and significantly reducing life expectancy in the short term.

Since the plague targeted the frail, it could credibly be argued that those who survived were more likely to reach an older age. Having weeded out the weak, the life expectancy in the stronger post-plague population would be expected to rise after a delay, correlating with available demographic data.[21] In fact, the delay between the tragic plague years and the rise in life expectancy, sometimes used to undermine the role of the disease in population ageing, actually points to the plague's ability to provoke deep-rooted change.[22] Ostensibly, the plague initially engendered a drop in life expectancy, wiping away the elderly in huge numbers, but the cycle of life rendered this change short lived as the stronger post-plague population grew.[23] Manifestly, the post-plague population possessed some natural immunity to the plague itself. Mortality rates fell considerably with each new wave of pestilence, to the point that the Pope's doctor declared that in 1382, 'only one twentieth of the population became sick, and almost all of these survived'.[24] Even accounting for optimism on his part, wills, monastic documentation and burial records all reinforce this sense of downward mortality.[25] In fact, later waves, notably the epidemic of 1361-1362, came to be known as the 'children's plagues', referred to by contemporary chroniclers as "the mortality of children" or "the pestilence of boys".[26] Though not English, the chronicler Ranieri di Sardo recorded

---

[20] DeWitte, S. ''Age Patterns of Mortality During the Black Death in London, A.D. 1349–1350'' *J Archeol Sci*, vol 37, no 12, (2010), *PubMed Central*, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3094018, Accessed 20/06/2020

[21] Cummins, N. "Lifespans Of The European Elite, 800-1800". *Journal Of Economic History*, vol 77, no. 2, (2017), pp. 406 - 439. *Cambridge Core*, doi:https://doi.org/10.1017/S0022050717000468. Accessed 15/07/2020

[22] Cummins, for example, points to this delay as evidence against the plague's impact. Ibid.

[23] Russell, J., *British Medieval Population*. (Albuqerque: University of New Mexico. 1948.); Razi Z. ''Life, marriage, and death in a medieval parish : economy, society, and demography in Halesowen, 1270–1400.'' (Cambridge: Cambridge University Press. 1980)

[24] 'In 1348, two thirds of the population were afflicted, and almost all died; in 1361, half the population contracted the disease, and very few survived; in 1371, only one tenth were sick, and many survived; while in 1382, only one twentieth of the population became sick, and almost all of these survived.' Raymundus Chalmelli de Vinario, 1382. Cited in Zinsser, H. *Rats, lice and history*, (New York, Little Brown for the Atlantic Monthly Press, 1935), p. 89.

[25] Although such documents are often limited to the affluent, and prevent a number of analytical issues such as small sample size, gaps in the record, and unreliable data, the consistency amongst these sources in indicating decreased mortality is significant; Cohn Jr, S. K. ''Epidemiology of the Black Death and Successive Waves of Plague'' *Medical History*, vol. 27 (2008) https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2630035/#fn32 Accessed online 01/07/20

[26] Cited by DeWitte. S, Kowaleski, M. ''Black Death Bodies'' *Fragments: Interdisciplinary Approaches to the Ancient and Medieval Past*, vol 6 (2017) https://quod.lib.umich.edu/f/frag/9772151.0006.001/--black-death-bodies?rgn=main;view=fulltext#N81 Accessed online 26/06/20; 'the pestilence of boys' Chronicle of Louth Park

specific figures, writing that 80% of plague deaths in the Pisa epidemic of 1374 were children under the age of 12.[27] Contemporary statistics may lack modern rigour, but his figures are supported by the burial records in Siena.[28] This phenomenon can be explained by post-epidemic immunity; those who had survived the first plague were naturally less vulnerable, children born since lacked this good fortune. Not only were survivors less likely to die from plague, they were typically stronger and longer-lived than pre-plague counterparts; by targeting the weak, the plague had reduced the average frailty of the population. Comparisons between pre- and post-plague burial grounds indicate a significantly stronger and longer-lived population, with more than 25% of the post-plague sample identified as older than 70, compared to less than 10% pre-plague, overtaking the 10-19 age group as the modal class.[29] Similarly, Kaplan-Meier survivorship values rocketed amongst the post-plague sample, displaying significantly lower mortality risks between the ages of 20 and 80.[30] It has been suggested that decreasing mortality rates can be attributed to mutations of the *Y. pestis* pathogen, but molecular comparison between ancient and modern strains has yet to yield such indications of decreased virulence.[31] Those who had survived the plague were, on average, stronger than those who died, and were therefore able to reach an older age than previous populations.

Crucially, survivors were able to pass on these genetic advantages to their offspring, changing the very fabric of the medieval population and contributing significantly to the extension of life expectancy. As a result of the staggering levels of selective plague mortality, it seems probable that the Black Death acted as a force for mass natural selection, triggering permanent genetic change.[32] Before the Black Death, only around 10% of the population lived past the age of 70; in the following centuries, this figure doubled to 20%.[33] Research has begun to reveal the genetic impact of the trauma of the 14th century, locating specific

---

Abbey pp 40 – 41, 'the mortality of children' Anonimalle Chronicle pp 50, 'children and adolescents were generally the first to die' An anonymous Canterbury chronicle 1346-67 Horrox, R., ed. and trans. *The Black Death*. (1994). pp 85-86

[27] Banti, O. ed. ''*Cronaca di Pisa di Ranieri Sardo*'', *Fonti per la Storia d'Italia*, (Rome, Istituto Storico Italiano, 1963), pp. 186. Cited by Cohn Jr, S. K. ''Epidemiology of the Black Death and Successive Waves of Plague'' *Medical History*, vol. 27 (2008) https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2630035/#fn32 Accessed online 06/06/20

[28] These burial records show the proportion of children amongst plague deaths rising from a third to over half between 1363 and 1374, reaching 88% by 1383. Laurent, M-H. ed. ''I necrologi di San Domenico in Camporegio (epoca cateriniana)'' *Fontes vitae S. Catherinae senensis historici*, vol 20, (Siena, Università di Siena, 1937)

[29] DeWitte S. ''Mortality risk and survival in the aftermath of the medieval Black Death.'' *PLoS One* vol. 9, no. 5 (2014) https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4013036/ Accessed online 24/06/20

[30] Ibid.

[31] Ibid.

[32] DeWitte, S. ''Age Patterns of Mortality During the Black Death in London, A.D. 1349–1350'' *J Archeol Sci*, vol 37, no 12, (2010), *PubMed Central*, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3094018, Accessed 20/06/2020

[33] Pappas, S. ''It Got Better: Life Improved After Black Death, Study Finds'' *LiveScience* (2014) https://www.livescience.com/45428-health-improved-black-death.html Accessed online 20/06/20

mutations which may have occurred as a result of the pestilence. Although theories suggesting that plague selectivity could account for the prevalence of the CCR5-Δ32 genetic mutation in Europe have been rejected, new comparisons between the almost genetically distinct European Romanian and Roma populations have indicated that the pressures of the plague did indeed alter the immune receptors of infected populations, selecting for a genetic cluster known as TLR2.[34] [35] This cluster, which includes 3 altered genes, contributes to the hosts' ability to recognise and destroy foreign pathogens by building receptors on the surface of leukocytes. The heightened immune response of cells engineered to express TLR2 when exposed to *Y. pestis* bacteria strongly indicates the role of the plague in this genetic evolution.[36] This correlates with the absence of this cluster in northwest India, where the population otherwise displays significant similarities with the Roma population but was spared the horrors of the Black Death.[37] In this way, life expectancy improved in the genetically stronger population in the centuries after the Black Death - and as a direct result of the Black Death, shifting the balance towards an aging population.

It has instead been argued that population ageing can be traced to pre-Black Death environmental trends such as changing diet as medieval agricultural techniques and the perception of food itself began to evolve - better nutrition ostensibly extended life expectancy. Dyer's analysis of the diet of medieval harvesters, for example, clearly demonstrates that the dominant components shifted dramatically from bread to meat and ale.[38] The increased quality of this food was pronounced; wheat bread replaced rye and barley, beef replaced bacon, and ale replaced cider.[39] Some of these trends can be traced to the early 14th century: records for manors in Norfolk such as Sedgewick and Catton indicate a decline in expenditure on bread and increase on meat as early as the 1290s.[40] But by far the greatest shift in diet was the result of the Black Death itself. The proportion of diet taken

---

[34] For a while, it was theorised that plague selectivity could account for the prevalence of the CCR5-Δ32 genetic mutation in Europe, but discoveries of the allele in Bronze Age samples challenged this notion. Hedrick, P. Verrelli, B. "'Ground truth' for selection on CCR5-Δ32" *Trends in Genetics* vol. 22, no. 6 (2006) https://www.sciencedirect.com/science/article/abs/pii/S0168952506001247 Accessed online 20/06/20

[35] Pappas, S. 'Black Death likely altered European genes'' *LiveScience* (2014) https://www.livescience.com/45428-health-improved-black-death.html, Accessed online 20/06/20

[36] Although controversy remains concerning the source of the Black Death, it is generally agreed amongst researchers that *Y. pestis* is the most likely. Nouri. A, "The Black Death Pathogen Genome Uncovered," *American Association for the Advancement of Science*, (2011), https://www.aaas.org/black-deathpathogen-genome-uncovered. Accessed online 24/06/20

[37] A number of plagues have devastated populations around the world, but none with the severity of the Black Death. Pennisi, E. ''Black Death Left a Mark on Human Genome'' *American Association for the Advancement of Science* (2014) https://www.sciencemag.org/news/2014/02/black-death-left-mark-human-genome

[38] Dyer, C. 'Changes in diet in the late Middle Ages: the case of harvest workers', *Agricultural History Review'* vol 36 (1988) pp 21-37

[39] Campbell, B, Bartley, K, Power, J. "The Demesne-Farming Systems of Post-Black Death England: A Classification'' *Agricultural History Review* vol 44, no 2, (1996) pp 131

[40] Dyer, C. 'Changes in diet in the late Middle Ages: the case of harvest workers', *Agricultural History Review'* vol 36 (1988) pp 31

up by bread for harvest workers at Sedgewick fell from 41% in 1256 to 34% in 1431, before dropping to 19% by 1387.[41] Unsurprisingly, prosperity and reduced population after 1349 increased the availability of resources, as well as the quality of nutrition the underprivileged could now access. These changes cannot be dismissed as short term; diet was improved substantially not only by the excess availability following the pestilence, but by the dramatic shift in the ratio of livestock to farmed land as labour shortages forced a shift to animal husbandry and the changing perceptions of food as the lower classes grew more prosperous and mobile.[42] The concurrent rise in availability of land and fall in availability of labour provided momentum for a previously minor turn towards the cultivation of livestock. Increasing meat consumption reflects these changes, from only 4% of harvesters' diets in 1256 and 9% in 1341 to 30% in 1387, and remaining high at 28% in 1424.[43] At the same time, these changing agricultural techniques provoked a shift from salted to fresh fish and meat after the epidemic, providing far more nutritional value.[44] Not only did higher quantities and quality of meat significantly change the nutritional profile of the popular diet, its traditional association with affluence intricately linked it with changing identity, allowing such changes to outlast population regrowth. This was the reason for dietary restrictions in the sumptuary laws of 1363, which the nobility repeatedly tried and failed to enforce.[45] Although the beginnings of change can be found before the Black Death, these were slow and regionally limited in comparison to the widespread transformation of diet in the second half of the 14th century. The plague provided an extraordinary catalyst, but also sparked deep rooted change itself; it is unlikely that the shift towards animal husbandry could have gained traction in the crowded land and labour markets of the 14th century. Therefore, whilst it seems clear that changes in diet contributed to the rising life expectancy of medieval England, many of these changes were themselves the result of the Black Death.

It could equally be argued that improvements in healthcare rather than the Black Death played a key role in rising life expectancy as late medieval medicine began to evolve beyond its traditionally theoretical confines. Previously, pursuits such as anatomy and surgery had received little attention in the field, and the Church placed heavy restrictions on dissection.[46]

---

[41] Table 1. Ibid. pp 25
[42] Cordova, J, "Mortality and Meals: The Black Death's Impact on Diet in England" *History Undergraduate Theses*. Paper 36. (2019) https://digitalcommons.tacoma.uw.edu/history_theses/36 Accessed 24/06/2020
[43] Dyer, C. 'Changes in diet in the late Middle Ages: the case of harvest workers', *Agricultural History Review'* vol 36 (1988) pp 25
[44] Dyer C. *An Age of Transition?: Economy and Society in England in the Later Middle Ages*. (Oxford: Oxford University Press, 2005)
[45] Statutes of the Realm, I pp. 380, in Horrox, R. ed. and trans. *The Black Death: Medieval Source Book* (Manchester, Manchester University Press, 1994) pp. 340.
[46] Legan, J., "The medical response to the Black Death" *Senior Honors Projects, 2010-current*, vol 103. (2015), pp. 28 https://commons.lib.jmu.edu/honors201019/103

In the late 14th century, however, practitioners such as John of Aderne, surgeon to King Edward III and considered by many as one of the fathers of modern surgery, began to promote reliance on direct experience in works such as his *Practica*.[47] [48] Both medical thought and public health had significantly advanced, which must have directly impacted life expectancy. Once again, however, much of this environmental change was rooted in the plague. Ironically, the loss of life amongst distinguished medical professions allowed new growth in medical thought - after 1349, every chair of medicine or surgery in the University of Padua was left vacant.[49] The all-consuming pestilence sparked interest in anatomy and pathological theory, and broke confidence in medieval medical methods such as the Galenic system.[50] The inability of existing medical thought to combat the calamitous infection had helped drive a transition from theoretical to practical learning, as demonstrated by the evolution of plague tractates.[51] The Pope himself authorised a dissection by Guy de Chauliac to help determine the cause of the plague, helping destigmatise surgery across the medical profession.[52] Although medieval medicine often remained far from scientific and Galenic humoralism remained prominent into the 17th century, these changes had far reaching effects across the population.[53] Fear of disease forced rapidly growing hygiene standards, with the institution of sanitation measures such as street sweeping and rubbish disposal which endured long after the Black Death.[54] Isolation was often considered the best form of defence from infection from 'bad air', leading to progress in the understanding and implementation of measures to contain disease.[55] The word for 'quarantine' itself originates from plague-time efforts to minimise infection: in Ragusa, incoming visitors from infected areas were isolated for a thirty day *trentino*, which was adopted and extended to 40 days

---

[47] John of Aderne's De Arte Physicali in Clendening, L. *Source book of medical history* (New York, Dover Publications, 1960). pp. 85 .

[48] Pearn, J. "Master John of Arderne (1307-1380): a Founder of Modern Surgery," *ANZ Journal of Surgery,* vol 82 no. 1 (2012): pp. 48.

[49] Vanneste, S, "The Black Death And The Future Of Medicine" *Wayne State University Theses.* Paper 29 (2010), pp 74

[50] Legan, J., "The medical response to the Black Death" *Senior Honors Projects, 2010-current*, vol 103. (2015), pp. 56 https://commons.lib.jmu.edu/honors201019/103

[51] Vanneste, S. "The Black Death And The Future Of Medicine" (2010). pp 49

[52] Marks, G. *The Medieval Plague* (New York: Doubleday & Company, Inc., 1971), pp 137

[53] Nuland, S. ''Bad Medicine'', *The New York Times,* (2007), https://www.nytimes.com/2007/07/08/books/review/Nuland.html?ex=1341547200&en=28b87289415e5d35&ei=5088 Accessed 23/07/20

[54] Warren, A. *Examination of Black Death and Public Health Implications for Today* (University of Connecticut, Connecticut, 2001) pp. 35

[55] 'Bad air'. The theory that disease was spread by bad air was common throughout the medieval period, and was often associated with the Plague. 'the ruinous corruption of the air that is all around us, is a harbinger of mortality and famine' Consultation with the Medical Faculty of the University of Paris, 6 October 1348 in Aberth, J. 'The Black Death: The Great Mortality of 1348-1350, A Brief History with Documents' (New York, St. Martin's Macmillan Learning, 2005) pp 42 - 43; 'bad air' released by corpses, Boeckl, C. *'Images of Plague and Pestilence: Iconography and Iconology.*' (Missouri: Truman State University Press, 2000.)

(*'quarantino'*) by a number of Italian cities over the next 80 years.[56] Similarly, the use of the word '*contagium'* proliferated in both medical and non-medical documents following the plague, indicating the developments in medical understanding.[57] The role of the Black Death in improving hygiene can be gauged by a comparison with the relative lack of medical change in the Middle East, where the predominant belief was that the Plague was not caused by contagion.[58] In short, the helplessness of contemporary medicine in the face of this all-consuming tragedy sparked a modernisation of the medical profession. The impact of these developments on population demography are obvious, better medical treatment and increased public hygiene as a result of the plague years were major contributors to public health and therefore population ageing.

The Black Death was a tragedy of extraordinary proportions. In the years that followed, 14th century England must have been simply unrecognisable: a decimated population where before there had been overcrowding, a labour shortage where before unemployment and exploitation had flourished, a food and land surplus where before there had been famine. These changes were, of course, short term. Years of regrowth were to follow as medieval England sought to heal from the mid-century tragedy. And yet the impact of the Black Death outlived this recovery as genetic and psychological change extended the life expectancy of the English population. Those historians who rail against recognising the impact of inhuman forces like the plague neglect the distinctly human impact this disease had. Psychologically, the mid-century food surplus and lower class prosperity had an enduring influence on diet, as did the attempts of landowners to cope with the labour shortage by turning to animal husbandry. Similarly, the plague was the root of significant medical development, clearing the way for new growth and heightening standards of cleanliness throughout the population. More importantly, the impact of the Black Death entered the very building blocks of human life, providing a force for mass selectivity across medieval England. Essentially killing off the weak and frail, survivors and their children would on average live healthier, longer lives. Bioarcheology has allowed for unprecedented insight into these monumental changes, providing a route into the bodies and minds of 14th century England. These techniques may in the future further expand the available evidence and provide a richer, more detailed picture of the factors underpinning demographic variation over time. Detailed analysis of dental samples, for example, may be able to provide a far more precise view of changes in

[56] Sehdev, P. ''The Origin of Quarantine. Clinical infectious diseases : an official publication of the Infectious Diseases'' *Society of America*. vol 35. (2002).
[57] Jr Cohn, S. K. ''Epidemiology of the Black Death and Successive Waves of Plague'' *Medical History*, vol. 27 (2008) https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2630035/#fn32 Accessed 16/07/20
[58] Legan, J., "The medical response to the Black Death" *Senior Honors Projects, 2010-current*, paper 103, pp 56 https://commons.lib.jmu.edu/honors201019/103

medieval diet, such as the presence of nitrogen isotopes to indicate meat consumption. More importantly, bioarchaeological evidence ascertains not just to the elites, but also to the often frustratingly inaccessible wider population. Study of the ‘commons’ could not be more necessary to understanding of the Black Death; they were, after all, the greatest part of its victims. As if nature wished to preserve life’s balance, they also received its greatest rewards. The Black Death cut millions of lives in half, but it extended millions more.

Bibliography:

Aston, T. H., and C. H. Philpin. "The Brenner Debate : Agrarian Class Structure And Economic Development In Pre-Industrial Europe". *Past And Present*, vol 107, no. 1, (1985).

Beidler, P. "The Plague And Chaucer's Pardoner". *The Chaucer Review*, vol 16, no. 3, (1982), p. 260. *JSTOR*, http://www.jstor.org/stable/25093795. Accessed 29 May 2020.

Boeckl, C. *'Images of Plague and Pestilence: Iconography and Iconology.'* (Missouri: Truman State University Press, 2000.)

Campbell, B, Bartley, K, Power, J. "The Demesne-Farming Systems of Post-Black Death England: A Classification'' *Agricultural History Review* vol 44, no 2, (1996

Cohn Jr, S. K. ''Epidemiology of the Black Death and Successive Waves of Plague'' Medical History, vol. 27 (2008) https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2630035/#fn32 Accessed online 06/06/20

Cummins, N. "Lifespans Of The European Elite, 800-1800". *Journal Of Economic History*, vol 77, no. 2, (2017), pp. 406 - 439. *Cambridge Core*, doi:https://doi.org/10.1017/S0022050717000468 Accessed 15/07/2020.

De Witte, S. ''Age Patterns of Mortality During the Black Death in London, A.D. 1349–1350'' *J Archeol Sci*, vol 37, no 12, (2010), *PubMed Central*, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3094018, Accessed 20/06/2020

DeWitte S. ''Mortality risk and survival in the aftermath of the medieval Black Death.'' *PLoS One* vol. 9, no. 5 (2014) https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4013036/ Accessed online 24/06/20

DeWitte. S and Kowaleski, M. ''Black Death Bodies'' *Fragments: Interdisciplinary Approaches to the Ancient and Medieval Past*, vol 6 (2017) https://quod.lib.umich.edu/f/frag/9772151.0006.001/--black-death-bodies?rgn=main;view=fulltext#N81 Accessed online 26/06/20

DeWitte, S and Wood, J. ''Selectivity of Black Death mortality with respect to preexisting health'' *Proceedings of the National Academy of Sciences USA* vol 105, no 5 (2008) https://doi.org/10.1073/pnas.0705460105 Accessed online 08/07/20

Dyer, C. 'Changes in diet in the late Middle Ages: the case of harvest workers', *Agricultural History Review* vol 36 (1988) pp 21-37

Ecclestone, M. "Mortality of Rural Landless Men before the Black Death: The Glastonbury Head-tax Lists." *Local Population Studies* vol 63 (1999): pp 6–29

Gowland, R. 'Detecting plague: palaeodemographic characterisation of a catastrophic death assemblage.' *Antiquity* vol 79, no 303, (2005): pp 146-157

Grainger, I. *The Black Death Cemetery, East Smithfield* (London, Museum of London Archeology Service, 2008)

Harvey B, Oeppen J. ''Patterns of Morbidity in Late Medieval England: A Sample from Westminster Abbey.'' *Econ Hist Rev* vol 54 (2001): pp 215–239.

Hedrick, P. Verrelli, B. "'Ground truth' for selection on CCR5-Δ32" *Trends in Genetics* vol. 22, no. 6 (2006) https://www.sciencedirect.com/science/article/abs/pii/S0168952506001247 Accessed online 20/06/20

Laurent, M-H. ed. ''I necrologi di San Domenico in Camporegio (epoca cateriniana)'' *Fontes vitae S. Catherinae senensis historici*, vol 20, (Siena, Università di Siena, 1937)

Legan, J., "The medical response to the Black Death" *Senior Honors Projects, 2010-current*, Paper 103. (2015), https://commons.lib.jmu.edu/honors201019/103

Margerison, B and Knüsel, C. 'Paleodemographic comparison of a catastrophic and an attritional death assemblage.' *Am J Phys Anthropol* vol 119, no 2, (2002): pp 134–143.

Marks, G. *The Medieval Plague* (New York: Doubleday & Company, Inc., 1971)

Nightingale, P. ''Some New Evidence of Crises and Trends of Mortality in Late Medieval England.'' *Past and Present,* vol 187, (2005). pp. 33–68.

Nouri. A, "The Black Death Pathogen Genome Uncovered," *American Association for the Advancement of Science*, (2011), https://www.aaas.org/black-deathpathogen-genome-uncovered. Accessed online 24/06/20

Nuland, S. ''Bad Medicine'', *The New York Times,* (2007), https://www.nytimes.com/2007/07/08/books/review/Nuland.html?ex=1341547200&en=28b87289415e5d35&ei=5088 Accessed 23/07/20

Pappas, S. 'Black Death likely altered European genes'' *LiveScience* (2014) https://www.livescience.com/45428-health-improved-black-death.html Accessed online 20/06/20

Pappas, S. ''It Got Better: Life Improved After Black Death, Study Finds'' *LiveScience* (2014) https://www.livescience.com/45428-health-improved-black-death.html Accessed online 20/06/20

Pennisi, E. ''Black Death Left a Mark on Human Genome'' *American Association for the Advancement of Science* (2014) https://www.sciencemag.org/news/2014/02/black-death-left-mark-human-genome

Pearn, J. "Master John of Arderne (1307-1380): a Founder of Modern Surgery," *ANZ Journal of Surgery,* vol 82 no. 1 (2012): pp. 48.

Razi Z. ''Life, marriage, and death in a medieval parish : economy, society, and demography in Halesowen, 1270–1400.'' (Cambridge: Cambridge University Press. 1980)

Röhrkasten, J. ''Trends of Mortality in Late Medieval London.'' *Nottingham Medieval Studies* vol 45, (2001) pp 172–209

Russell, J., *British Medieval Population*. (Albuqerque: University of New Mexico. 1948.)

Sehdev, P. ''The Origin of Quarantine. Clinical infectious diseases : an official publication of the Infectious Diseases'' *Society of America*. vol 35. (2002).

Smith, R. "'Human Resources' in Grenville Aston'' *The Countryside of Medieval England* (Oxford,; Oxford University Press.1988)

Warren, A. *Examination of Black Death and Public Health Implications for Today* (University of Connecticut, Connecticut, 2001)

Vanneste, S, "The Black Death And The Future Of Medicine" *Wayne State University Theses.* Paper 29 (2010).

Vinogradoff, P, "review of Page, T. W., *The End of Villeinage in England* (New York, 1900).'' *English Historical Review,* vol 15, (1989) pp 774 - 781

Primary Sources:

Aberth, J. '*The Black Death: The Great Mortality of 1348-1350, A Brief History with Documents'* (New York, St. Martin's Macmillan Learning, 2005)

- Consultation with the Medical Faculty of the University of Paris, 6 October 1348

Banti, O. ed. ''*Cronaca di Pisa di Ranieri Sardo*'', *Fonti per la Storia d'Italia*, (Rome, Istituto Storico Italiano, 1963), pp. 186

Clendening, L. *Source book of medical history* (New York, Dover Publications, 1960).

- John of Aderne's De Arte Physicali pp. 85

Horrox, R. ed. and trans. *The Black Death: Medieval Source Book* (Manchester, Manchester University Press, 1994)

- An anonymous Canterbury chronicle 1346-67
- Anonimalle Chronicle, pp. 50
- Chronicle of Louth Park Abbey, pp. 40 – 41
- Michele de Piazza's Cronaca
- Statutes of the Realm, I, pp. 340.

Raymundus Chalmelli de Vinario, 1382; in Zinsser, H. *Rats, lice and history*, (New York, Little Brown for the Atlantic Monthly Press, 1935), pp. 89