

CAUSES OF DEATH AMONG SWEDISH PEASANTS DURING MIGRATION TO SOUTHERN UKRAINE IN 1782–83

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The latter half of the 18th century was marked by significant geopolitical and administrative changes in the territory of modern Southern Ukraine, provoking the migration of large population masses. The switch in Iedysan Orda's loyalty from the Ottoman Empire to the Russian Empire in 1770 played a significant role in this process, along with emigration from that region into Russian territory.¹ Another important event was the signing of the Kyuchuk Kaynardzhy Peace Treaty between the Ottoman and Russian empires in 1774 (after the Russian–Turkish War of 1768–74). According to the treaty's conditions, the lands of Iedysan Orda between the rivers Bug and Dnipro were incorporated into the Russian Empire,² giving Russia access to the strategically important entrance to the Black Sea. However, Russia needed a loyal population in order to successfully colonise and hold onto the lands. Therefore, they could not use the independent Ukrainian Cossacks — the Zaporizhzhian Sich — located near Iedysan since the Russians feared revenge after Russian troops had eliminated the autonomy of the Ukrainian Cossacks in 1775. However, the Russian government could not even use Russian peasants for colonisation, as most of them were serfs. They thus pinned their hopes primarily on foreigners, but this option was also restrained by the governments of European countries. The administration of this territory fell to Prince Gregory Potemkin, who sought all potential opportunities to find colonists.

An advantageous situation emerged for the Russian government on Dagö island in Estland (the modern island of Hiiumaa in Estonia), where ethnic Swedish peasants attempted to assert their personal independence

¹ Volodomȳr Grȳbovskiĭ, *Nogaĭs'ki ordȳ Pivnichnogo Prȳchornomor'ya u XVIII – na pochatku XIX stolittia* (unpublished doctoral thesis, Zaporizs'kȳi natsional'nȳi universȳtȳt, 2006), 167–183.

² Elena Druzhȳnina, *Kyuchuk-Kaĭnardzhiĭskii Mir 1774 Goda (Ego Podgotovka i Zaklyuchenie)* (Moskva: Izdatel'stvo Akademii nauk SSSR, 1955), 284–285.

from local landowners in a tribunal.³ The Russian government intervened in 1781 and proposed that the peasants be removed to the lands of Iedysan Orda, which had been attached to the Russian Empire after 1774. A large tract of land was granted to the Swedes in the area known as Iedysan, which had previously belonged to the Ingulska palanka of the Zaporizhzhian Sich.

Catherine II and Prince Potemkin used the conflict between peasants and landowners to move people to newly conquered lands. The order that proclaimed an opportunity for Swedes from some Dagö settlements to colonise territories in Southern Ukraine was published only a day before the peasants entered into a contract with a new landowner – Ungern-Sternberg – regarding possibilities for staying on the island.⁴ After the publication of the order, two opportunities were available – to resettle or to stay. The conditions of resettlement were highly profitable. Many peasants agreed to them and consented to emigrate.⁵ The surveyor Peter Polozov demarcated the land for creating the colony in the territory of the Ukrainian Cossack Iuhym's Ploskogolovy zymivnyk in the autumn of 1781.⁶ Emigration began at the end of August, 1781. The migrants had to pass through Pskov and Belarus, and stopped for the winter in the village of Reshetylivka (the modern city Reshetylivka, Poltava oblast, Ukraine). From there they proceeded to the settlement site.

According to the expedition's logbook, 967 individuals set out on this trip.⁷ The first instance of high mortality emerged among resettlers dur-

³ Herman Fischer, "Om svenskarna från Korgessaare och deras öden 1779–1782", *Svio-Estonica*, 5 (1939), 90–117 (90); Jörgen Hedman, Lars Åhlander, *Historien om Gammalsvenskby och svenskarna i Ukraina* (Stockholm: Dialogos Förlag, 2003), 26–29; Yuliya Malits'ka, *Ėstons'ki shvedy na pıvdni Rosiis'koï imperiïi: mıgratsiya, adaptatsiya ta akul'turatsiya pėrésėléntsiiv-kolonistiv (1781–1871)* (unpublished doctoral thesis, Dnipropetrovs'kõi natsional'nõi univėrsytėt, 2010), 65; Svitlana Bobyleva, "The Russian State and Swedes in New Russia (between the Eighteenth and Nineteenth Centuries)", *The Lost Swedish Tribe: Reapproaching the History of Gammalsvenskby in Ukraine*, ed. by Julia Malitska, Piotr Wawrzenniuk (Stockholm: Södertörns högskola, 2014), 39–60 (41–42).

⁴ Hedman and Åhlander, *Historien om Gammalsvenskby*, 29.

⁵ Grigorii Pisarevskii, *Iz istorii inostrannoï kolonizatsii v Rossii v XVIII veke.: (Po neızdannym arkhivnym dokumentam)* (Moskva: Pechatnya A. I. Snegiriiovoi, 1909), 222.

⁶ Derzhavnõi arkhiv Khersons'koï oblasti [hereinafter, DAKheO], F. 14/Op. 1 Spr. 85: Ukazı Novorossiiskoï gubernskoï kantselyarii i raportı zemlemerov ob otvode zemel' pod koloniyu shvedskikh pereselentsev s ostrova Dago na territorii Kizikermenskogo uezda, plan Kizikermenskogo uezda, (1781–1783), p 3–4.

⁷ There has been a discussion on the number of settlers from Hiiumaa to Ukraine. Some researchers (Aleksander Loit, "Pereselenie Shvedov iz Ėstonii Na Ukrainu v Kontse XVIII Veka", *Skandinavskii Sbornik*, 32 (1988), 104–116 (106); Anton Karlgren, *Gammalsvenskby: Land Och Folk*, Svenska Landsmål Och Svenskt Folkliv (Stockholm: P. A. Norstedt & Söner, 1924), 8) have argued that there were between 1,200 and 1,207 migrants. Jörgen Hedman and Lars Åhlander left the question open (Hedman and Åhlander,

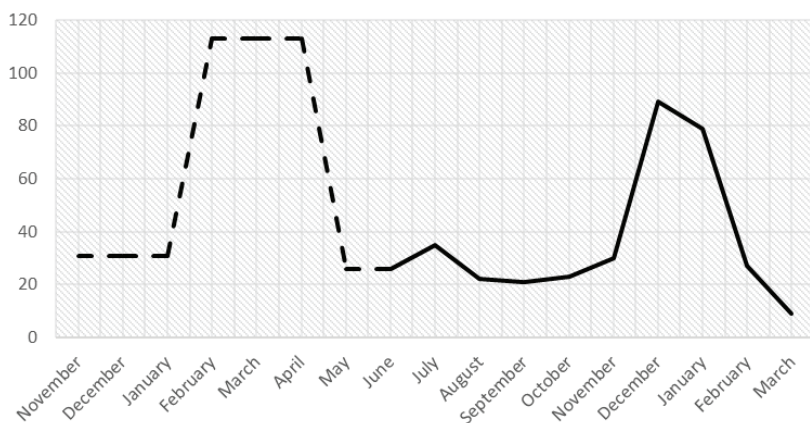


Figure 1. Number of deaths among Swedish resettlements to Ukraine during the period of abnormally high mortality 1781–3. The dotted line shows arithmetic mean for three periods 1) from November 1781 to January 1782; 2) from February to April 1782; 3) from May to June 1782 as the data was insufficient for single months. Data from July 1782 was more accurate and is based on the parish book of the settlement. Karlgren, *Gammalsvenskby: Land Och Folk*, 149–157; Pisarevskii, *Iz istorii inostrannoï kolonizatsii v Rossii v XVIII veke.*, 224; Dérzhavnïi arkhiv Dnipropétrovskoï oblasti, F. 134/Op. 1 Spr. 4: *Vedomost' o rashhodovanii sredstv ...*, p 3; DADniO, F. 134/Op. 1, Spr. 1: *Imennoi spisok shvedskikh kolonistov, pribývshÿkh v Novorossiiskuyu guberniyu na poselenie v 1781 godu (1781)*, 23 pp (the author's own calculations)

ing the trip and in the winter camp at Reshetylivka, so only 484 persons arrived at the settlement site in May of 1782. Then in the autumn-winter of 1782–3 (Fig. 1), the second wave of deaths occurred. Only 150 individuals were reported as still being alive in June of 1783.⁸ Existing historical sources provide the opportunity to more closely analyse the loss of lives during the interval from the summer of 1782 to June of 1783 (primarily the

Historien om Gammalsvenskby, 31). Svitlana Bobyleva pointed out that there were 965 migrants (Bobyleva, *The Russian State*, 43). In our opinion, there were 967 migrants. This point of view is based on information from several archival sources (Dérzhavnïi arkhiv Dnipropétrovskoï oblasti [hereinafter, DADniO], F. 134/Op. 1 Spr. 4: *Vedomost' o rashhodovanii sredstv na sodержanie shvedskikh kolonistov za 1784 god (1781–1784)*, p 3; DAKheO, F. 14/Op. 1 Spr. 85: *Ukazÿ Novorossiiskoi gubernskoi kantselyarii i raportÿ zemlemerov ob otvode zemel' pod koloniyu shvedskikh pereselenitsev s ostrova Dago na territorii Kizikermenskogo uezda, plan Kizikermenskogo uezda, (1781–1783)*, p 5; DADniO, F. 134/Op. 1, Spr. 1: *Imennoi spisok shvedskikh kolonistov, pribývshÿkh v Novorossiiskuyu guberniyu na poselenie v 1781 godu (1781)* p 23).

⁸ Loit, “Pereselenie Shvedov iz Èstonii Na Ukrainu”, 108–109.

second mortality peak) to understand what caused the abnormally high mortality rates.

Problem

No historiographical consensus has yet been reached on the cause of this mortality. The most widely accepted explanation is that the migrants died of ‘various diseases’ that they encountered ‘through the climate change and the difficulties of resettlement’. This explanation was first recorded in documents written during the resettlement in 1782 by Russian officials who had overseen its course.⁹ On the basis of these documents, this explanation was included in a report on the conditions of the so-called ‘Novorossia foreign settlers’ issued by Samuil Khristianovich Contenius to the Senate of the Russian Empire in 1800.¹⁰ From this report, the explanation made its way into historical research conducted by Apollon Skalkovskii (1850),¹¹ Aleksandr Klaus (1869),¹² and Grigoriĭ Pisarevskii (1909),¹³ and a historical novel by Karl Russwurm (1866).¹⁴ More recently, it was repeated with some changes by Tat’yana Shrader (2008),¹⁵ Svitlana Bobyleva (2008, 2014),¹⁶ Yuliya Malitska (2010),¹⁷ and Malitska and Peter Wawrzeniuk (2014).¹⁸ The

⁹ DADniO, F. 134/Op. 1 Spr. 4: Vedomost’ o raskhodovanii sredstv..., p 5.

¹⁰ “Výsochaĭshe Utverzhdennĭi Doklad Senata o Predlagaemykh Sredstvakh k Popravleniyu Sostoyaniya Novorossiĭskikh Inostrannykh Poselentsev i Ob Uchrezhdenii Pod Vedomstvom Ėkspeditsii Gosudarstvennogo Khozyaĭstva Kontorĭ Opekunstva Novorossiĭskikh Inostrannykh Poselentsev”, *Polnoe Sobranie Zakonov Rossiĭskoi Imperii*, 1830, XXVI, 118–119.

¹¹ Apollon Skal’kovskii, *Opýt statisticheskogo opisaniya Novorossiĭskogo kraiya* (Odessa: Tipografiya L. Nitche, 1850), 264–265.

¹² Aleksandr Klaus, *Nashĭ kolonii. Opýtĭ i mater’yalĭ po istorii i statistike inostrannoĭ kolonizatsii v Rossii* (Sankt-Peterburg: Tipografiya V. V. Nusval’ta, 1869), 142.

¹³ Pisarevskii, *Iz istorii inostrannoĭ kolonizatsii v Rossii v XVIII veke*, 257.

¹⁴ Karl Russwurm, *Utvandrarne. Svenskarnes utvandring från Dagö år 1781, En svensk folkspillra: Gammal-Svenskbyborna* (Stockholm: Bröderna Lagerström, 1925), 49–50.

¹⁵ Tat’yana Shrader, “Shvedĭ v Ukraine (Bor’ba Za Sokhranenie Ėtnichnosti)”, *Radlovskii Sbornik: Nauchnye Issledovaniya i Muzeĭnye Proekty MAĖ RAN v 2007 Godu* (Sankt-Peterburg: MAĖ RAN, 2008), 104–108 (105).

¹⁶ Svitlana Bobyleva, “Shvedy Ukrainĭ i Gosudarstvennaĭa Vlast”, *Voprosy Germanskoĭ Istorii* (Dnipropĕtrovs’k: Vĭdavnytstvo DNU, 2008), 247–268 (254, 264) and Bobyleva, *The Russian State*, 58.

¹⁷ Yuliya Malits’ka, “Aklimatyzatsiya Shveds’kĭkh Migrantiv Na Pivdni Rosiĭs’koĭ Imperiiĭ”, *Grani*, 13 (2010), 12–14 and Yuliya Malits’ka, “Estons’ki shvedĭ”, 75, 97–98.

¹⁸ Juliia Malitska and Peter Wawrzeniuk, “Approaching the ‘Lost Swedish Tribe’ in Ukraine”, *The Lost Swedish Tribe: Reapproaching the History of Gammalsvenskby in Ukraine*, ed. by Juliia Malitska, Peter Wawrzeniuk (Stockholm: Södertörns högskola, 2014), 13–38 (33).

main difference was that Bobyleva and Malitska believed that the key contributing factor to the high mortality rate among the migrants was the group's composition: specifically, it included numerous children, who were particularly vulnerable to disease.¹⁹ This aspect had not been considered hitherto. Malitska identified plague among the diseases migrants had suffered, but did not consider it to have been a key cause of mortality.²⁰ The suggestion that the abnormally high mortality rate among the colonists was attributable to 'different reasons' rather than an epidemic of a single disease is also confirmed by a textual source – the first parish book of the Gammalsvenskby colony, wherein several different diseases are recorded as causes of death among the colonists.²¹

However, in parallel with the theory that there were 'different reasons' for the mortality among Swedish migrants, another explanation, originating mainly from the colony's oral tradition, cited 'plague' as the main cause of mortality among the migrants. This explanation was first mentioned by the traveller Wilhelm Lagus in an article published in 1852 (the author also consulted the parish register).²² It was subsequently repeated in 1881 by Herman Wendell,²³ who had also visited Gammalsvenskby. Several authors mentioned a plague epidemic but emphasis remained mainly on 'acclimatisation' and mortality caused by 'different reasons.' Jan Utas noted that Gammalsvenskby oral tradition identifies plague as the main cause of mortality during migration. However, he doubted the veracity of this claim because he found no records that mentioned 'plague' in the colony's first parish book. At the same time, he observed significant mortality from '*lifsjuka*' (diarrhoea) in this document and surmised that '*lifsjuka*' may have been the term given by Gammalsvenskby people to denote 'plague'.²⁴ The historian Aleksander Loit had a similar perspective. Although he supported the theory that a plague epidemic had arisen among the colonists (he noted that the word '*pestis*' (plague) had been used in the original parish book²⁵ but that '*pestis*' was not mentioned in the publication of

¹⁹ Bobyleva, *The Russian State*, 254; Malits'ka, "Èstons'ki shvedy", 75.

²⁰ Malits'ka, "Èstonski shvedy", 97.

²¹ *Gammalsvenskbydokument*, ed. by Aleksander Loit, Nils Tiberg (Uppsala: Lundequistska bokh, 1958), 149–157.

²² Wilhelm Lagus, "Utflygt till Dniepern i April 1852", *Finlands Allmänna Tidning*, 1852 (129), 536–37.

²³ Herman Wendell, "Från Svenskar i Ryssland", *Folkvännen*, 1881 (27), 1–2.

²⁴ Jan Utas, *Svenskbyborna Historia Och Öde Från Trettonhundra till Nu* (Visby: Natur och kultur, 1982), 35.

²⁵ Loit, "Pereselenie Shvedov iz Èstonii Na Ukrainu", 113.

the source),²⁶ he did not contradict the suggestion that ‘different diseases’ affected the migrants, in accordance with the parish register.²⁷ He made only one exception in this regard: the number of deaths reported in his article as having been caused by the ‘plague’²⁸ coincided with the number of deaths attributed to ‘*lifsjuka*’ in his publication of the parish book.²⁹ That suggests that he doubted this issue. The plague epidemic in Kherson, located near Gammalsvenskby, in 1783–4 spread rapidly throughout Southern Ukraine, and the likelihood that this epidemic reached the Swedish migrants has been observed.³⁰

Hypotheses

Historiographical analyses highlight two stances on the reasons for the high mortality rate among the Gammalsvenskby colony’s population during resettlement and immediately after migration. The first stance asserts that no epidemic occurred, and that the mortality was the consequence of ‘different reasons.’ The second stance supports the notion that a main cause of death was epidemic disease (which the oral tradition called ‘the plague’). However, whether this was a plague epidemic remains unknown.

As earlier studies have argued, the age and gender structure of Gammalsvenskby’s population resembled that of a population that had survived a demographic cataclysm, which most likely was a consequence of an epidemic, because population age and gender distribution after war or famine includes significant gender disproportion which is not detected in this case (Fig. 2a-b).³¹ Death rates during 1782–3 were abnormally high and

²⁶ *Gammalsvenskbydokument*, 149–157.

²⁷ Loit, “Pereselenie Shvedov iz Ėstonii Na Ukrainu”, 113–114.

²⁸ *Ibid.*, 113.

²⁹ *Gammalsvenskbydokument*, 149–157.

³⁰ Konstantin Vasil’ev and Aleksandr Segal, *Istoriya Ėpidemii v Rossii. Materialy i Ocherki* (Moskva: Medgiz, 1960), 156.

³¹ On age and gender distribution after demographic cataclysm see Svyatoslav Chyruk, “Chy Bula Chuma u Staroshvedskii Kolonii? Kolonizatsiya Pivdennogo Prydniprova u Konteksti Ėpidemichnoi Zagrozy”, *Visnyk Dnipropetrovs’kogo Natsional’nogo Universytetu: Istoriya i Arkheologiya*, 21 (2013), 89–94 (91–92). On population consequences after demographic cataclysms see Sergii Pirozhkov and Gayané Safarova, “Vozrastnye Piryamidy – Bliznietsy-Brat’ya”, *Demoskop Weekly*, 405–406 (2010), http://www.demoscope.ru/weekly/2010/0405/s_map.php (viewed on 23 December 2021); Cormac Ó Gráda, Joel Mokyr, “What do people die of during famines: The Great Irish Famine in comparative perspective”, *European Review of Economic History*, 6 (2002), 339–363. We can also argue that demographic crisis was brought about by exogenous factors. The number of such factors is not large, among them: wars, epidemics, famine, and mass resettlements (Massimo Livi-Bacci, “Discussion Paper”, *Conference Series*, Conference

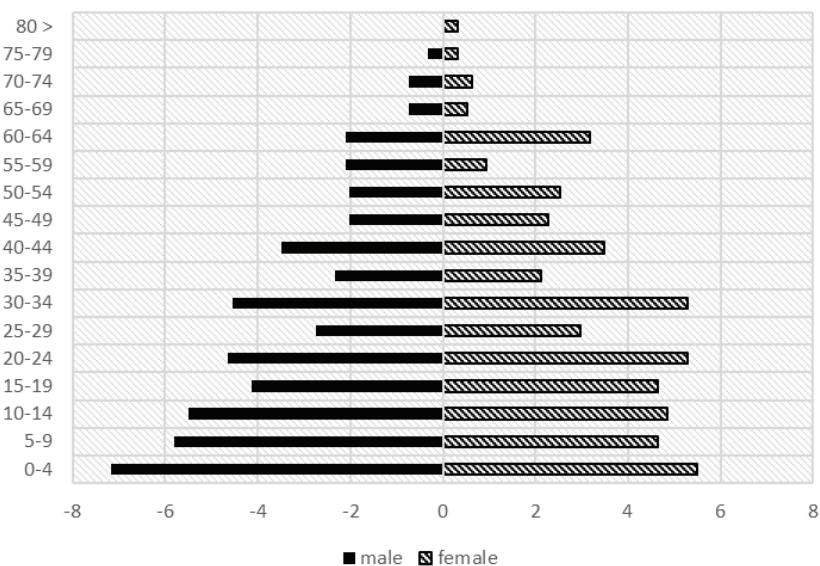


Figure 2a. Age-sex pyramid of Gammalsvenskby population before emigration and probable epidemic, Dagö (Hiiumaa), 1781, %. Dérzhavnŭjŭi arkhiv Dnipropétrovskoŭi oblasti, F. 134/Op. 1, Spr. 1: Imennoŭi spisok shvedskikh kolonistov, pribŭvshŭykh v Novorossiŭskuyu guberniyu na poselenie v 1781 godu (1781) 23 pp (the author's own calculations)

significantly exceed the death rates in the colony's later years. At the same time, sources report different causes of death,³² and so we cannot confidently affirm that there was an epidemic, although mortality caused by 'diarrhoea' was considerably higher than that attributed to other causes.

In our opinion, most studies that have explored this question have applied insufficient critical analysis of the sources. The supposition that the high mortality among the migrants was caused by 'different reasons' was based on sources created during the 18th century – in particular, the

Series (presented at the Demographic Shocks: the View from History, Federal Reserve Bank of Boston, 2001) xLVI, 43–66, https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKewiMmqWDz771AhXH_qQKHU5hDdMQFnoECacQAw&url=https%3A%2F%2Fwww.bostonfed.org%2F-%2Fmedia%2FDocuments%2Fconference%2F46%2Fconf46c1.pdf&usg=AOvVaw12Sh_MC5HE--N2t-Dw6oUqv (viewed on 23 December 2021). Most of these leave a significant information trace. Nevertheless, regarding this demographic cataclysm, we only have information suggesting plague epidemic, but not on other reasons.

³² *Gammalsvenskbydokument*, 149–157.

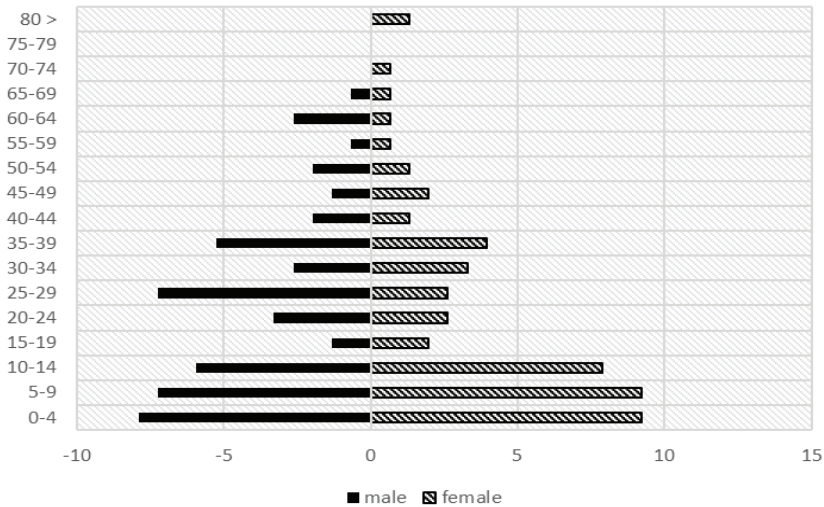


Figure 2b. Age-sex pyramid of Gammalsvenskby colony indicating demographic cataclysm, 1801, %. Dérzhavnŷi arkhiv Dnipropétrovskoïi oblasti, F. 134/Op. 1 Spr. 55: Vedomosti o nalichii colonistov, poseve i urozhae zernovŷkh kul'tur, sel'skokhozyaistvennogo inventarya v Rozental'skoï i drugikh koloniyakh i spiski kolonistov za 1802 god (1801-1802), 172 pp

Gammalsvenskby colony's first parish register. However, the people who compiled these documents, including the pastor of the colony, were not medical specialists, and the general level of medical knowledge in those days was lower than today. Frequently, the cause of death recorded was not a specific disease but rather pronounced symptoms (e.g., diarrhoea, cough, and fever). Studies have acknowledged this, but it has not influenced their conclusions.³³ Nevertheless, various symptoms may not necessarily indicate different diseases. Rather, a single disease may present multiple and varied symptoms.

Plague presents multiple different symptoms. Doctor Danylo Samoïlovich, who treated the plague in Moscow in 1771 and in Kher-son and Kremenchug in 1784, identified three external manifestations of the plague: buboes, carbuncles and petechiae. This was disputed by Doctor Charles de Mertens, who identified four main symptoms (Mertens

³³ Loït, "Pereselenie Shvedov iz Èstonii Na Ukrainu", 113 and Malits'ka, "Èstons'ki shvedŷ", 97.

considered haemorrhagic strips (lat. *vibices*) on the body³⁴ to be a manifestation; however, Danylo Samoïlovich considered them to be bedsores).³⁵ A report from an official medical commission on the plague epidemic in Moscow in 1771 also identified three main symptoms of plague: ‘buboes, carbuncles, big and little black spots (petechiae)’.³⁶ However, with reference to the plague in Kherson, Prince Gregory Potemkin designated five different symptoms (unfortunately without listing them) in a letter to the Russian Tsarina Catherine II on 13 June 1783: ‘...I ordered that the sick and the uninfected be separated and to fumigate and wash the clothes of the sick. I also ordered to distribute the patients by types of diseases. Thank the Lord that we have only five types again’.³⁷

Disease detection and identification of symptoms with the cause of death depended on the judgment and competence level of the document’s author. Documents in which symptoms are recorded as causes of death are essentially subjective. However, death records in the parish registers include more objective information – the dates of death. If the high mortality among the migrants was attributable to different reasons, no correlation should be discernible between the dates of deaths from different causes on the low level of data generalisation. However, if the different causes were attributable to the same reason (i.e., if they were symptoms of the same disease), strong correlation may be expected between dates of death from different causes on the low level of data generalisation.

Based on the historiography of the problem and direct observations, we may advance the following hypothesis:

Hypothesis 1. The dynamics of mortality attributed to different reasons are the same. The dates of death for various reasons are related and grouped into a common factor, which can explain most of the variance. Evidence of such factors testifies to the presence of epidemic at the colony. Causes

³⁴ Charles de Mertens, *An Account of the Plague which Raged at Moscow, in 1771* (London: F. and C. Rivington, no. 62, St. Paul’s Church-Yard, 1799), 12.

³⁵ Danilo Samoïlovich, *Rassuzhdeniya o Chume, Proizvodivshei v 1771 Godu Opustosheniya v Rossiiskoi Imperii i Osobenko v Stolichnom Gorode Moskve, Danilo Samoïlovich, Izbrannye Proizvedeniya* (Moskva: Izdatel’stvo Akademii meditsynskikh nauk SSSR, 1952) II, 155–162.

³⁶ Afanasii Shafonskii, *Opisanie Morovoi Yazvy, Byshe v Stolichnom Gorode Moskve s 1770 Po 1772 God s Prilozheniem Vsekh Dlya Prekrashcheniya Onoi Togda Postanovliionnykh Uchrezhdenii* (Moskva: Imperatorskii universitet, 1775), 23, <https://www.prlib.ru/item/714568> (viewed on 26 July 2021).

³⁷ Stanislav Desyatskov, *Ekaterina Vtoraiya i G. A. Potiomkin. Lichnaya Perepiska 1769–1791, Literaturnye Pamyatniki* (Moskva: Nauka, 1997), 172.

of death fixed at the sources may be considered to be symptoms of the same disease.

Daniel R. Curtis and Joris Roosen have argued that it follows from historical evidence that during plague epidemics, people died in close proximity to one another more often than was usual. This highlights the highly infectious nature of the disease and its potential transmission from person to person and not only through zoonotic carriers.³⁸

Documents also include other objective information aside from death dates, not least the numbers of households to which the deceased belonged. These sources allow us to verify whether multiple deaths within a single household occurred within a given timeframe. On this basis, we propose the following hypothesis:

Hypothesis 2. The deaths of multiple members of a single household within a short timeframe bears witness to near-synchronous infections that must have been caused by close personal contact within the household. Less close contact between members of different households led to longer time intervals between deaths, because other members of the group were infected later. This provides indirect evidence for the epidemic in the colony, the infectious character of the disease, and its potential transmission from human to human.

Methods

Factor analysis with varimax rotation was selected to test the first hypothesis. This method was selected based on the idea that if some indications of the group changed simultaneously, the same latent reason may have been responsible.³⁹ This coincides with our first hypothesis, in which we identify several different causes of death (indications) and wish to verify how similar their fluctuations are over time. Similarity detection will designate the existence of the latent reason (i.e., the real cause of death, which was not recorded in the source). To achieve this outcome, factor analysis applies multiple indication correlations.⁴⁰

³⁸ Daniel R. 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), 246–259 (255–256).

³⁹ Andrei Nasledov, *Matematicheskie Metody Psikhologicheskogo Issledovaniya. Analiz i Interpretatsiya Dannyykh* (Sankt Peterburg: Rech, 2008), 251.

⁴⁰ *Ibid.*, 252.

However, practical application of factor analysis demonstrated the difficulty in interpreting extracted factors.⁴¹ For this reason, many researchers have used different ‘rotations’ of calculated results. Varimax rotation maximises the shared variance and makes high factor loading higher and low factor loading lower to render the contrast more visible. Henry F. Kaiser created the varimax rotation method in 1958,⁴² and it is now among the most commonly used approaches in factor analysis. ‘Rotated and unrotated factor analysis solutions are mathematically equivalent’,⁴³ and so the use of rotation methods may influence the interpretation but does not change the factor analysis results.

The database was compiled based on chronological comparisons of mortality resulting from various causes listed in the parish book. The database was organised by months (nine months) when abnormally high mortality was observed. This period can be related to the probable epidemic. The independent variable was the date of death from various causes (symptoms). The number of observations was relatively small for factor analysis, but we considered it valid because we were working with a general data set.

Hierarchical cluster analysis was selected to test the second hypothesis (remote point method and Euclidean distance, data not standardised), which was applied to the single variable (dates of deaths). Cluster analysis comprises a series of methods that allows data to be broken down into specific groups. Hierarchical cluster analysis allows data to be organised by natural clusters. This means that it does not change variable values but merely helps to demonstrate them. Hierarchical cluster analysis has several clustering levels, but we used only the first (lower) level because we needed to divide the groups as much as possible to identify the time intervals between them. The remote point method in hierarchical cluster analysis helps to break the variables into groups at points where the distances between neighbours are greater. This method was deemed most appropriate for our purpose because we were looking for time intervals between infections, and greater distances between neighbours are just such intervals.

The dates of deaths during the probable epidemic were numbered and translated into a rank scale. The cluster analysis grouped people whose deaths were temporally close into clusters. After performing the cluster analysis, we analysed the components that were included in each cluster.

⁴¹ Brian S. Everitt, “Latent Variables, Factor Analysis, and Causal Modelling”, *Comprehensive Clinical Psychology*, 3 (1998), 287–311 (293–295).

⁴² Henry F. Kaiser, “The Varimax Rotation Criterion for Analytic Rotation in Factor Analysis”, *Psychometrika*, 3:23 (1958), 187–200.

⁴³ Everitt, “Latent Variables, Factor Analysis”, 294.

The components in the clusters were numbered, which made it possible to correlate them with the numbers of households from the family list created in 1781.

Sources

The first parish book of the Gammalsvenskby colony, compiled by Pastor Johann Adolf Europeus in 1783–1788,⁴⁴ and the family lists of the Swedes who were resettled from Dagö Island to Southern Ukraine, created in 1781 under the command of Captain Ivan Sinelnikov (s. c. ‘Sinelnikov’s list’),⁴⁵ are the main sources used in our research.

External criticism of the parish book demonstrated that the source did not contain full information on the supposed epidemic. The parish book only included information from July of 1782,⁴⁶ but we know from official reports that the abnormally high mortality in the group began at the end of December, 1781 and the beginning of January, 1782.⁴⁷ Therefore, the deaths recorded in the parish book likely amounted to only half (335 persons) of the probable epidemic victims.⁴⁸

We have no original or well-executed copy of the document.⁴⁹ We were instead obliged to work from a publication. For this reason, some information may have been lost in translation or otherwise corrupted. For instance, the author of the publication stated that some words of the original text were in Latin, but the text was published entirely in Swedish.

Sinelnikov’s list is an original document housed in the State Archive of Dnipropetrovsk oblast (Dnipro, Ukraine). The document was preserved in the collection of the Guardianship Office for Foreign Colonists. This organisation was founded in 1801, but the document was created in 1781. We may speculate that it was previously housed in the Prince Potemkin Chancellery.

⁴⁴ *Gammalsvenskbydokument*, 117–125, 149–157.

⁴⁵ Jörgen Hedman, *Svenskbysläkter. Släktförteckningar Över Familjerna Från Gammalsvenskby i Ukraina* (Visby: Ödins Förlag AB, 1994), 232–263.

⁴⁶ *Gammalsvenskbydokument*, 117.

⁴⁷ DADniO, F. 134/Op. 1 Spr. 4: Vedomost’ o raskhodovanii sredstv ..., 5 and Pisarevskii, *Iz istorii inostrannoï kolonizatsii v Rossii v XVIII veke*, 224. The journey began at the end of August, 1781 and lasted nearly two months. From 26 November 1781 to 16 April 1782, migrants stayed in Réshétylvka (Ukraine) for a winter rest. The final destination was reached on 1 May 1782.

⁴⁸ *Gammalsvenskbydokument*, 149–157.

⁴⁹ The book was taken back to Sweden and its current location is unknown.

Internal analysis has demonstrated that many names from the parish book are identical to those on Sinelnikov's list, attesting the authenticity of the parish book (see more below). The numerous causes of death named in the parish book indicate that they were not in fact illnesses but merely symptoms.

While information on the dates of death was represented in the parish book, the numbers of households were recorded in the family lists. Therefore, we were obliged to synthesise the information from both sources to obtain a holistic picture. However, comparison of the information contained in these documents revealed several problems. It emerged that the family list did not fully record all individuals who had immigrated to Ukraine (comparing the names, fathers' names, and social status, we observed that the mortality list compiled from the parish register included individuals who were not recorded in the family list created beforehand). The number of migrants in the accounting book (people who had actually emigrated) and the family list was the same, but some households recorded no deceased members. This suggests that some households from the family list remained in Estland while some individuals emigrated instead of them. Individual identification was particularly hindered by the fact that it was based on the individual's name, their father's name, and their age. However, age was recorded approximately and was often incorrect or failed to match the age recorded in another document. Records of different individuals whose names and fathers' names were identical presented a particular obstacle to identification.

For background information on the Kherson plague epidemic, we used witness memories from the Russian officer Ivan Andreevich Polnomochnyi,⁵⁰ the German Doctor Ernest Wilhelm Drimpelman,⁵¹ and papers of the Ukrainian Doctor Danylo Samoïlovych (Sushynskii): 'A short description of microscopic research studies on the essence of ulcerous toxicants, which were conducted by Danylo Samoïlovych in Kremenchug';⁵² 'Reflections on the plague, which decimated the Russian Empire in 1771,

⁵⁰ "Kratkie Avtobiograficheskie Zapiski Ofitsera Chernomorskogo Flota Ivana Andreeva Polnomochnogo (1764–1833)", ed. by A. Matveev, *Zapiski Odesskogo Obshchestva Istorii i Drevnostei*, 15 (1889), 683–710.

⁵¹ E. V. Drimpel'man, "Zapiski Nemetskogo Vracha Drimpel'mana o Rossii v Kontse Proshlogo Veka", *Russkii Arkhiv*, 1 (1881), 32–51.

⁵² Danilo Samoïlovich, *Kratkoe Opisanie Mikroskopicheskikh Issledovanii o Sushchestve Yadu Yazvennogo, Kotoroe Proizvodil v Kremenchuge Danilo Samoïlovich, Danilo Samoïlovich, Izbrannye Proizvedeniya* (Moskva: Izdatel'stvo Akademii meditsynskikh nauk SSSR, 1949), I.

especially the capital city – Moscow⁵³ and letters between Prince Gregory Potemkin and Tsarina Catherine II.⁵⁴

Analysis

Overall, we identified 335 deaths (167 male and 168 female, 116 children (younger than 16 years) and 219 adults (older than 16 years)).

Table 1. Distribution of factor loads between variables

Rotated Component Matrix		
	Component	
	plague	cold
fever	.166	.857
typhus	.859	.248
chills	.627	.704
sore throat		.933
cough	.478	.672
diarrhoea	.744	.552
dysentery	.818	.399
rotten fever	-.597	
scurvy	.704	.562
pneumonia	.917	
swelling	.792	.417

Factor analysis with varimax rotation was performed using SPSS software. The number of factors was determined using the screening test developed by Raymond Cattell (scree-test), which demonstrated the desirability of applying one to three factors in the model. One-factor, two-factor, and three-factor models were analysed. The two-factor model was considered the most appropriate because it explains the dispersion to the greatest extent (77.26%). However, we should also note that after deletion of exceptions, the one-factor model also began to work and explained 62.5% of the variation.

The causes of deaths recorded in the parish book were used as the variables. Four variables – burn-related diseases, childhood illnesses, weak head, and whooping cough – were excluded from the analysis because

⁵³ Samoïlovich, *Rassuzhdeniya o chume*, 492.

⁵⁴ Desyatskov, *Ekaterina Vtoraiya i G. A. Potiomkin*, 1027.

each was observed only once. Removal of these variables significantly improved the model and increased its explanatory capacity for dispersion from 64.1% to 77.26%.

The chosen model included two factors that we conventionally termed 'plague' and 'cold'. It explains 77.26% of dispersion. Analysis of the factor structure demonstrated that the first factor, provisionally named 'plague', which explains 62.57% of dispersion, included the following variables: pneumonia, typhus, dysentery, swelling, rotten fever, and several unclear variables, including diarrhoea and scurvy.⁵⁵

The second factor was conventionally termed 'cold', and it explained 14.68% of dispersion. It included as variables sore throat, fever, and some unclear variables, including chills and cough.

A hierarchical cluster analysis was selected to test the second hypothesis based on the 217 individuals in the sample that synthesised data from the parish book and the family list. The sample included 121 males and 96 females, 87 children (younger than 16 years old) and 130 adults (older than 16 years old). The deaths were clustered according to time (each day during the period of the epidemic was numbered individually). Clustering was achieved by combining the method of main components with the method of a distant neighbour and Euclidean distance. Data were not standardised.

As a result of the cluster analysis, 21 clusters were selected based on observations that they were close with respect to time. The identification of deceased individuals from the clusters demonstrated that the clusters included some representatives from the same households. This occurred in 30.42% of cases. In 10.14% of cases, representatives of the same households were included in the neighbouring clusters. This made a total of 40.56%. Analysis according to place of origin demonstrated that 75% of the deceased individuals in the clusters used to live in same or nearby villages.

Table 2. Time ranges of isolated clusters with number of deaths

Cluster number	Time range	Number of deaths
1	18–27 July 1782	17
2	29 July – 4 August 1782	12
3	6–8 August 1782	6
4	9–16 September 1782	13

⁵⁵ The assumptions on which this composition of factors is based are explained below in the research results.

Cluster number	Time range	Number of deaths
5	17–23 October 1782	9
6	27–29 October 1782	3
7	1–7 November 1782	6
8	9–16 November 1782	8
9	20–26 November 1782	5
10	1–3 December 1782	2
11	6–13 December 1782	23
12	14–20 December 1782	14
13	22–27 December 1782	16
14	28 December 1782 – 4 January 1783	19
15	5–12 January 1783	12
16	13–20 January 1783	13
17	22–28 January 1783	15
18	30 January – 2 February 1783	8
19	4–13 February 1783	11
20	28 February – 3 March 1783	2
21	7–29 March 1783	3

Results

Because the two-factor model explains the largest portion of the variance (77.26%), it must be considered the main model. At the same time, the first factor (supposedly plague) explains most of the variance (62.5%). The plague epidemic in Kherson during 1783–4 indicates such an opportunity. Variables (causes of death) were logically distributed between factors. The factors we identified as plague included pneumonia, typhoid, dysentery, swelling, rotten fever, and partly – diarrhoea and scurvy. This is consistent with the symptoms of plague, in particular those recorded in Kherson in 1783–4.

Among the first factors, diarrhoea and dysentery correspond to observations of diarrhoea occurring among Swedish colonists during their trip to Southern Ukraine⁵⁶ and among plague-infected patients in Kherson. Dysentery was noted as a symptom of the Kherson plague in a letter from

⁵⁶ DADniO, F. 134/Op. 1 Spr. 4, Vedomost' o raskhodovanii sredstv ..., 32 p.

the Russian Tsarina Catherine II to Prince Gregory Potemkin: 'I am very sorry that the diseases in Kherson are multiplying; there are rumours that there are no healthy persons and everyone has diarrhoea' (27 August 1787).⁵⁷ Doctor Drimpelman, who was in Kherson at this time, recorded the same symptom: 'Almost all of my recruits died, although most of them reached Kherson healthy and unharmed... They had diarrhoea. Combined with the plague it had inevitably led to complete exhaustion.'⁵⁸ The doctor, Danylo Samoilovich (Suschinsky), who treated the plague in Kherson (and earlier – in Moscow) mentioned dysentery as a symptom of the plague: 'Plague patients occasionally bleed from the nose and throat, but bleeding does not occur as often as diarrhoea, urinary incontinence and excessive menstruation among women.'⁵⁹ He wrote elsewhere, 'Sometimes these symptoms are so intrusive that they cannot be contained. Then it is a sign of approaching death.'⁶⁰ A monk from Poltava monastery – Iatsenko-Zelenskii – who visited the Zaporizhzhian Sich during the plague epidemic in 1751 classified the plague patients into two groups according to their symptoms based on his recollection: those who had diarrhoea, vomiting, and headache and those who had buboes.⁶¹ The modern researchers Dennis T. David and Paul S. Mead argued that diarrhoea is a symptom of septic plague.⁶²

Swelling is most likely to mean swelling of the belly. Pneumonia as a symptom of the plague is explained by the fact that the bubonic plague sometimes takes a pulmonary form and leads to pneumonia. Subsequently, plague may be airborne. The plague can also provoke haemorrhagic rashes on the skin, similar to outward manifestations of scurvy.

Typhoid was often a collective name given to a group of infectious diseases accompanied by fever and lapses of consciousness. Signs of blurred consciousness were also observed among plague patients as a result of high intoxication. The doctor Danylo Samoilovich wrote that even at the onset of the disease, patients experienced inexplicable grief, after which

⁵⁷ Desyatskov, *Ekaterina Vtoraiya i G. A. Potiomkin*, 223.

⁵⁸ Drimpel'man, "Zapiski Nemetskogo Vracha Drimpel'mana o Rossii v Kontse Proshlogo Veka", 34.

⁵⁹ Samoilovich, *Rassuzhdeniya o chume*, 153.

⁶⁰ *Ibid.*, 152–153.

⁶¹ Dmýtro Evarnitskii, *Dve Poezdki v Zaporozhskuyu Sech Yatsenko-Zelenskogo, Monakha Poltavskogo Monastýrya v 1750-1751 Godu* (Ekaterinoslav: Tipografiya T. A. Andrushchenko, 1915), 79.

⁶² David T. Dennis and Paul S. Mead, "Plague", *Tropical Infectious Diseases*, ed. by Richard L. Guerrant, David H. Walker, Peter F. Weller (Philadelphia: Churchill Livingstone, 2006), 1, 471–481 (476) <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7149940/> (viewed on 22 July 2021).

they experienced increased anxiety, even to the point of despair.⁶³ ‘Nervous fever’ was an archaic term given to typhoid.⁶⁴ It was often confused with ‘rotten fever.’ Nevertheless, Doctor K. I. Killian (author of a medical book published in the Russian Empire in 1825) noted that despite the similarity of symptoms, these diseases should still be differentiated. He argued that ‘during nerve fever, there is mainly delirium and dilation of the pupils, but during rotten fever, dull feelings and deafness are mainly observed’.⁶⁵ At the same time, he observed, ‘the more there are signs of lack of power and the earlier it starts, the worse the forecast is’.⁶⁶ These observations recall Danylo Samoïlovich’s notes on plague patients. He wrote that ‘plague toxicant ... sometimes causes the same paroxysms which occur during rotten fevers.’⁶⁷ Herewith, ‘Plague patients fall into a violent madness; it happens at the beginning of the disease or on the second, third or fourth day. If delirium and violent madness proceed to the seventh day, it is possible to forecast recovery, but if such a condition occurs on the second or third day and after that the patient immediately falls into weakness and calm, such change is the right sign of death.’⁶⁸ A similar situation was observed during the late (1878) plague epidemic in the village Vietlianka in the Astrakhan province of the Russian Empire. Doctor Depner recorded the following: ‘Severe headache in the forehead and temples, pain in the limbs, short moderate chills followed by prolonged, intense, burning heat of the face and eyes, bloated belly, swelling of the liver, spleen, and a pulse of 100–120.’⁶⁹ He noted that after this, two scenarios were possible: intense perspiration may begin after two or three days followed by a decline in paroxysms; alternatively, paroxysms may increase, leading to death. Among other symptoms he included ‘chest tightness’ and ‘spots on the body’.⁷⁰ The village of Vietlianka was among the areas that were most severely affected by the plague epidemics that afflicted the Astrakhan region of the Russian

⁶³ *Ibid.*, 150–151.

⁶⁴ Vasil’ev and Segal, *Istoriya Épidemii v Rossii. Materialy i Oчерki*, 234.

⁶⁵ Konrad Kilian, *Domashnii Lechebnik Ili Obstoyatel’noe i Yasnoe Pokazanie Kak vo Vsekh Opasnykh i Skoropostizhnykh i Khronicheskikh, Kak Naruzhnykh, Tak i Vnutrennikh Boleznyakh Pri Otsutstvii Vrachha Mozhno Podat’ Nuzhnyuyu Pomoshch Posredstvom Odnikh Domashnikh Sredstv i Diety; Sverkh Togo, Kak Postupat’ Kasatel’no Preduprezdeniya Boleznei i Khraneniya Zdorov’ya* (Sankt Peterburg: Tipografiya Ivana Glazunova, 1823), 105.

⁶⁶ *Ibid.*, 81.

⁶⁷ Samoïlovich, *Rassuzhdeniya o chume*, 154.

⁶⁸ *Ibid.*, 153.

⁶⁹ Mikhail Supotnitskii and Nadezhda Supotnitskaya, *Oчерki Istorii Chumy* (Moskva: Vuzovskaya kniga, 2006), I, 435.

⁷⁰ *Ibid.*

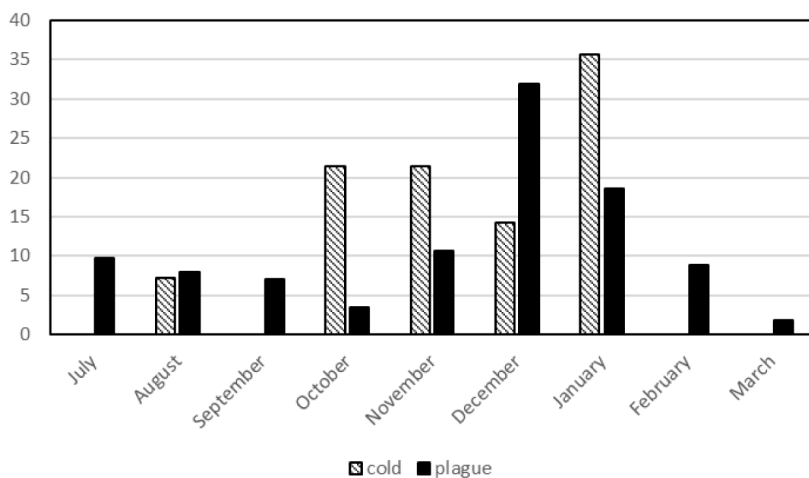


Figure 3. Seasonality of cold and plague deaths, %. *Gammalsvenskbydokument* (the author's own calculations)

Empire in the late 19th / early 20th century.⁷¹ In some instances, plague was determined bacteriologically (from 1896).⁷²

The plague microbe can either relatively easily override the lymph nodes, causing high intoxication (primary septicemic plague),⁷³ which causes death,⁷⁴ or it can be delayed by the lymph nodes, which will be accompanied by other manifestations of the disease, in particular chills, which is a manifestation of the body's defence. The lymph nodes' hindrance of the plague microbe does not guarantee recovery but may lead to recovery, whereas rapid intoxication often results in death.⁷⁵

Doctor Killian's description of rotten fever symptoms is similar to the description of rapid intoxication of the plague patient as we can see from the testimonies of Doctor Depner and Doctor Samoilyovych. This explains

⁷¹ Nikolai Vysotskii, *Astrakhanskaya Chuma* (Kazan: Tipo-Litografiya Imperatorskogo universiteta, 1911), 52 p.

⁷² *Ibid.*, 13.

⁷³ Florent Sebbane and others, "Role of the Yersinia Pestis Plasminogen Activator in the Incidence of Distinct Septicemic and Bubonic Forms of Flea-Borne Plague", *PNAS*, 14.103 (2006), 5526–5530. V. V. Nikiforov, M. G. Avdeeva, and H. A. Namitkov, *Chuma: Uchebno-Metodicheskoe Posobie* (Moskva-Krasnodar-Maikop, 2016), 46–48.

⁷⁴ Dennis and Mead, "Plague", 471–481.

⁷⁵ Septic plague was fatal in 30% of observed cases. *Ibid.*, 476.

the negative value of the 'rotten fever' variable in the factor named 'plague'. Analysis of the intrinsic correlations between the variables included in this factor showed an inverse correlation (at the trend level) with all variables except scurvy and pneumonia (signs of rotting fever are also referred to as 'rotten pneumonia',⁷⁶ and jaundice and red spots are petechiae,⁷⁷ which may be confused with the signs of scurvy).

Consequently, 'rotten fever', as a symptom of the plague, did not contribute significantly to the development of other symptoms, as it was an outward manifestation of the high intoxication that caused premature death. A patient with a disease resembling rotten fever simply did not arrive at the beginning of other symptoms. If the course of the disease was accompanied by sweating and chills for two to three days and a longer struggle between the organism and the microbe, it no longer resembled 'rotten fever'. Other symptoms were noted as the causes of death of such patients (if the patient died).

Thus, all causes of death included in the first factor were potential plague symptoms, and the negative value of rotting fever may be attributable to variations in the course of the disease.

The second mortality factor, which accounts for 14.68% of the variance, was, in our opinion, caused by colds. It included variables such as 'fever' and 'sore throat' as well as several poorly defined variables, such as chills and coughs.

The results of factor analysis confirmed hypothesis 1. Mortality from different reasons could be combined in a general factor, which can explain the majority of mortality cases. Attempts to improve the model through using more factors (two factor model) to explain mortality variance demonstrated that such a model could explain an even higher percentage of variance. Nevertheless, the search for differences between time of death of mortality cases from cold and plague factors (without ill-defined variables) did not show statistically significant results over the various months. Grouping the data by season (spring–summer; autumn–winter) for three months each did not produce a statistically significant result either. However, at the level of trends, it is noticeable that deaths from colds are grouped in the autumn and winter. Moreover, colds dominated during the autumn (plague – 21.24% of deaths; colds – 42.86% of deaths) while plague dominated in spring and summer (plague – 19.45% of deaths; colds – 7.14% of deaths). Plague increased again in winter (plague – 59.29% of deaths; colds

⁷⁶ Kilian, *Domashnii Lechebnik Ili Obstoyatel'noe i Yasnoe Pokazanie*, 83.

⁷⁷ *Ibid.*

– 50% of deaths) (Fig. 3). This fits in with bimodal distribution of mortality, which often characterises plague epidemics.⁷⁸ Nevertheless, the seasonality of plague showed several differences and could not be an indicator of this disease. The best way in our opinion is to argue that there was one main mortality factor with some additional other causes of death, most of which were explained by seasonal colds.

Hypothesis 2 was verified by cluster analysis. It demonstrated that mortality spread primarily within households, indicating the infectious nature of the disease that we consider to be plague and its transmissibility from person to person.

Discussion

Plague was often confused with other diseases during the pre-bacteriological period because its clinical picture varied significantly according to the individual specifics of each patient's body and the mechanism by which it was transmitted. Consequently, plague was not mentioned as a diagnosis and doctors made assumptions based on a file of different diseases. This was the case during the plague epidemic in Moscow in 1771, when doctors disputed the cause of the epidemic: 'One argued that it was an ordinary epidemic; another thought that it was rotten fever, etc.'⁷⁹ The same situation arose in Vietlianka village in the Astrakhan province of the Russian Empire in the 19th century. The first doctor who arrived in the village did not identify plague and determined the disease to be 'a hard fever with a gland tumour'.⁸⁰ Doctor Depner, who visited the village after him, registered fever with tumours of the liver and lymph glands (in the groin and under the armpits) and typhoid conditions.⁸¹ During the epidemic, several different causes of death were recorded in the parish book of Vietlianka village, among them 'cold', and 'malignant and typhoid fever'.⁸² Only later was the correct diagnosis made. However, no satisfactory diagnosis has yet been made for Gammalsvenskby.

Our findings demonstrate that an epidemic of infectious disease broke out among the Swedish migrants during the period investigated (July of 1782 – March of 1783) and seasonal cold broke out in autumn–winter 1783.

⁷⁸ Edward A. Eckert, "Seasonality of Plague in Early Modern Europe: Swiss Epidemic of 1628–1630", *Reviews of Infectious Disease*, 6:2 (1980), 952–959 (957).

⁷⁹ Samoïlovich, *Izbrannye Proizvedeniya*, 90.

⁸⁰ Supotnitskii and Supotnitskaya, *Ocherki Istorii Chumy*, 430.

⁸¹ *Ibid.*

⁸² *Ibid.*

Together, they account for 77.26% of the variance, and so another cause must account for close to a quarter of all cases. In our opinion, therefore, it is erroneous to continue to argue that Swedish migrants died of different causes in this situation and to assert that it was caused by the colonists' insufficient acclimatisation because it neutralised the fact that the epidemic was the main cause of death. In particular, it is not appropriate to repeat the myths invented by 19th-century officials that the migrants' high mortality levels were attributable to their lack of acclimatisation to the local climate conditions⁸³ because the high level of transmission within households indicates an infectious disease. The disease was only partly exacerbated by climatic factors (i.e., cold in the autumn of 1782 – winter of 1783).

Some symptoms observed among the Swedish colonists during the first months after migration to Southern Ukraine resemble plague symptoms (for instance, diarrhoea or rotten fever), but this is insufficient to permit a final diagnosis. We can merely hypothesise that the infectious disease that affected Gammalsvenskby during 1782–3 may have been plague. This hypothesis could be confirmed by bioarchaeological analysis of the remains from the burial place in the village of Zmiivka (Beryslav raion, Kherson oblast, Ukraine). According to Jörgen Hedman, the burial of the dead in 1782–3 was discovered in 1925, following a heavy downpour on the main street in the colony of Klosterdorf (on the site of an old Gammalsvenskby church cemetery) located near Gammalsvenskby.⁸⁴

The presumed inflectional disease in Gammalsvenskby approximately coincided with the plague epidemic in the city of Kherson. Several hypotheses have been advanced regarding the causes of plague in Kherson: 1) that the plague was brought by ship from Turkey;⁸⁵ 2) that the disease originated from Ochakiv fortress;⁸⁶ and 3) that the plague epidemics in Southern Ukraine the end of the 18th to the start of the 19th century were of local origin.⁸⁷ Nevertheless, we hypothesise that the Swedish colonists may have

⁸³ This opinion is presented in research by Tat'yana Shrader, "Ocherki Zhǐzni Shvedskikh Kolonistov v Rossii (XIX v.)", *Skandinavskie Chteniya*, 11, (2006), 229–253, Bobyleva, "Shvedy Ukrainy i Gosudarstvennaia Vlast", 247–268. Climatic factors as a cause of death were proposed as a conceptual idea in publications by Yuliya Malits'ka. See Malits'ka, "Aklimatyzatsiya Shvedsk'k'kh Migrantiv Na Pivdni Rosiis'koii Imperiï", 12–14; Malits'ka, "Ėstons'ki shvedy", 75.

⁸⁴ Jörgen Hedman, "About Emil Kristoffersson Hoas Memories", 29 April 2015.

⁸⁵ Vasil'ev and Segal, *Istoriya Ėpidemii v Rossii. Materialy i Ocherki*, 156.

⁸⁶ Zorya Orlova, *Kolektsiia Fotokopii Dokumentiv z Arkhiviv Khersonshchyny: Oglyad Fondu № 324/3* (Kherson: KhGT, 2007), 15.

⁸⁷ Ivan Rusev, "Antropogennaya Transformatsiya Prirodn'kh Ochagov Chumy v Severo-Zapadnom Prichernomor'e", *Uchionye Zapiski Tavricheskogo Natsional'nogo Universiteta Im. V. I. Vernadskogo*, 4.24 (63), (2011), 224–243.

brought this disease to the city from the northern lands. The reasons for this hypothesis include 1) Gammalsvenskby's proximity to Kherson,⁸⁸ 2) the origin of the presumable inflectional disease among the population of Gammalsvenskby before the epidemic began in Kherson,⁸⁹ and 3) contact between the soldiers from Kherson and Gammalsvenskby's inhabitants directly before the beginning of the plague epidemic in Kherson.⁹⁰

Conclusions

This micro-historical study has demonstrated that the time of cases of death from different causes indicated in the parish book among Swedish colonists during their trip to Ukraine and immediately afterward – in 1782–3 were not random, and the dynamics of mortality attributed to different reasons were the same. The one-factor model can explain 62.5% of the variation, which means that the majority of deaths could have been caused by the same factor. Cluster analysis demonstrated that 75% of the people who died in the clusters previously belonged to the same settlements and 30.4% belonged to the same households. This means that mortality could be connected to close contacts and infectious transmission. With the available results, we can conclude that the main cause of death

⁸⁸ 98 kilometres.

⁸⁹ It appears that the presumed infectious disease among the Swedish colonists began in December of 1781 (Pisarevskii, *Iz istorii inostrannoï kolonizatsii v Rossii v XVIII veke*, 224), while the plague epidemic in Kherson did not begin until the summer of 1783 (Orlova, *Kolektsiia Fotokopii Dokumentiv z Arkhiviv Khersonshchyni*, 15).

⁹⁰ The final death recorded during the presumed epidemic in Gammalsvenskby occurred on 29 March 1783 (*Gammalsvenskbydokument*, 157). The first mention of the plague epidemic in Kherson is dated as 16 June 1783 “Ordera Svetleishego Knyazya Grigoriya Aleksandrovicha Potiomkina-Tavrisheskogo Novorossiiskogo General-Gubernatora”, *Zapiski Imperatorskogo Odesskogo Obshchestva Istorii i Drevnostei*, 11, 1879, 324–377 (332). Colonists from Italy arrived in Gammalsvenskby from Kherson (Rossiiskii gosudarstvennyi arkhiv drevnikh aktov [hereinafter, RGADA], F. 16/Op. 1, Delo 692, 4: O kolonistakh poselionnykh v Ekaterinoslavskoi gubernii iz Korsiki, Dantsiga, ostrova Dago i bunte tam korsikantsev, P. 172) at the end of May, 1783 (DADniO, F. 134/Op. 1 Spr. 3: Vedomosti po uchiotu rashoduemykh deneg na priobretenie sel'skokhoziaistvennogo inventarya v shvedskikh koloniyakh, P. 3). Because the colonists from Italy were not familiar with the road from Kherson to Gammalsvenskby and because they organised a riot during their journey to Ukraine, they were obliged to travel from Kherson to Gammalsvenskby with a group of soldiers. The soldiers also accompanied the Swedes during their journey from Estonia to Ukraine. The soldiers presumably arrived in Gammalsvenskby and were obliged to return to Kherson as there was a Cossack patrol in the village.

among the reviewed group of migrants during the specified period was an epidemic of infectious disease.

The coincidence of the causes of death for 1782–3 recorded in the Gammalsvenskby parish book with symptoms of the plague epidemic (1783–4) in nearby Kherson suggest that the actual cause of mortality among Gammalsvenskby's population may have been plague. Another cause of death – colds – was added to the plague in Gammalsvenskby in the autumn of 1782 – the winter of 1783, exacerbated by freezing conditions and possibly poor living conditions. Nevertheless, this cause of death was secondary (accounting for 14.68% of the variance).

Identification of the epidemic in the Gammalsvenskby colony at the end of the 18th century and conjecture that it could have been a plague paves the way for further research into this epidemic and the last wave of plague epidemics in Southern Ukraine in the late 18th and early 19th centuries (e.g., origins of the disease and bioarcheology using Gammalsvenskby's parish register to test models of plague spread) for the entire region. Our findings also have significant implications for the revision of Gammalsvenskby's history.

KEY WORDS: plague epidemic; mortality; Russian Empire; Ukraine; Gammalsvenskby; 18th century

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KOKKUVÕTE: *Aastatel 1782–3 Lõuna-Ukrainasse rännanud Rootsi talupoegade surmapõhjused*

Pärast seda, kui Jedisani piirkond Bugi ja Dnipro jõgede vahel tänase Ukraina lõunaosas liideti Vene impeeriumiga ja Nogai nomaadid alalt lahkusid, alustas Vene valitsus selle koloniseerimist. Ühed esimesed asunikud olid rootsi talupojad Hiiumaalt. Vene valitsuse plaane takistas asjaolu, et suur osa kolonistidest suri peagi. Surmade põhjust ei ole seni põhjalikult uuritud. Esitame hüpoteesi, et rootsi talupoegade peamine surmapõhjus

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oli nakkushaiguse epideemia, mille võis vallandada katk. Artikli põhiallikateks on esimesed rootslaste poolt rajatud Gammalsvenskby koloonia kirikuraamatud ja perekondade nimekiri, mis koostati aastal 1781. Meetodina on kasutatud faktor- ja klasteranalüüsi.

MÄRKSONAD: katku epideemia; suremus; Vene impeerium; Ukraina; Gammalsvenskby; 18. sajand

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