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# Epidemics and Pandemics – the Historical Perspective. Introduction

Jörg Vögele, Luisa Rittershaus & Katharina Schuler \*

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**Abstract:** »Epidemien und Pandemien - die historische Perspektive. Einleitung«. Every historical period has its characteristic epidemic. In the Middle Ages, up to one-third of the European population died of the plague epidemic called the Black Death (1346 to 1353). Later, cholera, Spanish flu, and AIDS terrified the population. Every epidemic triggered social changes and functioned as a catalyst for developments, which were already taking place. In addition to the often-devastating impact on life and health, epidemics and pandemics hold potential for innovations. The Black Death certainly led to a rising standard of living and is even said to have accelerated the development of printing. In the 19th century, cholera was considered to be a motor of sanitary reforms, such as central water supply and sewerage. The current Sars-CoV-2 pandemic clearly shows that epidemics are still part of human history and not just, as has long been believed, limited to the Global South.

**Keywords:** Epidemics, pandemics, history.

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## 1. Introduction

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Epidemics and pandemics have always accompanied mankind and have had lasting effects on the development of societies (Winkle 2005; Ruffie and Sournia 2000): They acted as catalysts for already existing developments and functioned as a stress test for the collective. In this way, societies can be analyzed under epidemic crisis conditions as if under a magnifying glass and recurring patterns can be identified, which may also be of interest beyond the historical specialist audience. The plague, which has been passed on as the most devastating epidemic since ancient times, is particularly anchored in the collective memory. Particular attention is paid to the great plague pandemic known as the Black Death, which struck Europe coming from Asia in the years 1348

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to 1353 and is estimated to have killed presumably over 25 million people, which corresponded to between a quarter and one-third of the population at that time (Bergdolt 1994). This catastrophe had a wide range of political, economic, social, and cultural consequences for European society (Herlihy 1997; see also Graus 1987). In the short term, there was an almost complete collapse of public life, as Giovanni Boccaccio immortalized literally in his famous *Decameron* for Florence. The houses of plague sufferers were marked with a cross, the sick were often abandoned by their own families and friends, and even clergymen refused to give them support. Pogroms against Jews, flagella parades, sexual debauchery, and other diverse social upheavals accompanied the Black Death. In the longer term, the massive population losses made it possible to abandon less fertile and unprofitable land, which led to entire villages being abandoned and turned into so-called *Wüstungen* (“deserted” settlements and agricultural areas). In the cities, wages rose, as did the general standard of living. At the same time, the higher labor costs led to efforts to mechanize manual labor, even the invention of the printing press – though difficult to prove and rather speculative – being often mentioned in this context.

Quarantine measures for crew and cargo of ships were introduced by northern Italian cities to protect against the plague and became one of the classic measures to protect against epidemics for the following centuries. This, of course, had a major impact on trade and economy. The catastrophe also affected literature and the fine arts. For example, the emergence of the Dance Macabre as a constant reminder that all people – young or old, rich or poor – are equal before death. Some researchers even see a direct causal connection between the Black Death, the end of medieval society, and the beginning of the Renaissance.

Plague remained epidemic in the centuries that followed (Sticker 1908/10; for a detailed local statistical analysis, still see Woehlkens 1954). The Plague in London in 1665 is very well documented in the immediate observations of the British naval administrator and contemporary witness Samuel Pepys in his famous diary (Pepys 1660-69). Since his observations and fears seem so familiar in the light of the COVID-19 pandemic, they should be given a little more space here: Mid-1665, he reported about rumors of plague outbreaks in several London districts. In early June, he noted that he came across houses “shut up” and marked with a red cross on the doors, and “Lord have mercy upon us” written there. He became increasingly troubled as he tried not to stumble over corpses lying in the street or come into closer contact with possibly infected persons. With great concern he followed the rising number of funerals published weekly in the London Bills of Mortality. At the end of August, he cited the bill of mortality as having recorded 6,102 victims in the city but feared that the actual number would be considerably higher, mainly because of underregistration in the poor districts. A week later, the official

number had risen to 6,978 in one week. By mid-September, all attempts to control the plague were failing. Quarantines were not being enforced (Thornbury 1878),<sup>1</sup> and people gathered in public places or attended funerals in spite of official orders not to leave the house after 9 o' clock. Although plague victims were supposed to be interred at night (Harding 1993),<sup>2</sup> this system broke down due to the sheer number.

During the outbreak, Pepys was also very concerned with his frame of mind; he constantly mentioned that he was trying to be in good spirits and “not let it get to him” when several of his acquaintances died, including his own physician (which had at least the advantage that he could return to his routine alcohol drinking habits). Pepys found that when he left London and entered other towns, people became visibly nervous about visitors coming from London. He succumbed to paranoia himself: In late July, his servant Will suddenly developed a headache and Pepys mobilized all forces to get him out of the house as quickly as possible. It turned out that Will did not have the plague and could return the next day. In early September, Pepys did not feel comfortable at the thought of wearing his new wig and he wondered whether other people would stop wearing wigs because they could potentially be made of the hair of plague victims. He drafted his will and packed his books in boxes – ready to go, whenever the Lord should call him (mid-August). And yet, he was willing to risk his life to meet certain needs; by early October, he visited his mistress without any regard for the danger: “round about and next door on every side is the plague, but I did not value it but there did what I could con ella” (early October). A week later, he noted with relief a substantial decline of more than 1,800.

At the end of the year, he took stock:

I have never lived so merrily (besides that I never got so much) as I have done this plague time [...]. My whole family hath been well all this while. [...]. But many of such as I know very well, dead; yet, to our great joy, the town fills apace, and shops begin to open again. Pray God continue the plague's decrease! (December 31, 1665)

Completely focused on the plague in London is Daniel Defoe's famous *Journal of the Plague Year* (Defoe 1772). Although written in retrospective and based on family experiences, the author's harrowing descriptions of the epidemics describe the typical patterns of an outbreak of a severe and highly infectious disease, close reading, however, reveals the differences to the present-day situation, at least in the Western world. Defoe reports of many infected who staggered in delirium through the streets and died there, and similarly horrifying, infected persons committing suicide by drowning in the river or jumping into the mass graves as they could no longer stand the pain caused by the

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<sup>1</sup> <https://www.british-history.ac.uk/old-new-london/vol1/pp494-513> (Accessed December 3, 2021).

<sup>2</sup> <https://archives.history.ac.uk/cmh/epiharding.html> (Accessed December 3, 2021).

plague buboes. Defoe also provides information of how an epidemic comes to an end:

Such is the precipitant Disposition of our People, whether it is so or not all over the World, that's none of my particular Business to enquire; but I saw it apparently here, that as upon the first Fright of the Infection, they shun'd one another, and fled from one another's Houses, and from the City with an unaccountable, and, as I thought, unnecessary Fright; so now upon this Notion spreading, (*viz.*) that the Distemper was not so catching as formerly, and that if it was catch'd, it was not so mortal, and seeing abundance of People who really fell sick, recover again daily; they took to such a precipitant Courage, and grew so entirely regardless of themselves, and of the Infection, that they made no more of the Plague than of an ordinary Fever, nor indeed so much; they not only went boldly into Company, with those who had Tumours and Carbuncles upon them, that were running, and consequently contagious, but eat and drank with them, nay into their Houses to visit them, and even, as I was told, into their very Chambers where they lay sick. (Defoe 2008, based on the 1772 edition)

When plague withdrew from central and western Europe in the late 17th century, other epidemics became more prominent: dysentery, syphilis, typhus, smallpox, and malaria. In the 19th century, cholera, and in the 20th century, influenza, as the last of the classic epidemics of modern times, struck Europe in several waves. The late 20th and early 21st centuries brought new threats: AIDS, EHEC, SARS, and MERS are just some of the most feared infectious diseases in recent European history. The coronavirus SARS-CoV-2 will keep the world in suspense in 2020/21 with its pandemic spread.

Epidemics and pandemics are therefore a classic topic not only in medical history but also in social, economic, population, and cultural history (McNeill 1978; Hays 2009; McMillen 2016; Vögele, Knöll, and Noack 2016). The focus of the research is on epidemics of the 18th and especially the 19th century (Otto, Spree, and Vögele 1990; Dinges and Schlich 1995; Leven 1997; Vögele 1998; Vasold 2008; Thießen 2014) or on specific epidemics (e.g., Bourdelais and Raulot 1987; Barry 2004; Witte 2008). The current COVID-19 pandemic has also led to an almost unmanageable flood of publications of varying quality (for a more recent overview of presentations, see Fangerau and Labisch 2020; Hammond 2020; Snowden 2020; Vögele 2020; Byrne and Hays 2021; Honigsbaum 2021; see also Nolte, Frevert, and Reichhardt 2020, 3).

In the past, rapidly spreading infectious diseases were often summarized under the term *Seuche* ("epidemic"), modern terms make a distinction depending on the temporal and spatial spread:

- Epidemic, if the spread is limited in time and space;
- Endemic, with an unlimited but spatially limited spread;
- Pandemic, with a temporally limited but spatially unlimited spread.

The classic infectious diseases illustrate the complexity of the etiology. This stems from the pathogenic agents involved, e.g., bacteria, viruses, fungi,

which are transmitted in a broad variety of ways, e.g., as airborne diseases (tuberculosis, pulmonary plague), waterborne diseases (cholera, typhus), or vector-borne diseases (by animals – such as malaria, bubonic plague). Furthermore, diseases are, of course, contagious to different degrees. In order to measure how many people will be infected by a single infected person, the “reproduction number”, or  $R$ , has been introduced. For example, pandemic flu or Ebola have relatively low numbers around 1 and 2, smallpox between 4 and 6, chicken-pox around 6 to 8, and measles up to 20 in a fully susceptible society (Kucharski 2021, 58-9). COVID-19 had an  $R$  of 2-3 in early 2020, when no control measures were taken, the Alpha variant 4-5, and Delta 5-6 (Gallagher 2021). In addition, case-fatality rates (the proportion of people diagnosed with a specific disease who die from it) differ widely: untreated Ebola, smallpox, or HIV over 90, cholera 70, plague 50, Sars-Cov-2 (unvaccinated) around 2, and seasonal influenza 0.1 percent (Control of Communicable Diseases Manual 2020).

In a modern, networked, and mobile world in which people and economic goods are on the move around the world, pathogens are also transported more quickly. The necessary quick and comprehensive response to contain the outbreak of an epidemic is based on epidemiological studies of the disease process. This becomes all the more central when no curative therapies are available, as was usually the rule before the breakthrough of modern science-based medicine, but also plays a role in the emergence of new pathogens in the present.

In the following, therefore, the long-term development of health conditions will first be outlined. In the historical perspective, mortality and death rates (the number of deaths due to a disease divided by the total population) is often the only robust indicator to compare specific disease developments over time and space. A historical epidemiology therefore will function as a prerequisite to analyze the mechanisms of change in mortality including the role and impact of epidemics. Then the complex interdependencies between disease and society will be discussed based on the discussion of cholera as a classic epidemic of the 19th century and the flu-like infections of the 20th and 21st centuries. Using the examples of infant mortality and swine flu, it should be demonstrated that epidemiological findings and social perception do not always go hand in hand. Occasionally, epidemiologically significant events do not receive any social attention or, conversely, epidemiologically less serious incidents are scandalized.

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## 2. The Epidemiological Transition

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The path to modern health conditions as reflected in the vital statistics is characterized by a long-term decline in the death rate and a profound change in

the causes of death. With the epidemiological transition model, interactions between average mortality or life expectancy and socio-economic change can be described (Omran 1971, 1977). Three regularly consecutive phases can be distinguished:

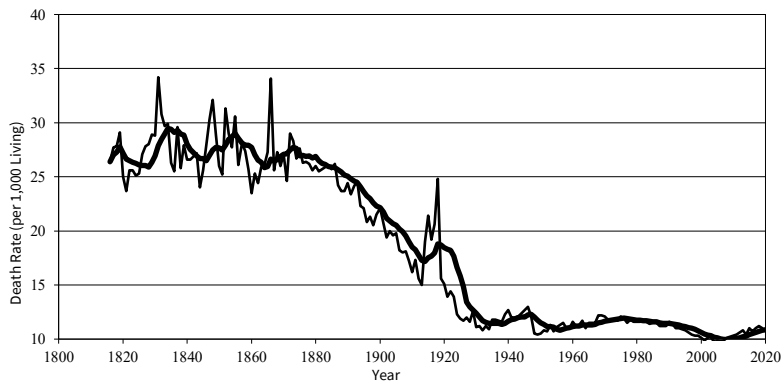
- Firstly, the period of epidemics and famine, which is characterized by high and fluctuating death rates. In this phase, the average life expectancy at birth is low, being between 20 and 40 years.
- Secondly, the period of declining major epidemics, a period in which the death rate steadies and gradually declines. Severe epidemics become less frequent and later vanish completely; life expectancy at birth rises to around 50 years.
- Thirdly, the recent period of man-made and socially caused diseases (cancer, cardiovascular diseases). This phase is characterized by a low mortality rate and a corresponding high life expectancy at birth, which can exceed 50 years.

In this classic form, the model continues to provide an important working basis for historical analyzes (Brändström and Tedebrand 1988; Nelson and Rogers 1989; Schofield, Reher, and Bideau 1998; Spree 1992; Vögele 1998, 2001). Accordingly, it has been made more concrete by working out the important role of social and economic change. The plague disappeared from central and western Europe as early as the late 17th century, and the other severe epidemics also declined due to less military activity and changes in the military organization. Whereas the interrelationship between war and epidemics was a classic research area of 19th and early 20th century bacteriologists, the theme has been neglected in historical research, although it is still postulated (although difficult to prove) that it was only since the 20th century that more soldiers died in combat than from infectious diseases (Vögele and Schuler 2021, forthcoming; see also Smallman-Raynor 2006). Similarly, the interrelationship between pilgrimage and the spread of disease has been rediscovered. In 1865, the pilgrimage to Mecca induced a terrible cholera pandemic, which led to a series of international sanitary conferences: European powers, in agreement with the Ottoman Empire, imposed a heavy control over the pilgrims, much harsher than that applied to commercial exchanges (Chiffolleau 2011). With the rise of the European world economy with accelerated transport and growing market integration, which goes hand in hand with increasing population and communication density, more people developed immunities against infection as increased travel intensified the circulation of disease. To what extent “herd immunity,” a phrase coined by the statistician Major Greenwood in the early 20th century (Kucharski 2021, 29), played an increasing role remains unclear. At the same time, new epidemics emerged, such as cholera. The narrower the commercial web was woven, and worldwide commerce increased, the more accelerated the spread of infectious diseases (Echenberg 2007; Harrison 2012; Vögele and Umehara 2015). In

addition, the so-called human crowd diseases (especially smallpox, measles, scarlet fever, and whooping cough) changed from age-unspecific to typical childhood diseases in Europe in the late 18th and early 19th centuries. This process was associated with a growing relative importance of gastrointestinal diseases, which in turn primarily threatened infants and young children. Since this complex of diseases also reacts particularly sensitively to socio-economic living conditions, life expectancy was increasingly determined by class-specific differences.

In fact, the model fits the data of numerous countries: As shown here for Germany, the actual transition (i.e., second phase) in the industrial nations of western Europe and North America fell into the age of industrialization (figure 1), pinpointing the essential role of socio-economic factors (Spree 1992; Vögele 2001; Imhof 2018). The strong fluctuations of death rates during the middle of the 19th century can still be depicted. This is where the cholera epidemics of the 1830s and 1860s and the smallpox epidemic of the 1870s manifest themselves. Then the major epidemics did not materialize any more, the trend in mortality fell (shown as a 9-year moving average with the thicker line), interrupted only by the Spanish flu at the end of the 1910s. Yet, it is also obvious that even in the crisis years of the Spanish flu, mortality levels were lower than in many *normal* years before 1880.

**Figure 1** Crude Death Rates, Germany Since 1816 (Crude Death Rate and Moving Average; 9 Years)



Prussia 1816-1870; German Empire 1871-1943; BRD 1946-1971; Germany since 1990  
Sources: Vögele 2001; DESTATIS.

With respect to the concept of the *Epidemiological Transition*, however, two basic points should be observed. It was developed using data on Ceylon, Chile, Japan, England and Wales, and Sweden as an example. Since data from Africa are not taken into account in the concept, one of the epidemiologically most important infectious diseases, malaria, is almost completely ignored.



The same applies to tuberculosis, as no information from Africa, China, India, or the states of the former Soviet Union is used. As far as the European findings are concerned, it is limited to north-western and western Europe and thus ignores the high and, in the 19th century, even growing importance of gastrointestinal diseases in central, eastern, and southern Europe. These in turn primarily threatened infants and small children and were the predominant cause of death during the phase of high industrialization, well before the rates of the scandalized diseases of the respiratory organs such as tuberculosis or the classic infectious diseases of childhood like measles, diphtheria, or rubella. Yet, it is precisely this complex of diseases, which can be traced back to undernutrition or malnutrition, that has played a predominant role in the disease panorama of the less developed or war-torn regions of the world.

Furthermore, in view of the increase in new infectious diseases or the return of those that have long since been defeated, it might be asked whether the concept should be expanded by a further phase (table 1) (Olshansky et al. 1997). First and foremost is HIV/AIDS, an infectious disease that has claimed more than 37 million deaths worldwide since the 1980s. The disease is also associated with an increased recurrence of tuberculosis as an opportunistic infection. About one-third of the world's population is estimated to be infected with tuberculosis pathogens. Almost nine million people become ill and nearly 1.8 million die from the disease each year. Most deaths occur in southeast Asia (480,000) and Africa (430,000), with the highest death rate in Africa at 50 per 100,000, with the southern part of the continent particularly hard hit. With two million deaths worldwide in 2020, the number of victims of COVID-19 is well on par with the two big "killers," HIV/AIDS and endemic tuberculosis.

**Table 1** Selected Pandemics of the 20th/21st Centuries

Period	Pandemic	Causes of Death
1918/19	Spanish Flu	40M
1957/58	Asian Flu	4M
1968/69	Hongkong Flu	1-2M
Since the 1980s	HIV/AIDS	>37M
1991	Cholera/South America	12,000
2002/03	SARS	800
2003	Avian Flu H5N1	250 (250,000-500,000 die every year from seasonal flu)
2020/October 2021	COVID-19 (SARS-CoV-2)	5M

Sources: World Health Organization (WHO), Robert Koch Institute.

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### 3. The Mechanisms of Mortality Change

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While the increase in life expectancy has traditionally been attributed to advances in medical technology, as a result of the pioneering work of Thomas McKeown, the contribution of curative medicine was measured modestly, and, rather, the importance of the socio-historical context emphasized (McKeown 1976). Since numerous causes of death declined significantly before specific medical therapies were available, the primary factor for the increase in life expectancy in the last 150 years has been considered to be the rising standard of living in the course of industrialization, which led to a quantitative and qualitative improvement in the nutritional status. This is said to be particularly true with regard to the reduction in mortality from tuberculosis, the main cause of death among adults during industrialization. Secondly, the role of the sanitary reforms has been emphasized, which would have brought about a substantial decrease in mortality from epidemic and endemic gastrointestinal diseases (cholera, typhoid fever as typical waterborne diseases). Then, in this context, reference has been made to changes in the virulence of certain disease organisms – especially with regard to scarlet fever. Before the introduction of sulphonamides as the first broad-spectrum antibiotics, medical interventions were ascribed to be effective only in the case of smallpox vaccination (1796) and serum therapy against diphtheria (1890). Diphtheria, which at the beginning of the 20th century was still regarded as the *Würgeengel der Kinder* (strangling angel of children), can now be controlled by means of vaccination, smallpox is considered to be eradicated, and poliomyelitis is very much under control due to the Global Polio Eradication Initiative, led by the World Health Organization (WHO).

Accordingly, the importance of prevention and public health care is emphasized more strongly at the state and municipal level. The federal structure in Germany acted on the one hand as a stimulus for innovations due to the perceived competitive rivalries; on the other hand, effective solutions to national problems were often ignored. For example, it took decades before the mandatory vaccination against smallpox, which was legally anchored in Bavaria in 1807, was adopted by the German Confederation and finally implemented across the Reich in 1874 (Vögele and Lee 2014 [2001]). Since the second phase of the epidemiological transition falls during the heyday of local self-government, in which a comprehensive service administration could develop that covered essential aspects of public health, it stands to reason to focus more specifically the effects of public health care on the long-term decline in urban mortality (Vögele 2001; Harris and Helgerts 2019). Therefore, in the following, cholera asiatica and the effect of the sanitary reforms, in particular the central drinking water supply, on the change in mortality will be examined.

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## 4. Cholera

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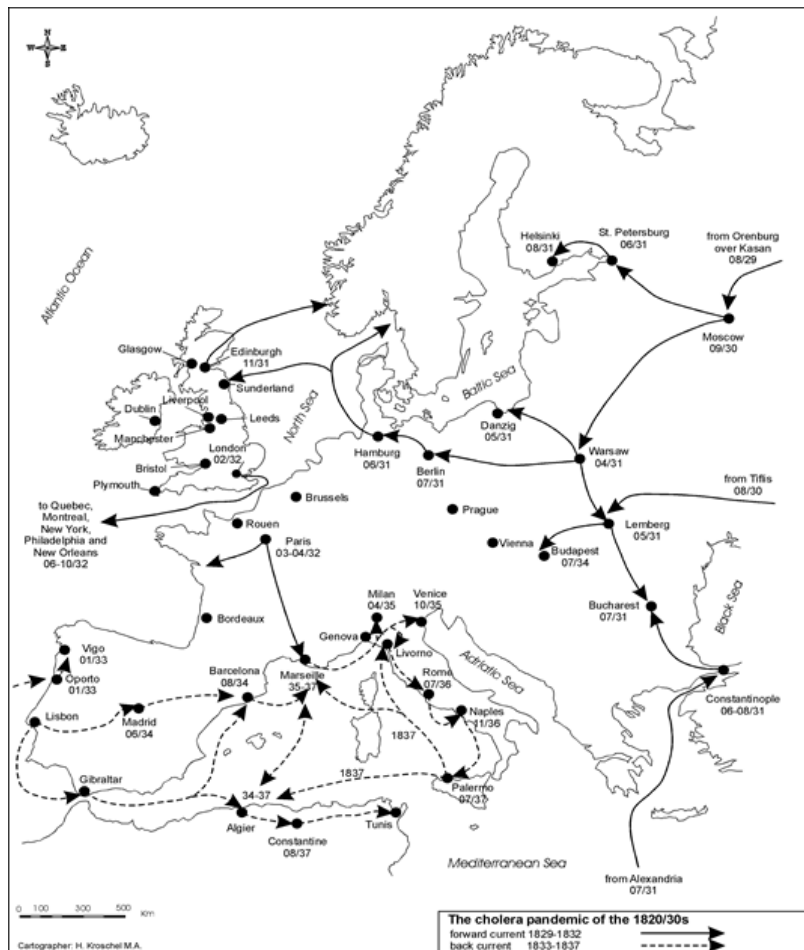
Cholera is considered the classic epidemic of the 19th century. A short incubation period and rapid course limited the disease to Asia for a long time. With the acceleration of trade and mass migration during the rising world economy, the diffusion of disease also increased and accelerated – and included infectious diseases with a short incubation period (such as cholera) and a rapid transmission. Coming from the east, cholera swept through Europe from the 1830s onwards in various pandemic waves (figure 2) (Haeser 1892; Sticker 1912; Spink 1978). In 1831, cholera was imported via ships to St. Petersburg and claimed more than 6,000 casualties within the region until the end of the year (Olzscha 1940). In May, cholera had reached Gdansk/Danzig and other German port cities of the Baltic and the North Sea (Creighton 1894[1]/1965[2]). From there, the disease moved further westward along the trade routes via rivers and coastal areas towards English and Scottish port cities and from there – with the Irish emigration – to North and Middle America. In the south-west, Spain, Portugal, and northern Africa were affected (Haeser 1882). Another highly affected area was southern France, particularly Marseille and Toulon; from there, ships carried the pathogen to Italian port cities such as Genoa, Torino, Florence, and Livorno (Haeser 1882, 825; Stolberg 1995, 20). Similarly, the following pandemics followed the trade and shipping routes with devastating effects to the population of port cities: In Naples, the most important transit port in the Mediterranean for emigrants to Argentina and the US, cholera caused around 20,000 casualties in 1884 (Snowden 1995).

Before its first appearance in Europe, it was still seen by some as a kind of clean-up in the slums of the emerging industrial cities, where the epidemic was sometimes called *weiße Polizei* (“white police”) – although the disease naturally also hit the bourgeoisie. Soon, however, the whole horror and extent of the pandemic became clear, and the fear of an impending outbreak alone terrified the population. The lack of clarity about the path of infection, the horrific symptoms, and death out of the blue all exacerbated the reactions.

The cholera epidemic of the 1890s, which affected Hamburg as the only major western European city, is particularly well documented (Evans 1987): Around 8,000 people fell victim to the disease within a few weeks. There was a clear social and topographical distribution pattern: City districts close to the water, where, of course, the poorer parts of the population lived, registered substantially higher death rates when compared to the districts of the population with higher income. As a water-borne disease, however, the spread of cholera was mainly directed by the course of central water supply. Since the drinking water in Hamburg was not filtered (cholera is considered a water-borne disease), the pathogens could spread through the central water supply over the entire city area. The city, shaped by the merchant spirit, had saved

in the wrong place! And indeed, the neighboring town of Altona, which had installed such a filter system, was not at all affected by the epidemic.

**Figure 2** Cholera-Pandemic in Europe 1829-1837



As with all major epidemics, typical reaction patterns can also be detected in Hamburg: First of all, the threat was trivialized by assuring that it was merely an increase in the incidence of ordinary summer diarrhea. When an epidemic outbreak could no longer be denied, there was a panic escape reaction. The number of train tickets sold multiplied enormously; whoever could leave the city ran away. After the epidemic subsided, the search for the culprits began, especially among strangers and marginalized groups. In the case of

Hamburg, these were Jewish migrants from Russia bound for America at the time.

Cholera is considered to be a motor for sanitary reforms in the area of central water supply and sewerage, which were systematically implemented from the 1870s onwards (Vögele 2001; for a case study, see Haverkamp 1996). The municipalities achieved technical and financial pioneering works, and cholera provided the scientific argument. Max von Pettenkofer, the first professor of hygiene in Munich, developed his concept of *Experimental Hygiene*, which emphasized the importance of ecological interventions: miasms, arising from rotting and decomposition in damp ground, were considered to be the cause of the epidemics. Increase in cholera cases in Munich correlated with declining groundwater levels. Cholera could therefore be stopped by draining the soil and fixing the groundwater level, i.e., by sanitation/*Assanierung* (Pettenkofer 1865). This view or explanation also allowed the cities to take prophylactic measures, whereby this approach also promised an economic benefit. Sanitary infrastructure was now considered essential for the functioning of a modern city, while traditional forms of state intervention such as quarantine appeared counterproductive in the context of a modern economy based on the free exchange of goods and services. An interruption of trade was therefore – according to Pettenkofer – a greater evil than cholera itself (Pettenkofer 1873, 6).

On the basis of his human capital economy, Pettenkofer pointed out that lives saved through sanitary measures and saved sick days far exceeded the necessary investment costs in the infrastructure (Pettenkofer 1876, 3). Even if in the following years his theory was increasingly replaced by Robert Koch's bacteriology, which focused on the pathogens in drinking water, cost-benefit calculations should shape the future of epidemics. The following calculation was the result for the aforementioned Hamburg epidemic: A total loss of 430 million marks was offset by the seemingly modest costs of 22.6 million marks for the waterworks equipped with a filter system in the following year (Gottstein 1929). In addition, city districts were renovated, and further hygienic measures were taken. Since the city was spared further cholera epidemics, it can be concluded that the great cholera epidemic accelerated Hamburg's transformation into a modern trading metropolis. In the industrialized countries, the period of the great cholera epidemics and pandemics had come to an end; even with typhoid fever, there were only local outbreaks that were less epidemiological than socially important. As a result of the Gelsenkirchen typhoid fever epidemic of 1901, tap water was legally regarded as food for the first time. Quality controls became more and more sophisticated in the period that followed, and today the water that gushes out of the domestic tap is considered to be absolutely safe for consumption (Weyer-von Schoultz 2000).

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## 5. Flu-like Epidemics

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The 20th and early 21st century, on the other hand, is characterized by flu-like epidemics and pandemics, starting with the Spanish flu in 1918/20, which is often discussed in connection with the First World War and with an estimated number of up to 50 million deaths, which far exceeded the number of deaths as a result of warfare (Vasold 2008; Witte 2008). Whereas it was long believed that the disease originated in United States, recent research has pinpointed that there are indications that the virus was likely to come via Chinese workers' transports to North America, and from there spread to France over European battlefields, and from there to the rest of the world (Hannoun 1993).

In contrast to many other epidemics, the flu did not seek its victims among children and senior citizens, but mainly affected young men in their prime – including soldiers (Vasold 2009; Bauer and Vögele 2013). After the end of the First World War, this triggered deep concerns about the development of the population and economic strength. Decades later, this economic aspect was also discussed in a comparable way with regard to HIV/AIDS on the African continent, where the economic mainstay of the families collapsed with the sick men in the middle-age groups. In the fight against epidemics, the financial aspect also played a central role, as a much-quoted sentence in the 1990s sums up: “If a glass of clean water was the cure for AIDS, most infected people in the world today would be unable to access it.”

But back to the Spanish flu: Miasmatic concepts of etiology – i.e., the evaporation from the ground – were finally a thing of the past, the infection from person to person was considered certain, i.e., the concept of a lockdown now also made scientifically justified sense. During the epidemic, major US cities reacted accordingly. In New York, quarantine, bans on going out, and school closings succeeded in reducing specific death rates. The city of Pittsburgh, which was delayed in reacting with public assembly bans and school closings, recorded the highest mortality of any US city with 807 additional deaths per 100,000 inhabitants – almost twice as many as in New York. Other cities, like Denver, which loosened up too early and opened schools, experienced a resurgence in a very short space of time and thus another wave. In Sydney, Australia, people reduced their infectious contact rate by as much as 38%, and it is estimated that social distancing was therefore the underlying cause of multiple epidemic waves (Caley, Philp, and McCracken 2008). At the same time, the scientific interest to predict the course (and end) of pandemics rose and was intensified by using epidemic modelling like Kermack and McKendrick's compartmental model developed in 1927, which has only recently been substituted by agent-based models (Brauer 2017; Brauer and Castillo-Chavez 2012; more general Kucharski 2021).

Decades later, the Asian flu pandemic (1957–1958) took an estimated death toll between one and four million (WHO 2013, 19). A vaccine was developed in the US, which was estimated to have saved hundreds of thousands of lives (Offord 2020). West German microbiologists issued no clear recommendation for preventive vaccination until 1960, whereas East German authorities accepted vaccination in the line of the social hygienic approach (Witte 2013). A decade later, a reassorted viral strain further caused the Hong Kong flu pandemic (1968–1969) with a similarly estimated excess mortality of between one and four million (WHO 2013, 19). During the Hong Kong flu, there was a burial emergency (*Bestattungsnotstand*) in Berlin and the hospitals in Munich were overcrowded; vaccination was sparse in both German states (Witte 2011). In the winter of 1969/70, schools were closed and production was shut down in some areas of the economy – but mostly only as a reaction to an outbreak and not as a preventive measure for health care as is currently the case during the COVID-19 pandemic. Medical drugs became scarce: antibiotics, antipyretic agents, cough syrups. Politicians reacted largely without empathy and relied on herd immunity (Rengeling 2017). How far eugenic thoughts of selection from the first half of the century – it only affects the old and the sick – were still in the picture, must remain an open question. In any case, the pandemic hit a post-war society for which suffering and death experiences from war, hunger, and starvation were still present.

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## 6. Emotional Epidemiology

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The history of epidemics is not only about statistical developments, but also about feelings and fears. In this sense, one can speak of an *emotional epidemiology*, which can have its own course more or less independent of the actual infection situation. The geographical proximity of the threats plays a role here: tuberculosis and malaria are far away; HIV/AIDS is now considered to be a problem in south and east Africa. But in the face of COVID-19, it becomes clear how quickly the dangers – old and new – can come to us. In addition, there is this discrepancy between actual infection occurrence and emotional reaction in the local disease occurrence, which also has an impact on society, as outlined below using the example of H1N1 (swine flu) and infant mortality.

### 6.1 H1N1 (Swine Flu)

In spring 2009, the H1N1 virus spread. In a panic-like mood, reference was made to the Spanish flu due to similarities of the genome and public opinion called for a vaccine (Ofri 2009). Fear increased when the WHO classified the transmissions as a pandemic in June. As of October, more than 440,000 laboratory-confirmed infections had been reported worldwide, of which 5,700

were fatal, well below seasonal flu deaths. Finally, the pharmaceutical industry saw the development of a vaccine as a billion-dollar business. When a vaccination was available in autumn, the demand remained low: the vaccine was said to be not tested, poorly tolerated, and led to serious side effects (narcolepsy), and, above all, H1N1 has meanwhile been classified as relatively harmless. Until May 2010, around 28.3 million vaccine doses worth 236 million Euros remained unused in Germany, which were sold, given away, or destroyed due to a limited shelf life. A few years later, in view of the COVID-19 pandemic, it is clear that the story could have turned out quite differently.

## 6.2 Infant Mortality

There have always been and will always be differences between epidemiological findings and the perceived threat of illness and death, but the gap between the two varies considerably. Some diseases are scandalized, others are not seen at all. An impressive example of the latter, from a historical perspective, is the perception of infant mortality. Infants were the greatest risk group. In the 19th century, infant mortality was between 20 and 25 percent, i.e., up to a quarter of all newborns did not reach their first year of life. The number of victims was therefore much higher than that of cholera, typhus, and tuberculosis combined (Haines and Vögele 2000). However, this was not scandalized; high infant mortality was considered an inevitable fate. Baptism was important as a sacrament to eradicate original sin – according to the quote from Job 1:21: “The Lord has given, the Lord has taken, the name of the Lord be praised” (as quoted from Imhof 1981). Only declining birth rates at the beginning of the 20th century aroused concerns about a sufficient number of future industrial workers and – perhaps even more important – soldiers. This was felt all the more urgent as infant mortality in the German Reich was much higher when compared to those countries with which they competed economically and militarily: England and France. The fight against high infant mortality now gained very high priority: diet was identified as a key variable for the health of the infant. Mortality among breastfed infants was seven times lower than that of infants fed substitute products. Breastfeeding campaigns have been developed accordingly; the mothers should be encouraged to breastfeed through education and rewards. In fact, breastfeeding campaigns are the only public health care measures that have persisted for a hundred years (Vögele and Rittershaus 2020).

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## 7. Conclusion

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Life expectancy in Germany almost doubled over the course of the 20th century. At the same time, death withdrew to the older age groups;



correspondingly, cardiovascular diseases and cancer dominate the causes of death panorama. From a global perspective, however, the picture looks different; new and recurring epidemics such as HIV/AIDS, malaria, tuberculosis, COVID-19, and other infectious diseases are threatening the health of the world population. The world economy, global mobility, and mass tourism turn these into global risks that are to be monitored and controlled with global institutions such as the World Health Organization (WHO), founded in 1948. Current developments suggest that infectious diseases will continue to play an important role in the future and make it clear that epidemics and pandemics should not only be viewed from a microbiological and medical perspective, but should also be analyzed from a political, economic, and social perspective. A look at history reveals these dimensions. Epidemics and pandemics challenge the stability of a society; they are both a stress test and a catalyst for already existing developments and trends. Fighting them is always a struggle to find the right way. It also becomes clear how fundamental both a sustainable lifestyle and preventive action are for health. However, this is not always easy to implement, in view of the old paradox of prevention: If preventive measures are effective, the reason why they were taken is soon no longer noticeable: “It wasn’t all that bad.” What would have happened if they had not been taken is largely up to our imagination. Furthermore, epidemics exacerbate the dimensions of social inequality. This was true for past epidemics, but also emerges clearly and in all its aspects during the current COVID-19 pandemic. For example, Central African Republic, one of the poorest countries in the world with a low life-expectancy, is at present not only struggling against COVID-19, but also against longer prevailing threats, such as HIV/AIDS, Malaria, and the effects of malnutrition.<sup>3</sup> Vaccination teams are existing from earlier campaigns against poliomyelitis, yet there is only a very low number of COVID-19 vaccination doses available: According to WHO data, Central African Republic has administered 78,685 doses of COVID-19 vaccines so far (July 2021), assuming every person needs two doses, that would be enough to vaccinate 0.8 percent of the country’s population.<sup>4</sup> What also might be of importance, is the interrelationship between various epidemics. For example, the weakened immune system of AIDS patients might favor the development of Sars-Cov-2 variants. The current COVID-19 pandemic will also leave permanent traces. Some are already clearly emerging – for example, the ever-increasing digitalization in schools, studies, and work; the development and spread of mRNA therapies, or the mathematical modelling of epidemics – others are more speculative: What happens next with wearing mouth and nose protection, shaking hands, the French *bises* (kisses)

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<sup>3</sup> “Crisis overview: What’s happening in Central African Republic?” UNICEF, <https://www.unicef.org/emergencies/crisis-central-african-republic> (Accessed December 1, 2021).

<sup>4</sup> “Central African Republic Situation”, WHO, <https://covid19.who.int/region/afro/country/cf> (Accessed December 1, 2021).

as a welcoming ritual, mass tourism, etc.? Strengths and weaknesses of the federalism in Germany or the structure of the EU are discussed as well as the role of the pharmaceutical industry and drug patents. Other discourses are disappearing just as quickly as they came: an appreciation of the nursing professions – pecuniary as well as social appreciation – seems to be paid lip service. Whatever the conclusions are, it should be clear in any case: After the epidemic, as at all times, is also before the epidemic! The next epidemic or pandemic is sure to come, the only question is when.

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## 8. Epidemics Past and Present – Selected Aspects of the Historical Perspective in the Light of the COVID-19 Pandemic 2020/21

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### Social Inequality

A strong component of social inequality is mediated sometimes by geographical factors; with the expansion of the European world economy, the commercial web was increasingly becoming a network that also spread a range of infectious diseases and brought them back from the Global South to Europe. It is no surprise therefore that the port and commercial cities became the locations primarily affected by the epidemics; from there, they spread into the economic dependent hinterland and via trade routes (rivers, railways) further on. In the towns and cities, the districts – particularly in English cities with a clear social stratification and segregation – death rates were particularly high in the poorer areas. Social inequality with respect to disease and death has been a constant theme following Max Mosse and Gustav Tugendreich's groundbreaking publication *Krankheit und Soziale Lage* from 1912 (Mosse and Tugendreich 1912). Those who are poor die earlier. This was obvious in the early 20th century and is still valid today. The poor suffer from almost all diseases more often, they have poorly paid and more unhealthy jobs, they smoke more and eat less healthy, their residential areas lie on streets with lots of traffic, and fine dust also has an impact. In this respect, it seems unsettling that in hardly any other European country has social inequality increased as significantly in the last ten years as in Germany, and in 2020, Germany was amongst the highest in Europe in the global ranking of the Gini index by country.<sup>5</sup> When it comes to the COVID-19 pandemic, discussion in Germany focused on the disproportional number of patients with a refugee and migration history in intensive care, and a special program to vaccinate residents in city districts classified as being of low status.

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<sup>5</sup> "Ranking of the Gini Index by Country 2020", Statista, <https://www.statista.com/forecasts/1171540/gini-index-by-country> (Accessed June 21, 2021).

These inequalities, indeed, can be traced back far into the past, as *Grażyna Liczbińska* (Poznań) demonstrates for the 19th century cholera epidemics in Poznań, demonstrating the impact of social class, and, in addition, of age and gender as well as spatial factors – e.g., cholera as a disease related to the health-related infrastructure, such as water supply. The impact of social class is also mediated through the role of local institutions, as *Evelien Walhout* and *Eric Beekink* (Leiden/Thollet) point out in their study of the cholera epidemic in Woerden in 1866. Their reconstruction uses a multitude of individual data not only with respect to gender, social, and economic status, but also includes a look at the impact of supporting municipal institutions and the churches during an epidemic.

### Politics, Scientific Discourse, and Behavior

The major epidemics of the 19th and early 20th centuries, such as cholera, typhoid, smallpox, and influenza take up a large part of historical research. Governmental strategies to combat disease, e.g., vaccination policies, together with the rise of the anti-vaccination movement, came into focus. Despite the concept of “microbial globalization” (Le Roy Ladurie 1973; Crosby 1976; McMillen 2008), developed on the basis of the spread of syphilis or the causes of exorbitant mortality rates among the indigenous peoples of the Americas, as well as the so-called “Spanish flu” from the USA (Crosby 2003; Barry 2004; Witte 2008; Ansart et al. 2009), the topos of the *Seuchenherd* (the origin of epidemics) in the Western world is mostly associated with the “East.” In addition to vectors, animals, or people, i.e., traffic flows and migratory movements, behavior has come into the focus of attention. Since the late Middle Ages, barricading measures (cordon sanitaire, quarantine, lockdowns) have been developed and implemented by the authorities, so that anti-contagionism as a form of bourgeois liberalism argued against the risk and side effects of these measures in the 19th century (Ackerknecht 1948; Baldwin 2005; Conti and Gensini 2007; Booker 2007). Efforts to eradicate or sanitize were also often closely linked to political or ideological conceptions (Vögele and Umehara 2015). This is why the historical analysis of social reactions, based on robust epidemiological data, appears just as informative as historical-geographical reconstructions (Benedict 1996; Johnson 2006; Echenberg 2007; Curtis 2008; Condrau and Worboys 2009; Suzuki 2009), especially in a colonial context (Arnold 1993; Yip 2009; Iijima 2010). Thus, the rapidly modernizing societies of Asia since the end of the 19th century, as it were in the mirror of their epidemic control as a sub-area of medicine, might be a promising area of research in the future.

*Kristina Puljizević* (Dubrovnik) analyzes governmental anti-epidemic measures in 19th century Dalmatia. Dalmatian public health was under the major impact of the Johann Peter Frank medical police system. The main

focus was to establish a network of public officials to monitor the outbreak and course of epidemics. Furthermore, the anti-epidemic measures corresponded to the dominant etiological theories. During the 19th century, they followed new developments in medicine and etiology, from anti-contagionism and contagionism to germ theory and bacteriology development.

*Julia Nebe, Enno Schwanke, and Dominik Groß* (Düsseldorf/Aachen) explore the rise and political implications of the German anti-vaccination movement in the broader context of criticism of scientific medicine, which included substantial elements of ideological thinking and *völkisch* anti-Semitic ideas.

Similarly, *Hannah Fuchs* and *Karl-Heinz Leven* (Erlangen) focus on the scientific discourse on the origin of HIV/AIDS and the distribution of the disease and the HI virus between the US and Haiti. They demonstrate that such a discourse on the origin and spread of disease carries a range of social implications and is always accompanied by underlying narratives of blame, responsibility, and guilt.

*Iris Borowy's* (Shanghai) study of the perspectives on the COVID-19 vaccine analyzes the interrelationship between politics, health equity, and global health management. While people in the 20th century had to wait for the pandemic to run its course, COVID-19 saw the emergence of a vaccine and with it the challenge of how to distribute vaccines at a time when existing stocks are far below what is required for global herd immunity. Decisions about the distribution have been related more to domestic and foreign policy than to scientific considerations.

## The Spanish Flu and COVID-19

Historians of epidemics are currently in great demand in the media landscape: Are there parallels, and what can be learned from past epidemics? A lot, of course: With regard to processes, reactions, and consequences, patterns can be recognized, societies and developments can be studied as if under a magnifying glass. But also, the other way around: Historians are rediscovering the topic; the long-forgotten influenza epidemic at the beginning of the 20th century, for example, is once again coming into focus.

For this purpose, new sources and methods are used. For example, *Bartosz Ogórek* (Kraków), aims at quantifying Spanish flu mortality in the cities of the Second Polish Republic on the basis of municipal statistics. The gathered data is modelled using Serfling regression to estimate excess mortality and identify waves and recurrences of the flu to help our understanding of the origins and spread of the disease within Europe.

*Isabelle Devos* (Ghent) and colleagues investigate the Spanish flu in Belgium on the basis of ego documents, vital and cause-of death statistics, and proffer a long outstanding overview of the developments in Belgium. They

particularly emphasize the European context created by the interrelations with war activities.

*Martin Gorsky* (London), *Bernard Harris* (Glasgow), *Patricia Marsh* (Belfast), and *Ida Milne* (Carlow) elaborate similarities and differences in the nature of the 1918/19 influenza pandemic and the 2020/21 COVID-19 pandemic in Ireland and the UK. They focus on the underlying social and economic inequalities and on an evaluation of the measures taken by central and local governments as well as civil society to combat the spread of disease.

*Wilfrid Witte* (Berlin/Bielefeld) reconstructs the history of virological influenza vaccination before, during, and after the Third Reich and emphasizes the interrelationship between science and politics. Fears of a new disastrous influenza pandemic that might develop in the context of World War II prompted those in power in Germany to develop a virological influenza vaccine. However, no influenza vaccination campaign took place during the Nazi era; it was not implemented until 1946/47 by the Allies in Berlin. The West German public remained skeptical about influenza vaccination until the late 1950s. In East Germany, vaccination was seen as part of a health policy based on social hygiene.

*Wataru Iijima* (Tokyo) analyzes COVID-19 and corresponding strategies in Japan (compared with other European and Asian countries). The main issues addressed are the different ways to control the spread of the disease. For example, the hard lockdown adopted in China or Germany was not adopted in Japan; instead, the main method was the so-called *Jishuku*, the self-restriction of the population.

*Patrice Bourdelais* (Paris) gives an insight of the historical perspective on the COVID-19 pandemic and elaborates elements of continuity and rupture since the 14th century. This historic view reveals a double tension, which appears in all epidemics of the past, between the need to find a balance between sanitary control and efforts to maintain a certain level of economic and social life. But also, the instrumentalization of the epidemic by socio-professional groups, governments, and political parties or the various reactions of and in different populations are analyzed. Thus, this historical perspective might prefer a contribution to classify measures and the general handling of the present pandemic beyond the current developments into a longer perspective.

## A Broader View

For the last 100 years, the modern concept of epidemics as contagious diseases caused by pathogenic agents or microorganisms entering the body has not only dominated present thinking about epidemics but highly influenced historiographical study of past disease as well. In the case of Greek and Roman Antiquity, this led to extensive and thorough scholarly work on

epidemics fitting the pattern of infectious diseases while incompatible cases were put aside notwithstanding that, by ancient definition, they were epidemics of the same quality: Illness which affects many individuals of the same community at the same time. This includes cases retrospectively explained as mass poisoning, ergotism, and mass hysteria. *Nadine Metzger* (Erlangen) discusses the methodological problems arising from disparate definitions of modern and ancient epidemics. Thereby, limits and potential of employing past epidemic concepts in present historiography of epidemics are examined. Using the examples of fungal poisoning, ergotism, and mass psychosis, she demonstrates the analytic potential resulting from a broadening of the source base.

Concluding, *Luisa Rittershaus* (Düsseldorf) and *Kathrin Eschenberg* (Köln) demonstrate the omnipresence death and dying took in the course of history using the example of the so-called Danse Macabre. This is an art genre that emerged around the time of the Black Death and has lasted until today, which pinpoints that Memento mori and Vanitas conceptions have been an integral part of human existence, particularly in times of epidemics and pandemics.

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