

Pestilence as a Phenomenon: Past, Present, and Future¹

Vladimir N. Alalykin-Izvekov

International Society for the Comparative Study of Civilizations

The paper analyses the profound role, which infectious diseases played, play, and will continue to play in world history and culture. The phenomenon of pestilence is studied in the context of other major calamities. The author puts forward a number of original concepts and also makes relevant predictions for the future.

Keywords: *calamity, 'civilized diseases', disease vector, endemic, epidemic, great sociocultural systems (GSCS), great socioeconomic systems (GSES), infectious diseases, outbreak, pandemic, plague, pestilence, revolution, social change, zoonotic diseases.*

Everybody knows that pestilences have a way of recurring in the world; yet somehow we find it hard to believe in ones that crash down on our heads from a blue sky.

Albert Camus

Truth unfolds in time through a communal process.

Carroll Quigley

Those who make peaceful revolution impossible will make violent revolution inevitable.

John F. Kennedy

1. Pestilences through the Ages

One of the most powerful factors behind the turbulent trajectory of human evolution is the *phenomenon of calamity*. It played a colossal role in the evolution (and revolutions) of the world history and culture. Countless lives have been ruthlessly affected and tragically lost during a perpetual struggle of humanity with *calamities*. Among the most devastating are *pestilences*, wars, revolutions, invasions, and various 'times of troubles,' magnified by fires, famines, hurricanes, floods, earthquakes, tsunami, and volcanic eruptions, as well as rapidly emerging environmental disasters. As Pitirim A. Sorokin authoritatively demonstrates, *calamities* exert extremely powerful effects upon human mind, behavior, social organization, and cultural life (Sorokin 1968).

¹ First published in Alalykin-Izvekov, V. (2020) Pestilence and Other Calamities in Civilizational Theory: Sorokin, McNeill, Diamond, and Beyond. *Comparative Civilizations Review* 83 (83): Article 13. Available at: <https://scholarsarchive.byu.edu/ccr/vol83/iss83/13>.

Among other existential threats, an enormous role is played by *pestilences* – a mysterious and much feared phenomenon. They often kill more people than even the deadliest of wars. During the American Civil War (1861–1865) for every soldier who perished from battle wounds, two died of *infectious diseases*, such as *dysentery*, *measles*, *small pox*, and *malaria*. The *1918 Influenza Pandemic* alone slayed 50 million people world-wide – almost three times more, than 17 million, killed during WWI.

The roots of *infectious diseases* go back a long way since they have been here eons of time, even before humanity evolved. William H. McNeill notes, ‘An amazing variety of animals suffer from one or another form of tuberculosis. Indeed, on chemical grounds it is commonly believed that the bacillus became parasitic when all life was still oceanic’ (McNeill 1976: 332). Unsurprisingly, the incurable *pestilences* have been a part of human history for millennia. They exerted a powerful impact on virtually every aspect of our lives, influenced outcomes of battles and wars, subdued proud rulers and ruined empires, formed our everyday habits and ways, and even dictated cultural and fashion trends.

Caused by draught, famine, cold, and other environmental changes massive prehistoric migrations spread them in their wake. *Epidemics* accelerated further as societies became settled, more complex, and people started congregate in ever more densely populated cities. The ancient Romans, Aztecs, and other empire builders created networks of paved roads, for armies and messengers to move quickly around their realms. The ancient Egyptians, Chinese, and others introduced elaborate systems of navigational canals. Lakes, rivers, seas, and later, oceans, became humanity's first superhighways. Spurred by wars, technological advances, and proliferation of international trade, further massive movements followed, with armies, trade caravans, religious pilgrimages and crusades, as well as expeditions of ‘exploration and discovery’ traveling far and wide.

One of the results of these advances was the emergence of what William H. McNeill termed ‘civilized’ diseases (McNeill 1976: 106), that are mostly incurable, and, therefore, mysterious *epidemics*, which periodically devastated lands and, especially, towns of ancient and medieval societies. Then, steam ships and steam-driven locomotives announced with their powerful whistles and bells the arrival of an era of mass transportation. The introduction of internal combustion, jet, and electric engines turbocharged the spread of *infectious maladies* even further. Now, with the advancement of cars and highways, commercial aviation and rapid land transit, any *infectious disease* is just one day away from anybody on the planet.

Through the ages, *pestilences* fell, as if from the sky, like bolts of lightning. Known as *The Black Death* (1346–1353), the *bubonic plague epidemic* was just the initial stage of *The Second Plague Pandemic* (1346–1844). With mortality rate of up to 70 per cent, it exerted a tremendous toll on countless European towns and villages. The great Italian writer and Renaissance humanist Giovanni Boccaccio (1313–1375) describes horrors caused by the *bubonic* killer in his beloved city of Florence in the year 1348,

...There came a deadly pestilence. ...It ... showed its first signs in men and women alike by means of swellings either in the groin or under the armpits, some of which grew to the size of an ordinary apple and others to the size of an egg (more or less), and the people called them *gavoccioli* (buboes). And from the two parts of the body already mentioned, in very little time, the said deadly *gavoccioli* began to spread indiscriminately over every part of the body; then, after this, the symptoms of the illness changed to black or livid spots appearing on the arms and thighs, and on every part of the body – sometimes there were large ones and other times a number of little ones scattered all around. And just as the *gavoccioli* were originally, and still are,

a very definite indication of impending death, in like manner these spots came to mean the same thing for whoever contracted them (Mark 2020).

Following those initial signs, plague victims usually developed an acute fever and started vomiting blood. Most of them died in two to seven days after the initial infection (Stanska 2020: 5).

Another vicious killer was *cholera*, known also as the *Blue Death*. There were no less than seven *cholera pandemics* during the nineteenth and the twentieth centuries (1817–1824; 1827–1835; 1839–1856; 1863–1875; 1881–1896; 1899–1923; 1961 – present) (Hays 2005: V–VII). When untreated, the mortality rate of this ruthless malady was about 50 per cent. William H. McNeill testifies,

The speed with which cholera killed was profoundly alarming, since perfectly healthy people could never feel safe from sudden death when the infection was anywhere near. In addition, the symptoms were particularly horrible: radical dehydration meant that a victim shrank into a wizened caricature of his former self within a few hours, while ruptured capillaries discolored the skin, turning it black and blue. The effect was to make mortality uniquely visible: patterns of bodily decay were exacerbated and accelerated, as in a time-lapse motion picture, to remind all who saw it of death's ugly horror and utter inevitability (McNeill 1976: 261).

A contemporary scholar adds,

Cholera is a horrible disease. At first, the symptoms produce no more than a surprised look as the bowels empty without any warning. Then surprise changes to agony as severe cramping pains begin. Copious quantities of liquid, resembling rice water, pour through the anus. As the pain intensifies, the only small relief is to draw oneself into a ball, chin held against the knees; the breath whistles softly between the teeth. When death occurs at this stage, the body cannot be unrolled and the victim has to be buried in the fetal position. Those who do not die from this first attack suffer a slow and painful decline. The cheeks become hollow, the body liquids surge more slowly but still remain beyond control, and the watery stools contain fragments of the intestinal lining. As the hours pass, the skin darkens, the eyes stare vacantly without comprehension, and then life ends (Sherman 2007: 33).

For most of the humanity's difficult story, the true causes of *infectious diseases* were not precisely known. The invisible is almost impossible to explain, and, therefore, it remains in a realm of the unknown or the unproven. Through the ages, the God's punishment for sins has been invoked, miasma, *i.e.* foul smells or vapors have been blamed, innocent cats and dogs exterminated, and inevitably, disenfranchised groups, such as the Gypsies, the Jews, the immigrants, and the poor have been blamed, forcibly isolated, expelled, and prosecuted.

The process of discovering true causes of *pestilences* was gradual, onerous, as well as dangerous, and until very recently, the answers remained elusive. The first inklings came only in the mid-nineteenth century, during the *Third Cholera Pandemic* (1839–1856). In 1854, London physician John Snow (1813–1858) proposed that *cholera* was disseminated by the way of located next to an open sewer in Soho water pump. Dr Snow's discovery led to the development of water and waste sanitation systems, first in London, and then around the world, and he himself is considered one of the founders of *epidemiology*.

It is now common knowledge that most of *infectious diseases* are caused by certain microorganisms, such as *pathogenic bacteria* and *viruses*. The introduction during the eighteenth and nineteenth centuries of optical microscopes into medical research led to the establishment of *microbiology* and *bacteriology* as scientific disciplines. Even then,

only the largest of the *pathogenic microorganisms* could be studied, such as, for example, *bacteria*. As to *viruses*, they are on average hundred times smaller than *bacteria*, and their discovery, as well as discoveries in virology had to wait until the invention of the electron microscope in the 1930s. Only by the mid-twentieth century a significant number of *epidemic diseases* caused by these and other *microbes* were tamed, and some were even altogether eradicated.

The spread of *infectious diseases* is at times facilitated by *disease vectors*, *i.e.* agents that carry and transmit *infectious pathogens* (fleas, ticks, mosquitos, *etc.*). *Zoonotic diseases* are the ones that are transmissible from an animal or insect to a human. An *epidemic* is a situation in which a disease affects a large number of people within a community, population, or region. When a disease becomes a permanent feature in the given circumstances, it is known as *endemic*. An *outbreak* is a sudden surge of infection, for example, an increase in the number of *endemic* cases. If it is not quickly controlled, an *outbreak* may become an *epidemic*. *Virgin soil epidemic* defines a situation in which the affected population has not been previously exposed to the disease and, therefore, has no immunological defenses against it. Especially devastating are *pandemics* – *epidemics* that may spread over multiple regions, countries, or continents.

2. Reflection of Pestilences in Literature and Visual Art

Through the centuries, a dramatic struggle with the horrifying multi-headed monster of *pestilence* continued unabated. Due to their uncanny ability to extract a dreadful toll on humanity, *pestilences* found an abundant expression in important religious and historic sources, as well as in significant works of literature and visual art.

We may go no further than to open attributed to John of Patmos (*c.* 6 AD ~100 AD) final book of the *New Testament* entitled the *Book of Revelation*. It features four supernatural beings charging forth on white, red, black, and pale horses (Holy Bible 1989: 175). Those riders are often seen as symbolizing *Pestilence, War, Famine, and Death*. According to the Christian apocalyptic teachings, the *Four Horsemen* are to set a divine apocalypse upon the world as harbingers of the *Last Judgment*. In fact, those awesome figures make their appearance even earlier, for example, in the *Old Testament's Book of Zechariah* (Holy Bible 1989: 585–591) and in the Book of Ezekiel (*Ibid.*: 515–552), the roots of which go as far back as the sixth century B.C.

Plagues have served as an ominous background in classic books by Giovanni Boccaccio (1313–1375), Geoffrey Chaucer (*c.* 1340s–1400), Daniel Defoe (1660–1731), Mary Wollstonecraft Shelley (1797–1851), and Edgar Allan Poe (1809–1849). *Tuberculosis* made its menacing appearance in major works of Charles Dickens (1812–1870), Ivan Turgenev (1818–1883), Fyodor Dostoyevsky (1821–1881), and Erich Maria Remarque (1898–1970). Albert Camus (1913–1960) situated his novel *The Plague* (1947) the French Algerian city of Oran in the 1940s, even though it was, conceivably, based on tragic events of the *Sixth Cholera Pandemic* (1899–1923). The same disease hovers in the background of the novel *Love in the Time of Cholera* (1985) by the Colombian writer Gabriel Garcia Marquez (1927–2014). Since his story unfolds approximately between 1880 and the early 1930s, it most probably reflects on either *Fifth Cholera Pandemic* (1881–1896) or *Sixth Cholera Pandemic* (1899–1923).

Such prominent artists, as Titian (*c.* 1488/90[1]–1576), Pieter Bruegel the Elder (*c.* 1525–1530–1569), Paulus Furst of Nuremberg (1608–1666), Pavel A. Fedotov (1815–1852), Arnold Böcklin (1827–1901), Egon Schiele (1890–1918), and Edvard Munch (1863–1944) reflected on various incurable afflictions, at times right before succumbing to

them. Set in Sweden during the *Black Death Epidemic* (1346–1353), Ingmar Bergman's (1918–2007) classic movie *The Seventh Seal* is a parable about a medieval knight and his imagined interaction with a personification of Death. Based on Michael M. Crichton's (1942–2008) novel (1969) eponymic film *The Andromeda Strain* (1971), as well as more recent movies *Outbreak* (1995) and *Contagion* (2011) are just a few examples of Hollywood 'science fiction' interpretations of *epidemics and pandemics*.

3. Pestilences as a Double-Edged Sword of Destruction and Change

Pestilences, very often in fatal combination with other *calamities*, complicate or even outright disrupt social and cultural activities, trade, business, and other conditions and circumstances of normal life. Before radically decimating Europe in 1346–1353, the *bubonic plague*, in conjunction with Mongol invasions, ravaged the medieval China on an apocalyptic scale. McNeill comments,

The combination of war and pestilence wreaked havoc on China's population. The best estimates show a decrease from 123 million about 1200 (before the Mongol invasions began) to a mere 65 million in 1393, a generation after the final expulsion of the Mongols from China. Even Mongol ferocity cannot account for such a drastic decrease. Disease assuredly played a big part in cutting Chinese numbers in half; and bubonic plague, recurring after its initial ravages at relatively frequent intervals, just as in Europe, is by all odds the most likely candidate for such a role (McNeill 1976: 163).

In much more extreme cases, *infectious diseases* lead to a complete downfall of societies, empires, and civilizations. For example, the transfer of *infectious diseases* to the Americas and other regions of the world, for example, Oceania, during the so-called *Age of Discovery* (the 15 – the 17 centuries), decimated most of local populations, often irreversibly so (McNeill 1976: 199–234; Hays 2005: 297–301).

As late as in the 19th century things were not much different even in the most advanced industrial countries and even among powerful, rich, and famous. Queen Victoria's husband Prince Albert (1819–1861) died at the age of 42 from what appears to have been *typhoid*. The Scottish novelist Sir Walter Scott (1771–1832), the English Romantic poet John Keats (1795–1821), and the English poet and revolutionary Lord Byron (1788–1824) – all perished from then untreatable *tuberculosis*. It was even worse elsewhere. A shaken British diplomat testified about his experiences in the Brazilian city of Recife in the year 1856, during the *Third Cholera Pandemic* (1839–1856),

The town has had all the appearance of a city of the plague, business is at standstill, the streets deserted, tar barrels burning in them by day, and penitential processions by night, which carried the mind back to the middle ages, men and women with torches, covered with sheets and barefooted, groaning, weeping, praying, chanting, and scourging; the dead carts galloping to and fro with six or eight bodies, by day and night (Hays 2005: 231).

That is why *outbreaks* and even some *epidemics of infectious diseases* have been at times under-reported, covered up, as well as outright concealed by the authorities. In his (contemporary, but published much later) novel entitled *Death in Venice* Thomas Mann (1875–1955) reflects on such a 'secret' *outbreak*, presently known as the *Cholera Epidemic in Naples* (1910–1911),

Obsessed with obtaining reliable news about the status and progress of the disease, he went to the city's cafés and plowed through all the German newspapers, which had been missing from the hotel lobby during the past few days (*Ibid.*: 373).

Later research revealed that the true Italian toll in 1911 was about 16,000, and in Naples, at least 2,600. Due to complicated political and business circumstances (Naples was the main port of departure for the massive immigration flow at the time), this *epidemic* completely 'disappeared' from almost all official, medical, and mass media records. Multiple levels of government (municipal and royal in Italy) in three countries (Italy itself, Argentina, and the US) have been to a different degree involved in the cover-up (Hays 2005: 369–375).

Exactly 110 years later, those catastrophic blunders have been repeated in Italy and elsewhere in the world during the *coronavirus COVID-19 pandemic*. For example, the Italian city of Bergamo was affected by *coronavirus* on a massive scale and became the country's epicenter of the disease. For various bureaucratic reasons, the areas that should have been locked down, were not, and that augmented the spread of the virus (Castelfranco 2020).

Another, more benign aspect of the *phenomenon of pestilence* is that it is a very powerful factor of social and cultural change. *The Black Death* (1346–1353) and the subsequent waves of *The Second Plague Pandemic* (1346–1844) completely altered the European social structure, as well as the belief systems of many of those who survived it (Mark 2020). McNeill elucidates,

...the inadequacy of established ecclesiastical rituals and administrative measures to cope with the unexampled emergency of plague had pervasively unsettling effects. In the fourteenth century, many priests and monks died; often their successors were less well trained and faced more quizzical if not openly antagonistic flocks. God's justice seemed far to seek in the way plague spared some, killed others; and the regular administration of God's grace through the sacraments (even when consecrated priests remained available) was an entirely inadequate psychological counterpoise to the statistical vagaries of lethal infection and sudden death. Anti-clericalism was of course not new in Christian Europe; after 1346, however, it became more open and widespread, and provided one of the elements contributing to Luther's later success (McNeill 1976: 184–185).

It is a well-known fact that in the wake of the *Black Death epidemic* European societies witnessed remarkable economic, scientific, and technological advances, as well as a virtual explosion of inventiveness and entrepreneurship. Jo N. Hays notes,

The new supply-demand situation of labor also encouraged greater efficiency of production. The pre-Black Death economy had little incentive to save on labor costs; surplus population made labor cheap. The Black Death – and the continuing demographic pressure of the ongoing pandemic – coincided with a remarkable period of technological innovation, which likely was not coincidental (Hays 2005: 49).

It was during *The Second Plague Pandemic* (1346–1844) that the Italian perfume maker Giovanni Maria Farina (1685–1766) introduced in 1709 his famous *Eau de Cologne*. The perfume with sweet, yet refreshing and stimulating aroma was concocted according to a highly guarded formula from the aromatic essences of oranges, lemons, grapefruits, bergamot, flowers, and lavender. Originally very expensive, it was believed to have the power to ward off the *bubonic nemesis*.

Even more tantalizing issue is the relation between the *plague* and the creative genius of Isaac Newton (1642–1726/27). Between April 1665 and January 1666, the city of Lon-

don suffered a major *epidemic of bubonic plague*, which killed about 100,000 people, almost a quarter of London's population, in just eighteen months. The *Great Plague of London* (1665–1666) was even described by Daniel Defoe (1660–1731) in a novel entitled *A Journal of the Plague Year* (1722). This was the last major *outbreak* of by then receding in Europe *Second Plague Pandemic* (1346–1844). With the University of Cambridge closed because of the *epidemic*, Newton returned to his home in rural Lincolnshire between June 1665 and April 1667. During that period, not only he developed the calculus and realized that white light contained the colors of the spectrum, the thinker also conceived of his famous theory of universal gravitation (Hays 2005: 129).

Thus, *pestilences*, as well as other *calamities*, while viciously attacking society on a 'physical' or 'biological' level, are also capable of exerting a profound social and cultural change. Therefore, their true impact on social and cultural life of multiple societies was often misinterpreted, as well as hidden behind convenient for the elites euphemistic formulations or even outright cover-ups. Gradually, a number of prominent historians and social scholars began a process of uncovering the true significance and the enormous role of *epidemics and pandemics* in human history.

4. Pitirim A. Sorokin: Apocalypse Explained

Russia is no stranger to *calamities* and hardship. In fact, some of the greatest Russian literary works reflect or persistently dwell on various cataclysms. The Russian historian Nikolay M. Karamzin (1766–1826) lived during the Napoleonic Wars, and the scholar's unique library perished together with his apartment during the Fire of Moscow in 1812. Apparently, the historian's labors on his twelve-volume *History of the Russian State* were in no small measure motivated by the forthcoming threat of the Napoleon's almost million-strong military juggernaut (Smirnov 2014: 5–6).

In his 'War and Peace' Leo Tolstoy (1828–1910) presents nothing less than his own deterministic philosophy of history using the Napoleonic Wars as a dramatic background (Tolstoy 1960: 588–625). Yet another type of *calamity*, revolution, continues to be an endemic feature of Russian historical and cultural landscape. In 1993, Daniel Yergin and Thane Gustafson published a book on Russia's fate after the collapse of the Soviet Union. They started it with the words: 'The twentieth century closes as it began, with revolution in Russia ...' (Yergin and Gustafson 1995: 3).

Sorokin hails from the historic land of Komi people, located north of the 60th parallel. The climate conditions of this unforgiving, but beautiful region approximate those of Alaska, northern Canada, and even Greenland. Born into a Russian-Komi family of an impoverished itinerant artist, the precocious young man overcomes enormous obstacles to become Russia's 'second Lomonosov.' In just a few years after arriving penniless at the age of 18 in Saint-Petersburg, the young genius becomes not only a prominent scholar and public figure (sociologist, lawyer, ethnologist, and journalist), but also literally a 'second person' in the Provisional Government (March–July, 1917) of a gigantic state occupying one sixth of the globe (Alalykin-Izvekov 2017: 21).

After the October Revolution of 1917 the already widely known scholar and popular political leader joins the anti-Bolshevik insurrection. On November 30, 1918, he is thrown into jail in the Russian far-northern town of Ustyug. There, he almost drinks the bitter cup of a political prisoner sentenced to death to the end. If not execution, then certain death from *typhus* certainly awaited him in the overcrowded and *pestilence-infested* jail (Sorokin 1963a: 141–175). This vicious disease killed millions during World War I (McNeill 1976: 220), and was particularly fatal during the Russian Revolution (1917) and the Russian Civil War

(1917–1923). However, even in these harrowing conditions, the scholar soberly contemplated over an omnipresent toll of *calamities* on humanity. In words, worthy of the pen of Nicolas de Condorcet, he noted, ‘The revolution, this voracious monster, cannot live without human blood’ (Alalykin-Izvekov 2017: 40). With yet more ordeals to follow, the American sociologist Michel P. Richard keenly summarized the scholar's unique career by saying: ‘The amazing thing about Sorokin's life is that he managed to survive it’ (Sorokin 1991: V).

Not surprisingly, the thinker deeply investigated the phenomena of revolution, hunger, *pestilence*, and other *calamities* in such works as *Hunger as a Factor* (1922), *Sociology of the Revolution* (1925), *Modern Historical and Social Philosophies* (1950), *Social and Cultural Dynamics* (1937–1941), *Society, Culture, Personality* (1947), and *Sociological Theories of Today* (1966). Especially significant in this regard is Sorokin's classic monograph *Man and Society in Calamity* (1942). The American sociologist and Sorokin's biographer Barry Johnston notes, ‘The scientific value of the work is that it is a factual, analytically driven theory of catastrophic social change. ... In it, Sorokin explores how hunger, epidemic and war affect the mind and lead to regression of social behavior and social organization’ (Johnston 1995: 168–169).

With his unique talent of the panoramic scholarly vision, Sorokin investigated the *phenomenon of pestilence* as a complicated and closely connected with other *calamities* occurrence. He is one of the first social scholars to fully recognize that *calamities* may also inspire profound thought, boost creativity, promote inventions and discoveries, and even evoke in a significant number of people their best qualities. Sorokin reminds us that some of the greatest achievements of human spirit have been created during the times of change and crisis. The scholar writes in his monograph *Modern Historical and Social Philosophies* (1950):

Even in normal times, cogitation about man's destiny – on the whence and whither, the how and why, of a given society – is now and then carried on by at least a few thinkers or scholars. In times of serious crisis these problems suddenly assume exceptional importance, theoretical as well as practical; for thinkers as well as for plain folk. An enormous part of the population finds itself uprooted, ruined, mutilated, and annihilated by the crisis. People's routine of life is entirely upset; their habitual adjustments are broken; and large groups of human beings are turned into a flotsam of displaced and disadjusted persons. ... This means that in times of crisis one should expect an upsurge of cogitation on and study of the how and why, the whence and whither, of man, society, and humanity. Most of the significant ‘philosophies of history,’ most of the ‘intelligible interpretations of historical events,’ and most of the important generalizations about sociocultural processes have indeed appeared either in the periods of serious crisis, catastrophe, and transitional disintegration, or immediately before and after such periods (Sorokin 1963b: 3–4).

Later, Thomas S. Kuhn would later agree by saying ‘...crises are a necessary precondition for the emergence of novel theories’ (Kuhn 1970: 77). Not surprisingly, as to the way out of *pestilences*, Sorokin is looking far ahead of his times. A true humanist, the scholar writes,

...side by side with the biological and medical questions, the problem of alleviation and elimination of epidemics has its no less important social and cultural aspects. A wise society, desirous of being free from pestilence, would eliminate not only its biological roots but also the social causes of epidemics; famine, ignorance, revolution, and war. Such a goal requires a society supremely well integrated in scientific, religious, moral and social respects. Unfortunately, many societies have been, are and probably will be lacking in this integration and wisdom. Hence, they have been pay-

ing the penalty of the visitation of pestilence with its death toll and will probably so continue (Sorokin 1968: 301).

Thus, by expertly studying the effects of war, revolution, famine, and *pestilence* upon human mind, behavior, social organization and cultural life, Pitirim A. Sorokin is confidently laying the foundation for a rigorous scientific study of *calamities*.

5. William H. McNeill's tour de force of Plagues and Peoples

William H. McNeill was a friend, collaborator, and biographer of one of the founders of the field of *comparative study of civilizations* Arnold J. Toynbee – the man who, according to *Time* magazine (c. 1947), ‘found history Ptolemaic and left it Copernican.’ This significant connection may explain the profound depth and astounding scope of McNeill's writings. In his compact, competent, and elegantly written volume *Plagues and Peoples* (1976) the scholar describes a dramatic struggle of humans with *infectious diseases* through the ages. The book is highly interdisciplinary, yet fundamental in character. The scholar methodically follows the development of what he justifiably calls *civilized diseases* through eons of time and among peoples of a breathtaking diversity of regions.

It is bursting with insightful observations, original thoughts, and profound scholarly judgments. The scholar suggests, for example, that the Indian castes originated, at least in part, due to the role of *infectious diseases* (McNeill 1976: 93–94). *Epidemics* had a major impact on the spread of Christianity, as well as on the fall of the Western Roman Empire (*Ibid.*: 121–123). A subsequent shift of *civilization* away from the Mediterranean toward the cooler climes of Northern Europe happened not in small part due to the death-carrying breath of *epidemics* (*Ibid.*: 127–128). Following in the footsteps of Sorokin's earlier observations, McNeill rightfully notes, that *epidemic diseases* usually arrive amongst other *calamities*, such as invasions, uprisings, wars, as well as internal conflicts (McNeill 1976: 118–120).

One of the book's most fundamental revelations is a realization of the effects of cataclysmic *epidemiological catastrophes* which transpired in the Americas and elsewhere in the world in the sixteenth–seventeenth centuries C.E. Multiple societies, empires and civilizations collapsed to a large extent due to a combined onslaught of Eurasian *diseases*, such as *plague*, *malaria*, *typhus*, *smallpox*, *yellow fever*, and *measles* (McNeill 1976: 181–182). According to scholar's estimates, an astounding number of 100 million perished due to the transfer of incurable then *infectious diseases* to the Americas by the invading European colonizers (*Ibid.*: 203). Before McNeill's groundbreaking book, these apocalyptic *calamities* have been conveniently obscured by various euphemistic and ‘umbrella’ terms like *The Columbian Exchange* (Hays 2005: 79), *The Seeds of Change* (*Ibid.*) and *The Virgin Soil Epidemics* (*Ibid.*: X).

The scholar shares with us his initial insight,

...as part of my self-education for writing *The Rise of the West: A History of the Human Community*, I was reading about the Spanish conquest of Mexico. As everyone knows, Hernando Cortez, starting off with fewer than six hundred men, conquered the Aztec empire, whose subjects numbered millions. How could such a tiny handful prevail? How indeed? All the familiar explanations seemed inadequate. ... A casual remark in one of the accounts of Cortez's conquest ... suggested an answer to such questions, and my new hypothesis gathered plausibility and significance as I mulled it over and reflected on its implications afterwards. For on the night when the Aztecs

drove Cortez and his men out of Mexico City,** killing many of them, an epidemic of smallpox was raging in the city (McNeill 1976: 1–2).

Therefore, systematically building on the laid by Pitirim A. Sorokin's foundation, McNeill continues a thorough, rigorously scientific study of profound and perennial effects of *calamities* and *pestilences* on the humanity's arduous story.

6. Guns, Germs and Steel of Jared M. Diamond

Covering a span of 13,000 years, Jared M. Diamond's book *Guns, Germs, and Steel: The Fates of Human Societies* reveals the main forces behind the eventful story of humanity on all inhabited continents and even on distant islands. As it is clear from the title of the book, he identifies as such three major factors – advanced weapons, *infectious diseases*, as well as cutting-edge technology.

Initially, he focuses on reasons why Eurasians found themselves in an auspicious position compared with societies in other regions of the world. For example, those were mostly Eurasian species of wild plants and animals that proved suitable for domestication, while other lands had few or even none. The settled agricultural life and food production based on those domesticates led to the development of dense and stratified human populations, writing and the centralized political organization. This domestication of certain animal species, *i.e.* livestock, beasts of burden, and pets brought humans into a close contact with them, creating favorable conditions for *zoonotic* (*i.e.* transmissible between animals and humans) *infectious diseases*. In chapter eleven, entitled *Lethal Gift of Livestock: The Evolution of Germs* the scholar writes,

The major killers of humanity throughout our recent history – smallpox, flu, tuberculosis, malaria, plague, measles, and cholera – are infectious diseases that evolved from diseases of animals, even though most of the microbes responsible for our own epidemic illnesses are paradoxically now almost confined to humans. Because diseases have been the biggest killers of people, they have also been decisive shapers of history. Until World War II, more victims of war died of war-borne microbes than of battle wounds. All those military histories glorifying great generals oversimplify the ego-deflating truth: the winners of past wars were not always the armies with the best generals and weapons, but were often merely those bearing the nastiest germs to transmit to their enemies (Diamond 1999: 196–197).

While brilliantly elaborating on the Sorokin's and McNeill's insights, Diamond also points to much needed solutions to the exponentially mounting problems of the globalizing humanity, for example, the alleviation of deleterious effects of *infection diseases* by restoration of the historically evolved natural habitats.

7. Great Cultural Systems vs Killer Apps

The British and American historian Niall C. Ferguson confronts the reader of his book *Civilization: The West and the Rest* with a seemingly perplexing question. How did it happen, that within a span of just five centuries a dozen countries of a particular civilizational identity gained control of three fifths of mankind and of four fifths of the world's economy and wealth? As an answer, the thinker invokes six *Killer Apps* – *Competition, Science, Property, Modern Medicine, Consumerism, and Work Ethic* (Ferguson 2011: 13).

** The dominant city of the Aztec empire was known as the city-state of Tenochtitlan. Contemporary Mexico City is essentially located where it formerly stood (*Author's note*).

In fact, the idea appears to be not as groundbreaking as it seems. Back in 1947, in his *magnum opus* entitled *Society, Culture, and Personality* (1947) Pitirim Sorokin introduced a notion of the *Great Cultural Systems*. He writes about a direct correlation between the universal significance of such systems and their relative lifespans,

When we turn to such systems as a given language, a major religion, notable philosophical, ethical, juridical, aesthetic, scientific, technological, economic, and political systems, we find that most of them endure for decades or centuries and that the greatest of them function for a thousand or more years, fluctuating qualitatively and quantitatively, but maintaining an uninterrupted existence. ... The decisive factor is the greatness of the system itself. The more universal, the more essential to the survival and creativeness of humanity the meanings, values, and norms of the system are, the longer its span of life is likely to be (Sorokin 1947: 707–709).

This, of course, means, that while societies themselves may collapse and disappear, their *Great Cultural Systems* often continue to exist.

Sorokin's exact contemporary Arnold J. Toynbee (both scholars were born in 1889) proposes the concepts of *Challenge and Response* to explain how civilizations rise and fall. By *Challenge* Toynbee means an unpredictable factor that presents a threat to an organized group of people. A *Challenge* may arise as a result of many circumstances, for example, overpopulation, resources depletion, or a climate change. *Response* is an action taken by the group to deal with the new situation. According to the scholar, an adequate *Response* initiated by the group's *creative elite* would ensure its survival and prosperity (Toynbee 1947: 60–79).

In his book *The Hero with a Thousand Faces* (1949), the American mythologist Joseph J. Campbell suggests a notion of the *Ultimate Boons*. The scholar describes the concept as follows,

A hero ventures forth from the world of common day into a region of supernatural wonder: fabulous forces are there encountered and a decisive victory is won: the hero comes back from this mysterious adventure with the power to bestow boons on his fellow man (Campbell 1973 [1949]: 23).

The *Ultimate Boon* may be a limitless bounty, indestructible life, but also valuable experience, profound insight or revelation, innovation or discovery, and so forth. Upon return from his mythical journey, the hero shares those hard-earned *Ultimate Boons* with his people. This crucial action usually serves a purpose of saving a society (civilization) from troubles and ensures its further existence and prosperity.

In the 1960s, the American historian Carrol Quigley developed a concept of *Instrument of Expansion*. According to the thinker, these instruments provide civilizations with a mechanism for dynamism and growth (Quigley 1979: 132–145). For example, for the *Classical civilization*, which occupied the shores of the Mediterranean Sea from 950 BC to 550 A.D., the *Instrument of Expansion* was the institution of slavery (*Ibid.*: 269–270). For the first stage of expansion of *Western civilization* (970 A.D. – 1270 A.D.), the *Instrument of Expansion* was the institution of feudalism (Quigley 1979: 358), for the second stage (1440 – the end of the seventeenth century) – commercial capitalism, and so forth (*Ibid.*: 367–369).

Essentially, Jarred M. Diamond's concepts of *Guns, Germs, and Steel* (Diamond 1999) are an elaboration on the same eternal topic. The scholar writes in his '2003 Afterword' to his famous book: '... the themes of GGS seem to me to be not only a driving force in the ancient world but also a ripe area for study in the modern world' (*Ibid.*: 440).

In a less-known quote, the American political scientist Samuel P. Huntington elevates his famous concept of the *Clash of Civilizations* to the level of universal values,

In the greater clash, the global ‘real clash,’ between Civilization and barbarism, the world's greatest civilizations, with their rich accomplishments in religion, art, literature, philosophy, science, technology, morality, and compassion, will ... hang together or hang separately (Huntington 1997: 321).

Altogether, what Pitirim A. Sorokin, Arnold J. Toynbee, Joseph J. Campbell, Carrol Quigley, Jarred M. Diamond, Samuel P. Huntington, Niall C. Ferguson, as well as many other scholars propose, is something rather similar. All those concepts reflect on real or imaginary insights, systems, concepts, ideas, revelations, instruments, and vehicles that have a potential capacity to benefit humanity. However, who exactly did they benefit so far? Apparently, as Ferguson convincingly demonstrates, not everybody. Some, if not most of those *Instruments of Expansion* and *Killer Apps* have been used in an expansionist, conquering, and/or subjugating mode.

Yet, is not humanity presently in a desperate need of the new *Great Sociocultural Systems (GSCS)* and the new *Great Socioeconomic Systems (GSES)*, which would provide it with advanced tools, instruments, and vehicles of overcoming or, at least, alleviating such existential threats, as *pestilences* and other *calamities*? In order to accomplish that, they ought to be based on the universal values, rights, and human needs of a rapidly globalizing humanity, not on an outdated set of values, rights, and needs of one or several elite groups. Reflecting universal aspirations of humankind, those powerful new systems would encompass insights, discoveries, innovations, and creative breakthroughs in medicine and public health, science and technology, literature and art, politics and management, education and philosophy, law and religion in a caliber range of Greek Philosophy, Roman Law, Renaissance Humanism, Enlightenment Ideas, European Rationalism, Romanticism, and Russian Classical Literature and Musical Art.

For instance, in the medical and public health fields, those great new systems are needed in a caliber range of such previous discoveries and innovations, as vaccination (1796), anesthesia (1846), pasteurization (1863), water sanitation and waste disposal systems (the mid-nineteenth century), penicillin (1928), and the like. One of examples of such new systems appears to be a specific type of *gene editing*, known as *CRISPR Technology*. As the term implies, it is a powerful tool for ‘editing’ genomes, and thus destroying the targeted *infectious pathogens*. In fact, researchers turn the *pathogenic microorganisms’* reproductive mechanism against them (Doudna 2019; Vidyasagar 2018).

Obviously, the problem of *epidemics* and *pandemics* can be solved only in conjunction with resolution of multiple other pressing issues, such as overcrowding, social, ethnic, and racial injustice, lack of resources, development of safe water and sanitation systems, and equal access to medical care. The alternatives to speedily devising and urgently implementing based on the universal values, rights, and human needs new *Great Sociocultural and Socioeconomic Systems* may be quite grim. A number of contemporary thinkers even foresee a collapse of contemporary civilization from such *calamities* as nuclear war, *diseases*, resource depletion, economic decline, ecological crisis, or sociopolitical disintegration (Tainter 1988: 3).

8. Case Study: Coronavirus (COVID-19) Pandemic

Being an ultimate expression of the massive ‘civilized’ *infectious diseases*, *pandemics* are occurrences of astounding scale, complexity, and significance. The grim roster of these

monsters includes at minimum a dozen planet-encompassing *pandemias*: two *influenza pandemics* (1889–1890; 1918–1919), *three plague pandemics* (541–747; 1346–1844; 1894–?), *seven cholera pandemics* (1817–1824; 1827–1835; 1839–1856; 1863–1875; 1881–1896; 1899–1923; 1961 – Present), as well the inexorably unfolding *AIDS pandemic* (1981 – Present) (Hays 2005). Starting in 2019, the world saw yet another *pandemic* unleashing its terrific force on human communities, cities, and societies around the planet.

Sadly, the onset of *coronavirus (COVID-19)* has been met with a sense of condescending superiority by the governing elites in the US, as well as in a number of other Western countries. However, not for long. The *pandemic* teared through social, economic, and cultural fabric of the Western, as well as other societies like a massive, vicious and prolonged *biological warfare* attack. By the end of June 2020, above 10 million cases of COVID-19 were reported in more than 188 countries, resulting in more than 500,000 deaths. The United States experienced the highest death toll so far, accounting for more than a quarter of the global total (Hollingsworth *et al.* 2020).

As we have already seen from the example of *Cholera Epidemic in Naples (1910–1911)*, as well as from the *coronavirus (COVID-19) pandemic*-related human catastrophe in Bergamo (2020), there is nothing new about the government-level arrogance, ignorance, and incompetency. Pitirim A. Sorokin prophetically wrote in 1959, right before the impending *calamity* of the Cuban Missile Crisis (1962),

Thus, the question *Quis custodiet ipsos custodes* (Who shall guard the guardians?) acquires a truly fateful importance. ... the powerful ruling groups have been rather poor guardians of peace and moral order in the human universe. A large percentage of rulers have had either mediocre or low intelligence; many have also suffered from split personality, compulsive-obsessive complexes, aggressiveness, manias, paranoia, schizophrenia and other mental disorders. Morally, the ruling groups have been more criminal than the ruled populations. No wonder, therefore, that this kind of leader has been unable to secure for mankind any lasting peace or 'life, liberty, and pursuit of happiness' in the preceding millennia of human history (Sorokin and Lunden 1959: 105–106).

President John F. Kennedy was familiar with Sorokin's ideas (Sorokin 2008) and, apparently, learned from them. Perhaps, because of that, the world was saved from a nuclear annihilation back in 1962. However, not all political leaders are equally considerate, educated, have the sense of anticipation, as well as compassion and empathy for human suffering. As a consequence of belated measures and mismanagement, the situation in the US quickly turned phantasmagoric, almost surreal. Far from leading others in the fight against the new global threat, the country quickly became the world's epicenter of a ruthless and highly *infectious disease*. The social measures of containing *pandemic*, such as *lockdowns*, *social distancing*, and *sanitation* could only go so far. As to the much-awaited vaccine, according to the American epidemiologist Lawrence Brilliant, creating a worldwide *COVID-19 vaccine programme* would require a prolonged and sustained international effort (Sample 2020: 4). Clearly, this would have to wait for another country leadership.

Meanwhile, the unemployment rate increased much more in the first three months of the *pandemic* than it did in two years of the Great Recession (2007–2009). By the end of June of 2020, about 40 million Americans were unemployed – the largest number since the unemployment insurance system was created in the 1930s. A rush to jump-start the nation's economy without proper safety measures in place caused new spikes of *infections*. By the end of June, 2020, some of the state governors were reversing course and tightening restrictions again.

Despite the official ‘we are all in the same boat’ rhetoric, it was almost immediately apparent that the *pandemic* is not the ‘great equalizer’ that transcends all social, cultural, demographic, and economic boundaries. As George Orwell (1903–1950) sardonically quipped in his allegorical novella *Animal Farm* (1945), ‘some ... are more equal than others.’ The *pandemic* almost grotesquely amplified existing social, racial, ethnic, and economic disparities. Spurred by the *pandemic*, social tensions ensued. With demonstrations against systemic racism and police brutality spreading far and wide, the *Black Lives Matter* movement rapidly gained support around the world.

Could it be that the political processes, unfolding during the summer of 2020, represented an initial, *moderate* stage of an impending revolution? (Alalykin-Izvekov and Satkiewicz 2014) That would be a perilous path. As Pitirim A. Sorokin reminds us, ‘... A society ... which has been incapable of carrying through adequate reforms, but has thrown itself into the arms of revolution – has to pay the penalty for its sins by the death of a considerable part of its members...’ (Sorokin 1967: 412) Obviously, a revolution during the *pandemic* would turn out exponentially more deadly.

So far, it appears that the American society is moving forward by the way of reforms. Sweeping changes are introduced at all levels of society. A number of monuments, memorials, and portraits of controversial historical figures have been removed, and contentious books and films have been ‘pulled off the shelves.’ The process of re-naming schools, streets, and other public places and institutions is gaining momentum. Outdated designs of flags and other symbols are being changed. Private business companies are discussing relevant changes in policies. Police reform-related and many other bills are being considered in the US Congress. Substantial changes in educational, legal, medical, and other fields are obviously underway.

Conclusions

One of the most powerful factors behind the turbulent and eventful trajectory of the humanity's story is the phenomenon of *calamity*. It played, continues to play, and will play a significant role in the evolution (and revolutions) of the world's history and culture. *Calamities* exert extremely powerful effects upon human mind, behavior, social organization, and cultural life. They seldom arrive alone, often triggering one another and multiplying each other's effects. Besides inflicting an enormous toll on populations, *calamities* have a tendency to exacerbate existing social, economic, and cultural problems. Yet while exposing the inner workings of the social system, *calamities* provide a society with opportunity to regroup and address what needs to be remedied, thus at times opening the way for new, creative, and constructive ideas, concepts, and developments.

Among other great *calamities*, *pestilences* played a colossal role. As societies became settled and more complex, *infectious diseases* followed them at every turn. Through the centuries, a dramatic struggle with this horrifying multi-headed monster figured prominently in some of the most fundamental sources on history and religion, as well as in a number of prominent works of literature and art. Only recently and quite gradually, science and medicine achieved a degree of control over some of the most dangerous *infectious diseases*. A number of them have been conquered and even completely eliminated. In no small degree, this helped to prolong the lifespans of our contemporaries, in some cases to more than twice the duration of our ancestors' lives.

However, due to the mysteriousness of their origin and mechanisms of proliferation, as well as the self-centered attitudes of some of the ruling elites, the true role of *infectious diseases* in history remained obscure. Only recently, a number of prominent social schol-

ars offered a number of groundbreaking ideas, concepts, theories, and paradigms, which greatly contributed to a better understanding of the *phenomenon of pestilence*. Pitirim A. Sorokin, William H. McNeill, Jared M. Diamond and others advanced original, fundamental, and revolutionary paradigms, which have revealed the true patterns and dynamics of proliferation, the important laws and regularities, as well as the enormous impact of the *infectious diseases*, as well as other *calamities* on human societies.

Our analysis of numerous *calamities*, including the latest *coronavirus (COVID-19) pandemic* clearly demonstrates that to efficiently confront the existential threats faced by humanity there are needed concerted, prolonged, and sustained international efforts, involving enlightened leadership and adequate funding. It can only be achieved simultaneously with solving such pressing global problems, as social, racial and ethnic injustice, hunger, poverty, lack of medicine, sanitation, fresh water and other resources, as well as equal access to education and medical care. All these giant tasks would require devising and implementing a number of new Great Sociocultural Systems (GSCS) and Great Socioeconomic Systems (GSES). The alternatives may be quite grim, since the contemporary civilization may collapse under a combined pressure of such *calamities* as *diseases*, nuclear war, resource depletion, economic decline, ecological crisis, or sociopolitical disintegration.

References

- Alalykin-Izvekov, V. N. 2017.** *Philosophical and Historical Views of P.A. Sorokin: Genesis and Evolution*. Tomsk: TSPU. In *Russian* (Алалыкин-Извекоев, В. Н. *Философско-исторические воззрения П. А. Сорокина: генезис и эволюция*. Томск: ТГПУ).
- Alalykin-Izvekov, V. N., and Satkiewicz, S. 2014.** From Brinton to Goldstone: A Scientific Civilizational Perspective on the Theory of Revolution. *Comparative Civilizations Review* 71 (71): Article 8.
- Campbell, J. 1973 [1949].** *The Hero with a Thousand Faces*. Princeton, NJ: Princeton University Press.
- Castelfranco, S. 2020.** *Will We Heed Lessons Learned from Italy's Bergamo COVID-19 Infections, Deaths?* URL: <https://www.voanews.com/science-health/coronavirus-outbreak/will-we-heed-lessons-learned-italys-bergamo-covid-19-infections>. Accessed 19 July 2020.
- Diamond, J. 1999.** *Guns, Germs, and Steel: The Fates of Human Societies*. New York. London: W.W. Norton & Company.
- Doudna, J. 2019.** *Jennifer Doudna on the Future of Gene Editing*. April 10. URL: <https://news.berkeley.edu/2019/04/10/berkeley-talks-transcript-jennifer-doudna-future-of-gene-editing/>. Accessed 06 June 2020.
- Ferguson, N. 2011.** *Civilization: The West and the Rest*. New York: The Penguin Press.
- Hays, J. N. 2005.** *Epidemics and Pandemics*. Santa Barbara, California: ABC-CLIO, Inc.
- Hollingsworth, J. et al. 2020.** Coronavirus Pandemic: Updates from around the World. *CNN*, June 28. URL: <https://www.cnn.com/world/live-news/coronavirus-pandemic-06-28-20-intl/index.html>. Accessed 28 June 2020.
- Holy Bible. 1989.** *Authorized King James Version*. Iowa Falls, IA: World Bible Publishers, Inc.
- Huntington, S. 1997.** *The Clash of Civilizations and the Remaking of World Order*. New York: Simon & Schuster.
- Johnston, B. 1995.** *Pitirim A. Sorokin: An Intellectual Biography*. Lawrence, Kansas: University Press of Kansas.

- Kuhn, T. 1970.** *The Structure of Scientific Revolutions*. Chicago, IL: The University of Chicago Press.
- Mark, J. 2020.** *Boccaccio on the Black Death: Text & Commentary*. *Ancient History Encyclopedia*. URL: <https://www.ancient.eu/article/1537/boccaccio-on-the-black-death-text-commentary/>. Accessed 09 June 2020.
- McNeill, W. 1976.** *Plaques and Peoples*. Garden City, New York: Anchor Press/Doubleday.
- Quigley, C. 1979.** *The Evolution of Civilizations: An Introduction to Historical Analysis*. Indianapolis: Liberty Fund.
- Sample, I. 2020.** Why We Might Not Get a Coronavirus Vaccine. *The Guardian*. May 22. URL: <https://www.theguardian.com/world/2020/may/22/why-we-might-not-get-a-coronavirus-vaccine>. Accessed 28 June 2020.
- Sherman, I. 2007.** *Twelve Diseases that Changed the World*. Washington, DC: ASM Press.
- Smirnov, A. 2014.** *Symbols of Past Centuries: How the 'History of the Russian State' Was Created* (Volume 1–3). Moscow: DeLibri. In Russian (Смирнов, А. Символы прошлых веков: как была создана "История Росийского государства". Т. I–III. М.: DeLibri).
- Sorokin, P. 1947.** *Society, Culture, and Personality: Their Structure and Dynamics. A System of General Sociology*. New York – London: Harper & Brothers Publishers.
- Sorokin, P., and Lunden, W. 1959.** *Power and Morality: Who Shall Guard the Guardians?* Boston, MA: Porter Sargent Publisher.
- Sorokin, P. 1963a.** *A Long Journey: The Autobiography of Pitirim A. Sorokin*. New Haven, CT: College and University Press.
- Sorokin, P. 1963b.** *Modern Historical and Social Philosophies*. Formerly titled: *Social Philosophies of an Age of Crisis*. New York: Dover Publications.
- Sorokin, P. 1967.** *The Sociology of Revolution*. New York: Howard Fertig.
- Sorokin, P. 1968.** *Man and Society in Calamity: The Effects of War, Revolution, Famine, and Pestilence upon Human Mind, Behavior, Social Organization and Cultural Life*. New York: Greenwood Press Publishers.
- Sorokin, P. 1991.** *Social and Cultural Dynamics: A Study of Change in Major Systems of Art, Truth, Ethics, Law, and Social Relationships*. New Brunswick – London: Transaction Publishers.
- Sorokin, P. 2008.** Welcome to the Pitirim A. Sorokin Collection at the University of Saskatchewan Special Collections. *The Sorokin Collection*. URL: <https://library2.usask.ca/sorokin/index>. Accessed 27 June 2020.
- Stanska, S. 2020.** *Plague in Art: 10 Paintings You Should Know in the Times of Coronavirus*. URL: <https://www.dailyartmagazine.com/plague-in-art-10-paintings-coronavirus/>. Accessed 31 May 2020.
- Tainter, J. 1988.** *The Collapse of Complex Societies*. Cambridge: Cambridge University Press.
- Tolstoy, L. 1960.** *War and Peace*. Vol. 3–4. Moscow – Leningrad: Khudozhestvennaya literatura. In Russian (Толстой, Л. Война и мир. Т. 3–4. М. – Л.: Художественная литература).
- Toynbee, A. 1947.** *A Study of History*. Abridgement of Volumes I–VI by D. C. Somervell. New York – London: Oxford University Press.
- Vidyasagar, A. 2018.** What Is CRISPR? *Livescience*, April 21. URL: <https://www.livescience.com/58790-crispr-explained.html>. Accessed 06 October 2020.
- Yergin, D., and Gustafson, T. 1995.** *Russia 2010: And What It Means for the World*. New York: Vintage Books.