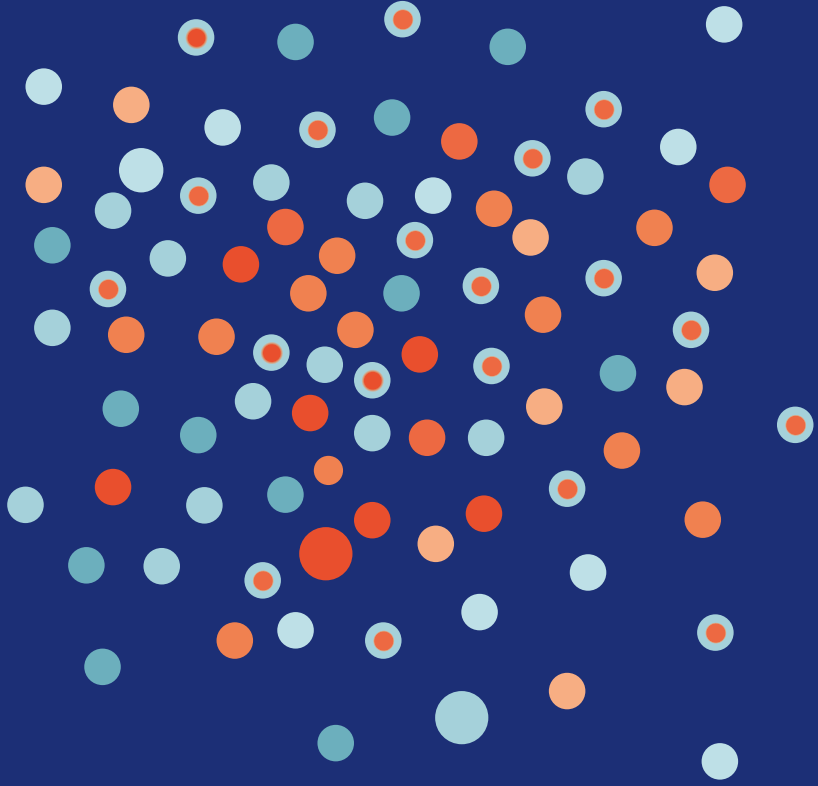


ROOTS
Cluster of Excellence

Social, Environmental, and Cultural Connectivity in Past Societies

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Distant Times So Close: Pandemics and Crises Reloaded

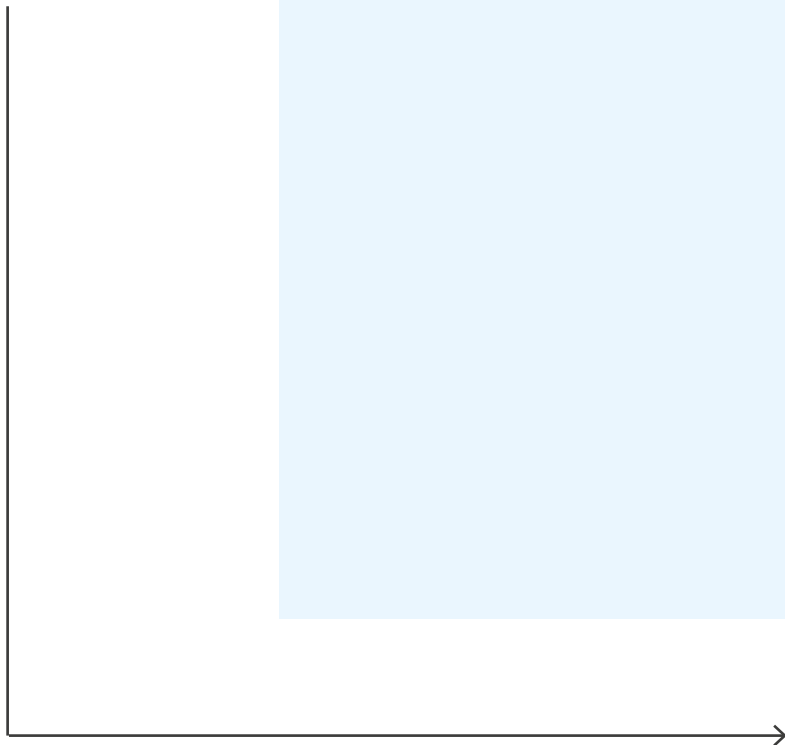


Edited by:
Lutz Käppel, Cheryl Makarewicz, and Johannes Müller





» *Distant Times So Close:*
Pandemics and
Crises Reloaded «



Preface

Perspectives on Past Societies during the Time of COVID-19

In the Cluster of Excellence 'ROOTS - Social, Environmental and Cultural Connectivity in Past Societies', scientists from diverse disciplines deal with the reconstruction of past societies. From an archaeological and historical perspective, connectivities of individuals and groups, of people and the environment, of events, processes and structures are investigated.

Globalisation as a worldwide process, including the associated regional effects and reactions, are of primary importance. The underlying hypothesis – the more that people are connected, the lower the potential for conflict – was the starting point. In times of a pandemic, it is even more essential to know how people reacted in crisis situations: not only in the industrial and post-industrial world but also in distant times, which provides us, so to say, with a mirror of our behaviour. Thus, the question is posed how did hunter-gatherers, first farmers, ancient societies or early modern urban communities act in general crisis situations?

In this respect, we decided to create this booklet, which presents information in a generally understandable way in times of a pandemic. ROOTS starts a 'booklet series', which introduces the discussion and results of our research cluster to a broader public. The booklet series is also conceived to stimulate discourses and commentaries in other media on future issues from a past perspective.

Only those who understand the past are able to sustainably shape the present and develop lasting future perspectives. As humans, we are dependent on the reconstruction of our behaviour in completely different times than today – not only with regard to human societies but especially concerning the human-environment relationship.

Johannes Müller

Speaker of the Cluster of Excellence ROOTS

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* BCE = 'before the Common Era' as an alternative to BC; CE = 'Common Era' as an alternative to AD.

*Lutz Käppel, Cheryl Makarewicz,
and Johannes Müller*

Introduction:

Pandemics, Crises and Solutions – The Past in the Future

For thousands of years, people and societies have been shaped by their environment and they have shaped their environment. With the help of studies of past eras, we as human beings can recognise ourselves as actors who had to react in completely different situations: very different or very similar to how we act today. It is precisely the reflection of our actions in distant times under completely different conditions that holds a mirror up to us: a mirror that explains our actions by comparison much better than any short-term analysis.

This also applies to the current global crisis. The outbreak of a pandemic, the collapse of the economic and social system is nothing new. All the more reason to study the crises and crisis management of past times.

In this respect, you may regard the texts collected here as a contribution of the Kiel Cluster of Excellence ROOTS to crisis management, i.e., the search for and mirroring of the roots of crises that were, among other things, connected with pandemics. In doing so, you will be confronted with the human being in situations that are mostly foreign to us today: the human being as a hunter, fisherman and gatherer, the human being as a former farmer, as a member of the first ancient world of states or of a large medieval city.

How did the transmission of animal-human diseases in wildlife and first arable societies begin about 12,000 years ago? What are the concepts of Siberian wildlife hunters with regard to diseases? How can Neolithic connectivity be organised without risk? What are the effects of dense cohabitation in the oldest European cities in terms of disease and hygiene? How did people react to emerging crises around 3100 BCE and around 500 BCE in Central Europe? What happened during active and passive crisis management? Many questions, many answers, in which the mechanisms of crisis management become especially clear.

In particular, the topic of an 'epidemic' was of existential importance for ancient Greek culture, in life as well as in literature. Great works, such as the *Iliad* or *Oedipus Rex*, develop their respective poetic concepts from this central crisis phenomenon. And not only that: the epidemic offers a starting point and a point of crystallisation for the development of fundamental views on the basic conditions of human existence, as they apply *mutatis mutandis* to every human society. Recent events, in particular, teach us what an effort even modern societies have to make to cope with an epi- or a pandemic. Modern virology is one key to salvation, certainly the central one, but not the only one. A fighting force from Mycenaean times and the citizenship of an ancient polis or a medieval village are certainly different social alliances than our post-modern, post-industrial societies. However, even today, it is still crucial that interests are not played off against each other, but rather come to an agreement with each other. In our present situation, it is still important that individuals take responsibility in the knowledge of themselves and their possibilities. As in a laboratory, the *Iliad* and *Oedipus Rex*, e.g., carry out the failure and success of these elementary principles of action of human society. Individual elements of these poetically designed forms of behaviour can be observed in some places even today. Perhaps the integration of these elements into a consistent concept will help us to master this crisis as well: with a deeper understanding of our situation, which is not only medically, legally, economically or politically informed, but also *culturally* mediated. Europe's cultural memory, in any case, has long had concepts for this. ♦



Cheryl Makarewicz

The Roots of Zoonoses



← The domestication of animals 10,000 years ago provided humans with completely new possibilities. But the close coexistence of humans and animals also increased the risk of diseases (photo: Sara Jagiolla, Institute of Pre- and Protohistoric Archaeology, Kiel Univ.).

Zoonoses are naturally transmissible pathogens – viruses, bacteria, and parasites – that jump from animal hosts to humans. The propagation of zoonotic diseases and how such diseases are sustained in human populations depend not only on the virulence of the pathogen itself but also on the environmental context and the very shape of human-animal relationships. The ways in which hunter-gatherers interact with animals are very different from those of nomadic pastoralists, who move livestock across the steppe, which are, in turn, different from settled agriculturalists tending barnyard animals.

» The roots of some diseases appear to have their origins in domestication processes underway in the Near East ten thousand years ago, [...] «

Wild animals carry a wide variety of pathogens that can jump to human hosts, for example, rabies, giardiasis, toxoplasmosis, ringworm, and, most recently, COVID-19. Our hunter-gatherer ancestors certainly contracted pathogens initially borne by wild animals. However, the combination of dispersed human populations and contact with animal prey largely limited to hunting events and carcass processing may have provided barriers to the endemic establishment of zoonoses and their transmission between humans.

The domesticated animals that we depend on today for food are another, perhaps more immediate source of zoonotic diseases that shape the daily lives of individuals and influence the social and economic health of communities. Over ten thousand years ago in the Near East, humans began to experiment with managing wild animals in order to increase the reliability of their own food supplies. This process may have been triggered by over-hunting and, initially, involved the development of new hunting strategies that enhanced the availability of target prey species. Other animals may have entered a

pathway to domestication through increasing commensality between humans and select animal species at first drawn to food scraps discarded by people. Over time, humans brought sheep, goats, cattle, and pigs under their control by providing them with food, directing their movement, and interfering with reproductive cycles.

With their domestication, animals were integrated closer into villages and households. For the first time in human prehistory, humans were in contact with animals on a daily basis, providing livestock with food, clearing their waste, birthing young, and caring for ill animals. As people accrued larger herds, animals were packed into purpose-built structures, such as barns and corrals, often located within settlements near domestic dwellings, and in some cases they were probably also brought into the home. With a ready source of livestock on hand, people could more easily access meat and fats, as well as a wholly new food source with a high potential for disease transmission – milk. Altogether, this profound intensification in the human-animal relationship provided new opportunities for zoonotic diseases,



↑ Photo: Sara Jagiolla, Institute of Pre- and Protohistoric Archaeology, Kiel Univ.

such as brucellosis and tuberculosis, to take hold in ancient human populations. Livestock-borne zoonoses continue to emerge today with newly introduced infectious diseases such as camel-origin MERS-CoV or swine flu N1-H1.

Livestock-borne zoonoses may have emerged in the Near East relatively soon after the domestication of animals approximately eight thousand years ago during the early Neolithic. Early domesticated goat herds likely spread *Brucella melitensis*, the main agent for human brucellosis, through cultural practices involving the focused harvest of juvenile male animals. While this slaughtering strategy optimises meat production for human consumption, it also increases the proportion of adult females within the herd that, notably, transmit the pathogen to kids during birthing. Consequently, human strategies to increase food production potentially increased the overall transmission rate of *Brucella* between animals. The pathogen may have become endemic in human communities if goats from different villages were mixed together, engaging a cycle of introduction and reintroduction of the pathogen.

Ancient DNA analyses conducted on human skeletal remains from the early Neolithic site Atlit Yam have revealed that *Mycobacterium tuberculosis* afflicted largely sedentary agriculturalists. Strikingly, the early farmers at Atlit Yam were among the first people to intensively husband cattle, which host *M. bovis*, the causative agent of tuberculosis in bovid livestock. Close contact with cattle, along with dense human settlement within the village, may have sustained *M. tuberculosis* and facilitated its transmission. Far from being eradicated, human tuberculosis persists today and is the leading cause of death from an infectious agent.

The roots of some diseases appear to have their origins in domestication processes underway in the Near East ten thousand years ago, when both animals and humans interacted with each other on a daily basis and, perhaps, early livestock were kept in confined spaces within settlements. ♦

Henny Piezonka

Epidemics, Mobility and Permafrost: Lessons from Siberia



← In the Siberian taiga, lifeways and subsistence are based on close-knit human-animal ties (photo: Jens Schneeweiß, Young Academy, Kiel Univ.).

Diseases from the ice

During the summer of 2016, the world was startled by the news of an anthrax outbreak in a remote tundra region of Western Siberia caused by global warming. The still-infectious bacteria had been released from some seventy-year-old reindeer carcasses that had thawed out of the permafrost in an unusually warm climatic episode, leaving a boy and hundreds of reindeer dead and many people hospitalised. Reports of 30,000-year-old giant viruses found in the ice of Yakutia in Eastern Siberia indicated a still larger, alarming dimension of this new threat, and DNA evidence of a smallpox-related virus found in a 300-year-old human mummy also unearthed in Yakutia backed up the reports further. Such incidents have drawn public as well as scientific attention to the emerging danger of potentially unleashed ancient, still potent germs that could pass from their frozen reservoirs onto humans and animals today. Speculation emerged as to whether even completely unknown pathogens might thaw out of the ice, for example, long-gone mammoth diseases, potentially releasing zoonoses against which today's living organisms would not be prepared. Is Pandora's box about to be opened, or rather, de-frosted in the Arctic in the wake of global warming?

In addition to the role of the permafrost as a natural reservoir for ancient germs, Siberia also bears witness to two other aspects connected to the spreading of epidemics: Just like population agglomeration (see chapter by J. Müller on population

agglomeration), mobility and close co-habitation of humans and animals represent important vectors in the spread of infectious diseases and the outbreak of epidemics.

Nomadic ways and human-animal ties

In the more remote regions of Siberia, many communities still lead nomadic or semi-nomadic lives. Mobile reindeer herders in the tundra cover hundreds of kilometres every year on their north-south migrations between summer and winter pastures. The taiga is the home of hunter-fishers and reindeer herders, who conduct regular seasonal cycles of movement in their quest for good hunting and fishing grounds and for pasture for their reindeer. The steppes to the south are the realm of pastoral nomads with herds of livestock such as sheep, goats, cattle and horses. All these mobile life ways are inherently based on closely-knit, human-animal ties. This is reflected in social organisation often involving totemic clan structures and non-human kinship, and in a perception of the world as being inhabited by animated human and non-human beings that co-shape each other in intertwined relationships.

Certain infectious diseases have probably been familiar to Siberian nomadic societies for millennia, including anthrax (also known as the "Siberian plague"), tick-borne encephalitis, and bubonic plague. In taiga areas, archaeological evidence for pathogens is poor due to lacking bone and tissue preservation. However, in permafrost areas to the north and in the mountain ranges to the south, conditions are more favourable, and even mummies with evidence for germs have been discovered. Ethnohistoric and ethnographic information reveals details about practices that potentially further the outbreak and spread of diseases, including, e.g., the consumption of raw meat and blood, and the role of insects and other parasites.

At the same time, ethnography also bears witness to long-established, socio-cultural responses to the dangers of epidemics, many of them connected to mobility and the associated freedom

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of choice concerning one's place and routes. The Finnish scholar, Kai Donner, described how Evenks send out a scout to check for ill people before visits to camps of strangers, and in another instance, he mentions how the Evenks withdrew themselves far into the forests after an epidemic outbreak among a Samoyed community. A simple but effective measure of protection against infection is also the long-term remembrance and avoidance of contaminated areas, e.g., areas where dead animals have been disposed of. Connected to this are long-standing taboos concerning graves and cemeteries, houses where people have died, and equipment that has been unsuccessfully used to heal people. In some communities, old dwelling sites of seasonal settlements are also taboo for further use. Thus, the experience and knowledge of the foragers and herders have led to a range of measures to hinder the wider spread of infections among the communities.

Imperial conquest and the spread of epidemics

In the past, catastrophic epidemics spread across Siberia after their introduction from the outside, killing large proportions of its population. The Russian conquest of Siberia during the 16th century, as well as colonising activities by Manchu and Yakuts in East Asia, led to the expansion of new diseases, such as smallpox, measles and syphilis, into the northern regions, where they rapidly spread among the nomadic groups. Much like the paral-

lel history of the indigenous population in North America, these epidemics have played a central and infamous role in Siberia by weakening, demoralising, decimating and partially eradicating the indigenous population in the course of imperialist colonisation. Death counts frequently reached more than half and in some cases up to 80% of individual communities. The Yukagirs, for example, a hunter-fisher-reindeer herder group in the Siberian Far East, have been decimated by waves of smallpox outbreaks since the 17th century, repeatedly killing large proportions of the population. According to accounts by the Russian ethnographer, Waldemar Jochelson, Yukagir oral tradition has transformed the role of the epidemics in the colonial conquest into legendary narratives:

"[T]he Russian invaders could not conquer the Yukagir tribe whose warriors were numerous and brave; so that, in order to reduce the number of their enemies, the Russians imported the small-pox in a box, and let it out among them. Then the earth was filled with smoke, and men began to die in consequence".

At the beginning of the 20th century, Kai Donner witnessed the raging of smallpox among Samoyed communities in the Middle Ob region with no cure or vaccination available to the disadvantaged indigenous groups in the remote taiga, leaving much of the population dead or dying before his eyes.



Hunter-fishers of the Samoyed group of the Selkup keep small reindeer herds mainly as draught animals for the sledges in winter. Mobility with temporary dwellings plays an important role in taiga lifeways. Photos: Christoph Engel (top), Aleksei Rud' (bottom).

Thus, introduced infectious diseases have played a crucial role in the installation and confirmation of colonial power on the indigenous population of Siberia, ultimately also influencing existing forms of social and economic praxis and the associated webs of ideology and identity. They contributed to the still ongoing processes of streamlining and erasing societies of difference, based on imperialist colonial and later socialist and post-Soviet capitalist notions of cultural and economic superiority.

Lessons and prospects

A glance at the epidemic history of Siberia highlights a range of mechanisms and entanglements involving established systems of nomadic life ways and human-animal co-existence, the external introduction of new diseases in the wake of colonial expansion, and the recent effects of environmental changes connected to global warming. Mobility, nowadays continually increasing in importance in our “new, multi-mobile era”, can act not only as a motor spreading disease but also as a measure against the further expansion of infectious diseases. This is reflected by the indigenous strategies of long-term, ritualised avoidance and distancing in connection with disease outbreaks. At the same time, the established adaptive strategies were not suited to deal with diseases introduced from the outside by conquerors, and their deadly effects were enhanced further by increasing discrimination and suppression under colonial rule.

The emergence of ancient pathogens from the Siberian permafrost due to global warming and the connected threat of new epidemics today shifts the focus to adjustments and alternatives to the late capitalist world order that is causing the current unprecedented climatic change. Balanced multi-species systems, as represented, e.g., by Siberian nomadic life ways, are not based on the exploitation of the non-human world, but on more entangled relations between species and their environment. Archaeology and anthropology can contribute to a better understanding of such systems and their adaptive capacities in their development from deep history into the recent past and present.

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Sustainable adaptations of Siberian nomadic life ways to current social, economic, political and ecological change can be developed and implemented through the de-colonisation and empowerment of the groups themselves and through ongoing interaction and dialogue with the sedentary parts of the societies. Approaches of ethno-ecology and the involvement of nomadic ethno-expertise in the planning processes of, e.g., more sustainable mineral extraction strategies in the tundra are initial steps towards involvement and participation. Indigenous notions of health and well-being also start to play a bigger role in these discourses. In hunter-gatherer anthropology, de-colonisation and indigenous empowerment are reflected in alternative ontologies that are becoming the centre of focus, for example, when Nurit Bird-David considers

“a universe of [...] multispecies communities of relatives whose plural mode is supported by a ‘diverse-and-together’ rather than a ‘same-and-separate’ logic”.

Alternative notions of social organisation and sustainable forms of being-together-in-the-world could develop from here. ♦

Martin Furholt

Social Diversity and the Sharing of Knowledge in European Prehistory: Lessons for the Pandemic Present?



Infectious diseases that led to pandemics were frequent during prehistory (see the contributions in this volume). How did prehistoric communities deal with them, how did they even get by without, as it seems in most cases, experiencing larger-scale crises or collapses? I would like to propose two main factors common to these people, which are often undervalued: social diversity and a full mobilisation of knowledge.

↑ Previous page: In every society, food supply is crucial. For many societies, a cooperative approach in the production, processing and distribution of food can be demonstrated. The image shows the place of a permanently installed grain mill in a Copper Age village (ca. 3800 BCE) (photo: Sara Jagiolla, Institute of Pre- and Protohistoric Archaeology, Kiel Univ).

Although there are striking exceptions (see Müller, this volume), during European prehistory, 99% of people lived in small-scale societies without a centralised government, on single farms, small hamlets with a few dozen persons or in villages with a few hundred inhabitants. People were mostly self-sufficient and there was a low degree of specialisation. There were no kings, no police, no armies, no schools, and no hospitals. There may have been chiefs or elders with more authority than others, and there might have been healers or shamans, or priests or someone with special abilities or knowledge about how to best help people who are in need or have fallen ill. It seems to us, having grown up in a highly regulated and bureaucratised state society, hard to imagine how people without laws and a state-owned monopoly to enforce them could have actually organised without descending into absolute chaos. Yet, the great majority of societies existed for the great majority of human history in such non-state communities.

A characteristic of societies without a centralised government is that they have internalised a number of norms, codes and systems of meaning, which guide their actions and the way they socially interact. For example, kinship seems to be a near-universal principle structuring allegiances and enmities. A second characteristic must have been councils or assemblies. Without a centralised

government, it is absolutely crucial to achieve and maintain some form of consensus about the norms and codes. As the anthropologist Hermann Amborn has studied in modern stateless communities at the Horn of Africa, for example, codes of behaviour, decisions that affect the whole community, conflict reconciliation and punishments for wrong-doing are negotiated there in community-wide, often endless assembly meetings. These assemblies are governed by authority – personalised by individuals, such as elders or chiefs, and the general acceptance of certain shared principles.

A third feature, which is probably close to universal in small-scale, non-state societies, is their relative openness and thus social diversity. This contradicts our common stereotype about “traditional, rural communities”, but it is in line with the available anthropological observations and archaeological data. Settlement communities in European prehistory usually included a significant number of people who had not been born there, due to different forms of population circulation, for example, the exchange of marriage partners, the exchange of children, people with multiple residences, or people just looking for a new place to build a farm.

Social diversity has been often discussed as a main driver of innovation. If a group of close kin or people, who were socialised together, are assembled, they will probably all have the same or very

» This is not about idealising the past, but about using our knowledge about it for a vision on how to improve our current condition. «

similar ideas, which do not likely bring them very far in terms of innovation. In contrast, if a good mix of people with different upbringings are gathered, they are much more likely to come up with a much broader spectrum of different and new ideas.

Thus, there are two factors which may have proven very important in coming up with responses to a crisis like a pandemic: first, the fact that local communities were socially heterogeneous and diverse, and second, that they had the means to let many, maybe even all members contribute to finding the best solution for a specific situation. These mechanisms probably made it possible to compensate for a relative poor understanding of the nature of a disease and the way it spread. Today, we are much better equipped with detailed knowledge, but one could argue that there is still something that we can learn from the scenario just painted for prehistory. What enabled (most) prehistoric communities to survive was social diversity and universal access to freely shared knowledge. There were probably noticeably fewer restrictions on who was allowed to contribute than in our modern society. Although we have improved in recent decades, we do observe a situation where for centuries essentially only white men from wealthy family backgrounds had the possibility or were even allowed to explore their full intellectual capacities. We were extremely lucky that within this small fraction of

the population we had an Einstein, a Pasteur and a Fleming. However, where could humanity be today if we had systematically looked for ideas in the entire pool of human intelligence, which is probably 100 times greater than the small segment of the population that has participated until now? This is not about idealising the past, but about using our knowledge about it for a vision on how to improve our current condition. In the long run, we have to work towards a situation where everyone has the freedom and the economic opportunity to contribute in a discourse of diverse and multiple ideas. This is the greatest strength of humanity. ♦

Tim Kerig

Why Solidarity Is Needed: Connectivity and the Prerequisites for Pandemics in the Neolithic



← The first agrarian societies in Central Europe had a large network of contacts and similar ritual practices. The reconstruction of an excavated settlement in Western Slovakia with three residential quarters is characterised by the fact that around 5000 BCE new rituals were introduced during a general crisis: Depositions of corpses in trench systems around a single residential area (drawing: Karin Winter, Institute of Pre- and Protohistoric Archaeology, Kiel Univ).

Covid-19 has already changed how we interact, how we understand society, how we envisage the future and the past. Could something similar have happened in prehistory? Were there preconditions for a comparable pandemic already in the earliest sedentary, food producing, non-state societies, which emerged after the Ice Age and which are termed Neolithic?

A virus does not live, it cannot travel. Its spreading follows the contacts that people or animals have. Generally speaking, a virus is transported in the bodies of human beings and transferred by social interaction via human transmission. How people cooperate and how they connect becomes crucial.

Until recently, every possibility for the spread of epidemic or even pandemic diseases was negated for prehistory up to the historical plagues in Late Antiquity, the Middle Ages and modern times. Generally, population densities appeared to have been too low in non-urban prehistoric societies. However, as we all realise, what matters is not only the number of people, but also the frequency and the mode of contacts between them.

In the following, the conditions for the possibility of spreading diseases will be re-examined for earliest farming populations of Central, North-west and Northern Europe. Broad outlines on the development of contact and connectivity between households and especially between regions will be presented. The presence of various Neolithic social groups can be observed depending on their origin, gender and seniority, their divergent access to resources and depending on their shared beliefs and political interests. Below, the focus is placed on groups of people settling together in specific landscapes.

How were these specific Central European landscapes settled? The Neolithic way of living developed in mountainous and steppe areas of Western Asia. Wild cereals are steppe plants and their cultivation required creating steppe conditions for their growth. With the first diffusion of cereals to temperate Europe and subsequently to Northern Europe, this became increasingly more difficult. When first cultivators introduced cereals to Central European woodland conditions in the first half of the sixth millennium, they started using a very narrow ecological niche as similar to Western Asia's steppes as possible: They settled exclusively on loess-derived soils, actually steppe-soils from the Ice Age. Loess is found in Eastern Europe and in the lower altitudes all over the European lower range mountain zone. Its dispersal is sketchy, with non-loess zones in between.

The first mid-European cultivators, at roughly 5600 to 4900 BCE, are named Linearbandkeramik (LBK) societies after their decorated pottery. Their way of living developed in Hungary and evolved while spreading all over the loess zone. This diffusion was – in most cases – a migration of smaller groups of people moving within one or between several of the above-mentioned loess patches. First settlements were established where local chronologies of these loess patches existed and the inhabitants occupied positions in the landscape with access to

» What is the significance of knowledge on Neolithic connectivity for an understanding of Covid-19? The fundamental way of building safety has always been initiating and maintaining reliable social ties between human beings. «

the richest and most diverse resources for centuries, while later settlements were shorter in duration and resources, according to the maxim: first come – first serve. LBK biological reproduction – the number of children per woman – was very high and the number of younger people must have been much higher, e.g., than among groups of contemporaneous Central or North European hunter-gatherers. In general, pioneering groups and the plant-growing groups, which use simple technology, have some of the highest reproduction rates ever reported. Even if we do know little of property rights and heritage systems of the LBK society, it is clear that fission repeatedly occurred: While some stayed at the older, larger and richer households, where first settlement took place, others became pioneers, migrated and settled at places where they found convenient conditions.

How do we know how LBK people interacted? It is possible to trace the movements and contacts of LBK people by sourcing the worked stones – lithic raw materials like flint – and by looking for the interdependencies in ceramic patterns. Stone artefacts originated from certain geological deposits, thus once sourced, they point to a contact close to their outcrops. From the entire variety of lithics from an LBK

site, it is possible to narrow down the main direction of contact. From the abundance and the different stages in stone tool production, centres of exchange as well as the degree of dependency of settlements, hamlets or single farmsteads can be described. Often, the main direction of supply held for generations, indicating strong ties over quite long distances. The usual range of Austrian, Czech and German LBK site distances to the main raw material sources is 25 to 50 km with maxima of up to 400 km – compared to less than 6.5 km in the preceding Late Mesolithic as well as in the following Central European Middle Neolithic. Flintstones were small items of probably little value, passed on from hand-to-hand, thus travelling randomly, but following and mirroring the actual contact between neighbours, friends or exchange partners, not unlike the transmission of a virus.

Ceramics are made for the household they belong to. Decoration on pottery refers to the patterns and motives that a potter knows and has actually seen. Thus, there are shared patterns connecting households, villages, and regions. The stylistic similarities between sites can be measured and compared over time, showing clear evidence of stylistic diversity, on the one hand, and regionalisation on



↑ Pottery vessel and stone tools from the linear-pottery site of Vráble, Slovakia (Photos: Agnes Heitmann, Institute of Pre- and Protohistoric Archaeology, Kiel Univ. and Gerrit Müller-Scheefel, Bauhaus-Universität Weimar).

the other. At the beginning of the LBK era, potters used a simple common style with a handful of motives, but over centuries, several stylistic groups developed from this unity, differentiated by a wide range of highly elaborated pottery decorations. This process of diversification can be explained as a result of thousands of random copying processes: With fewer far reaching contacts, potters no longer became familiar with patterns from distant places. In general, they reproduced stylistic traits common in their immediate vicinity. The small individual changes leading to stylistic variation are like mutations in biology: They might have been “meaningless” in themselves, but they indicate contact, reference and a shared preference or taste.

How did LBK people interact? LBK contact between individuals from different settled areas was surely more than individual and friendly, and can thus be reconstructed, and may be understood as a main tool of exchange, social bonding, of internal as well as foreign politics, and especially of economic risk minimising. During the earlier pioneer phases, ceramic stylistic variation was low while contact was maintained over long distances. There are strong indicators that people held contact to regions where

their ancestors came from: raw material flow followed the same lines over generations. At the end of the LBK, raw material networks shifted to more local scales and ceramic stylistic differences between regions, villages and even households became much more visible. These small-scale contact patterns will become characteristic in the Middle Neolithic.

What caused the expansion of the later Neolithic? In the 1970s, the later northern expansion of the Neolithic (around 4000 BCE) was merely explained by constantly high reproduction rates, denoted as the demic model. Farming communities were simply interpreted as being very fertile and thus the farming population expanded at a constant rate. In principle, this is still in accordance with modern fertility research, but human reproduction rates are currently understood as complex social phenomena rather than as machine-like mechanisms. During the 1980s and 1990s, it was realised that the spreading rate of the Neolithic way of life was not constant. In particular, there were remarkable time lags from the loess zone to the North European Plain and between here and Scandinavia. In contrast to the older demic model, a purely cultural narration without the population expansion became favourable in

the 1980s, according to which the acceptance of the southern novelties was a kind of learning process: Local hunters and gatherers had increasingly come to appreciate the advantages of the Neolithic until they became Neolithic people themselves. From the North European Plain, some finds witness early contacts between the Neolithic southern loess belt and the woodland north of it. In particular, polished stone axe blades were introduced from the Neolithic south to the hunter-gatherers on the North European Plain, possibly predating and initiating the Neolithic. In a next step, e.g., from Denmark, Neolithic pottery and flint axe blades were brought farther to the North to the hunters and gatherers in Central Norway.

The strengths of the mentioned demic and cultural models, respectively, can be combined to a demographic-cultural approach. Accordingly, it could recently be proved for the British Isles that a similar axe-horizon predates the clearance of the woodland, which seems to be rather a precondition of plant cultivation than a result of it. Such an active process of niche construction can be expected to have taken place gradually all over Northern and Northwestern Europe. It is worth mentioning that this landscape modification was not successful everywhere and that the Neolithic northern rim relied entirely on hunted and gathered resources.

In the course of the later Neolithic, groups became smaller and connectivities became generally more unstable. There were often rather separated populations, sometimes even genetically isolated families, where contacts were previously or subsequently more far-reaching. In general, the degree of connectivity, otherwise termed as accumulated social capital, could only develop when there was time enough. Vice versa: an individual's connectivity is a means to stabilise his or her social environment.

What is the significance of knowledge on Neolithic connectivity for an understanding of Covid-19? The fundamental way of building safety has always been initiating and maintaining reliable social ties between human beings. At the same time, social contacts enable the spreading of infections: Infections

follow contacts, especially after asking the next of kin for help. The specific resilience of Neolithic societies with respect to infectious diseases (caused by viruses and transmitted from human being to human being) can therefore be understood as an inversion of their general resilience. While the LBK first prospected for a certain ecological niche, the loess patches, the following phases of the LBK and the northern Neolithic are characterised (at least in part) by a more active niche construction. During pioneer phases, linear contact networks existed with strong ties, resulting in infrequent contacts over larger distances. If one connection along such a string is gone, the transmission of the virus is cut off. Both later phases, on loess and in the northern woodlands, became more regionalised over time, which implies mesh-like contacts with a preference for more, but weaker ties to at least some of the immediate neighbouring groups. Such communities can be expected to have been much more vulnerable at the beginning until a certain threshold is reached and reliable meshes guarantee support. Not knowing that a virus is transmitted by social interaction, seeking for help can have resulted in a rapid spreading of an epidemic disease.

» The greatest danger might be that we sacrifice our most needed chance in favour of an alleged resistance against the corona virus: Solidarity. «

In fact, we observe a radical change all over the LBK world around 4900 BCE, which has often been interpreted as a collapse. Could this have been caused by a pandemic disease? Actually, the process took place over several generations and is now widely interpreted as a change from far-reaching networks between loess patches with high internal connectivity to more regionalised networks of the Middle Neolithic. We do not know what caused the change in interaction, but ruptures caused by pandemics would have led to such a new contact pattern without the far-reaching weak ties to a wider world.

A lesson for the future might be that societal groups as well as entire societies become strong and resilient through a high level of interconnectivity. Infectious diseases can travel by way of personal contact, but unlike in the Neolithic, fundamental scientific knowledge of the transmission channels enables us to stay connected today and at the same time to reduce the risks due to direct personal contact.

The greatest danger might be that we sacrifice our most needed chance in favour of an alleged resistance against the corona virus: Solidarity. As

a special quality of connectivity, it can strengthen humanity's chance for general resilience during the coming hazardous times of global climatic and social changes. To sever connectivity would diminish humankind's possible range of action in the future. We should not relinquish this potential. ♦



← From 4100 BCE, members of the so-called Tripolye communities lived in large settlements with more than 10,000 inhabitants. In Maidanetske, an early urban settlement in today's Central Ukraine, humans and animals lived together in confined spaces. Some scientists believe that the Black Plague developed here (drawing: Susanne Beyer, Institute of Pre- and Protohistoric Archaeology, Kiel Univ).

Johannes Müller

Population Agglomeration and the “Bubonic Plague”: The Earliest European Cities around 3800 BCE

In human history, there are always moments and developments in which human communities find certain things attractive and favourable, which, in contrast, can have negative effects on many aspects, including health. We have seen that the domestication of animals and plants was also associated with the ‘domestication’ of humans – their adaptation to the annual rhythms of, for example, cereals, or the change towards stockpiling and confinement to limited spaces that came with sedentariness.

We observe further developments in the Neolithic and the Copper Age, such as the fusion of large populations as well as large settlements and cities, a

process which was formerly denoted as the ‘urban revolution’, alongside the agricultural and industrial revolutions. In addition to the first agglomerations in the Aceramic Neolithic of the Near East, the developments in Uruk and Sumer, in particular, led to the development of urban cultures and city-states in Mesopotamia around 3500 BCE. Whereas a very early turn to class systems, to the oppression of man by man, can be observed there, the situation in Europe and large parts of the rest of the world is different.

Whether among the foraging Northwest Indians, the Chalcolithic groups of Southwest Iberia, the metallurgists of Southern Africa or the Neolithic communities of the North Pontic forest-steppe: Here the human laboratory provides us with historical situations in which large population agglomerations also emerge, but without the ‘Mesopotamian’ class

development. While in Southern Mesopotamia, the oldest city-states of the world develop with a pronounced temple hierarchy, with the administration and control of public and private life, and with the institutionalisation of unfree labour, the aforementioned European and other cities remain free from slavery and oppression. Nevertheless, even these constructs possess not only positive progress but also hitherto unrecognised dangers of narrow social cohabitation.

Tripolye, a small settlement near today's Kiev, is the eponymous village which gave its name to the social transformation processes between the Dniester and the Carpathians. Following social conflicts in the then technologically extremely advanced Balkan world, communities, who wanted to escape the narrowness of small settlements in Southeastern Europe, settled a large area from about 4800 BCE onwards. The vast, fertile forest steppes with their black earth offered both animals and humans almost unlimited food resources for the agricultural subsistence economy. Tens of thousands of people and animals populated the vast steppes, initially in a widely dispersed settlement pattern, but then in increasingly contracted settlements.

Around 4100 BCE, the moment is reached when history takes an extraordinary turn. In a relatively small area near the present Ukrainian city of Uman, situated midway between Kiev and Odessa, about 10 mega-settlements were built – the oldest cities in Europe. Like wagon forts in the Wild West, houses were built one after another in concentric circles and ellipses around a free inside space. Thousands of people leave the small settlements of the other regions to form here up to 2.5 km² large, city-like complexes with paths, streets, meetinghouses and also increasingly more craftsmen's quarters. People live together for several generations with about 10,000 inhabitants and about 30,000 domesticated animals per settlement in a relatively small area. We observe public and private places, promenades and clubhouses. We take note of animals that live disorderly in and outside of the large settlement and we recognise animals that are deliberately fed



↑ Belonging to the special cultural expressions of the Tripolye communities are complex and often multi-coloured, decorated vessels as well as figurines with self-portrayals (photo: Agnes Heitmann, Institute of Pre- and Protohistoric Archaeology, Kiel Univ).

» [...] the crisis became visible, but was also overcome by an increase in diversity [...] «

and used for silvopasture as well as for fertilisation. Sowing and harvesting activities are conducted with animal-drawn sledges going in and out of the settlements. Slaughter and grain processing take place in the still independent households.

Due to the few genetic analyses, we know that the people obviously belong to an open society. One is a member of the community, regardless whether one comes from the steppes, the Balkans, Central Europe or the forest areas of the north. A melting pot has been created, in which for the first time in history people live with so many animals in one space. Population densities of about 300 inhabitants and about 900 animals per square kilometre speak for themselves.

Unfortunately, hardly any human bones have survived in archaeological terms, since the rites of passage to death were archaeologically hostile and took place without burials. Therefore, we can say little about diseases. Nevertheless, we assume that a sophisticated system of neighbourhood, district-related and large settlement-level meetinghouses speak for a controlled, even unconsciously installed hygienic concept. Thus, in the large Tripolye settlements, a system of waste pits, recycling, fertilisation and waste transport is recognisable, which distinguishes the settlements strongly from other, rather 'littered' prehistoric settlements. The clear planning concept with streets, squares, rows of houses and access controls at the beginning of each large settlement has certainly contributed to this. Without such a system, the residents would not have been able to live close together for generations.

However, the settlements collapse. At 3700 BCE, they are abandoned. Without any evidence of violence from outside, the houses burn down: in Maidanetske, for example, 1700 houses are deliberately, simultaneously, and completely burned down. What had happened? Our research group in Kiel assumes that management problems of the rather democratically organised system led to destabilisation from within. Other research groups suspect the emergence of epidemics, such as the Black Plague, as a result of the close coexistence of animals and humans unlike any other place in the world at that time. Both scenarios may have interacted with each other.

Nevertheless, the crisis became visible, but was also overcome by an increase in diversity: life was no longer continued in large settlements, but rather in small and medium-sized settlements. Diversity in this case actually also indicates strong regionalisation. Instead of a rather uniform habitus, there are now smaller, different looking settlements, different house forms, and different ceramic styles. Moreover, in some communities, dealing with death also led to the construction of graves. It is likely that new settlements were actively founded and new, democratically oriented groups shaped the world. They escaped from a troubled society, long without the development of class society! For centuries, they were no longer as susceptible to crises as we observe here around 3700 BCE. ♦

Johannes Müller

Upheaval against Social Order: A Solution? Lessons from Neolithic and Iron Age Europe



Social disorder is often ordered for interests that do not correspond to the majority of the population. Diseases, pandemics, and crises carry claims to social power within themselves, e.g., power claims against health that is not available for everyone, power over resources that have become scarce, and the power to control people. Eliminated connectivity between and within societies fuels inequality and the abuse of power. It is not crisis, chaos, and barbarism that lead to the collapse of systems, but it is rather the people who reconnect in such crises and who remain active to deal with the new situation. We observe this in the past, we observe this in the present, and this has always shaped the future.

3100 BCE in Central Europe: We recognise chaos and we recognise a shut down. Megalithic tombs, which are the testimonies of cooperative societies, are no longer being built in Northern Germany. In Central Germany, people are no longer buried in collective graves. Here, too, the harbingers of a new era are evident. In Hesse and Westphalia, settlements are moved to the heights, which is one indication of turbulent times and that something is changing the world. A model of society – based on cooperation – is coming to an end. How could this happen? Evidence of hunger and disease can be found in burial sites even before this, but an increased deposition of stone axes as weapons is also observed. Everything collapses and agricultural land is abandoned. Is this all an indication of a pandemic or an epidemic? Even if we do not share this view, some research institutes claim that this was the first time that the black plague, which is difficult to prove, had invaded larger parts of Funnel Beaker societies. Is there evidence for such a scenario? The islands, e.g., the large Danish islands, are spared. There life goes on as usual and even large settlements continue to develop there with a cooperative way of life.

Otherwise, there is no resistance. The end of the old order is replaced by the power of the war-

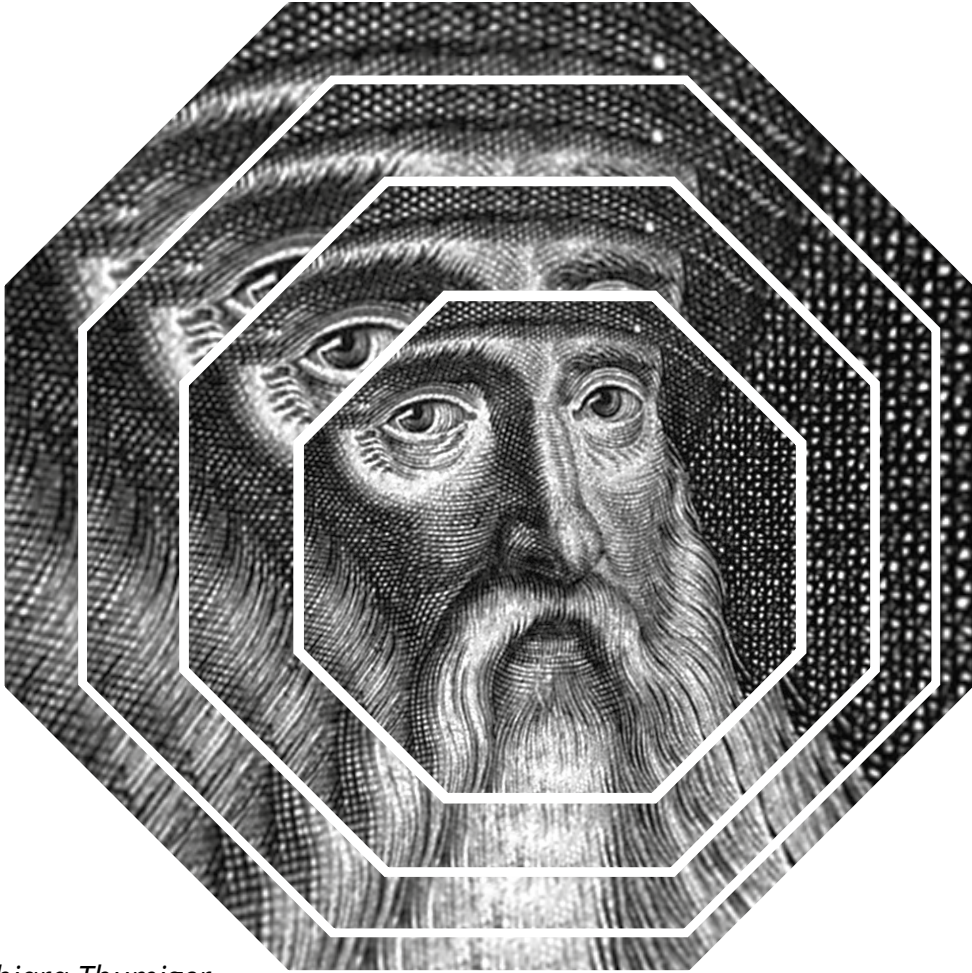
like individuals, who are now the rulers of the new landscape. They monopolise weapons and they monopolise the possibility to rise above burial mounds, above the landscape and above other human beings. After a few generations, they are the clear profiteers of the new world...the rest has disappeared. You do not see it anymore.

This is how it all can change. Or maybe not? Another situation, more than 2500 years later. In Southern Germany, a city has developed: Pyrene – the Heuneburg near Sigmaringen on the Danube. 5000 people live in agricultural households in a controlled suburb, dominated by those up at the castle, a citadel with envoys in the institutions that have become independent and that spread their rulership, controlling the rest of the population. Then, around 540/530 BCE, it is over. The citadel is burned down, the gates are breached, the symbols of domination are ended and the liberated live again in scattered settlements, not agglomerated in the shadow of the rulers. What had happened? What led to the collapse of a system, not only here but also in the entire area of Southern Germany and Eastern France, whose rulers lived from wine trade with Greek Massalia, today's Marseilles? We do not know what spurred the crisis; we only know that the restructuring succeeded. Not central power, but rather a diversification of power to many is the result – an opposite situation to the one we saw 2500 years earlier.

The overthrow has freed. During the crisis. After a few generations, a new society was born, which with new art and new institutions finally defied the claim to power of Mediterranean invaders for a long time – the myth of the Gallic War still shapes the myth of resistance.

There are no instructions for action from the past, but there is an understanding of another world, which teaches that non-behaviour or different behaviour in crises has consequences, i.e., that there are always transformations in which the chance of disenfranchisement is only one of the options and in which the chance of joint action is a must for social participation. ♦

← The collective construction of monuments served to preserve peace in numerous societies. Pictured is the megalithic tomb of Albersdorf in Schleswig-Holstein, ca. 3300 BCE (photo: Sara Jagiolla, Institute of Pre- and Protohistoric Archaeology, Kiel Univ).



Chiara Thumiger

Pandemia and Holism: ***What Ancient Medicine Had to Say***

← Hippocrates. Line engraving by P. Aubry, born 1596 (?). Aubry, Pierre, copper plate engraver 1610-1686. (source: Publication note: R. Burgess, Portraits of doctors & scientists in the Wellcome Institute, London 1973, no. 1403.20. Reference: Wellcome Library no. 4246i).

Pandemic and contagion: unknown concepts in Greco-Roman medicine

Fundamental to the contemporary conceptualisation of a *pandemic* is the notion of contagion, of infection spread among individuals over a large territory or worldwide, which rests on microbiological data (the presence and actions of bacteria, viruses and other microorganisms capable of invading hosts). The mathematical models of expansion in space and time and the role played by interpersonal behaviours as concrete vehicles of infection are thus the centre of interest. A number of political and social, even psychological implications follow, ranging from the curbing of liberties to spontaneous forms of mutual social control, to very private fears and anxieties – with rising suspiciousness and superstition.

The overall human experience of a pandemic in the terms I have just sketched, despite its archaic traits and the often primitive, irrational psychological infra-group behaviours it brings, was unknown to ancient and even premodern societies. The English writer, Thomas Lodge, for instance, speaking of the plague at the beginning of the seventeenth century, still writes of it in terms that could be Hippocratic or Galenic:

"An Epidemick plague, is a common and popular sickness, hapning in some region, or countrey, at a certaine time, caused by a certaine indisposition of the aire, or waters of the same region, producing in all sorts of people, one and the same kind of sickness" (Thomas Lodge, A treatise of the plague, 1603).

The notion of a pandemic – in 'our' sense '*(a disease)* affecting persons over a wide geographical area, or worldwide; extensively epidemic', which, it is implicit, expands through contagion – is nowhere to be found in the surviving Graeco-Roman sources, and would have puzzled ancient physicians and natural philosophers for a variety of reasons. Most importantly, as Nutton explains, the lack of official archives and institutional policies that are necessary for the monitoring of and commenting on patterns and general data made such a 'demographic' grasp of the extent of an epidemic disease an impossible abstraction.

Ancient medicine on generalities

On the other hand, from as early as the Hippocratics, Greek medicine offers close, at times sophisticated observations of the many ways in which super-individual, general circumstances (season, weather, winds) can steer diseases and cause health variations among the population in clusters, or even *en masse*. The ancients were well aware, in a number of different ways, of phenomena that affect the *entire* environment, mankind, and all communities. Most of the phenomena observed in this sense were natural and neutral (potentially negative as much as positive) from the point of view of human benefit: meteorological, seasonal, astronomic variations and periods constituted the background of human life and culture and represented an important set of circumstances to regulate human life. When it comes to medicine, the notion of health and disease shares then a more general attitude.

For example, take the description of different kinds of *katastasis*, or 'common/local constitution', found notably in the Epidemics I and III ('epidemic' here means 'visits to the people, the *demē* of different communities' by itinerant doctors). According to them, the Hippocratic physician identified clusters of patients, as we read in the opening of *Epidemics I*:

"[...] in Thasos, during autumn, about the time of the Equinox to near the setting of the Pleiades, there were many rains, gently continuous, with southerly

» The pragmatism of the ancients' holistic, environmental views on health and disease, then, usefully exposes elements of vulnerability in the world we have created, pointing at still valid directions: the problematisation of travel, the role of seasonality, the polluted 'airs' which exacerbate contagion. «

winds [...] the whole weather proved southerly, with droughts [...] a few patients suffered from ardent fevers [...] many had swellings behind one ear, or both ears [...] in some cases there was slight heat [...] This was the character (ho tropos) of [the suppuration]: flabby, big, spreading, with neither inflammation nor pain; in every case they disappeared without a sign [...]."

Other circumstances, instead,

"[...] caused much suffering; in others still, 'many died', or 'patients quickly wasted away and grew worse [...] delirium in many cases as death approached [...]."

and so on. All these and the constant reference to the seasons and to natural elements in each 'constitution' (*katastasis*) give us the sense of the holistic blend of geographic-temporal circumstances as they variously make an impact on age groups, genders, and individuals. This is fundamentally the kind of epidemic/pandemic thinking that was available to the ancients.

Along the same lines, the second, perhaps more explicit instance of generalisation among the ancients is what we may call an 'environmental' approach to medicine, most evident in the Hippocratic treatise on *Airs-waters-places*. This text sets out the programme of reconstructing 'ethnic' patterns of human health and even physical-ethical portrayals of different people, depending on the key natural features of the place in which they live. A good doctor must consider 'what effects each season produces': 'the hot winds and the cold', 'the properties of

the waters', 'the soil too', 'the mode of life (*diaita*) of a given place, and so on. Based on these factors, inhabitants may fall prey to different ailments and need different therapies.

The 'airs, waters, places' are key in causing diseases and determining cures; so much so that 'travellers' are mentioned specifically as a category at risk at various points by Hippocratic doctors, and the fourth-century BCE physician, Diocles of Carystus, even writes a treatise with specific *dietary* rules for *those who frequently undertake journeys*. The ancient physicians generally paid much attention to changes of 'geographic circumstances', where the key element of risk is the *change* (*metabole*) as it impacts on the person, rather than its converse – the traveller as a possible vehicle of contagion.

Even Galen, commenting from a much stronger professional standing and philosophical premise on this same text, some six centuries later, will express himself along similar environmental, holistic lines:

"When the mixture merges seasons with one another and the winter becomes warm and the summer cold, the effect of this goes counter our nature; and because of these alterations, our nature takes damage and becomes weak. The strings [of a musical instrument] are an example of this: for when they are correctly fitted, as their working order requires, they produce a sound that the listener enjoys. If one of the strings, the one called hypate (the string of the index finger) is in the place of the string called neate (that is, the string of the little finger) its tone has no harmony or sweetness."



← Galen holding a medicine jar and a book. Line engraving (1600-1699) (source: Wellcome Collection. Attribution 4.0 International [CC BY 4.0]).

← Hippocrates. Line engraving by P. Aubry, born 1596 (?). Aubry, Pierre, copper plate engraver 1610-1686. (Publication note: R. Burgess, Portraits of doctors & scientists in the Wellcome Institute, London 1973, no. 1403.20. Reference: Wellcome Library no. 4246i).

This is an example that explains the seasons and the health of our bodies in them.

The great epidemics of antiquity

So, given these views of the interaction between humans and the environment, disproportionally centred on the human individual as a microcosm in his or her interrelation with the macrocosm, how did ancient doctors react facing the challenges and the traumatic evidence of big epidemics? We know of several of them – the Athenian plague, which hit in 430 BCE, grandly depicted by Thucydides and Lucretius, the Antonine plague in the second century, and the plague of Cyprian in the third century (as well as the various ones, which hit Europe in the subsequent centuries). Classical medicine is basically silent – many have noticed and interrogated the absence of any Hippocratic mention of the Athenian plague.

Imperial age doctors, instead, speak of the great epidemics, which hit the Roman empires: Galen testifies repeatedly to the toll taken by the so-called Antonine plague in Rome and elsewhere, with specific reference to his recently rediscovered letter *On not suffering*, *Peri Alupias*, and others too.

However, did ancient doctors in any way hint at a notion of *infection*, vehicled by human beings through contact? Not in any explicit, articulate way. The fundamental idea, taking various forms, remained that air was a carrier of 'seeds of disease', affecting human individuals at the same time in the same place, rather than one of 'horizontal' spread.

A change of angle: miasma and pollution in ancient cultures

Did ancient cultures really ignore the basic anthropological and existential concept of contagion –



The angel of death striking a door during the plague of Rome: an engraving by Levasseur (after Jules-Elie Delaunay [1828-91]). (Source: from the Wellcome Images: [Place of publication not identified]: Imp. Chardon-Wittmann. Jacques Lethève and Françoise Gardey, Inventaire du fonds français après 1800, Bibliothèque nationale, Département des estampes, tome XIV, Paris 1967, p. 232. Jule-Gabriel Levasseur no. 70 ("Une pl[anche] pour la Société française de gravure, pl. XXXII, 1894 : La peste à Rome, d'apr. Elie Delaunay. Deux épr[euves] dont 1 avant l[ettres]").

a phenomenon that is bodily and physiological as much as spiritual and ethical? An obvious ancient parallel, in fact, is offered by the notion of 'pollution', *miasma*: the contamination that an individual, guilty of especially serious crimes (matricide is the famous example, as for Orestes in Aeschylus' *Orestia*), brings on the whole community, from which he needs to be expelled, exiled, isolated, 'quarantined' until purification has been effectively carried out. Various ritual, social and even legal practices correspond to the cultural, religious and anthropological category of *miasma*, with reverberations in medical thought, too (a comparison of religious and medical categories is offered by J. Jouanna; cf. also K.-H. Leven). In the poetic representation, if the 'polluter' – the scapegoat – is not expelled then the disease

spreads in the community and people die in numbers (so in Oedipus' Thebes, or among the Achaian's army at the beginning of the *Iliad*, as Lutz Käppel explores in this volume).

'Positive' mass infection in ancient cultures?

Miasma is an obviously negative kind of contagion, as such, a fitting parallel for destructive 'epidemics' or 'pandemics'. There are, however, also positive mythologies about 'contagious' human states seen as enriching and festive, in popular, non-institutionalised contexts. Thus, the mass celebrations, notably Dionysiac, with dancing and ecstasy, involving women but also eminent for bringing together different categories of individuals from the

population (old and young, free men and slaves, and so on), as a whole, are also depicted as infectious phenomena, as even a kind of spreading disease, *nosos*, by their critics (see Euripides' tragedy *Bacchae*, with the wonderful representation of the collective frenzy of the maenads. The possessed followers of the god are also a favourite topic in vase painting; famously, E.R. Dodds analysed some of these phenomena in his classic *The Greeks and the irrational*, in a comparative spirit).

These are poetic and mythological, obviously, but they show how concomitance and even contagion, in some form, had not gone unnoticed by the ancients as a basic human phenomenon.

Conclusions

Why (apart from some hints and sporadic suggestions) did these two strong features of ancient thought, medical environmental holism and poetic-mythological sensibility to ideas of contamination and pollution, fail to cross-pollinate and engender, at least, a hypothesis on infective disease and pandemics in some form? Nutton's answer must be the definitive one: the lack of big data and of centralised political organisations with broad institutional policies were the main hindering elements. The grasp of diseases in ancient times, thus, remained short of any clear idea of person-to-person contagion and larger patterns, focusing instead on the 'endogenous' factors (environmental, seasonal, cosmical) which were seen to simultaneously provoke the same disease in different individuals.

While it is tempting, when we look back at ancient medical cultures, to concentrate on the shortcomings, in this case, the inability to recognise infection and contagion, there is much that can be retained from the inspiring attention that doctors paid, in a holistic spirit, to links between individual health (or disease) and environment, mindful of the alternating seasons and placing the particularity of each individual in context. The generalities of an affection hitting larger groups can be then brought back to the shared circumstances in a particular place in the world, at a particular time.



Side B: Maenads dancing around an image of Dionysos (photo: Maria Daniels; source: with courtesy of the Staatliche Museen zu Berlin, Preußischer Kulturbesitz. Antikensammlung, February - March 1992 [Berlin F 2290]).

None of these, actually, are absurd or irrelevant to the pandemic in 2020, as we observe now. Indeed, they remain key to the debate about understanding and controlling the current COVID crisis – and envisaging similar occurrences in the future. A therapy and vaccine in the present case are indispensable, of course, although individual therapies may be costly and require very early detection to be effective, and a vaccine is still a way away and might not guarantee 100% immunity. An attempt to understand the rise of the corona virus and of the COVID-19 disease in its demographic, social, occupational, economical, lifestyle and environmental frame emerges then as the most sophisticated, and equally important response to such a modern pandemic. The pragmatism of the ancients' holistic, environmental views on health and disease, then, usefully exposes elements of vulnerability in the world we have created, pointing at still valid directions: the problematisation of travel, the role of seasonality, the polluted 'airs' which exacerbate contagion. These should not be dismissed as less valid alternatives, or 'primitive' suggestions from our current standing point – regardless of what one considers to be the clinical, practical, political right course of action in the specific circumstances that we are facing today. ♦

Lutz Köppel

The Epidemic as a Challenge: **Homer, Iliad**



At the beginning of European literature stands – a plague. The place: Greece. The time: the second half of the 8th century before Christ. The work: the Iliad. The story: the Trojan War. The author: Homer.

Whoever reads the *Iliad* for the first time is surprised. For the work does not, as its title suggests, tell the whole story of the war against 'Ilion' (the old name of the city): How Paris, the Trojan king's son, robs the beautiful Helen, the wife of Menelaus, from Sparta, then, under the leadership of his brother Agamemnon, how the Greeks gather the best heroes of Greece, among them Achilles, Ajax, and Odysseus, and march with a fleet against Troy, besiege the city for ten years, and finally, with the help of the 'Trojan Horse', penetrate the walls, destroy Troy, and bring Helen back – the *Iliad* tells nothing of all this, or rather at best only hints at it in flashbacks and outlooks. These narratives were the subject of many oral poems sung by singers at the courts of the Greek nobility before the middle of the 8th century BCE in many versions and formats all over the country.

The poet of the *Iliad*, in contrast, whom the later tradition called Homer, wrote – probably with the help of script – towards the end of the 8th century BCE, based on these stories, a work of his own, meticulously composed throughout, which only deals with one single episode from the ninth year of the war, lasting only a few days: a conflict that originated from an epidemic in the Greek naval camp.

On their raids through the outskirts of Troy, the Greeks had, among other things, also robbed women; Agamemnon had thereby captured the daughter of an Apollo priest, who was understandably angry about this and asked his patron god for help (First Book, verse 43ff.):

... Phoibos Apollo heard him,

and he burst from the summits of Olympus, angry in his heart, carrying the bow over the shoulders and the quiver closed on both sides.

There were arrows rattling on the shoulders of the angry god, as he set himself in motion; and he walked along, like the night.

Then he took a seat apart from the ships, and he shot the arrow – terrible was the sound of the silver bow!

On the mules he went first and the fast dogs, but then he aimed at them themselves and shot the pointed bullet: and the pyres of the dead burned in close succession.

For nine days the arrows of the god passed through the army...

← Red-figure skyphos of the so-called Brygos painter, Attic, around 490 BCE. Priam (left) asks for Hector's body (lying on the ground) from Achilles (lying on the cline) (source: Kunsthistorisches Museum Vienna. Europeana collections ANSA IV 3710).

These verses are the first written testimony of the outbreak and course of a disease in Greek literature. In mythical-poetic pictures, striking moments are described. What is remarkable is the precision of perception: the infection by the arrows of the god who is responsible for illness and healing in general, possibly even specifically as 'Apollon Smintheus' with rats and mice; the 'night-same', i.e. invisible spread; the successive illness of mules, dogs and humans, finally lethality.

It would be pointless to speculate what kind of disease exactly might be meant here. In an emic, i.e., contemporary perspective, this is in any case hardly relevant for their understanding in a culture that does not know virological connections. The poetic-religious images and concepts used to describe them should rather be seen as a genre- and culture-specific way of talking about the phenomena at all.

What is revealing, however, is the central function the poet gives to this plague for the construction of the plot of his work. The entire events of 24 books with more than 15,000 verses are linked to the plague, and a clarification of the function of the epidemic in the context of the plot also refers to the poetic meaning of the epidemic as such. The cause of the epidemic is less important. It is known and also quickly eliminated with the return of the priest's daughter. What is decisive for what follows is rather the question of what it does to the actors, the course of further action and finally the social order within the Greek army as a whole.

For in the distress of the epidemic, a dispute about authority and claims arises. Agamemnon, although leader of the army, had obviously exceeded his authority considerably. Even he was not allowed to take the daughter of a priest as spoils of war. In the end, he realises this and finally gives her back to her father. As compensation for the material and prestige damage he suffered, however, he confiscates the spoils of his internal adversary, Achilles, who in turn takes this as an affront to himself. The consequence is that Achilles angrily withdraws from the fight and the Greeks now have to fight without

their best fighter. This internal wrangling puts the goal of the common enterprise, the conquest of Troy, in the far distance, because the Trojans now gain the upper hand. This goes so far that Achilles' friend Patroclus falls through Hector, the best fighter of the Trojans. The grief for his friend and his thirst for revenge drive Achilles back into the battle; the fight escalates into a bloodbath; finally he avenges Patroclus' death, kills Hector and cruelly desecrates his body – Achilles has become a bloodthirsty monster. The action of the *Iliad* is thus heading towards a complete disaster, a disaster that in the end was nothing more than a consequence of the failure to solve the *social element* of the epidemic problem. The cause of the epidemic had been eliminated. The epidemic was over. In modern terms, it was 'medically' defeated when its cause was eliminated. The dead, of whom the *Iliad* reports in 22 books, are not immediate victims of the epidemic. Nevertheless, the root of the tragedy of the *Iliad*, all the killing and senseless dying, lies in the end somehow in the *failure to achieve social balance* in dealing with the epidemic.

The *Iliad* would not be one of the founding documents of European culture if this failure were to continue. In the last book of the *Iliad*, Priam appears in the Greek camp and asks for the return of the body of his son Hector. Achilles, however – still filled with hatred – refuses a proper burial. All his father's requests threaten to fail because of Achilles' insistence on his claim to revenge. A solution appears only at

» Nevertheless, the root of the tragedy of the *Iliad*, all the killing and senseless dying, lies in the end somehow in the failure to achieve social balance in dealing with the epidemic. «

the very last moment: Achilles suddenly thinks of his own father at the sight of old lamenting Priam. This thought, which already here, in tragic irony, insinuates the thought of Achilles' own imminent death, brings the resolution: The – in detail quite justified – claims (for the spoils of war, prestige, revenge, etc.) find their limit in the human. In the mental exchange of roles between perpetrator and victim, a balance is possible. Achilles recognises in Hector's father his own father and in Hector himself. Therefore, he gives the son's body to Priam, the father.

Only here is the damage of the epidemic, which was long since defeated 'medically', overcome. There is no perpetrator-victim relation in an epidemic. Victims are always all together. The social solution of the epidemic (as, by the way, already the 'medical' one by the return of the prey woman) – which is the factual consequence of the mere course of action of the *Iliad* – does not consist in the insistence on and in the restitution of claims, but in their abandonment and a reorganisation of the social in the human.

The poet of the *Iliad* also seems to have connoted the surrender of the body with such an interpretation. At the very end, after Priam returned with the body to Troy, Hector's mother, Hecabe, bewails her son. The body is laid out and washed (Book 24, verse 757ff.):

"Now you're lying dewy to me in the hall as if just died, like him, whom Apollo, the god with the silver bow, overtook and killed with gentle arrows."

Certainly, on the outside, Hecabe describes the gruesome beauty of the washed and tended corpse. The wounds of the fight and the desecration of the corpse are no longer visible. He appears like one who died of natural causes. With the mention of Apollo, however, she also refers to the beginning in tragic irony: Hector's corpse resembles those that Apollo killed with his arrows, those who died not in battle but from an illness, a plague, *the* plague. He is like them. As a reader, one can understand that Hector is, after a long series of victims, the last victim of the plague, not a medical one, but a social one after all. ♦

Lutz Köppel

The Epidemic as a Challenge: **Sophocles, Oedipus Rex**



The tragedy of *Oedipus Rex*, which Sophocles probably first performed in Athens shortly after 430 BCE, is also based on the crisis situation of an epidemic.

Oedipus worriedly enters the stage and has a priest tell him about the desperation of the citizens of Thebes. In his answer, he describes the situation (v. 22ff.):

*For the city, as you yourself
can see, is surging
now very much and can no
longer raise its head
from the depths of the bloody wave:
it perishes in the fruit-bearing
calyxes of the land,
it passes away in the grazing herds and
the births of women as miscarriages.
For the fire bearing God
invaded the city and drove
it as a deadly plague,
from which the house of Kadmos
is depopulated, the black place
of the underworld is enriched with
cries of lamentation and of wailing.*

Thebes, once founded by ancient King Kadmos, is plagued by an epidemic, fields and herds are desolate, miscarriages and death rates are high. As the current king, Oedipus must find the cause to end the crisis. It is quickly determined: The death of his predecessor Laius is still unpunished. He had been slain on a journey to the Delphic oracle, where he wanted to find a cure for the sphinx that threatened the city at the time. Until the murderer is found, the epidemic will not end.

Therefore, Oedipus sets out on his search. Since taking power, he was considered to be the clever one. After all, he had already solved the riddle of the sphinx, upon which he earned the vacant royal throne and the hand of the widowed queen Jocasta. One remembers: What has four, two and three legs in the course of his life? Answer: Man – as a baby, as an adult and as an old man with a stick. Thus, the riddle solver also gets to work now.

First, the seer Tiresias, the authoritative holder of knowledge *par excellence*, tries to give him the right answer. However, Oedipus is outraged by his insinuations, suspects him of colluding with political opponents and drives him away. The search for the murderer increasingly turns into an almost absurd hunt for the straw to free himself from the burden of proof, which becomes more and more pressing from witness to witness. Oedipus is completely unable to recognise the obvious reality until an old shepherd solves the riddle: Oedipus is not who he thinks he is. His supposed parents had only taken him in. In reality, he is the son of Laius and Jocasta, had been abandoned by them because of an oracle and was rescued by the shepherd of his foster parents, then later, on a trip to Delphi, killed his real father without knowing him, had become the king of

← Oedipus and the Sphinx of Thebes, Red-figure kylix, c. 470 BCE, from Vulci, attributed to the Oedipus painter (source: Vatican Museums [9665213064]).

» In coping with the crisis – so the analytical substrate of the plot – a clarification of *who one really is* proves to be a suitable strategy for survival. «

Thebes and had married his mother. Thus, Oedipus himself is unmasked as the culprit. When he realises this, he breaks down and blinds himself. The solution of this mystery also points back to the one who was supposed to solve it.

There has been much debate as to whether Oedipus himself is to blame for his downfall, he, who in intellectual complacency and narrow-minded blindness, ignores the most obvious clues, kills a disruptive old man by the wayside with a violent temper in pursuit of vigilante justice and clings to his own position obsessed with power, or whether he is a pitiful victim of fate, with whom the gods have played an evil game as punishment for his father's old misdemeanours. The drama itself seems to be less interested in the question if Oedipus deserves his downfall. On the contrary, that is not the point at all. It is about the question: What is the cause of the plague? Who is the murderer?

In fact, as in the *Iliad*, the action begins in the crisis of the epidemic. It is necessary to overcome it or at least observe what happens under its pressure. What then takes place before the eyes of the audience is an intimate play of self-discovery. The change of the main character is meticulously dissected – under the pressure of suffering from the epidemic – as it were under a magnifying glass: piece by piece the false identity is destroyed, piece by piece the true identity is (re-)constructed. The conclusion

of this rational (re)construction – for here, too, Oedipus proves to be a rational riddle solver in the end – is then also the end of the epidemic. A successful means of overcoming the crisis therefore obviously lies in finding an answer to the question: *Who am I?* The moment an answer to this question is given, the crisis is over.

This treatment of coping with the epidemic situation also reflects a facet of human dealings with it: while the *Iliad* emphasised the moment of social action, the compensation, the moderation of individual demands in order to keep the epidemic itself, but also and especially its social collateral damage within bounds, Sophocles' drama directs the perspective towards the individual. In coping with the crisis – so the analytical substrate of the plot – a clarification of *who one really is* proves to be a suitable strategy for survival. With the return of one's own existence to this substantial core, freedom emerges – and with it responsibility, not least in the knowledge that it is oneself from whom danger emanates. The assumption of responsibility (which Oedipus, with his self-dazzle, ultimately achieves and thus overcomes the epidemic) is obviously the (only?) means on the part of the individual to overcome the crisis, both for himself and for the community as a whole. ♦

Oedipus and the Attic Plague



The prominent role of the plague in Sophocles' tragedy Oedipus Rex does not seem to be just a sophisticated literary fiction to provide the appropriate framework for Oedipus' self-disclosure. It is – probably shortly after 430 BCE – possibly also a very current reflex of historical reality in contemporary Athens: the so-called 'Attic plague' at the beginning of the Peloponnesian War between 430 and 426 BCE.

The Athenian historian Thucydides describes this plague precisely in his work on the Peloponnesian War (2, 47-54)*. In a mixture of medical-biological report, scientific-rational description and historical-social-sociological analysis, his account is a sum of the ancient understanding of epidemics in general. Here, too, the virological explanation of the phenomena is (naturally) missing. Nevertheless, one recognises the astonishing sensitivity with which the phenomena are described. Modern research in the history of medicine has repeatedly tried to fathom which epidemic is actually described here. The more than 20 suggestions made so far range from

typhoid and tuberculosis to anthrax and Ebola. The most probable assumption still seems to be that this is a historical disease, which is unknown today. In any case, the text of Thucydides is one of the pioneering descriptions of a plague, the reading of which, even after more than 2400 years, gives today's reader an authentic impression that is hard to beat. ♦

*For the full text (available at the Perseus Digital Library of Tufts University) see, e.g.: <https://tinyurl.com/y6muutha>

Ben Krause-Kyora and Almut Nebel

Tracing Past Pandemics through the Analysis of Ancient Pathogen Genomes



← The search for pathogens. Working in the clean room in order to avoid contaminations with modern DNA (photo: Ben Krause-Kyora, Kiel Univ.).

**» In our own research work,
we have shown that certain
infectious diseases have
already plagued our ancestors
since the Neolithic. «**

Infectious diseases of pandemic proportions are caused by highly contagious pathogens that can affect a large number of people over a relatively short period of time. Pandemics are not restricted to the modern era. Throughout history, many large-scale infectious disease outbreaks, including the infamous Black Death in the 14th century, affected families, small villages and cities alike. However, up to now most of the causative pathogens, the very viruses or bacteria that caused contagious diseases in the past, have largely remained elusive to detection. Now, new molecular technologies enable researchers to identify ancient pathogens by isolating their genetic material (i.e. genomes consisting of DNA or RNA) from the remains of once infected individuals. The subsequent reconstruction and analysis of the genomes can provide insights into not only the origin and the spread of the infectious agents but also into their evolution, transmission potential, and virulence.

In our own research work, we have shown that certain infectious diseases have already plagued our ancestors since the Neolithic. For example, we detected the so far oldest human pathogen, the hepatitis B virus (HBV), in the skeletal remains of a man who lived in Germany 7000 years ago. This ancient virus is completely distinct from all HBV lineages that exist today. Although it was very common in Neolithic Western and Eastern Europe, the ancient HBV virus eventually went extinct for reasons that are still unclear. It is also not yet known when and where the modern HBV types emerged and how quickly they spread, but we and our colleagues have observed that they were already present at a very high frequency in Bronze Age Eurasia. The infection rate at that time (around 10%) is comparable to the one we see currently in countries in which HBV is endemic, e.g., sub-Saharan Africa and the Western Pacific. HBV causes hepatitis B, a potentially life-threatening inflammation of the liver that can progress to



← Human bones that are analysed for externally visible signs of diseases and prepared for genetic sampling (photo: Katharina Fuchs, Kiel Univ.).

cirrhosis or cancer. Hepatitis B is one of the most widespread infectious diseases today, diagnosed in over 250 million people globally.

Another notorious pathogen is *Yersinia pestis* (*Y. pestis*), the bacterium responsible for three historical plague pandemics (Justinian Plague, 6th century; Second Pandemic, 14th-18th century; Modern Plague, 19th / 20th century). The bacterium likely originated in Asia, from where it swept across Europe. The oldest *Y. pestis* genome analysed thus far is dated to ~ 5000 years ago and was present in Northern Europe. The large number of *Y. pestis* infections seen in the skeletal remains of Neolithic and Bronze Age individuals may indicate that a plague pandemic affected much of Europe throughout the fourth millennium BCE. The mega-sites of the Tripolye culture, accommodating thousands of inhabitants, and wide trade networks may have facilitated the spread of the pathogen. However, genomic analyses indicate that the early strains were probably less virulent and

contagious than the later forms that caused the extremely high death tolls during the Justinian Plague and the Black Death. Even after the Middle Ages, the plague repeatedly returned to haunt Europe until the 19th century, when the pandemic eventually died out on the continent. Improvements in medicine, sanitation and nutrition certainly contributed to this positive development as well as genomic changes in *Y. pestis* that may have led to the emergence of more benign strains in the last centuries. Currently, the plague is deemed under control, with about 600 cases reported per year worldwide. ♦

Ben Krause-Kyora and Almut Nebel

The Medieval Leprosy Pandemic and Its Impact on the Human Gene Pool



↑ Previous page: Human skull with bone changes typical for leprosy and the structure of the genome of the causative bacterium (*M. leprae*) gained from this skull (photo: Ben Krause-Kyora, Kiel Univ.).

» Research on the historical causes of disease is important in order to understand the interactions between pathogens and people and the resulting changes that have taken place in our genomes over time. «

Leprosy is caused by infection with the bacterium *Mycobacterium leprae* (*M. leprae*). The disease progresses slowly, leading to chronic infection and necrosis of nerves and tissue. It still afflicts around two hundred thousand people worldwide a year, especially in low-income countries in Asia and South America, and can be fatal if not treated with antibiotics. Although the disease has probably existed for thousands of years, it developed into a real pandemic in Europe during the Middle Ages, resulting in the construction of numerous leprosy hospitals that were needed to accommodate the large number of sick people. At that time, the disease was believed to be a heavenly punishment on families that had led a less than virtuous life. This belief resulted in moral prejudices, stigmatisation, and spatial separation of the victims. During the 16th century, leprosy disappeared almost entirely from Europe, even before antibiotics for medical treatment had been discovered.

An *M. leprae* infection can leave telltale lesions on human skeletal remains. Bones with leprosy-specific pathologies are therefore often used as starting material for the isolation and analysis of the patho-

gen genome to gain valuable information about the disease in past populations (see also the previous contribution by B. Krause-Kyora and A. Nebel in this publication). In the world's largest study of ancient and modern *M. leprae* genomes from Europe, we were able to show that the genetic composition of the bacterium had not changed considerably over time. Based on the genetic data, we estimated that this pathogen had emerged around 3000 BCE. Our research also revealed a high diversity of leprosy strains in the European Middle Ages, suggesting that Europe played a particularly important role in the diversification and subsequent global spread of the pathogen.

Insights into past infectious diseases cannot only be obtained through the study of pathogens, but also through the genomic analysis of the once infected people who died hundreds or thousands of years ago. Humans and pathogens have been involved in long-standing reciprocal evolutionary processes, in which the hosts are constantly forced to adapt to new microbial attack strategies. Consequently, their immune defense and the genes responsible for it are altered in such a way that in-



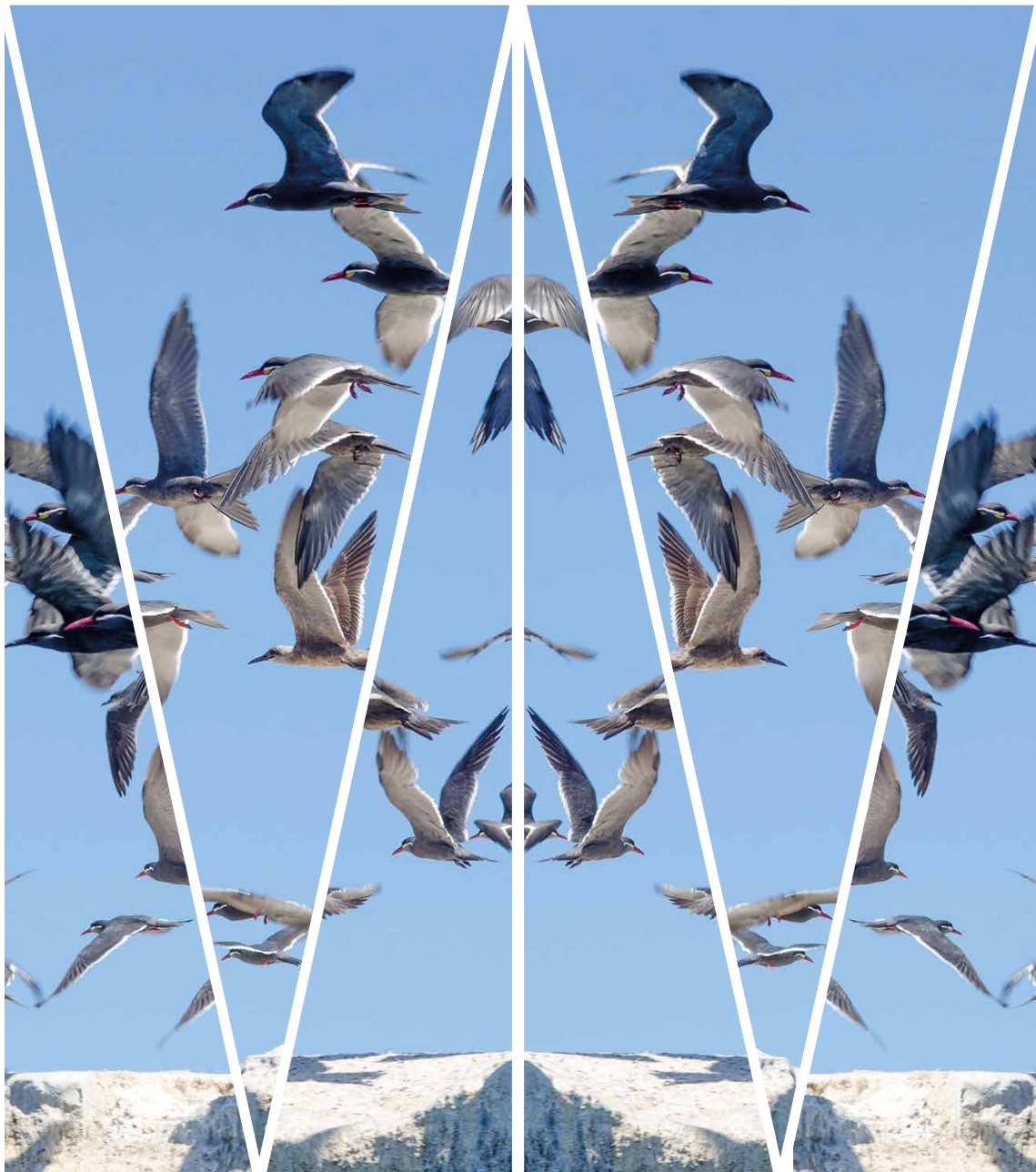
← Leprosy is an infection that migrates to nerve cells and causes peripheral nerve pathways to necrotise. As a result, inflammations cause fingers or toes, for example, to rot off (photo/copyright: Dorthe Pedersen).

fections can be fought more effectively. Such adaptations can be traced in the genomes of individuals, dead or still living.

In one of our studies, we focused on the human leucocyte antigen (HLA) region, which encompasses a number of very important immune genes. Bones from 85 individuals that had suffered from especially severe leprosy during the 12th and 13th centuries in Odense, Denmark provided us with source material for the first case-control study in the world based on ancient DNA. We compared these samples with 223 medieval Danish and Northern German skeletons that did not demonstrate any signs of leprosy. Our analyses showed that a certain variant of the immune gene HLA-DRB1 made people more susceptible to leprosy as it could not trigger an effective immune response against the bacterium *M. leprae*. Because lepers were isolated and not allowed to have children, they did not pass on this risk factor. As the leprosy epidemic in Europe lasted for several centuries, this particular variant slowly decreased in frequency in our population. This process most likely contributed to the gradual disappearance of leprosy. In addition, it had another positive effect: The

leprosy-associated risk variant predisposes people today to several severe inflammatory diseases, such as ulcerative colitis or multiple sclerosis. If it had not been for the leprosy epidemic that our ancestors had to endure, many more people would now carry this variant and be at risk of developing modern-day inflammatory diseases.

This example supports the notion that leprosy and other past epidemics influenced the current composition of gene pools – for better or worse. Research on the historical causes of disease is important in order to understand the interactions between pathogens and people and the resulting changes that have taken place in our genomes over time. ♦



V. P. J. Arponen

Politics of the Pandemic

Our first-hand experience with the politics of the pandemic can inform us now on our thinking about the past, and vice versa.

In the past months, we have seen debates emerge over the political handling of the pandemic – in particular concerning political responsiveness to the emergence of COVID-19 in different countries early on. Questions continue to be asked about the truthfulness of the Chinese authorities in reporting early infection case numbers for fear of political reprisal. In the United States, the pandemic threat was initially labelled by some as a politically motivated “hoax”. In many other countries, the pandemic response has been largely devoid of politics, focusing instead on scientific knowledge as the basis of plotting the course through the pandemic, even while alternative narratives have been nibbling away at science-based perspectives.

The issue of the political handling of the virus brings to the fore the question of the role and impact of the institutions and structures of governance on the human-environment relationship. We can understand the key role of politics by the distinction sometimes made between environmental hazards and disasters. Environmental hazards can be thought of as natural possibilities for the environmental frame, for one reason or another, to change: the climate may change, a volcano may erupt, a virus may spread, and so on. A disaster, by contrast, designates the condition and the degree to which a hazard may have become an anthropocentric problem. For example, a virus is a powerful hazard and has become something of a disaster for many societies, but this to varying degrees depending on the nature of the political processes in various countries.

What tools does conceptual heritage from archaeology and anthropology afford us with regard to understanding the politics of the pandemic in the context of the transition from hazards to disasters? The aforementioned heritage is rich and in it one might, for example, distinguish systems with lineage or wealth-based inheritance of power from

← The role of structures and institutions determines coexistence. This is particularly important in crisis situations (photo: Sara Jagiolla, Institute of Pre- and Protohistoric Archaeology, Kiel Univ).

systems that are meritocratic, or merit-based. Modern bureaucratic and administrative systems are merit-based systems in that, at least ostensibly, they rely on institutional principles, rules, and training, the learning and adoption of which would suffice to acquire or be recruited for a role in the system. These are conceptual distinctions that concern the source of legitimacy of power in a system.

Again, in archaeology and anthropology, vertical, hierarchical, or exclusive systems of governance have been distinguished from systems with network-like, heterarchical, and horizontal features. Exclusive systems concentrate power, while network systems distribute it. Arguably, modern democratic bureaucracies are characterised by network-like, horizontally spread out, heterarchical power structures with extensive “checks and balances” built into, for example, the constitution of the United States. In some recent archaeological and anthropological work, the continuity and discontinuity of social systems has been traced to their ability to sufficiently maintain horizontal power structures.

As an additional important element of the anthropological and archaeological conceptual tool set for comprehending the human-environment relation, social evolutionarism has fostered imagery of social life – in a parallel to natural life – as a process of the survival of fittest. Fitness, in turn, has often been understood as the degree of the distribution of favourable “cultural attributes in a population”. Prime examples of such cultural attributes are technological innovations, but also more abstract cultural attributes, such as cultural attitudes and conceptual systems, may be thought of as advantageous or disadvantageous (as, e.g., classically found in Max Weber’s concept of the protestant ethic and spirit of capitalism).

One negative implication of such an “attribute-focused” view of social evolution may be that the concept of evolutionary advantage comes to focus reductivistically on particular attributes in absence of a holistic view of advantage as a matter of multiple and circumstantial, interlocking factors (“Häufigkeitsverdichtungen”). In a reductivist view, in-

stitutions as systems of co-operative and equitable governance may threaten to be forgotten. However, the emerging synthetic paradigm in biology is now changing the imagery towards concepts of co-operation, collectivity, reciprocity, and symbiosis. With that, a different social evolutionary philosophy can begin to emerge and inform a different imagery of human sociality, one based on reciprocity rather than competition.

However, institutions are not built overnight. The anthropologist of hazards, Anthony Oliver-Smith, described the 2010 Haiti earthquake and the humanitarian disaster that followed as a culmination point of an “earthquake” that had begun some 500 years earlier. What he meant was that the preceding 500 years had seen colonialism dismantle and replace local institutions, leadership and other governance structures with corruption and malpractice. Instrumental to how the crisis played out in Haiti was the lack or insufficiency of governance institutions. A true crisis could not be handled by institutions that had been progressively dismantled.

The present pandemic hits the Western world on the heels of a decades-long, gradual process of disenchantment and weariness with politics (in German, *Politikverdrossenheit*). Wide-spread is the view that the institutions of governance serve narrow

» The issue of the political handling of the virus brings to the fore the question of the role and impact of the institutions and structures of governance on the human-environment relationship. «

elite interests, that nothing changes in politics regardless of which party is in charge, that control is in the hands of global business and other elites, and so forth. In the words of archaeological and anthropological theory reviewed above, our institutions and systems of governance have been going through a transformation towards more hierarchy, vertical and exclusive power structures.

Against such a background, the present pandemic appears to us as a culmination point of a decades-long dismantling of equitable institutions of governance. A number of established democracies are already showing signs – and bearing the human cost – of malfunctioning, politicised institutions of governance. A report published in 2008 by the German Parliament on *Politikverdrossenheit* prophesized that:

“Die seit fast zwei Jahrzehnten andauernde Vertrauenskrise in der Bundesrepublik könnte sich nach Meinung einiger Beobachter – insbesondere im Zusammenspiel mit einer möglichen sozial und ökonomisch sehr kritischen Situation des Gesamtstaates – längerfristig zu einer Gefahr für das demokratische Gemeinwesen in Deutschland entwickeln”.

This crisis can be a wake-up call and an opportunity to realign our institutions of governance around

an equitable core. In recent years, climate change has empowered environmentally conscious politics. Not only have the green parties profited but also a broader phenomenon of cross-party consensus has emerged to get the necessary political processes underway. In a parallel manner, the present crisis is an opportunity for a political consensus and mandate to emerge that aims at restrengthening the principles of equitable governance in our institutions. ♦

*Lutz Käppel, Cheryl Makarewicz,
and Johannes Müller*

Consequences: Diversity and Personal Responsibility

Hepatitis B

The
Plague

Leprosy

12500 BCE -
today

8000 BCE
Zoonoses in
Pre-Pottery
Neolithic

4900 BCE
LBK crisis

3700 BCE
Megasite
collapse

3100 BCE
North German
crisis

2500 BCE-
15th century CE

1260- 1180 BCE
Trojan War

Past crises and pandemics bring to mind similar patterns of how people react and act. Regardless of whether we are in a timeframe around 5000 BCE in Southern Central Europe or in a medieval city on the Baltic coast, in Athens in Greece around 400 BCE or in Northern Mesopotamia around 8000 BCE, crises and pandemics are overcome by a diversification of modes of action. Whether in prehistoric or historical times, an increase in the diversity of options enables even more diverse ways of dealing with the new situation as well as a broadening of the economic and intellectual resources of communities.

It also becomes clear how necessary it remains for people to act on their own. Situations, in which archaeological evidence of self-determined activities is lacking in conjunction with crises, usually exhibited a change in the balance of power: Societies of a more democratic character can only be stabilised if their own actions in times of crisis have been made clear beforehand. Historical sources show that epidemic situations have also been exploited ideologically.

Humanity has at least 10,000 years of experience in dealing with crises and pandemics. Although the respective historical situations were and are very different: In no case did the outbreak of a pandemic alone lead to the decline of cultures or societies. The opposite is true: Often, it was possible to create something new from diversity.

The Black
Plague

today

725 BCE

Iliad (recorded)

540/530 BCE

South German
crisis

430 BCE

Attic Plague
(*Oedipus Rex*)

1346-1353 CE

1550 CE

Russian conquest
of Siberia

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Archaeology is all about how the present came into existence. Thus, it contributes to the social understanding of crises, including present and potential future adversities. Even diseases, such as pandemics in past societies, were and are observed by archaeology. Some examples can be found in this booklet. The scientists of the Kiel Cluster of Excellence ROOTS describe human reactions in past societies that were organized quite differently from ours. This is precisely why it is possible to identify the basic features of human behaviour for the management of crises.

From the emergence of agriculture more than 10,000 years ago to the Russian colonisation of Siberia a few hundred years ago, a fundamental pattern is becoming apparent: crises, including those caused by disease, can only be managed by increasing diversity. Acceptance of diversity, the introduction of new technologies and socially responsible action have always led to the mastering of crises.

It is also clear that values can only be preserved or updated in crises through active involvement. For example, scientists describe that when people are passive, other social groups can easily bind power to themselves, whereas when people actively participate, more democratic structures can develop even in crisis scenarios.

This is the message that we take with us from the past: Whether as a forager or as a simple farmer in earliest agricultural societies, in ancient Greece or in an early modern society – diversity and social commitment are the components that help us to overcome crises. Learning from the past for the present – that is the task of international archaeology.

Felipe Criado-Boado

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