

Committee 3
The Threat of Epidemics

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The Cultural History of Epidemics

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□ The cultural history of epidemics

- When Hernando Cortez conquered the Aztec empire, he started out with fewer than six hundred men, an "army" unlikely to conquer an empire numbering several millions. The Aztecs were no pacifists. Impressed both by the horses and the primitive guns at the first encounter, it is unlikely that the "technological" superiority of the Spaniards tells the whole story. There were neither journalists nor historians present when Cortez attacked Tenochtitlan (now Mexico City) But we know that Cortez was driven out of the city by the Aztecs after their first assault.
- Cortez' little "army" would most certainly have been eliminated if destiny had not intervened in a most unexpected fashion. The balance of power was suddenly changed in the favour of Cortez when the leading general of the Aztecs suddenly died together with the bulk of his army, not because of the primitive Spanish guns, but because of one of the first recorded instances of bacteriological warfare. The death toll was staggering. Even the Spaniards took pity on the Aztecs and since then the faithful night of the battle is known as **noche trista**.
- The invisible allies of the Spaniards were the smallpox. The conquistadores were carriers of the lethal variola virus. They were protected by their immune systems after a long European battle with the virus. The immune system of the Aztecs, however, had never before been exposed to this invisible predator.
- After their defeat, the Aztecs recorded that they had been well prepared for the Spanish siege of their capital when the disease struck. The chroniclers report: "There was great havoc. Very many died of it. They could not walk, they only lay in their resting places and beds. They could not stir, they could not change position, nor lie on one side, nor face down, nor on their backs. And if they stirred, much did they cry out. Great was its destruction. Covered with pustules, very many people died of them."¹
- A similar tragedy was repeated when Pizarro a little later conquered the Inca empire in South America. The Amerindian empire in the Andes, the Inca, is recorded in the cultural history of the human species as one of the primary civilizations together with Egypt, Mesopotamia, the Indus civilization, and Chinese Yellow River, predecessor of the Chinese Empire. The Incas had developed bureaucratic institutions and a pictorial symbol-system reminiscent of the Egyptian and the Chinese. They had an established cosmology and a pantheon of deities which had served them well until the advent of the Spanish ruffians.
- But the whole cultural edifice crumbled, not because of the cultural superiority of the conquistadores, but as a result of the bacteriological warfare which nobody had planned and no contemporary sage understood. The Amerindians not only lost their independence, they lost most of their culture and were for centuries subjected to Spanish - European hegemony. The historians have until recently not taken sufficient account of the role of microbiology in the development of human civilizations.

¹ Crosby, Albert. Smallpox: There never was a cure in Kiple, K. F. Ed 1999. Plagues, Pox & Pestilence. Disease in History, Phoenix Illustrated, London.

- In order to understand the struggle between living organisms in the biosphere a short sketch of the rise of the homo sapiens to the top of the food chain is useful. In spite of the lack of first class documentations, paleontology and archeology have squeezed an impressive amount of information of the calcic remains of our ancestors in the past millions of years.
- What was the diet of our ancestors? Dentition suggests a rather complex menu. Probably nuts and fruits, grubs and vegetable shots were more important than animal flesh. The focus on diet is part of the ecological paradigm which has informed our view of the relationship between living organisms from the smallest virus, and even prions to the largest like the elephant and the blue whale. Part of this paradigm is the idea of homeostasis, of balance between the links in the food chain. There is a balance when the relationships between organisms develops symbiotic forms.
- Homo sapiens through the development of language and symbol systems around 100 000 years ago was probably the first specie in the macrosystem to upset this balance.
- Dentition suggests that our forefathers needed unknown thousand years of training in order to rise to the top of the food chain. Although it is not more than informed guesswork, some scholars assume that the prehuman primates were more carrion eaters than predators, feasting on the leftovers of the parties of the accomplished hunters like the lion and the tiger. If this is true we can imagine that our forefathers were waiting in the bushes together with the hyenas until the great cats had had their fill. Close relatives of the hyena as we know, became man's best friend and probably the first domesticated animal.
- With the development of hunting techniques, symbol systems and language, man the hunter became the worst predator since tyrannosaurus rex. We assume that North and South America were invaded by human beings around 40 000 years ago. A rich fauna of large game was waiting for them. It is assumed that it did not take more than a thousand years before the whole zoo of large-bodied game in North and South America was exterminated. This is a dramatic example of what happens when the homeostasis between the eaters and the eaten is upset.
- It is easier for most people to understand this macro-drama than the invisible theater of the microbiological world. But there are close analogies.
- A new balance between homo sapiens and the large game was struck with domestication. Of particular importance was the domestication of the bovine species in the old world. The domestication restored a state of homeostasis. Seen from the point of view of cultural anthropology domestication created a relationship of symbiosis.
- In the microbiological world a particularly violent and greedy organism sometimes threatens to exterminate its own ecological niche. From the point of view of certain microorganisms homo sapiens is their main and sometimes only ecological niche. But also on this level there are processes which at least temporarily restore the ecological balance.
- Smallpox may serve as an example. In Europe a kind of truce had been established between man and the variola virus. This truce was not

respected when Cortez brought the virulent bug to the gates of Tenochtitlan. The balance was disrupted and a major part of the Amerindian population was wiped out.

- This paradigm of analogy may give a useful perspective of the career of one of the most prominent bacteria, **Yersinia pestis**, the perpetrator of the bubonic plague which several times in recent history threatened the demographic balance in the old world.
- *Yersinia pestis* is a bacterium that usually infects rodents and their fleas, particularly the gray **rattus norvegicus**. A truce had been established between the bacterium, the flea and the rat. The outbreak of the plague may have been caused by *Yersinia pestis* attack on the unprepared *rattus rattus*, a rodent that was ubiquitous in Europe. When *rattus rattus* in great numbers died, the niche-less fleas switched to *Homo sapiens*, equally unprepared. In some of the outbreaks more than 20 percent of the populations in Europe were wiped out.
- However there are other epidemic disasters of almost the same magnitude relatively speaking. Thucydide describes the plague that struck Athens in 430-429 BC which wiped out a quarter of its army. It inflicted a blow on Athenian society from which it never entirely recovered. The plague has never been medically identified. According to Thucydide the infection "first, it is said, in the parts of Ethiopia above Egypt, and thence descended into Egypt and Libya and into most of the king's country (i.e. Persia). Suddenly falling upon Athens it first attacked the population of Piraeus and afterwards appeared in the upper city, when the deaths became much more frequent."² The disease disappeared as mysteriously as it had arrived. McNeill assumes that the disease burnt itself out by creating so many antibodies in Athenian bloodstreams that the chain of infection could no longer be sustained.
- A temporary homeostasis had been established in the old world primary civilizations around 500 B.C. As McNeill argues at that time a micro and macroparasitic balance had established themselves in the great population centers of Eurasia. But the balance was fragile as the Athenian example demonstrates.
- Livi records that during the second century A.D. at least eleven cases of pestilence struck the Roman republic. A particularly notable epidemic struck the empire in 165 A.D. It was brought to the Mediterranean by troops that had been campaigning in Mesopotamia. It is assumed that this was the first recorded case of a smallpox epidemic.
- When a population has adapted to a microbiological predator it is reduced to a childhood disease. The most prominent of these are the diseases measles. Smallpox was also considered as a childhood disease in the early Christian period. It killed small children in great numbers, but the survivors were protected by their immune systems like Cortez' little army of Spanish invaders.
- The domestication of animals created a form of symbiotic relationship at the macrolevel. But it subjected the first domesticators to new microbiological challenges because micro-predators sometimes jump species. It is reasonable to assume that one of humanity's oldest foes,

² McNeill, W. H. 1976 *Plagues and Peoples*, Anchor Press/Doubleday. New York p. 105.

the tubercular bacilli, may have jumped from the domesticated bovines to humans. The influenza virus probably jumped from pigs to humans. The biologist Thomas Hull has compiled the following list of the number of diseases people have acquired from domesticated animals:

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|--------------------------|--------------|-----------------|
| <input type="checkbox"/> | Dogs | 65 |
| <input type="checkbox"/> | Cattle | 45 |
| <input type="checkbox"/> | Sheep, goats | 46 |
| <input type="checkbox"/> | Pigs | 42 |
| <input type="checkbox"/> | Horses | 35 |
| <input type="checkbox"/> | Poultry | 26 ³ |
- With the growth of medical knowledge, homo sapiens acquired weapons against the microbiological threat which for some time gave us the upper hand. The first vaccine was developed by Edward Jenner two centuries ago. His application of cowpox to immunize humans gave its name to our major protection against virus and bacilli. (derived from the latin word for cow, vacca). With the breakthrough in the insight in the microbiological world achieved in the last part of the 19. century and with the discovery of antibiotics in the first half of the 20th a brief period of triumph was enjoyed in the western world.
 - In 1969, the U.S. surgeon general, Dr. William H. Stewart, told the US that it had already seen most of the frontiers in the field of contagious disease. With the discovery of antibiotics and the development of new vaccines, the microbiological challenge appeared to be conquered. Epidemiology seemed destined to become a backwater. The attention shifted to the problems of life-styles. Drinking and overeating had replaced bubonic plague, smallpox and cholera. The developed nations indulged in a vision of an antiseptic age with man in control.
 - But ten years later, new diseases struck with greater impact and visibility, and old ones reappeared resistant to the new drugs. Both syphilis and measles made comebacks.
 - Of the new diseases AIDS is the most prominent. It is also the most well known. The first cases reported in the press appeared in the early 1970-ies, but a few other cases had been reported as early as the late fifties. A few cases in Norway had been diagnosed as immune deficiency. Only later was professor Stig Frøland at Rikshospitalet Oslo able to spell out the diagnosis, AIDS, because he had meticulously preserved blood samples of the deceased.
 - AIDS became the leading killer in Africa a mere 18 years after the infection was first recognized. The horrible news from Africa alert us to the speed which infections are able to spread. The threat of epidemics is today more serious than the threat of war and famine.
 - Because of this the seminar has two purposes: One is to promote the knowledge of epidemics as a medical and cultural problem by bringing together scientists of high standing and publish the results both in professional journals and through the popular media. The other is to alert the world community to the threat of epidemics with the aim of getting the problem on the top of the list of global concerns.

³ Karlen, A 1995 Man and microbes. Disease and Plagues in History and Modern Times. G.P. Putnam's Sons, New York. P. 39.

- Since 1951 more than 28 new diseases have been discovered. Of these AIDS is the best known, but also Marburg disease, Lassa and Ebola fever, Lyme disease and legionnaires' disease have been in the limelight. Legionellosis is now striking without warning in hospitals, hotels and lately also at a Dutch flower-market. This particular pest is interesting because it shows that our technological environment breeds its own brand of infections. Just as the so called neolithic revolution and the development of agriculture in Egypt, Mesopotamia and China provided a breeding ground for infectious diseases, the air-condition-systems, cooling towers, whirlpool-baths of high-tech US sponsored the legionnaires' disease, and the industrial breeding of meat may have sponsored the cow-disease.
- The cow-disease, or bovine spongiform encephalopathy (BSE) resembles Creutzfeldt-Jakob disease (CJD). BSE belongs to a group of diseases whose history goes back at least 200 years. In Norway it is known as skrape-syke, scrapie, because the illness was killing flocks of sheep. First the animals staggered; then they trembled, became irritable and itched so badly that they scraped off their wool on rocks and trees. BSE resembles scrapie, CJD and kuru, a strange illness which almost wiped out the Fore tribe of New Guinea.
- The fore-disease was investigated by the American virologist D. Carleton Gajdusek. He discovered that the disease struck mostly women and children and he traced it to a post mortem cannibalism practiced by the fore women as part of the death ritual. Gajdusek discovered that the disease which was called *kuru* by the Fore, was caused by a degeneration of the brain. The good news is that the opening made by Gajdusek has increased the general understanding of the mode of operations of so called slow-viruses, and made a breakthrough in treatment more likely. In 1982 Stanley Prusiner suggested that the cause of these diseases is not a virus but a protein molecule called **prion**. Possibly an attack on Alzheimer, Parkinson, multiple sclerosis and other degenerative neurological disorders may be launched.
- Epidemics have played a prominent part in cultural history, a fact which is often ignored by the professional historians. Several of the papers to be presented will address these issues.
- Our first contributor is professor Ho-Wang Lee who will present the Hanta-virus which was first noticed by Western medicine in the early 1950s. The virus was isolated in 1976 and named for Korea's Hantaan river. In 1993 a deadly epidemic of the Hanta-virus struck United States and is near the top of the list of microbiological enemies.
- Professor Ole Jørgen Bendictow will present his historical investigation of the black death in the Nordic countries. His contribution will be followed by Bi Puranen who in one of her presentations will focus on the nomadic way of life and its role in the spread of tuberculosis. In her last presentation she will give a unique perspective in this formidable killer.
- Of the present dangers the last bug to jump species is the AIDS virus. The Security Council of the United Nations has recently declared the AIDS pandemic not merely a biological but also a political threat. It is taking its most heavy toll in Africa, and professor Edward Kakonge and Dr Sigrid

Damman will inform us on this bug which seems able to beat our most advanced medical skills.

- Professor Tom Bergan will present his recent discoveries in the search for the ancestor of our well know influenza virus which was responsible for the last great epidemics in Europe, the Spanish flu.
- The responsibility for the scientific homestasis of this seminar is taken care of by professor Guido Pinchaira who will show that the host -parasite relationship is an intrinsic part of the process of evolution. This process has been with us since the birth of life on this planet, and will be with us as long as the biosphere persist.

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