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Specialized in hydrology, Ghislain de Marsily has mainly studied water resources, water contamination by human activities, and geological processes related to groundwater flows.

Many articles have already been published to draw parallels between the current epidemic and past respiratory epidemics, from the Spanish flu of the past century to the most recent epidemics (SARS, MERS, etc.).



Ghislain de Marsily @IFGR

*Ghislain takes us back in time, with a historical perspective on another epidemic: the plague and in particular **the plague of Marseilles, which originated exactly 300 years ago.***

To better understand the current coronavirus crisis, I went back to the history of a slightly older crisis, the plague in Marseille in 1720¹. The plague had arrived by boat, on May 25, 1720, on the Grand Saint Antoine ship, coming from the Middle East, and carrying bundles of fabrics. The City was in principle protected against this health risk by measures to control ships at the entrance and "infirmaries" to quarantine any sick people. Despite all these precautions, the clandestine unloading of goods by sailors and the desire of merchants to put the goods on sale quickly led to the outbreak of the plague, which then spread like wildfire. The city was enclosed by the Parliament of Aix and under the authority of the Regent, no one entered or left Marseille.

The purpose of the containment was mainly designed to prevent the disease to spread

outside the city and contaminating the region. Half of the city's population will die, about 50,000 people.

The plague began to recede from October 1720, but it still left the City of Marseille and caused between 90,000 and 120,000 deaths in the region, including Marseille, out of a population of about 400,000 people.

This is the last great plague epidemic in France. It is known that the bacterium responsible for the disease, *Yersinia Pestis*, which is therefore not a virus, was only discovered in 1894 by Alexandre Yersin, a Franco-Swiss bacteriologist working for the Pasteur Institute, during a plague epidemic in Hong Kong; Yersin also developed a vaccine against the disease. Subsequently, a treatment with antibiotics was developed in the 20th century, but by 1720 there was no known effective treatment. The

¹ Scenes from the life of Marseillaise during the plague of 1720, by Dominique Cier, Actes/Sud, 1979. See also Wikipedia "Great Plague of Marseille".

contagion was rapid, and death usually occurred within 3 days. Protection by containment was practiced by avoiding contact between the inhabitants, and by closing the houses, but the sick were also quarantined, without seeing anyone. Doctors and caregivers "disinfected" themselves with vinegar. The bacterium was spread by fleas and rodents, and then by lung contamination through coughing and droplets.

The most threatened "healthcare teams" were the gravediggers, who had to pick up corpses from the streets (they were thrown out of the windows) in dumpsters and bury them in hastily dug mass graves or incinerate them. This work was imposed on the galley prisoners, most of whom died. Since all economic activity was excluded, the city's aldermen ensured food for all by bringing in food products from outside and distributing them to the population. Then, after a few months, the scourge died out by itself, the survivors no longer contracted the disease, and "normal" life resumed its course. The mechanism by which this happened is not specified.

However, a relapse took place from April to August 1722, to the horror of the population. Note that the "Spanish flu" of 1918-1919 due to a virus of H1N1 strain coming from the United States had caused between 20 and 50 million deaths in the world, we are even talking about 100 million, India and China being the most affected countries!

What are the similarities between the plague of 1720 and the current Covid-19?

First of all, **these are diseases for which there is still no cure**, and for which only containment can reduce the impact. But quarantine (the

total isolation of the sick), supposed to be able to protect oneself more effectively against the spread, does not work because of negligence, and requires an authoritarian power capable of imposing itself on everyone.

One notable difference is that mortality due to Covid-19 is much lower than that due to plague. The majority of people at real risk from the novel coronavirus are elderly or already in poor health, but there are reports of deaths of younger people. The plague attacks everyone, but some people appear to be immune.

"The mode of propagation through international transport is similar."



Painting by Michel Serre. Scene from 1720 in Marseille

Second, the mode of propagation through international transport is similar. In both cases, it is the transport of people and goods by air or sea that explains the spread. See in 2020 the role played by cruise ships !

Severe economic consequences. In 1720, the contained populations no longer had any income and had to be fed by the authorities. In 2020, the most affected area is perhaps India, where containment has laid off populations of "day labourers" who are paid on a daily basis according to the work actually done. Without

income, these poor populations can no longer afford to feed themselves, and start wandering around the city and trying to return on foot to their villages of origin, several hundred kilometres from the big city. In southern Italy, there is talk of the key role played by the Mafia in supporting poor families, against the backdrop of the loyalty thus acquired to its illicit activities. It should be remembered that during the great famines of the 19th century, in India and China², a large part of the population died of hunger because they could no longer afford to buy food, the prices of which had skyrocketed. The same thing happened in 1975 in Ethiopia³. If the current pandemic spreads to low-income countries, it may result in loss of life, not directly through disease, but through loss of income. And what will happen if the pandemic reaches the slums of large cities in some developing countries, in Asia, Africa or Latin America, where millions of people may live? How can a policy of social distancing, containment or quarantine be implemented there? How can access to food be maintained?

What place does religion have in this picture?

In 1720, in Marseille the population was essentially Christian and the Church sought to bring comfort to the dying (confession, which was organised in the open air to avoid going to church, extreme unction...). Divine anger is often invoked as the cause of illness, as punishment for a dissolute life. In 2020, in France, the contamination of the population in the East of France is due to an influx in Mulhouse of faithful of the Christian Open Door Church, with 2.000 people confined together in a church, from February 17th to 24th, who were numerous to be contaminated,

then who spread the disease by returning home, in France and neighboring countries. In Georgia, the Orthodox Church in mid-April maintained traditional Easter ceremonies despite government bans. Because of the danger of gatherings of the faithful, Saudi Arabia suspended for the first time in history the 2020 annual Haj pilgrimage to Mecca, which is scheduled end of July. But in Pakistan, the faithful refuse the containment and place their fate in the hands of God, who will protect them. In India, Muslims hide in Mosques and Hindus in Temples. The Indian Prime Minister Narendra Modi, who plays on the religious conflicts between the two communities, speaks of "Corona-Jihad", the willingness of the parties to contaminate the other, according to the Indian journalist Vaiju Naravane. In cases of great danger, it is, alas, classic to pit the communities against each other, instead of making them cooperate. This is what happened for example in Rwanda, during the 1994 genocide, the danger of famine was transformed into an ethnic conflict between Hutus and Tutsis, according to Jared Diamond⁴, with 800,000 people massacred in two months. Religious tradition must be taken into account in the fight against the pandemic!

Only direct and authoritarian management of the pandemic by public authorities seems to be able to control it, in 1720 as in 2020. For example, the results obtained in 2020 in China and South Korea were only possible by constraining a very strict lockdown. Conversely, the progression of the disease in Italy, Spain or the USA in New York or Massachusetts seems to show the

²Davis, M., 2003. Génocides tropicaux. Catastrophes naturelles et famines coloniales. Aux origines du sous-développement. La Découverte Poche, Paris, 480 p.

³ Armatya Sen (1990) Poverty and Famines : An Essay on Entitlements and Deprivation, OUP Oxford.

⁴ Diamond J. (2006). Effondrement. Comment les sociétés décident de leur disparition ou de leur survie. Gallimard.

consequences of a certain laxity or delay in the implementation of containment.

The problem of the saturation of hospital structures by the influx of patients is the same in 1720 in Marseille, with however this great difference that the effectiveness of treatments in 1720 (bleeding...) was unrelated to the effectiveness of those of today ! On the other hand, safety measures for the nursing staff by means of protective equipment (masks, visors, gowns, gloves, vacuuming the air in the premises, disinfectants...) has made very great progress, insofar as this equipment is available in sufficient quantities where it is needed! This problem is now a major concern for many countries with low incomes, and international solidarity is a priority.

"Pandemics, climate change and economic crises know no borders and require multilateral solutions on a global scale"

What lessons can we learn from these past epidemics?

Pandemics, climate change and economic crises know no borders and require multilateral solutions on a global scale. Nationalism and isolationism are not a protection, they make the situation worse. Michèle Bachelet, UN High Commissioner for Human Rights, says that *"Each country is managing the crisis in its own way, whether it is containment, testing or quarantines. Situations and cultures are different, but if certain basic measures are not*

taken [together], the virus will be contained, but not eradicated."

Bertrand Badie (Professor Emeritus at Sciences-Po) considers that the threat is global and must be dealt with by the whole of humanity in a coordinated manner. In 1957, the Asian flu epidemic had taken two years to reach Europe, whereas the Covid-19 took less than 2 months! And the whole planet is concerned ! Wanting to weaken the World Health Organization, as Trump wishes, is absurd: **on the contrary, the response must be global, coordinated and supportive**. Let's recall that Bill Gates had already predicted in 2015 that we would face, in a few years, a health crisis of the kind we are going through today, and that he had recommended that a "health intervention force" be created in order to be able to face this threat, much more serious according to him than the risk of a new war. In this respect, the absence of a joint responsibility by the European Union for the problems linked to the coronavirus, in terms of both health and economic aspects, is also a missed opportunity, even if such a responsibility for a health risk is not one of the European Union's missions. But as long as we want to reform Europe, why not ask it to think about and propose a possibility of dealing with this type of risk, when we have been talking for years about creating a European army?

Avivah Wittenberg-Cox⁵ observes that the countries that have managed the health crisis best, with the fewest deaths, are those led by women: Germany, Denmark, Ireland, Finland, New Zealand, Norway or Taiwan with protective measures taken very early on.

⁵ Forbes, 13 Avril 2020

Ghislain de Marsily and IFGR

Let's go back to IFGR. In our field, that of the future of the great rivers, IFGR has shown that it is possible to study in solidarity the serious problems that all rivers face, with their local peculiarities, by bringing together and cooperating the managers of these rivers, by sharing the experiences and successes obtained, by exposing the problems and difficulties that arise.

IFGR is a successful example of reflection and exchange of expertise that enable progress to be made in solving global problems, with an interdisciplinary approach that takes into account all technical, economic, health, societal, historical and religious factors.