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Post mortem: looking for traces of the Black Death, from vexillology to McDonald's

Adrián García Candel<sup>1,2</sup>

FISC (CSIC-UIB) Palma de Mallorca – Spain <sup>2</sup>Brotherhood for the Cure of the Black Death

agarcia@ifisc.uib-csic.es





Friends of Leeches Association



## Et præbuistis ei frenum in context



elieve it or not, global pandemics are possible<sup>[1]</sup>. And they have occurred throughout human history. One of the most important was the Bubonic Plague that decimated the human population for centuries, the most serious being the outbreak known as the Black

Death that ravaged Afro-Eurasia from 1346 to 1353. It is estimated that between 75 and 200 million people died during those years alone. Bubonic plague is caused by the bacterium *Yersinia pestis*. Understanding how the epidemic affected our present could help prevent future global epidemics, which, although unlikely, could occur when we least expect them. The main hypothesis of this work is that a higher incidence of the Black Death in one area has influenced how black its flag is today.



ata provided by WSL Remote Sensing Group will be used to analyse the Bubonic Plague epidemic<sup>[2]</sup>. These records consist of digitised data on 6,929 plague outbreaks that occurred between 1347 and 1900 AD across Europe and North Africa. The data are based on an

inventory first published in 1976. For georeferencing, information from Tele Atlas 2009 has been used with coordinates in ETRS89 and WGS84 systems.

Data providet dispectus

#### A vexillum enim omnis homo



n order to analyse the spatial impact of the epidemic, we need to find some variable common to all the records in the dataset. There is one thing that every city has associated with it: a flag. The period covered by the dataset is quite broad and politically turbulent, so we

used the current flags of the states to which the cities currently belong. The reverse\_geocoder package was used to determine which country each set of coordinates belongs to.



Right: Spatial density of the outbreaks in the aggregated data. Each red dot is a city with a recorded outbreak

Down: Temporal distribution of the outbreaks. The peak was in 1348 (107 outbreaks) during the period of the Black Death.





The location with the most outbreaks is London (146), followed by Alger (112) and Paris (90).

# Quod est nigro nigrum vexillum mortis



**母sponsored** 

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f there is any colour associated with the Black Death (and bubonic plague) it is **black**<sup>[3]</sup>. Having the colour of the flags averaged in HSV system, we calculate the correlation between the inverse of the brightness (*blackness*) with the number of outbreaks that each country has recorded in the dataset both taking and not taking into account the extent of the country.

#### average(Flag) Flag Hue $(165^{\circ})$ Sat. (26%) Bri. (49%)

To compare the flags, an "average" filter was applied. This filter converts the image into a solid colour by producing an average of all the colours in the image. Each flag can then be expressed using the HSV system which determines each colour as a combination of *hue, saturation* and *brightness*.

#### Dic mihi quis es qui es et quaeritis



**Oogle** is, today, the first source people turn to for health information<sup>[4]</sup>. As an additional hypothesis, we propose that the countries that suffered the most outbreaks of bubonic plague in the past will have a greater interest in knowing the history of these

outbreaks. To test this, we used data provided by *Google Trends*, which offers normalized data on how much a term is searched (in various languages) in its search engine.

Right: Number of Oubtreaks vs. the normalized Google searches for terms related with the bubonic plague since



Number of Outbreaks



Left: Number of Outbreaks vs. the Blackness of the averaged flag (r=0,17)

**Right: Spatial density of** outbreaks only counting those that occurred before the country adopted its current flag vs. the Blackness of the averaged flag (r=-0,28)

#### In prima luce in hominum huius temporis



#### 2004 (r=-0,33)

## Lucem itinere post

■ The bubonic plague was a terrible disease that affected all of Europe. Hopefully we will not see a worldwide pandemic again.

■ Surprisingly, there seems to be no correlation between the number of bubonic plague outbreaks that occurred in a territory and how black its flag is today. ■ Nor is there an obvious correlation between how interested a population is in learning about bubonic plague and the incidence of the disease in the past. At least not since Google was invented.

■ There is a positive correlation between the number of McDonald's® franchises opened in a country and the number of bubonic plague outbreaks reported in the past. Further research is needed.

*index* to compare the purchasing power of different countries where the McDonald's® Big Mac hamburger is sold. Along these line, we propose the **McPlague index** that relates number current of open **McDonald's**® franchises in a country the number of bubonic plague outbreaks suffered in the past.



Right: Number of Outbreaks vs. Number of McDonald's® (r=-0,80 / r=-0,84 without Russia)

#### Nolite timere eos qui sciunt plura quaerere

#### ■ [1] Citation needed

■ [2] Büntgen, Ulf; Ginzler, Christian (2019). Digitizing historical plague. EnviDat. doi:10.16904/envidat.181.

■ [3] Manipulating the sacred: Image and plague in renaissance Italy. L Marshall -Renaissance quarterly, 1994

■ [4] Anna Kłak et. al (2017). Dr Google as the source of health information – the results of pilot qualitative study. Polish Annals of Medicine. doi: 10.1016/j.poamed.2017.02.002

You Lose The Game





I something that one learns in the midst of plagues: that there are more things in men worthy of admiration than of contempt **Albert Camus**