The Filoviridae family includes non-segmented single-stranded negative-sense RNA virus. It belongs to the order Mononegavirales and it contains different genera and species (Fig. 1)\(^1\).

Filoviruses, which cause hemorrhagic fever, are zoonotic and bats seem to be their reservoir. How the virus is transmitted from the reservoir to humans is unclear, but between humans the transmission occurs through personal contact with infected people or their bodily fluids. Moreover, there is no effective treatment or vaccine available against this hemorrhagic fever, reasons why the transmission chain is usually interrupted. Genetic analyses reveal that Marburgvirus and Ebola virus genomes differ ≥50% in a nucleotide level (Fig. 2); quite the same to the almost equally evolutionary distance for Cuvavirus with them (in particular it is 56 and 51% respectively). Despite the discussion with the classification of the viruses within the Marburgvirus (Marburg and Ravn virus) they are still considered members of the same specie. For Ebola virus species, their genomic sequences differ between 32.2% and 42.3% from one another\(^4\).

In a chronological way, after the first four outbreaks there is an absence of disease from 1979 to 1994 (Fig. 3). In contrast, the frequency of outbreaks from 1994 until nowadays is relatively high and constant, and they were mainly produced for Zaire ebolavirus, Sudan ebolavirus and Bundibugyo ebolavirus but with different fatality rate (Table 1). Some of them were individual infections while others were result of different waves of the same epidemic. This information, coupled with some seroprevalence studies, show an occult but permanent circulation of Ebola virus\(^5\).

### Species

<table>
<thead>
<tr>
<th>Species</th>
<th>Zaire ebolavirus</th>
<th>Sudan ebolavirus</th>
<th>Reston ebolavirus</th>
<th>Tai Forest ebolavirus</th>
<th>Bundibugyo ebolavirus</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Discovered in (place)</strong></td>
<td>Democratic Republic of Congo</td>
<td>South Sudan</td>
<td>Reston (USA)</td>
<td>Côte d’Ivoire</td>
<td>Uganda</td>
</tr>
<tr>
<td><strong>Number of outbreaks</strong></td>
<td>15</td>
<td>7</td>
<td>0</td>
<td>Single case</td>
<td>2</td>
</tr>
<tr>
<td><strong>Fatality rate</strong></td>
<td>74% (114.77)</td>
<td>63% (18.92)</td>
<td>Non-pathogenic for humans</td>
<td>0%</td>
<td>39% (10.39)</td>
</tr>
</tbody>
</table>

Table 1: Outbreaks characteristics for the different ebolavirus species

The most important Ebola virus outbreak, the first reported in West Africa which also had some cases out of this continent, started in December 2013. It was produced by a Zaire ebolavirus 97% similar to a previously reported one, and it had cause more deaths itself than all the previous outbreaks together. Despite that it is still ongoing, on May 9, Liberia was declared free of virus and it seems that the cases in Guinea and Sierra Leone are going down. Nevertheless, surveillance has to keep going to avoid an unexpected upturn of the disease\(^6\).

### Mapping Ebola virus outbreaks and areas at risk

With the exception of Reston ebolavirus (only found in Philippines, Asia), Africa seems the continent of origin of Ebola virus. The locations of the outbreaks (Fig. 4) have been seriously studied in order to predict risk regions of Ebola virus outbreaks. There are large geographic areas (mainly in the rainforest in West and Central Africa) with the right environmental conditions for the Ebola virus reservoir, and consequently there are susceptible of zoonotic transmission (Fig. 5).

Moreover, all the countries where there have been an index case are in areas of high probability of finding bats, although there are also countries in these regions without index cases reported until the moment (Fig. 5)\(^6\).

#### Weather influence to the outbreaks

There have been observed seasonal variations in outbreaks in relationship with moderate temperature and wet conditions. Some studies in bats have shown a high seropositivity rate in adults and pregnant females, suggesting that the mating and fighting (more frequent in rainy seasons) increase the virus transmission and consequently human infections\(^5\).

### Conclusions

- Ebola virus is an emerging virus well characterized and studied.
- Although, the most important outbreaks, we have not yet to confront it, more information, some treatment and a vaccine, between others, are needed.
- It has been demonstrated constant circulation of the virus among the population.
- In order to predict possible Ebola virus outbreaks in the future, it is necessary to combine the distribution map of its reservoir with the weather conditions.

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5. Fig. 4: Ebolavirus disease distribution map between 1976 and 2014.
6. Fig. 5: Predicted geographical distribution of zoonotic Ebola virus.

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**Outbreaks along the recent history**

**Fig. 3:** Chronology and measure of the reported outbreaks of Ebola virus disease through time\(^3\).

**Ebola virus outbreaks throughout human history**

**Fig. 4:** Ebola virus disease distribution map between 1976 and 2014.

**Fig. 5:** Predicted geographical distribution of zoonotic Ebola virus\(^6\).