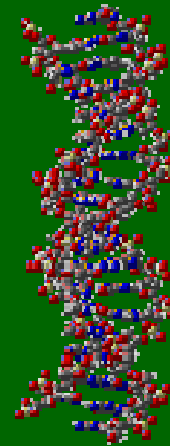


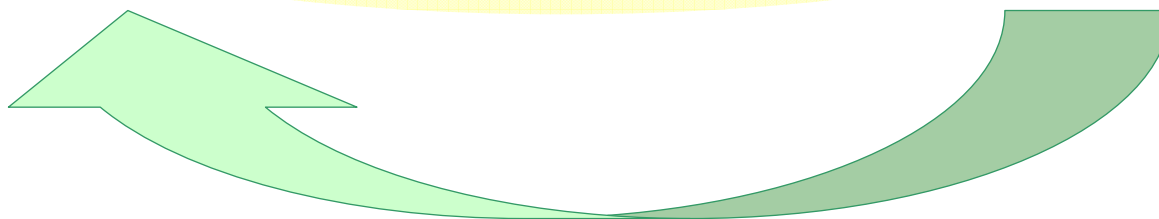
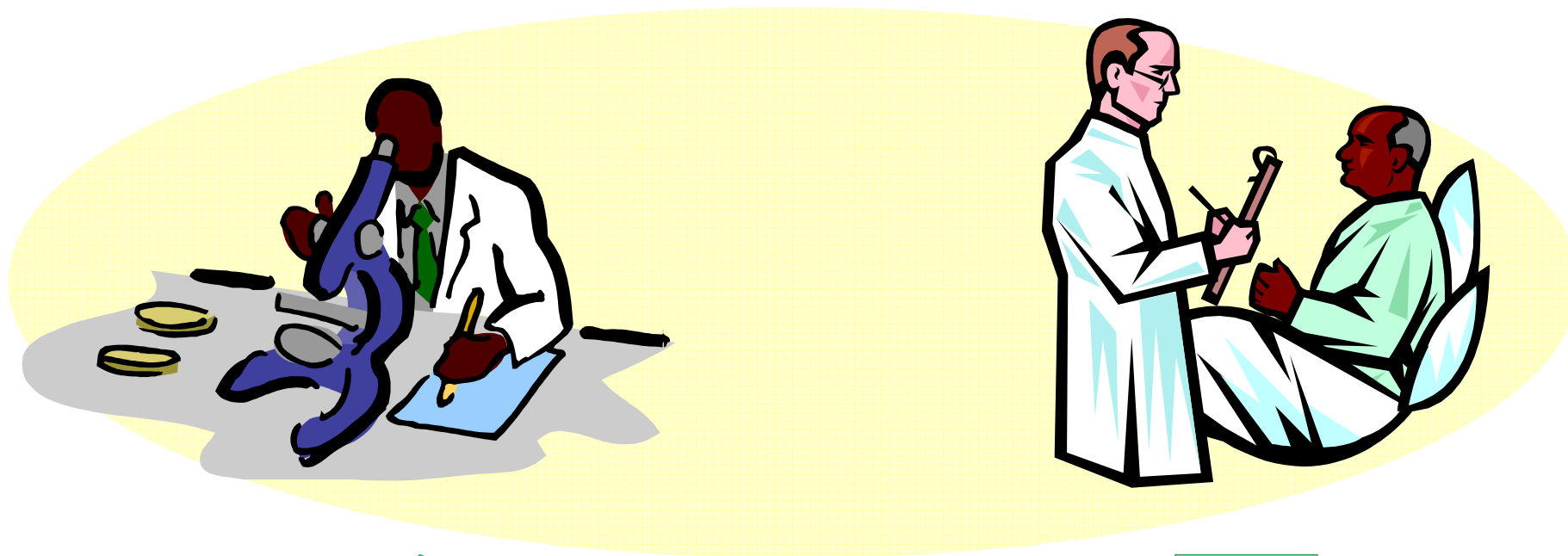
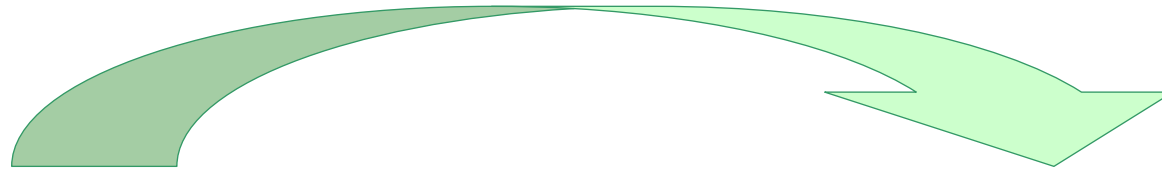
MOLECULAR EPIDEMIOLOGY OF HIV-1

Francisco M. Codoñer



IrsiCaixa Foundation, Badalona, Spain

from bench to bed

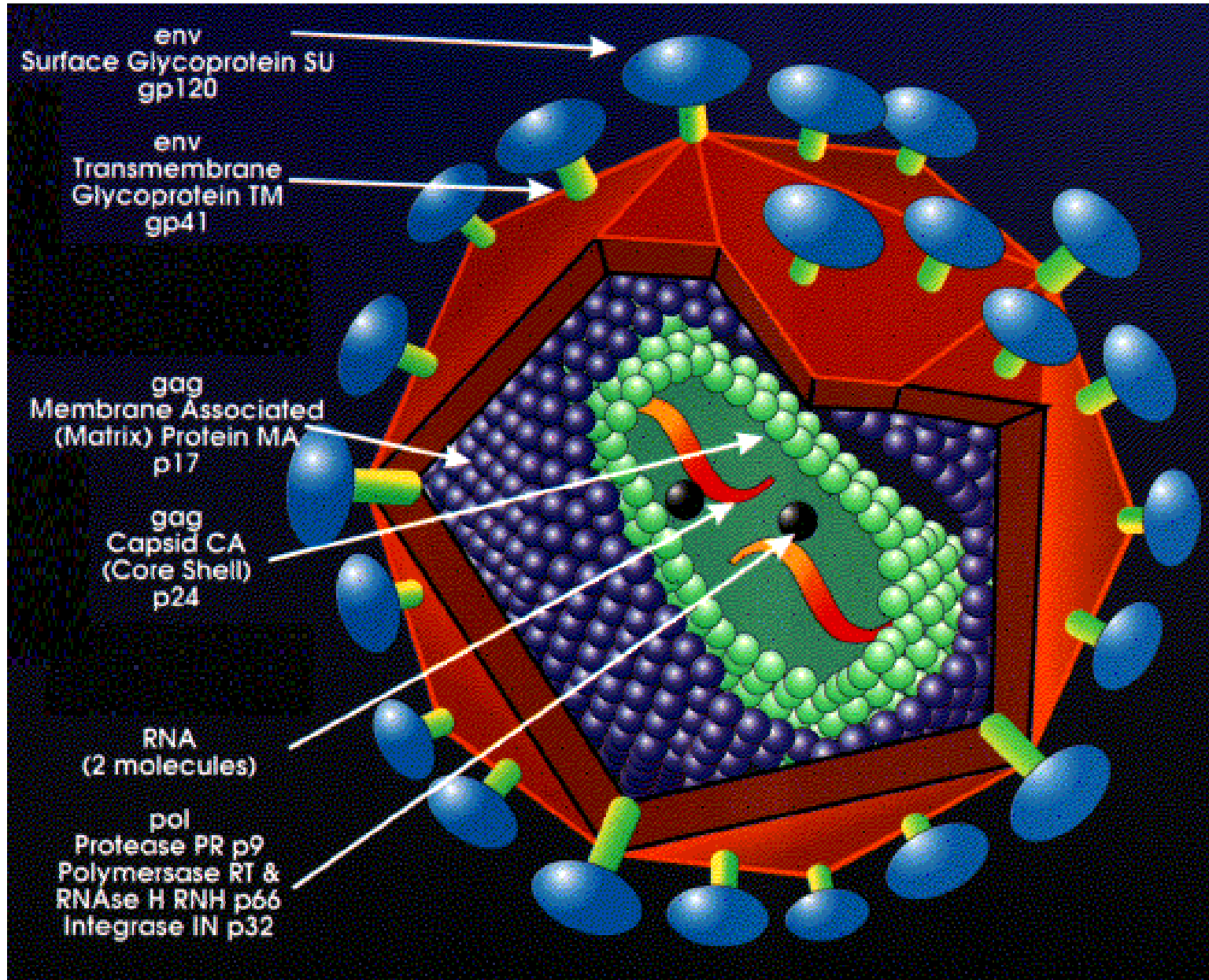


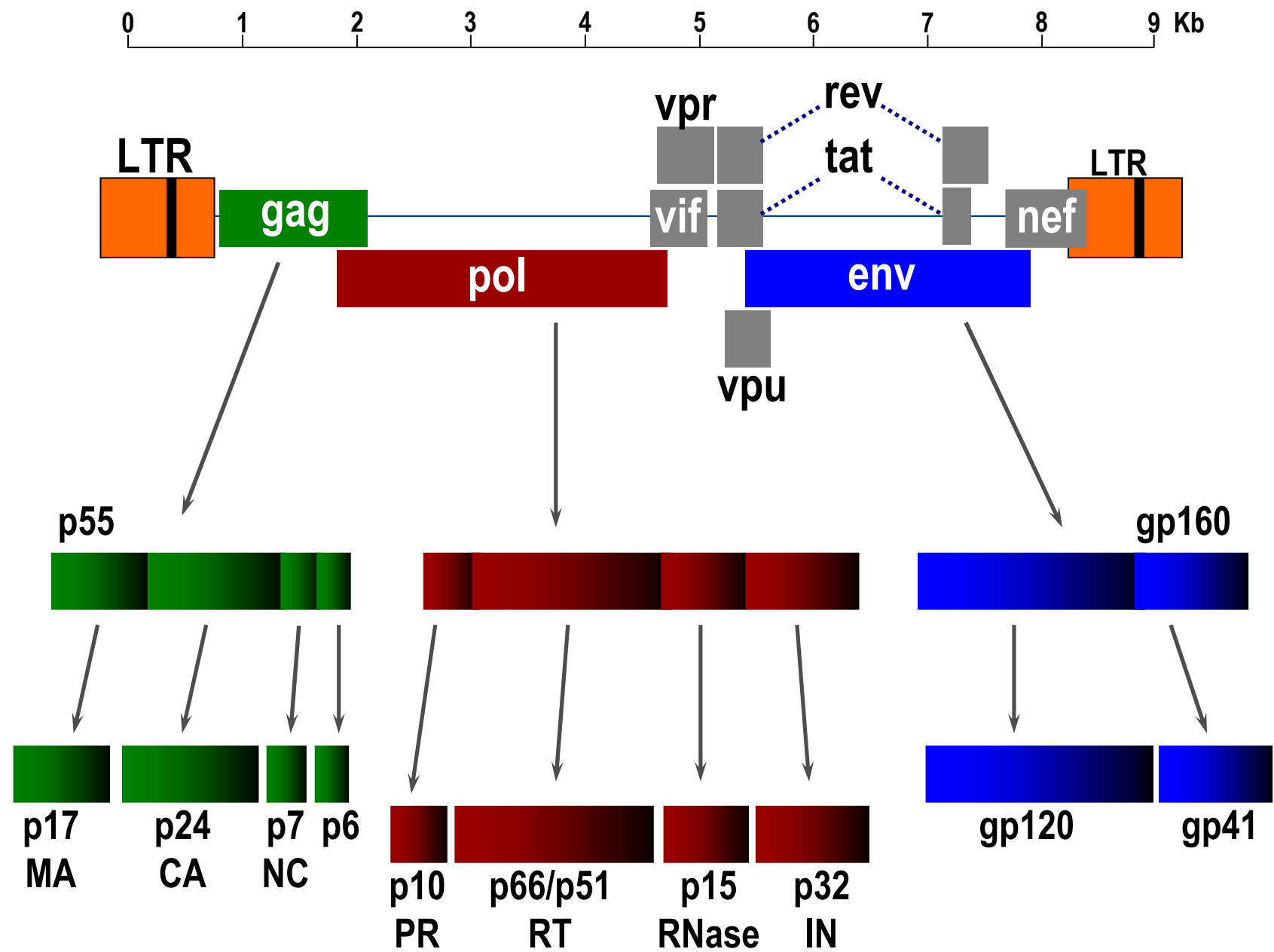
... and back

What is?

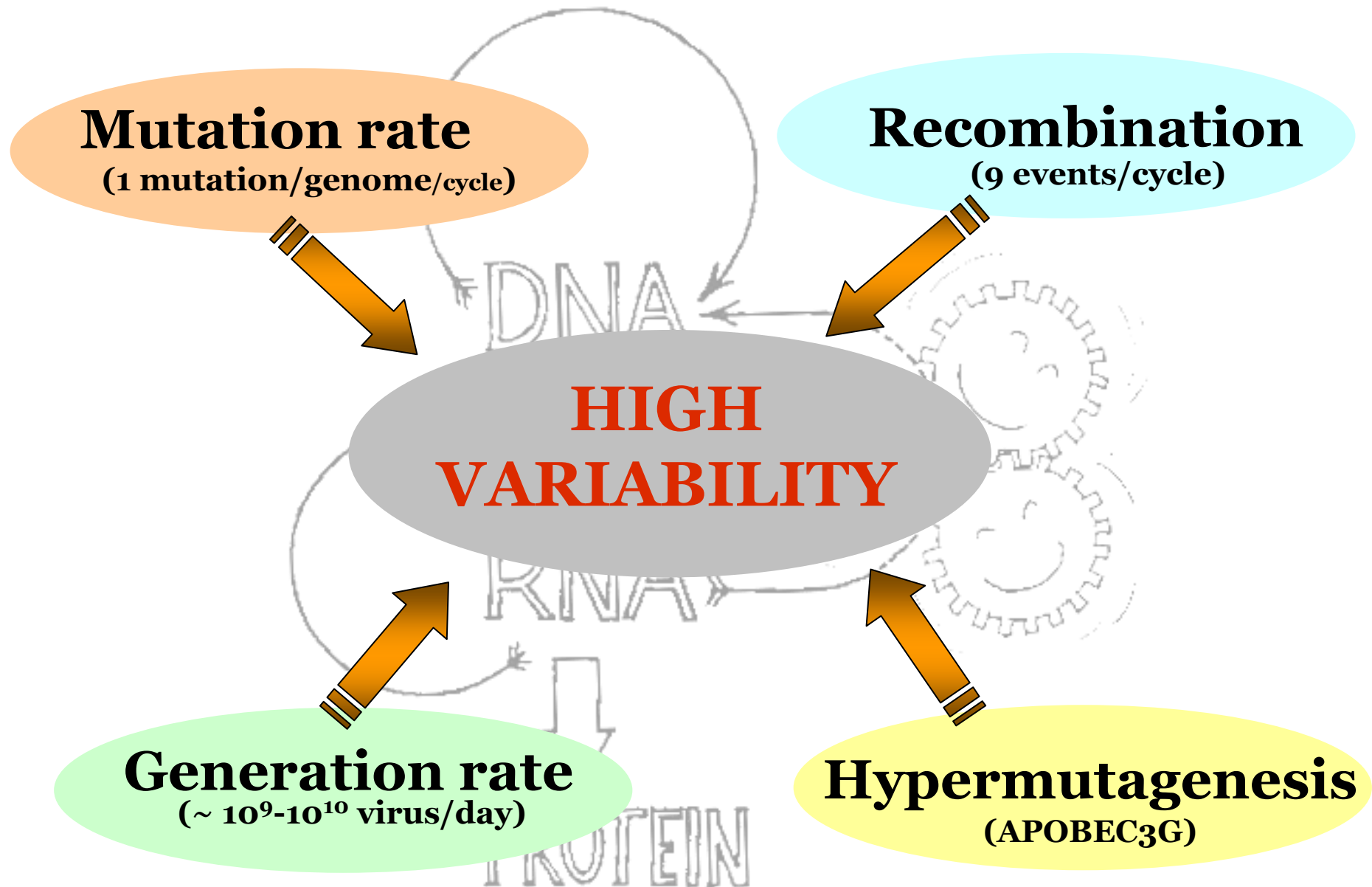
MOLECULAR EPIDEMIOLOGY:

- 1.- Deals with the contribution of potential genetic and environmental risk factors identified at the molecular level.
- 2.- Distribution and control of the disease in groups of relatives and populations.
- 3.- Improves our understanding of the pathogenesis of disease by identifying specific pathways, molecules and genes that influence the risk of developing disease.
- 4.- Helps to trace the prevalence of variants in specific geographical areas.

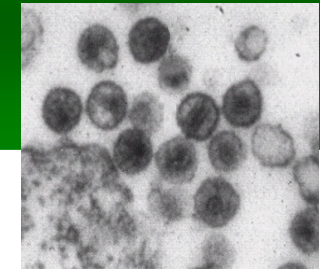
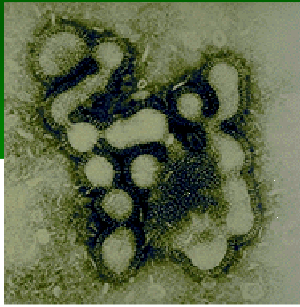




Key of HIV adaptation



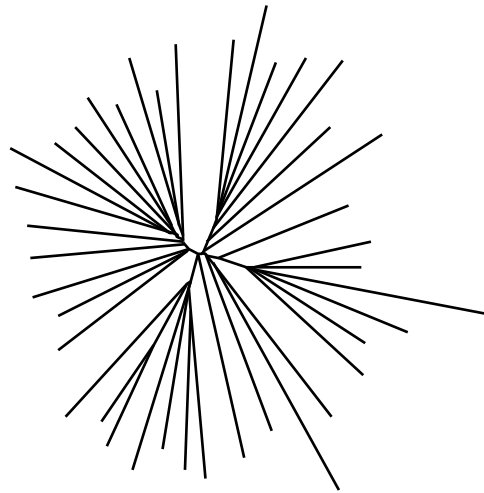
Relative Genetic Diversity: Influenza A and HIV-1



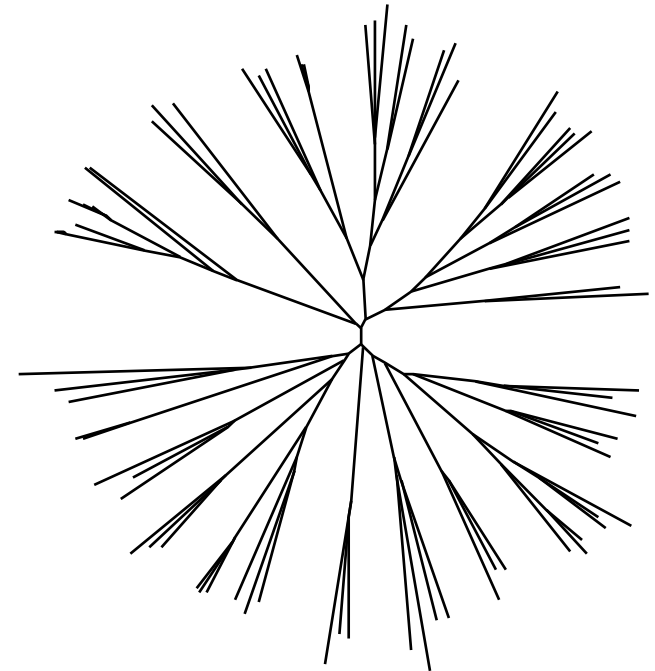
**Annual global
Influenza A**



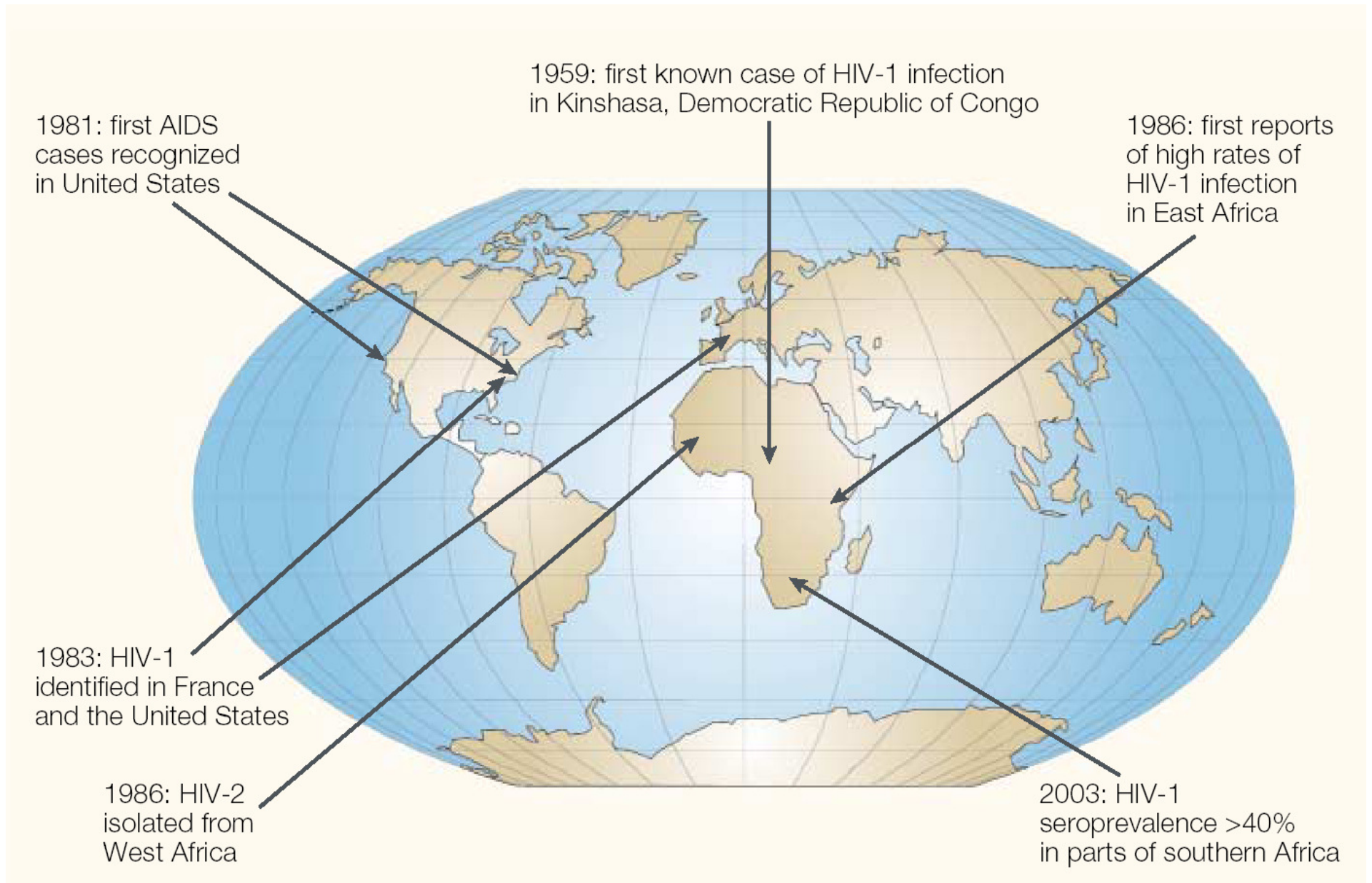
**HIV-infected
patient**



**One HIV-1
subtype**



**All HIV-1 subtypes,
sub-subtypes, CRF**



Nat Rev Immunol 2003;3:343.

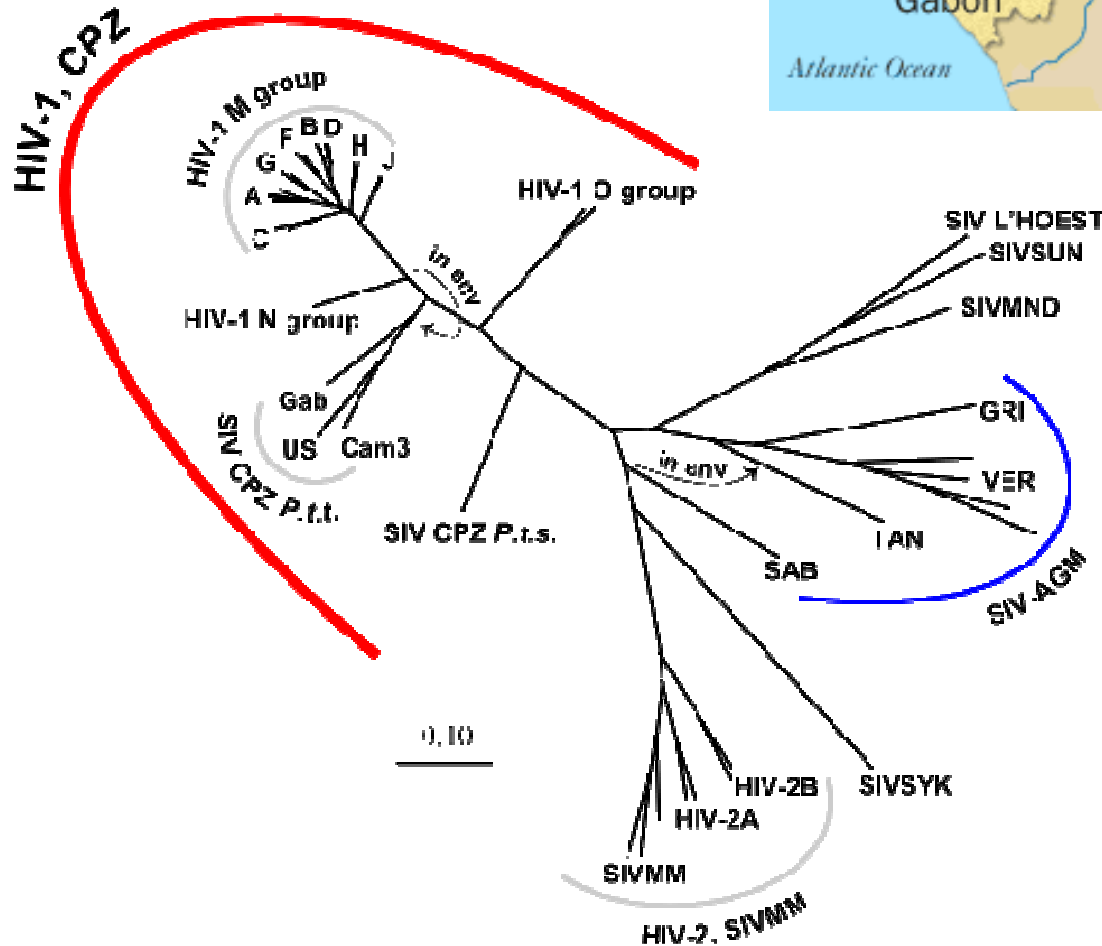
HIV-1 zoonosis transfer

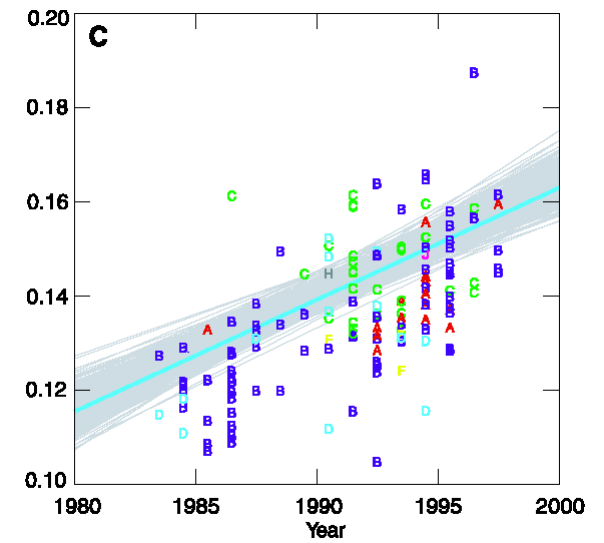
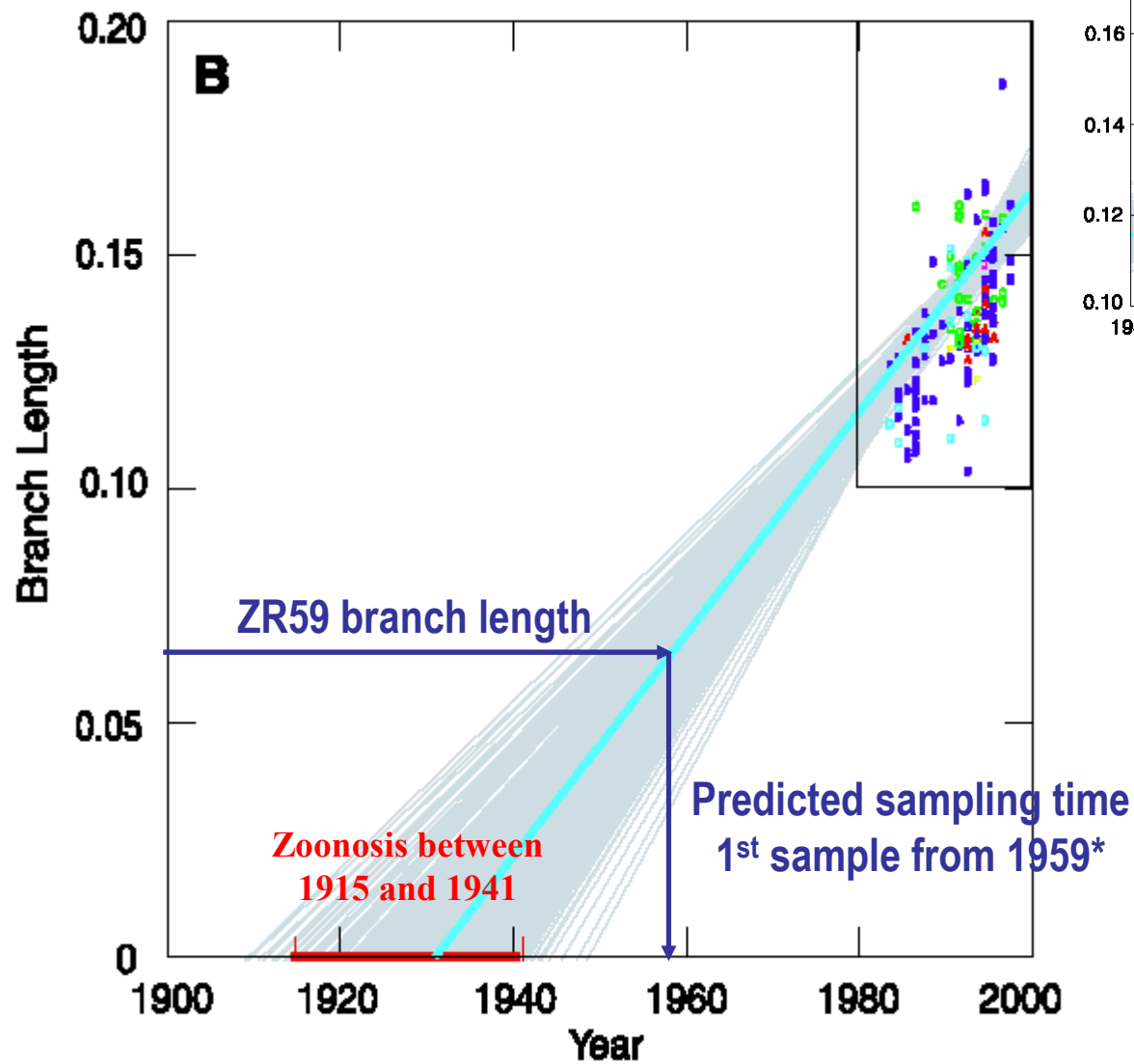


Two zoonosis:
Chimpanzee (HIV-1)



African green monkey (HIV-2)

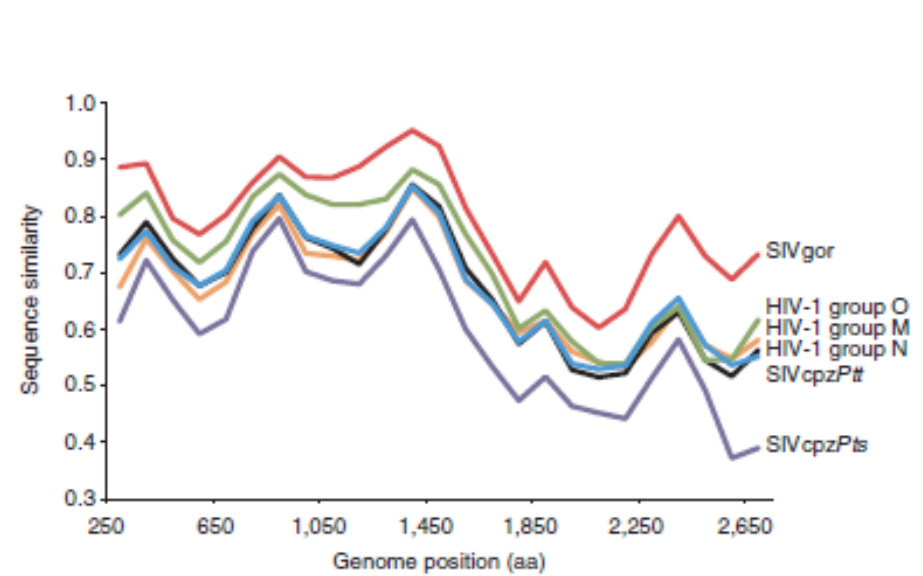
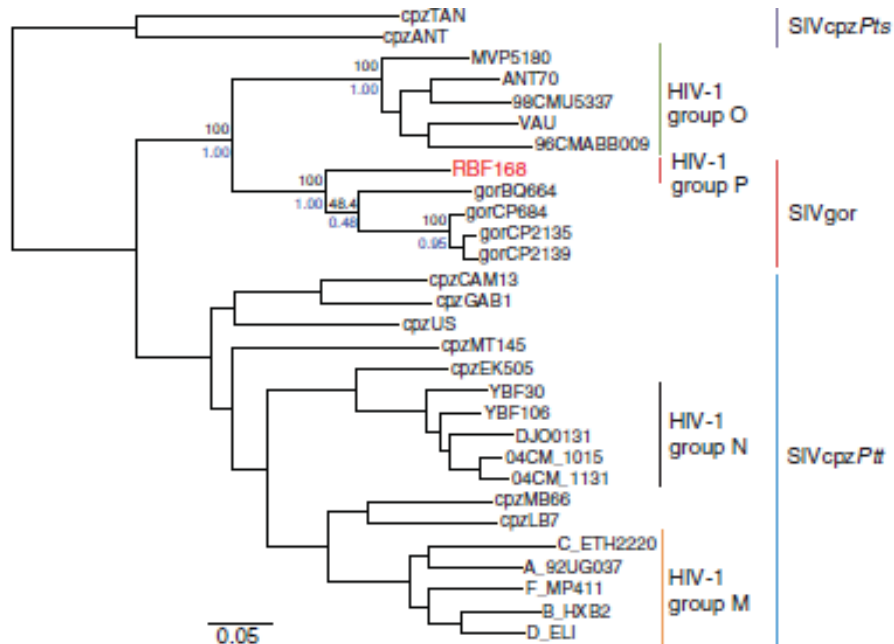




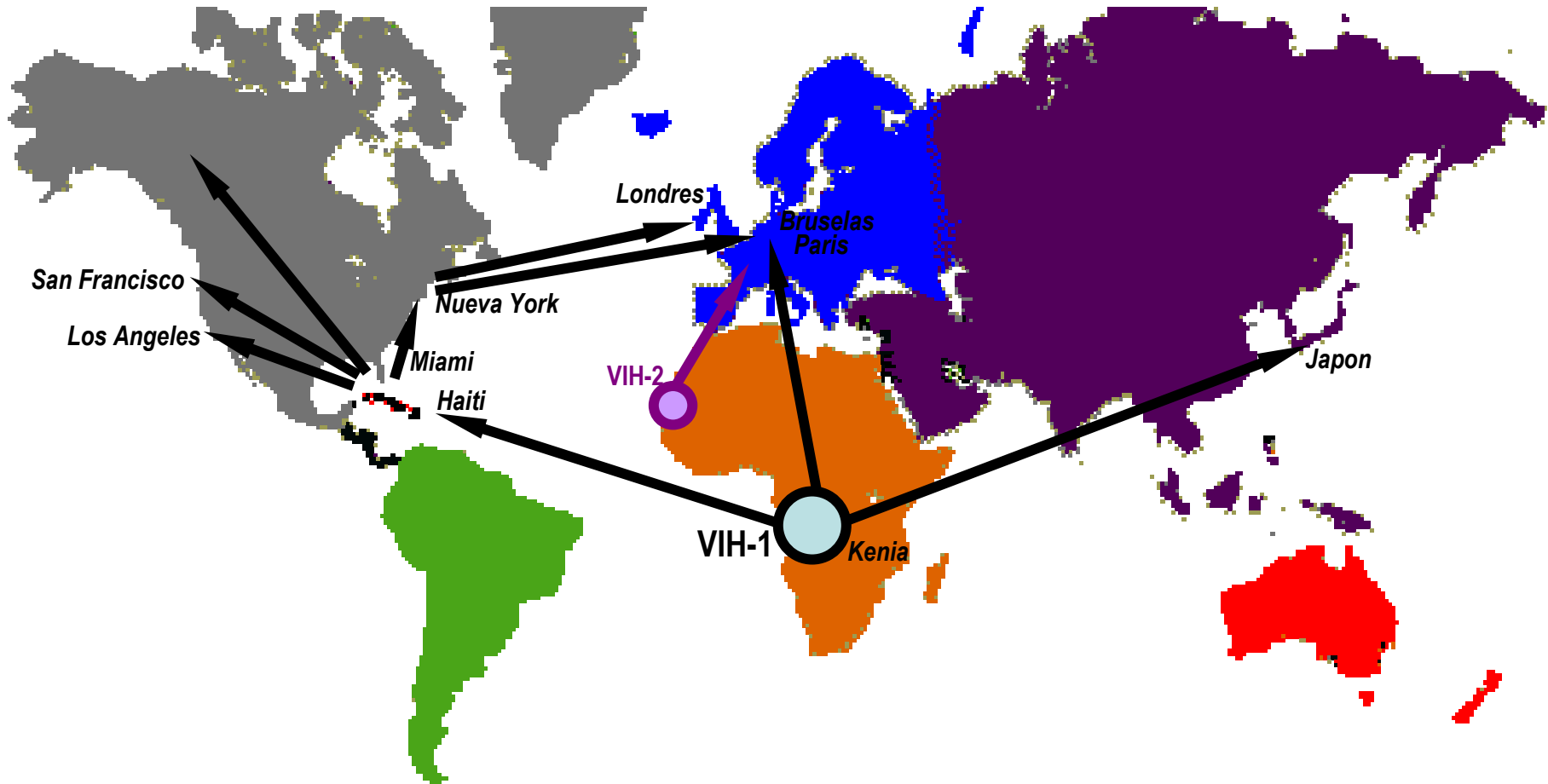
Korber 2000, Science

* Other HIV+ samples in USA (1969) and Norway (1976)

HIV-1 zoonosis transfer



HIV-1 (and HIV-2) Distribution



HIV change to avoid the immune system recognition



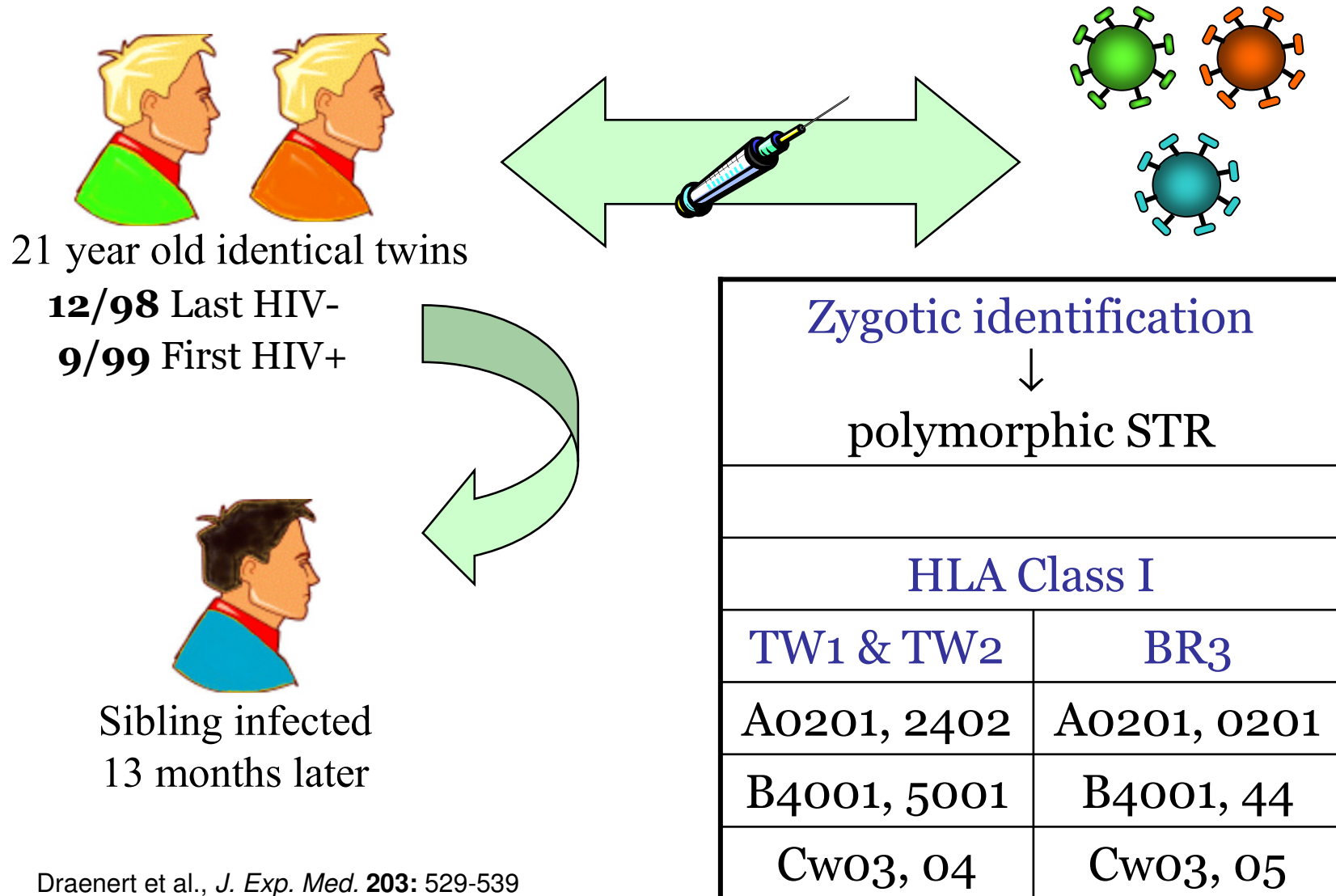
Distribution of HIV subtypes

Major subtypes in capitals

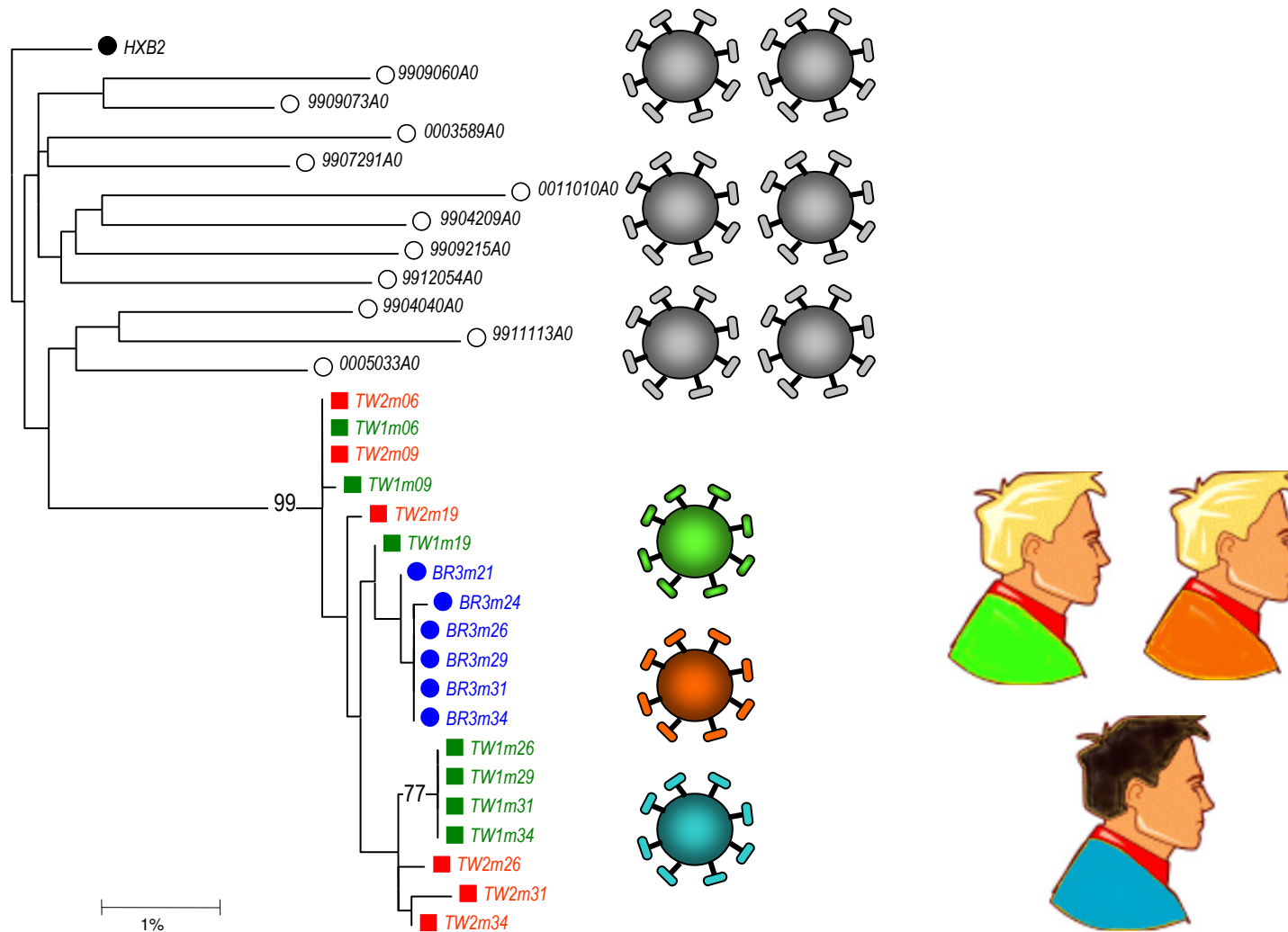
HIV-1 classification

- 1.- Based on serological and/or molecular data.
- 2.- The recombinants affects to the classification, and play an important role in the different subtypes distribution (special attention to recombinant AG 2% in Spain)
- 3.- When a sub-typing analysis is performed it is better to explore 2 separated genes in the genome (to avoid not detecting recombinants)
- 4.- HIV infection is made by inter-species jumps.

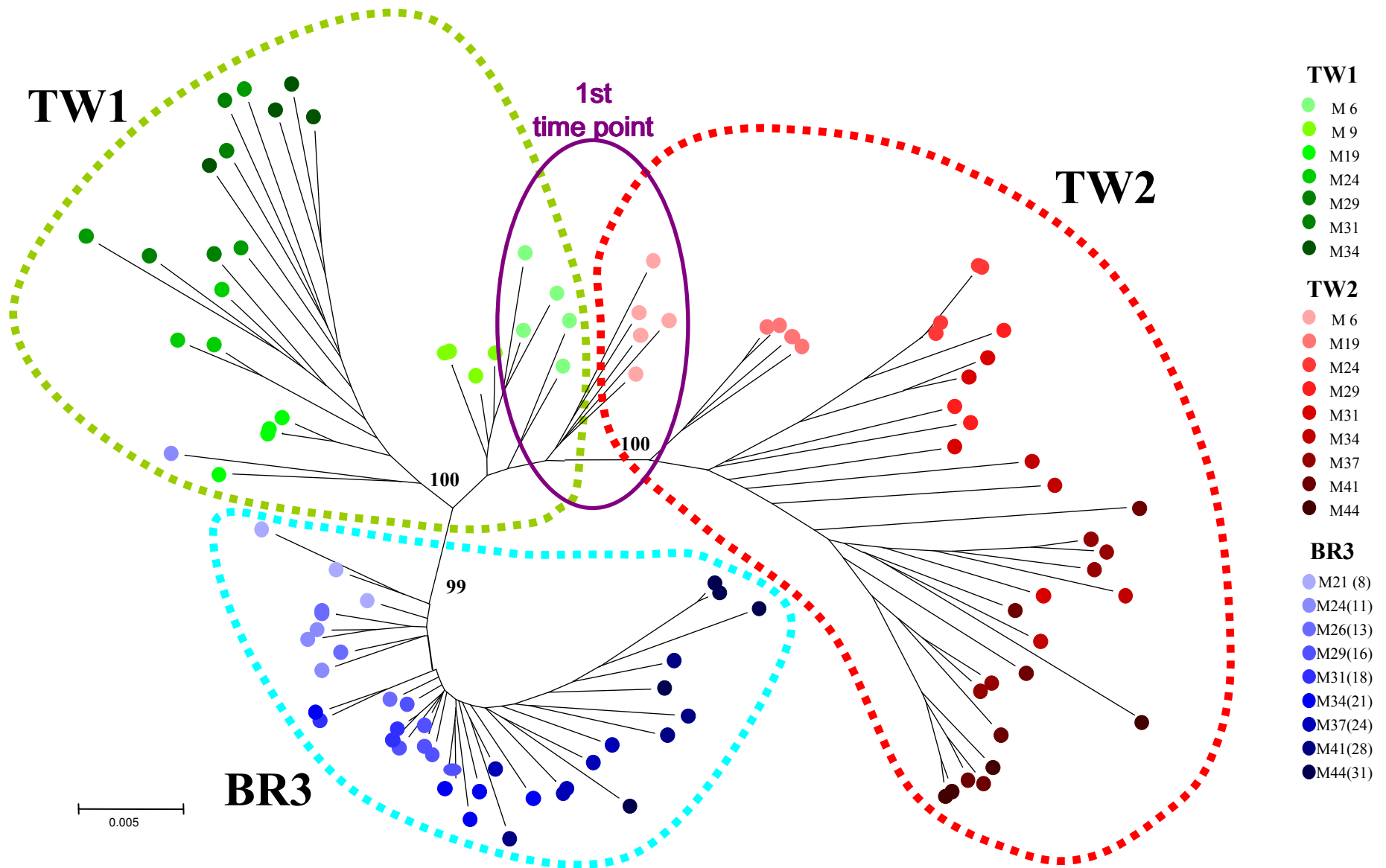
Patients: zygosity identity and HLA Class I



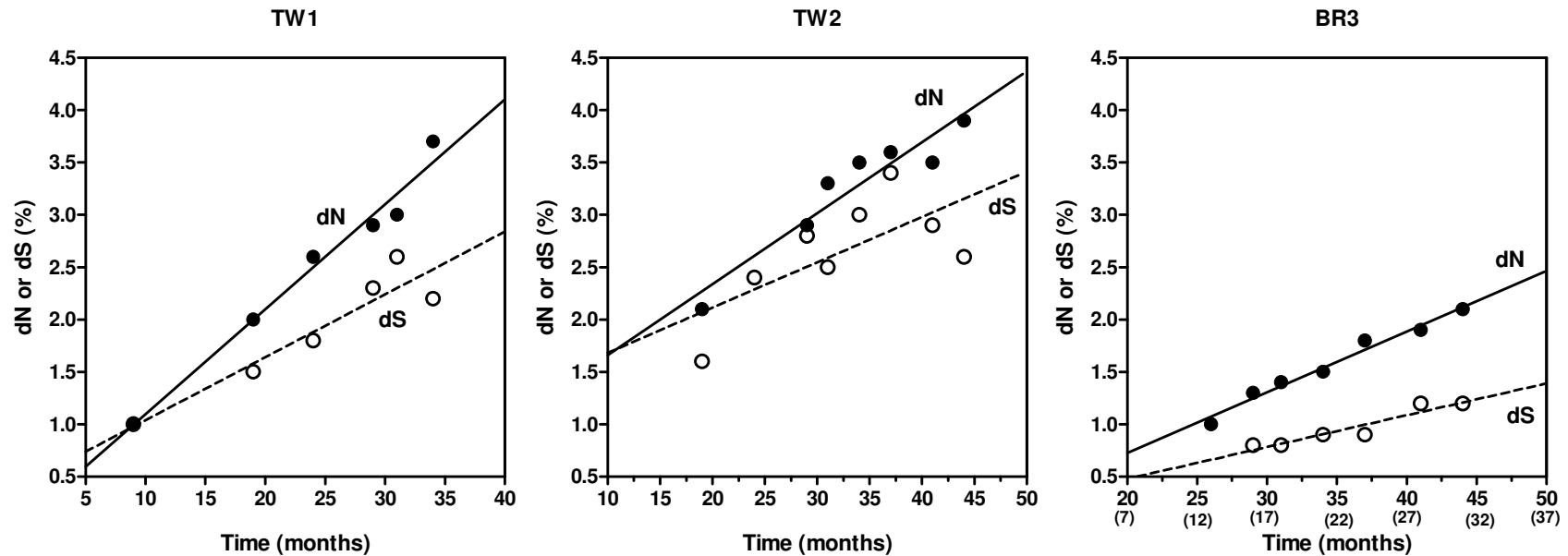
Genetic identity of infecting VIH



Clonal evolution of *env*



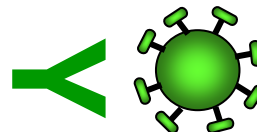
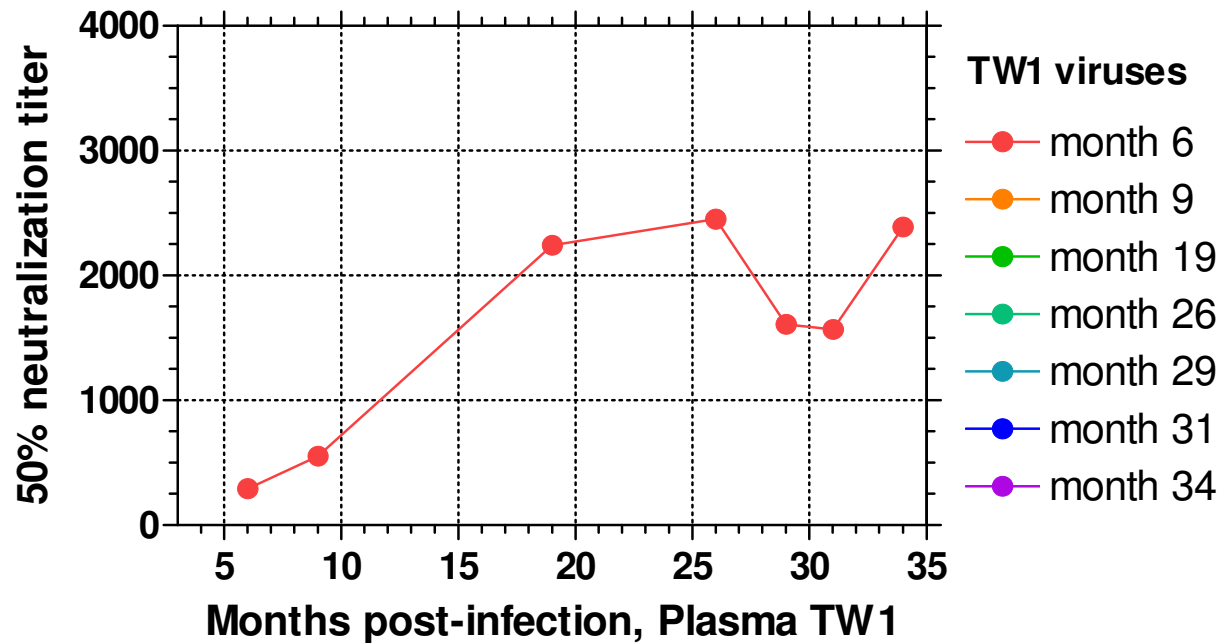
Amino Acid Changes



Positive selection in envelope because $dN/dS > 1$

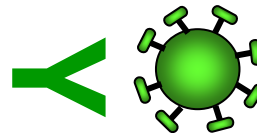
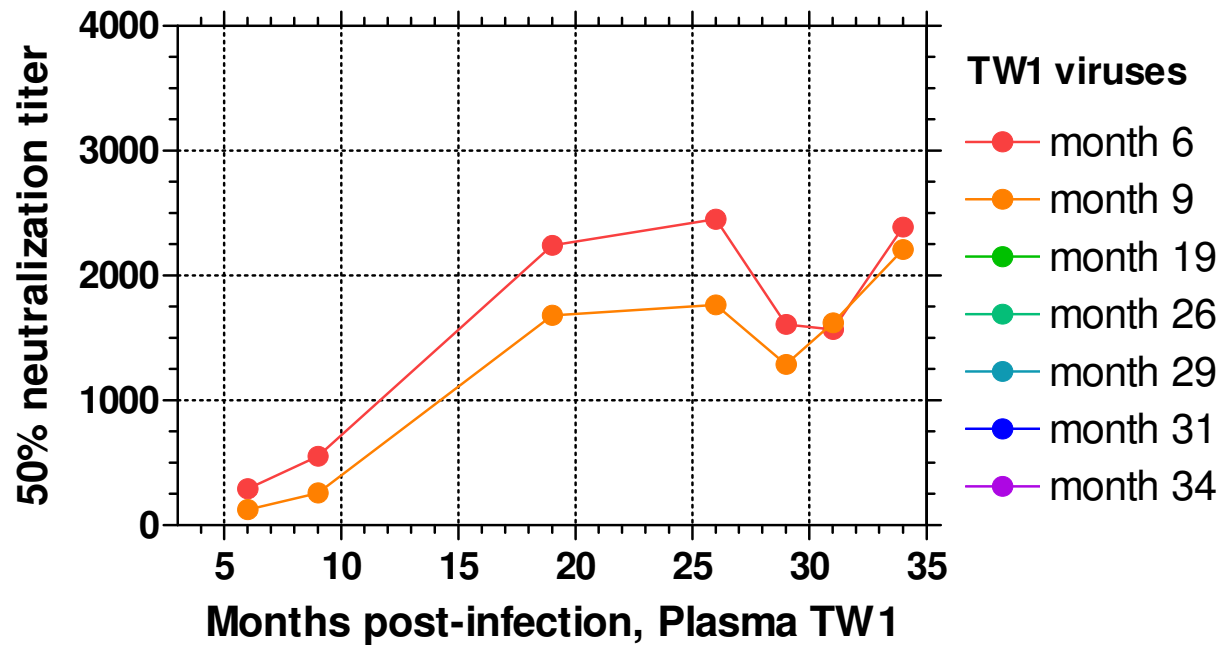
Antibody neutralizing titers of TW1, TW2 and BR3 plasma against autologous viruses

A. TW1 plasma vs. TW1 viruses



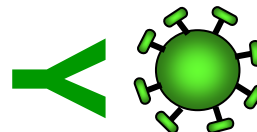
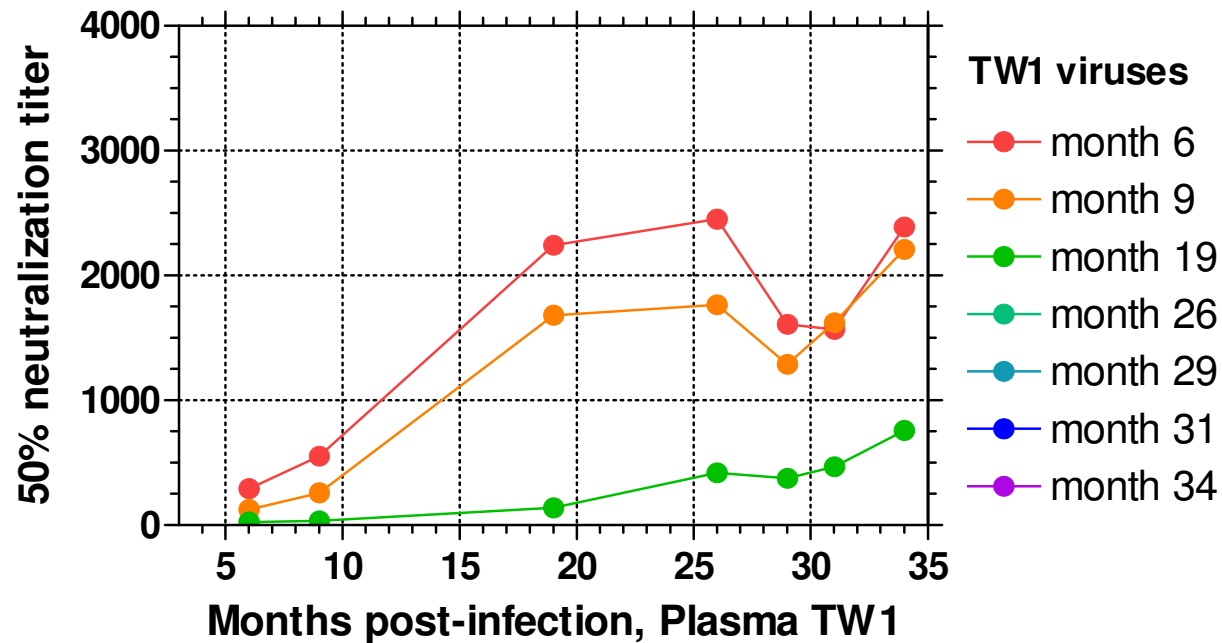
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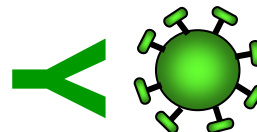
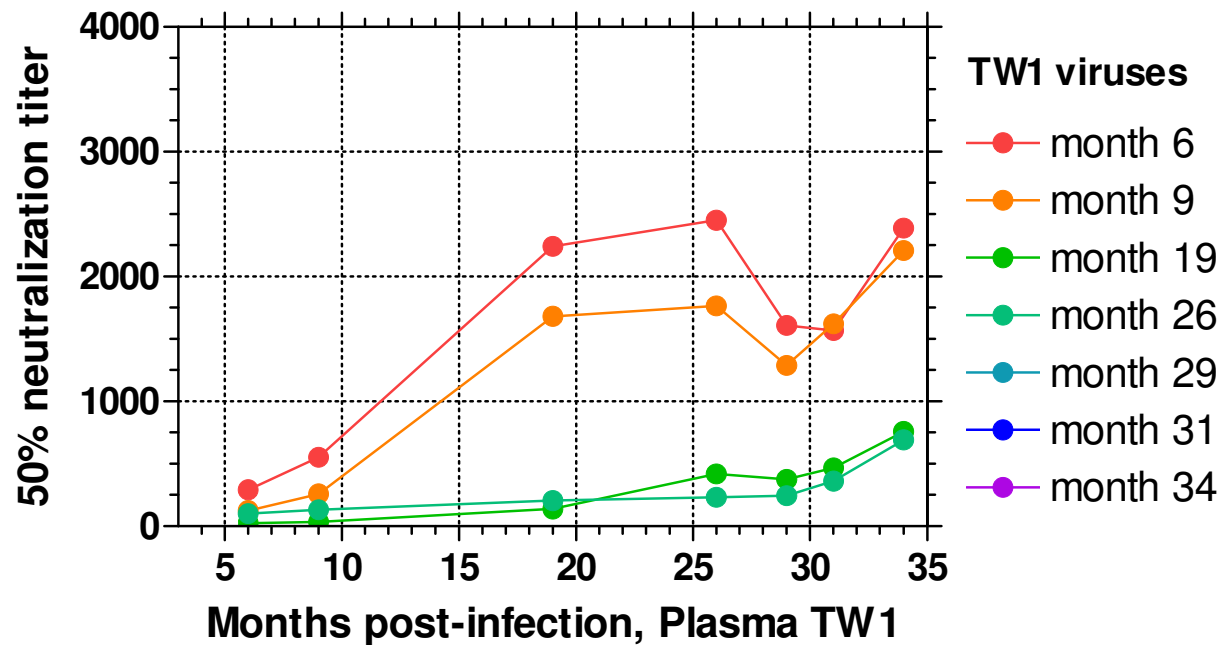
Antibody neutralizing titers of TW1, TW2 and BR3 plasma against autologous viruses

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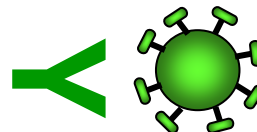
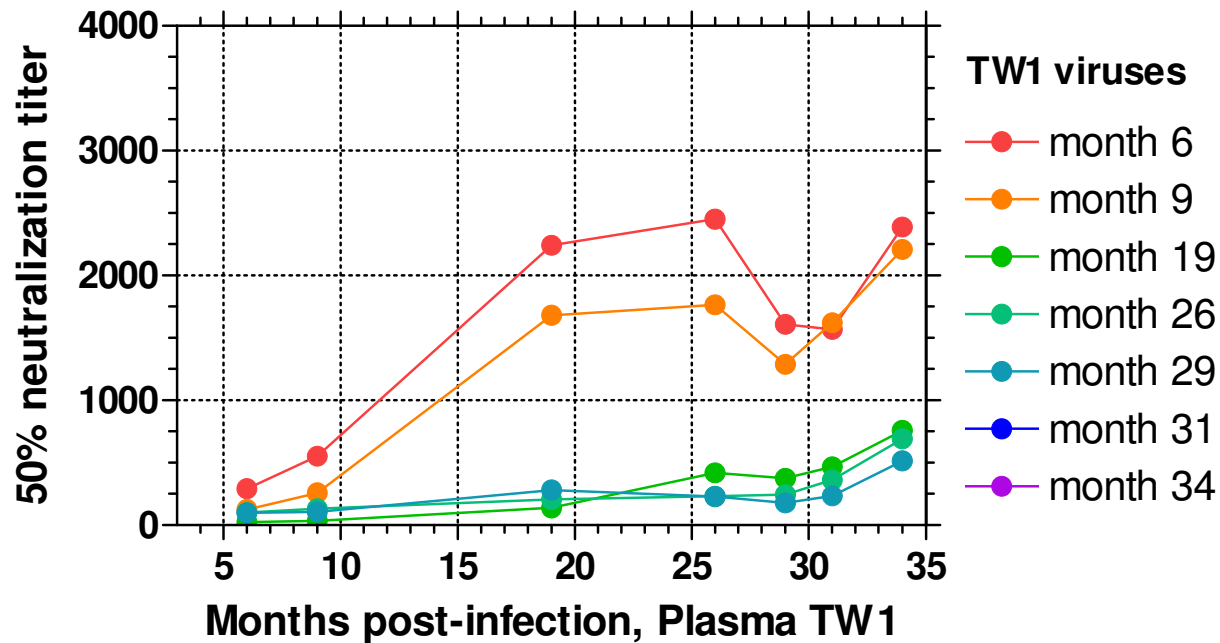
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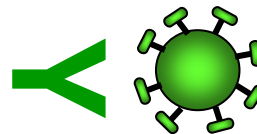
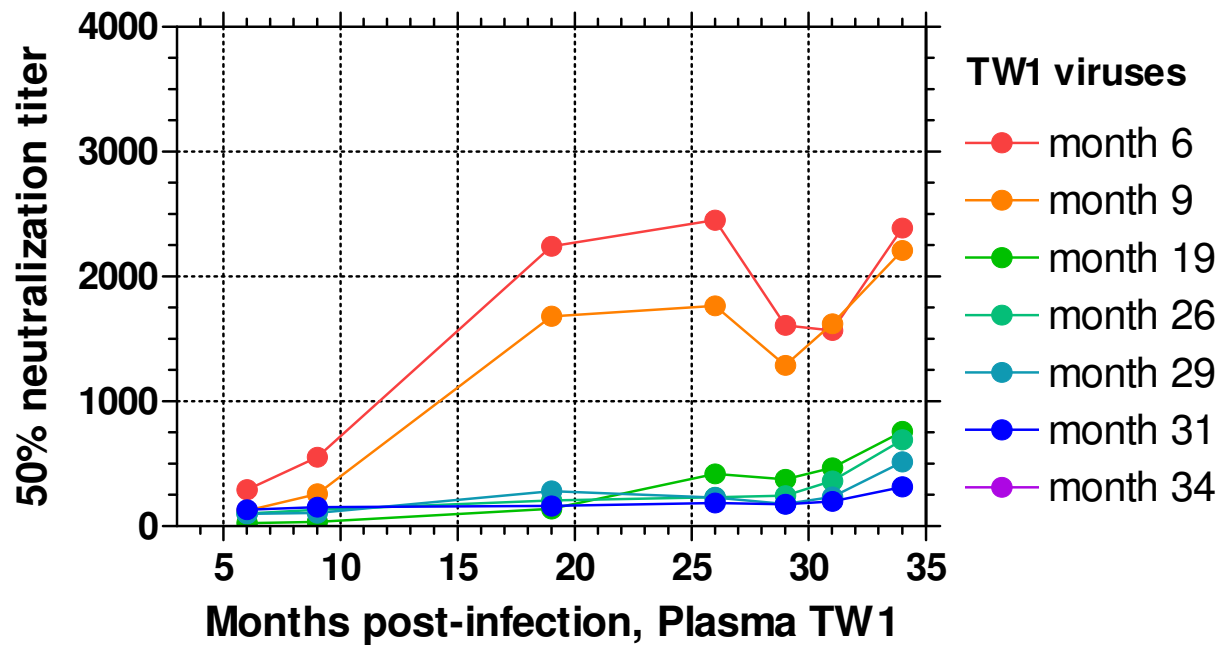
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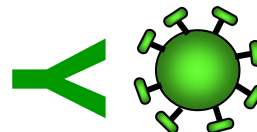
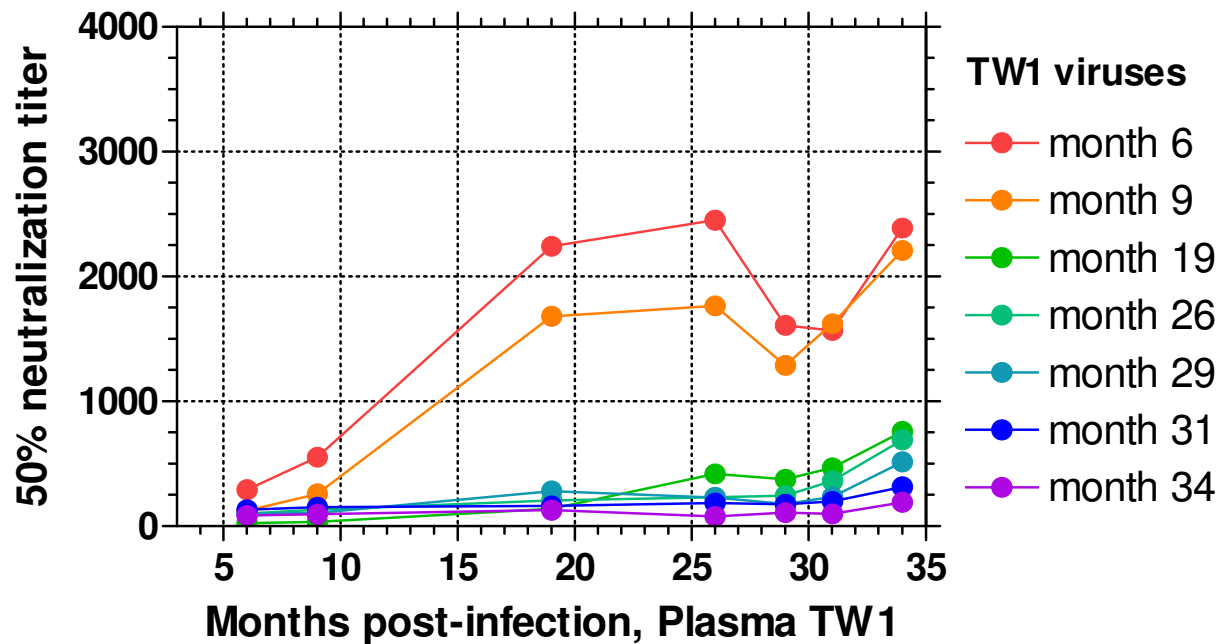
Antibody neutralizing titers of TW1, TW2 and BR3 plasma against autologous viruses

A. TW1 plasma vs. TW1 viruses

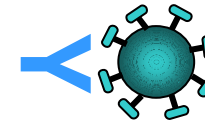
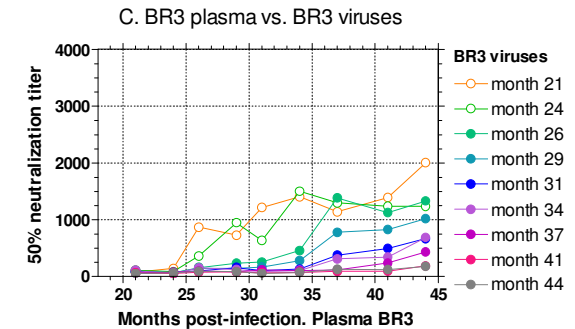
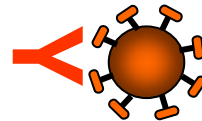
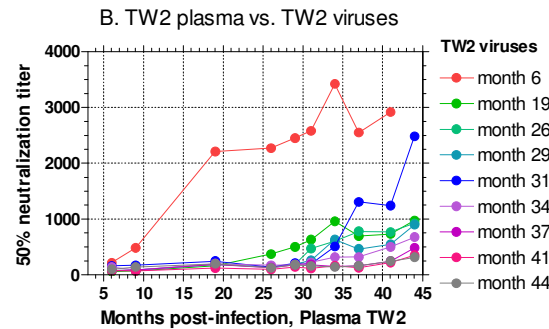
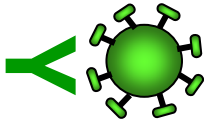
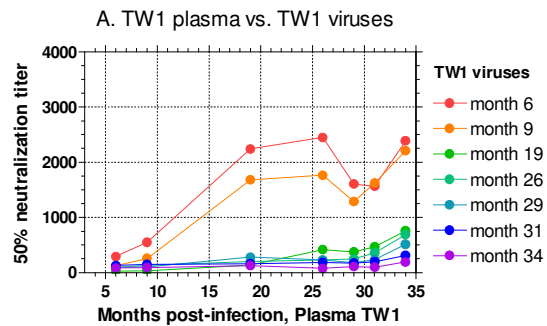


Antibody neutralizing titers of TW1, TW2 and BR3 plasma against autologous viruses

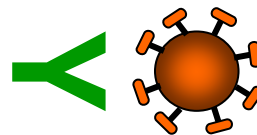
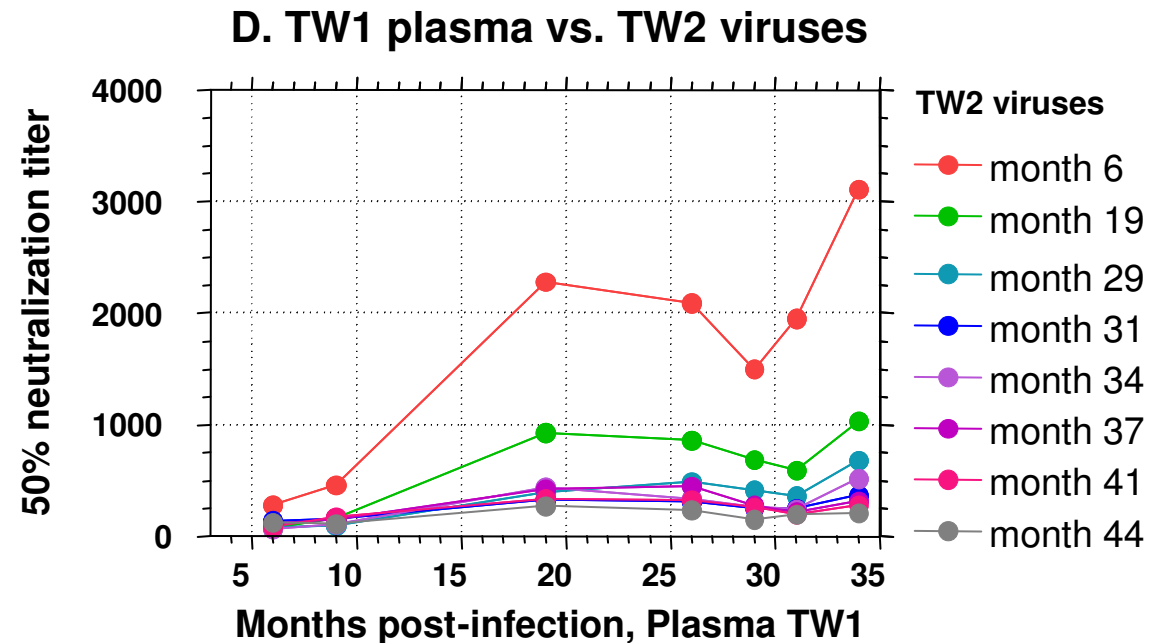
A. TW1 plasma vs. TW1 viruses



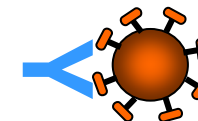
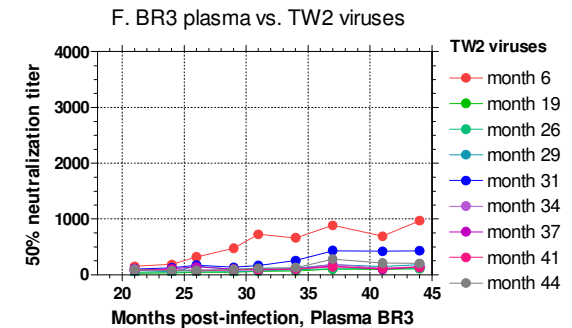
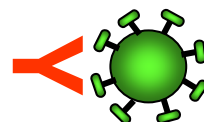
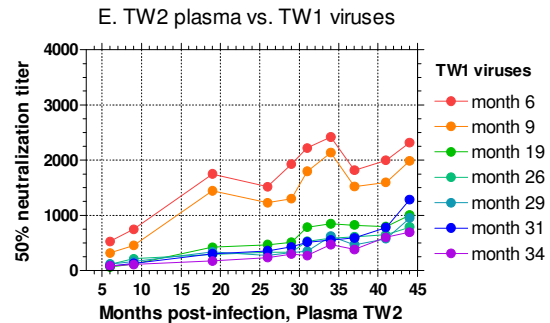
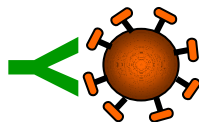
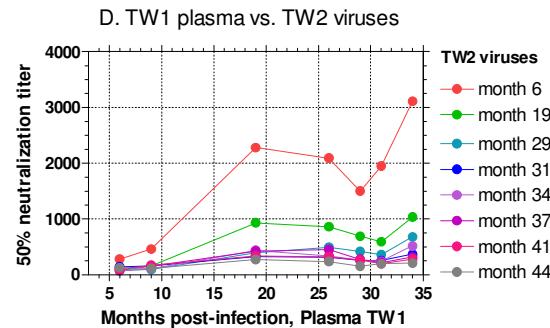
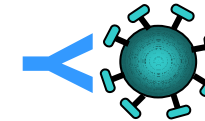
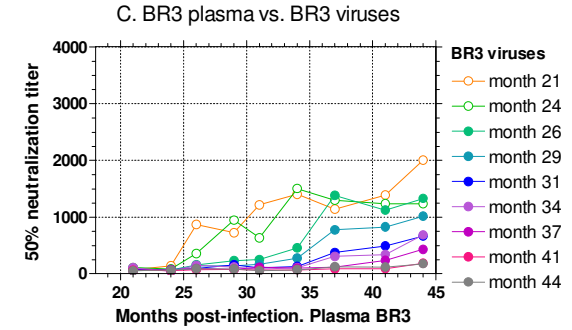
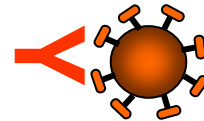
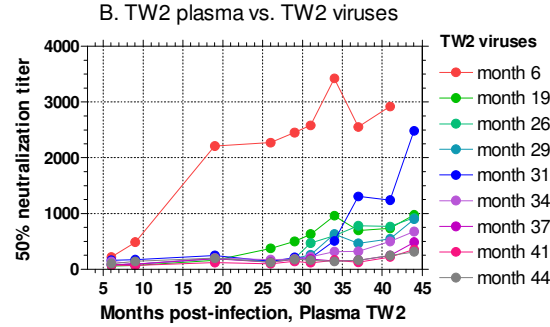
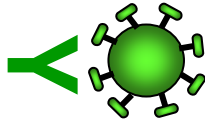
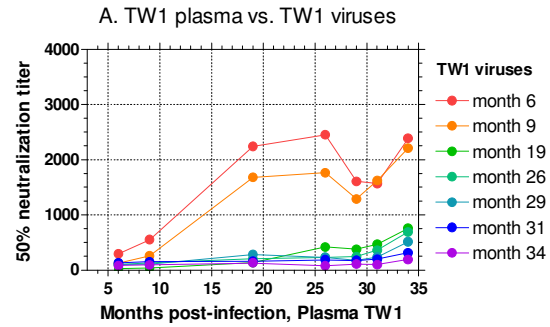
Antibody neutralizing titers of TW1, TW2 and BR3 plasma against autologous viruses



Antibody neutralizing titers of TW1, TW2 and BR3 plasma against heterologous viruses



Antibody neutralizing titers of TW1, TW2 and BR3 plasma against autologous and heterologous viruses



Conclusions

- ❑ Molecular epidemiology can be of help for discerning the effect of environmental factors on the infection.
- ❑ Key genes during the infection can be highlight and use them for further research and clinical inspection.
- ❑ Molecular evolutionary studies in combination with experimental trials can be of help in order to trace the appearance of new variants.

Acknowledgements

□ Javier Martinez-Picado's Group

irsiCaixa Foundation

□ Roger Paredes's Group

irsiCaixa Foundation

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