

# What determines adaptive evolutionary rates?

Kiwoong NAM(ki-woong.nam@inra.fr)

INRA

## Abstract

Adaptive evolution occurs by fixation of beneficial mutations. Therefore, adaptive evolution may be limited by the generation of potentially beneficial mutations. In this case, species with large population size may have a higher adaptive evolutionary rate because a large population generates a higher number of mutations per generation than a small population. Then, we expect a positive correlation between population size and adaptive evolutionary rate.

Alternatively, environmental changes may be a single factor determining adaptive evolution. Species may generate a sufficient number of mutations for adaptive evolution. Thus, whenever species experience selective pressure, this species may be adaptively evolved by fixation of a new mutation.

In this presentation, I will show that in great apes population size is positively correlated with the rate of selective sweeps[1], footprints of fixation of beneficial mutations, supporting that adaptive evolution is limited by the available mutations. Simulations show that the existence of interference among beneficial mutations for the fixation, and that the strength of this interference is positively correlated with the population size. Thus, the adaptive evolutionary rate has a non-linear relationship with population sizes. These results demonstrate that the interference among beneficial mutation plays an important role in determining the adaptive evolutionary rate, particularly when population size is large.

**Keywords:** *adaptive evolution, evolutionary biology*

## References

[ 1 ] <https://doi.org/10.1073/pnas.1605660114>