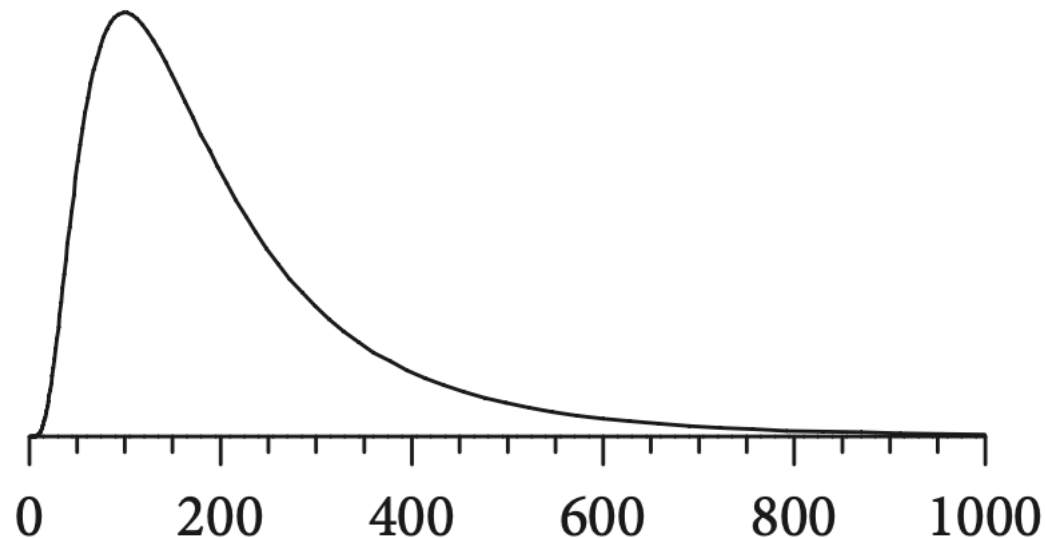


Lognormal distribution

Lognormal distribution

- arise if factors of variation act in a multiplicative, rather than additive manner

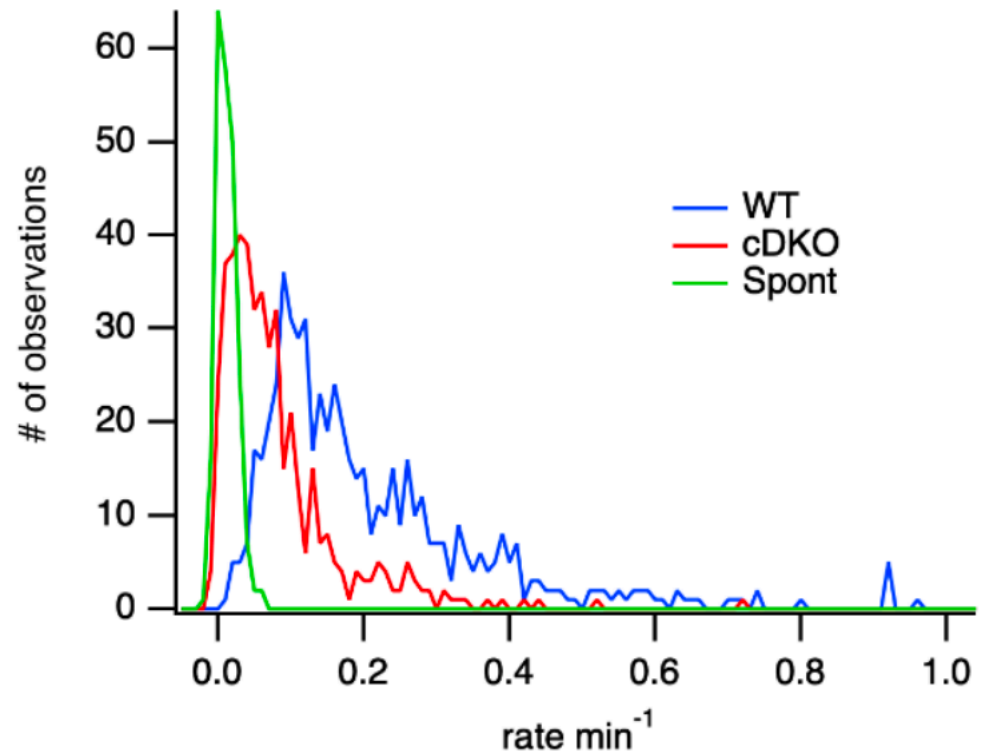


Lognormal distribution

- arise if factors of variation act in a multiplicative, rather than additive manner - when??
 - PMT

Lognormal distribution

- arise if factors of variation act in a multiplicative, rather than additive manner - when??
 - PMT
 - in a synapse! but why?



Lognormal distribution

- How to deal with them statistically?
 - take the log of the values!
 - transforms data into normal distribution

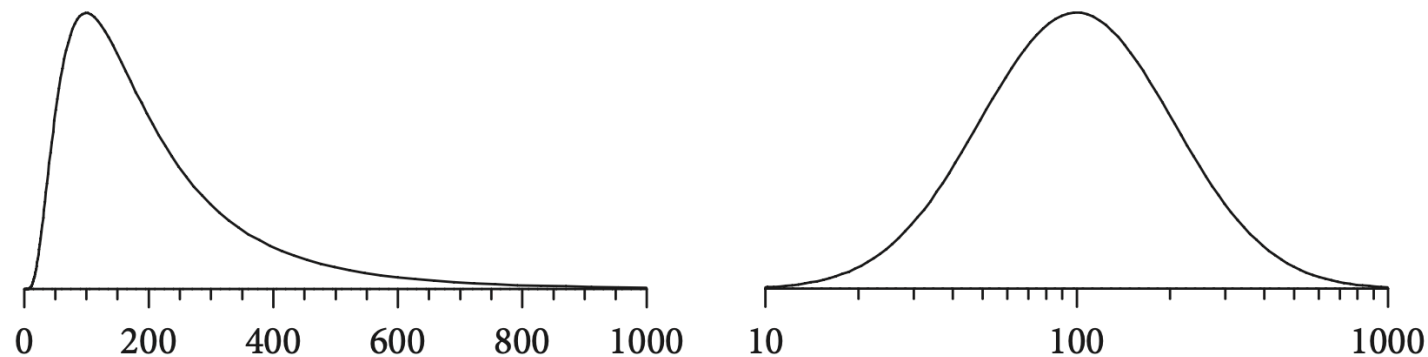
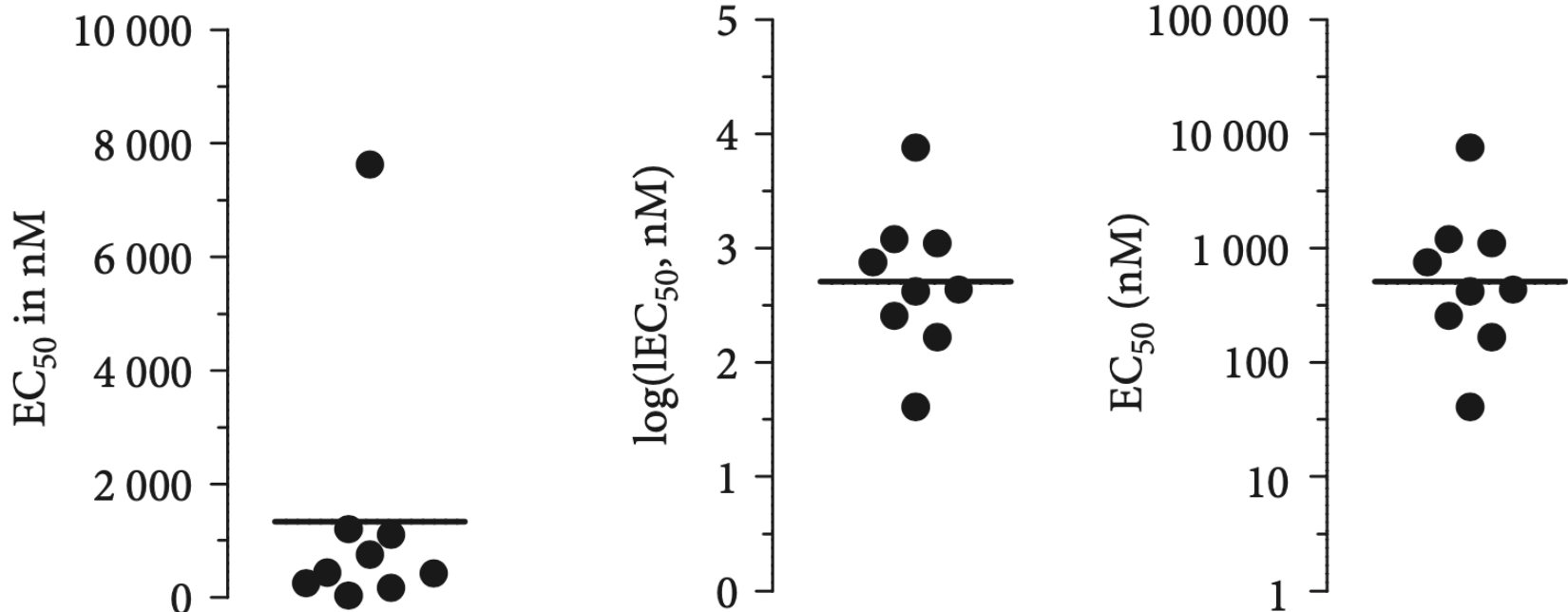


Figure 11.2. Lognormal distribution.

(Left) Lognormal distribution. The distribution appears Gaussian when plotted on a logarithmic axis (right) or when all values are transformed to their logarithm.

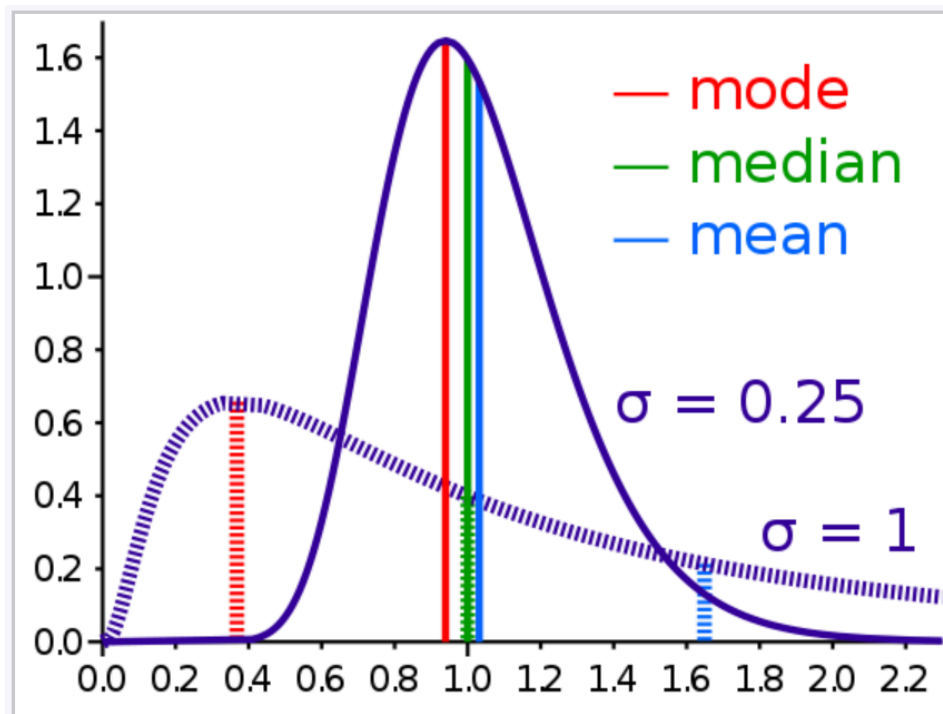
Lognormal distribution

- Are my data lognormally distributed?
 - just test!



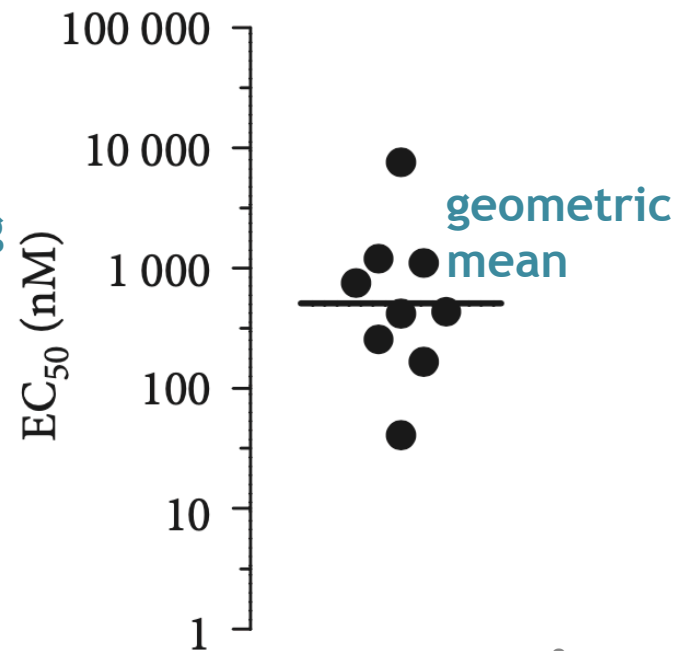
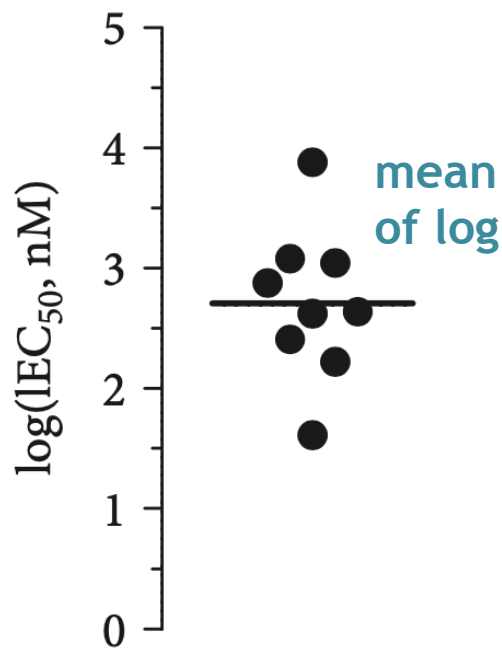
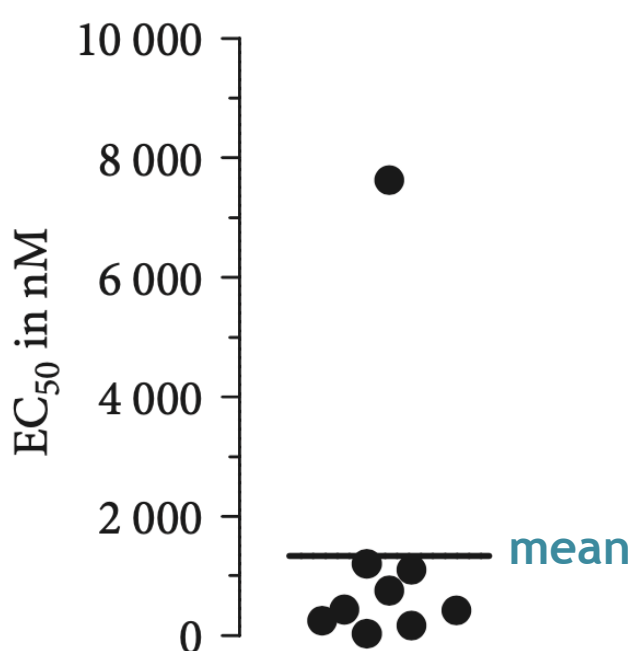
Lognormal distribution

- mean, geometric mean/mode, median
- central tendency of geometric mean „most frequent value“



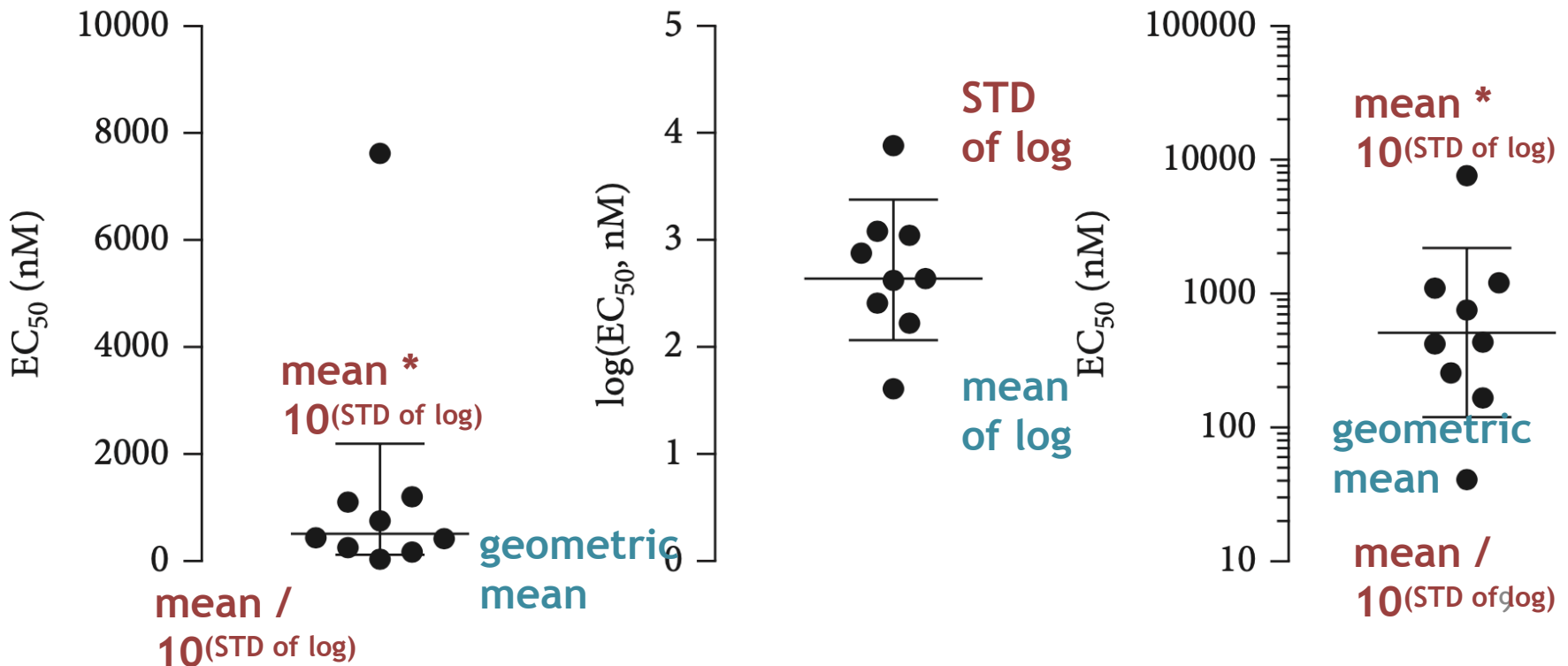
Lognormal distribution

- graphing the mean value
 - geometric mean most natural
 - but be aware of the meaning!



Lognormal distribution

- graphing the geometric STD (factor)



Summary

- Lognormal distributions are very common in many fields of science.
- Lognormal distributions arise when multiple random factors are multiplied together to determine the value. This is common in biology. In contrast, Gaussian distributions arise when multiple random factors are added together.
- The center of a lognormal distribution is quantified with a geometric mean.
- With data sampled from a Gaussian distribution, you think about the mean plus or minus the SD. With data sampled from a lognormal distribution, you think about the geometric mean multiplied or divided by the geometric SD factor.
- You may get misleading results (in tests) if you make the common mistake of choosing analyses that assume sampling from a Gaussian distribution when in fact your data are actually sampled from a lognormal distribution.
- In most cases, the best way to analyze lognormal data is to take the logarithm of each value and then analyze those logarithms.
- Biology decides whether you interpret the mean or the geometric mean.