Power-law relations

Log-log regressions

- Several biological relations take the form of power-law relations
- We can linearize these relations using a log-log transformation

$$y \propto ax^b$$

Take the log on both sides

$$log(y) \propto log(ax^b) = log(a) + log(x^b) =$$

$$\boxed{log(y) \propto log(a) \; + \; b \; log(x)}$$

West, G. B., Brown, J. H. & Enquist, B. J. A general model for the origin of allometric scaling laws in biology. *Science* **276**, 122–126 (1997).

Power-law relations

Log-log regressions

- Several biological relations take the form of power-law relations
- We can linearize these relations using a log-log transformation
- In this model, the slope is and estimate of the exponent of the power-law
- The interpretation of the slope is that a 1% increase in x leads to a $\beta\,\%$ increase in y

$$log(y_i) \sim N(\mu_i, \sigma)$$

$$\mu_i = \alpha + \beta\ log(x_i)$$

$$\downarrow$$

$$\%\ \Delta y \approx \beta\,\%\ \Delta x$$

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