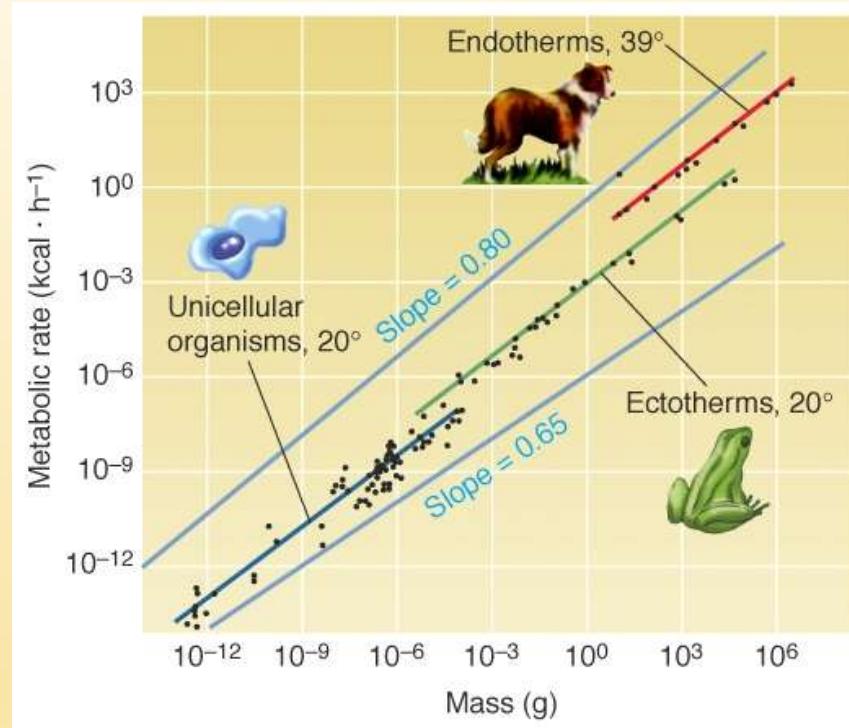


# Srovnávací fyziologie živočichů 2016 / 8

## Energetika metabolismu



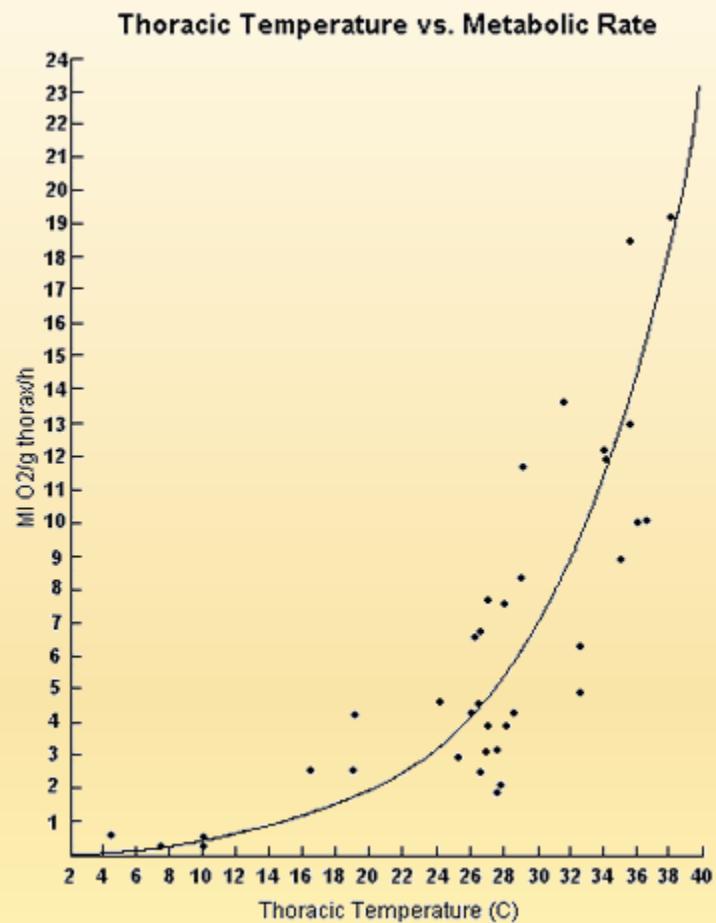
**Oldřich Nedvěd**

Jihočeská univerzita v Českých Budějovicích



# Metabolismus

- Energetické potřeby, metabolizmus. Teplota, rychlosť funkcií, životní limity.
- reaction rate of enzymes = enzyme activity
  - $mr = \exp(a + kT)$
  - $Q_{10} = 2-3$



# Respirační kvocient

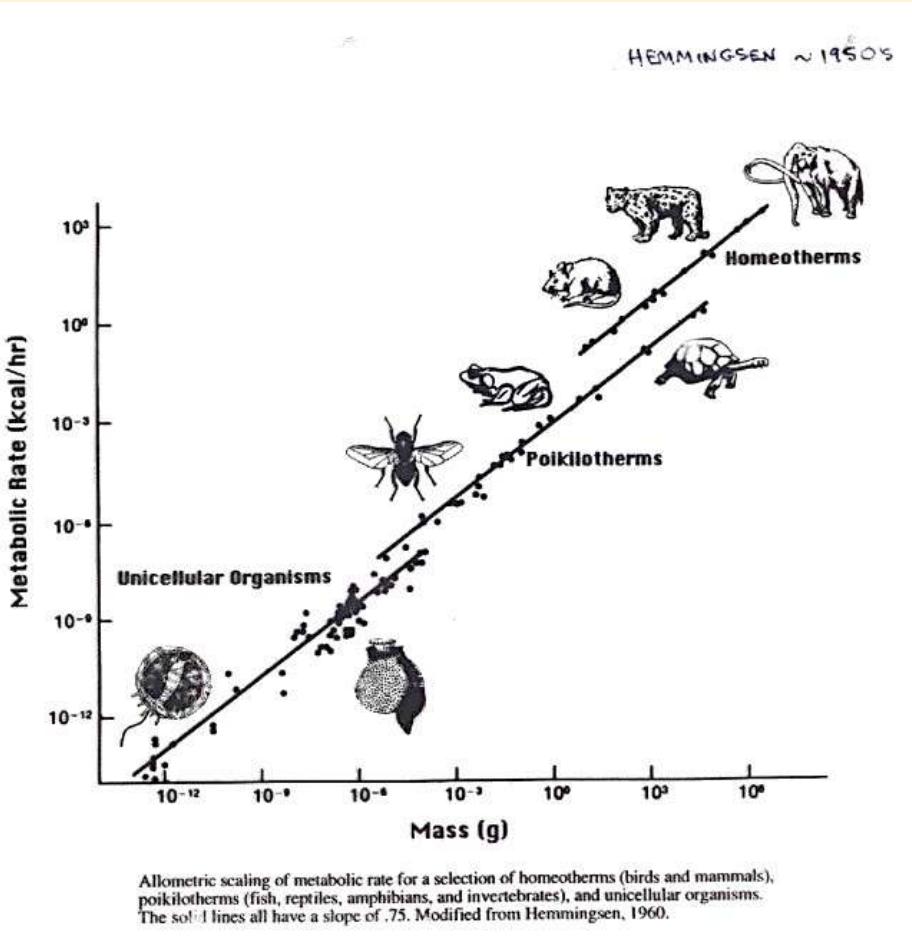
- $RQ = V \text{ CO}_2 / V \text{ O}_2$
- uhlovodany = 1,0
- tuk = 0,7
- proteiny = 0,8-0,9
- Organické kyseliny = 1,5-4,0



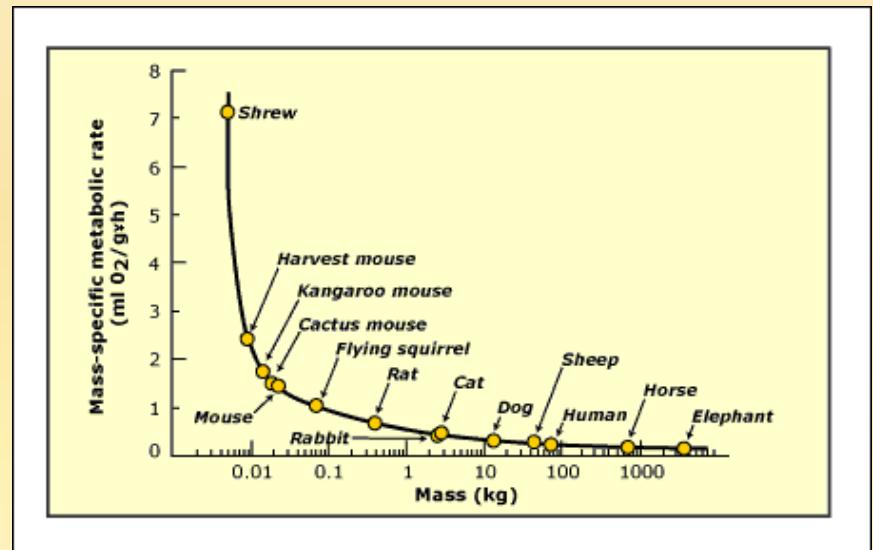
# Metabolism

## metabolism

- 100g mammal: 100 ml O<sub>2</sub>/h
- = 2 kJ/h
- $B=a.m^b$
- $b=0.75$
- $10^{0.75}=5.6$
- $12\text{kJ/h/kg}^{3/4}$  ( $600\text{ml/h/kg}^{3/4}$ ) (3.3W...)



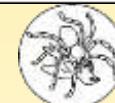
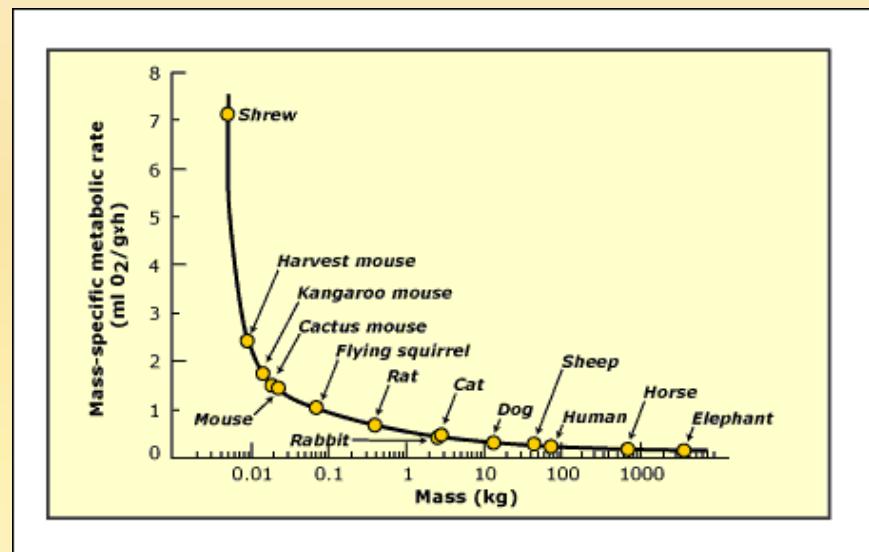
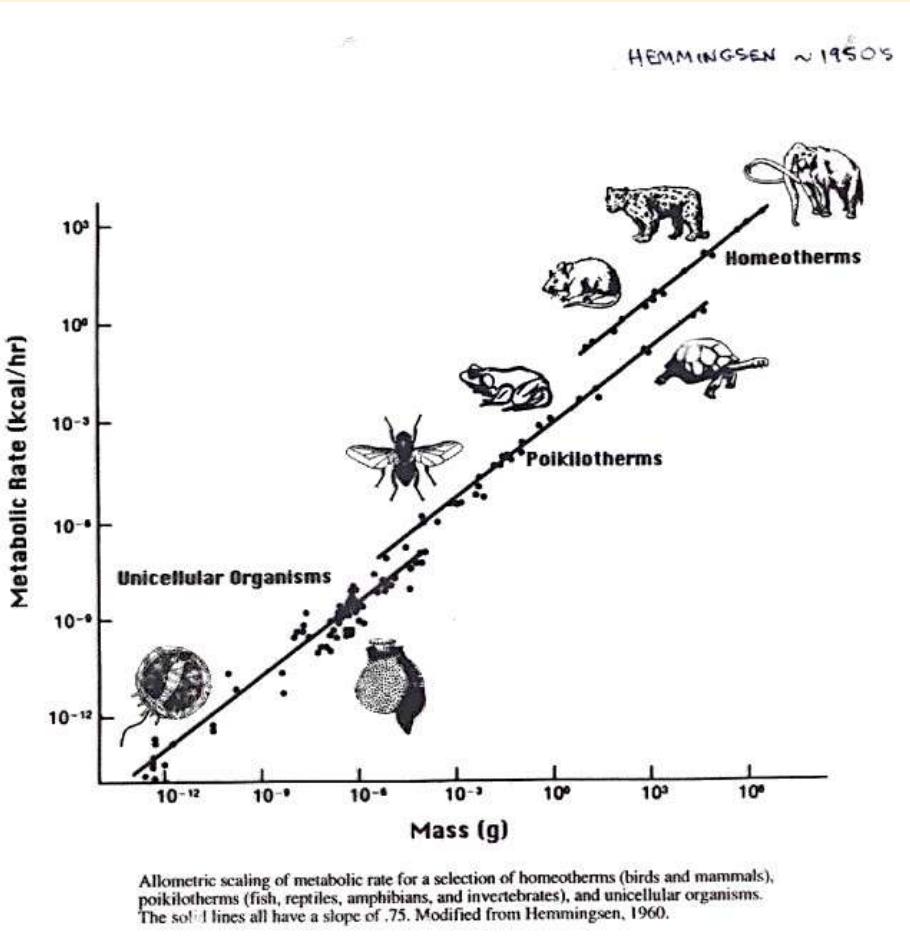
Allometric scaling of metabolic rate for a selection of homeotherms (birds and mammals), poikilotherms (fish, reptiles, amphibians, and invertebrates), and unicellular organisms. The solid lines all have a slope of .75. Modified from Hemmingsen, 1960.



# Metabolism

## metabolism

- 1 g poikilotherm animal at 20°C
- $<10^{-3}$  kcal/h = 4J/h > 1mW = 200 $\mu$ J/h



# Metabolism

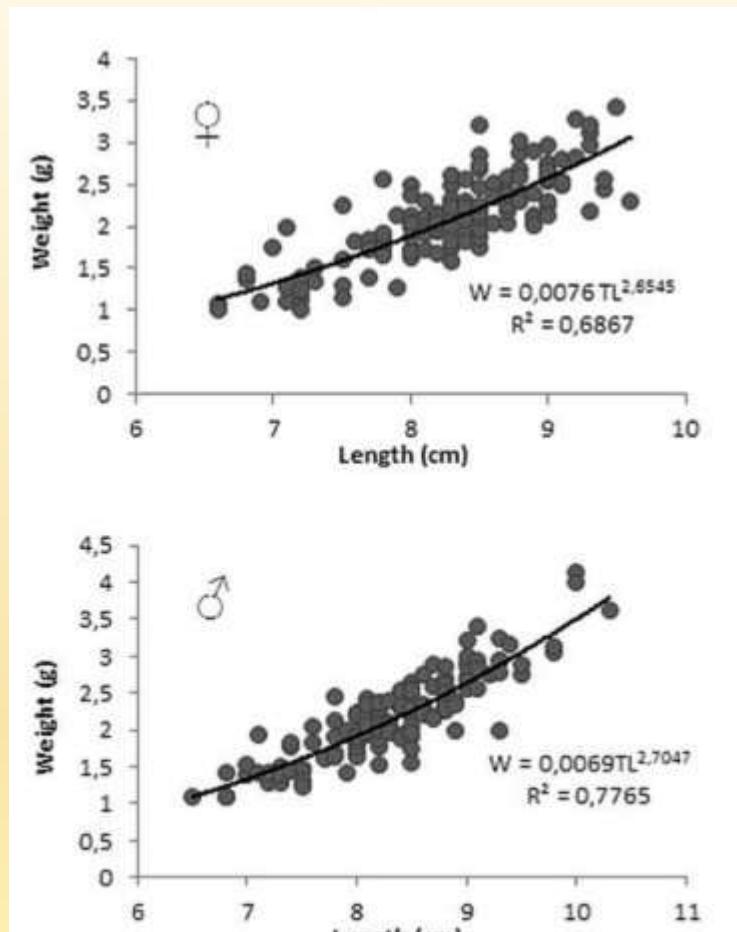


- mass specific MR
- marmot  $1.5 \text{ L O}_2/\text{h} = 30 \text{ kJ/h}$ , 4 kg
- chipmunk  $70 \text{ ml O}_2/\text{h}=1.4 \text{ kJ/h}$ , 45 g
- $1 \text{ L O}_2$
- chocolate 2300 kJ/100 g
- W ?



# Alometrie

- Hmotnost vs. Velikost
- $M=a \cdot L^{2,62}$



**Fig. 3.** Length-weight relationship of seahorses by sex groups

