

Energy Metabolism



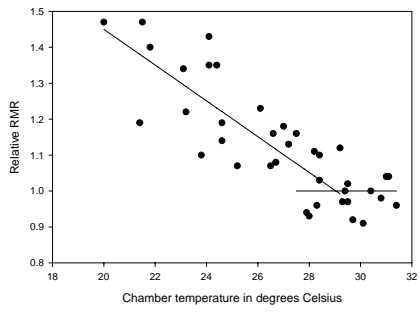
Resting metabolic rate (RMR)

- Fundamental property of a species
- Measure of lowest energy expenditure
- Other measures of energy expenditure often are multiples of RMR
- Allows repeatable comparisons among species
- Active phase versus inactive phase

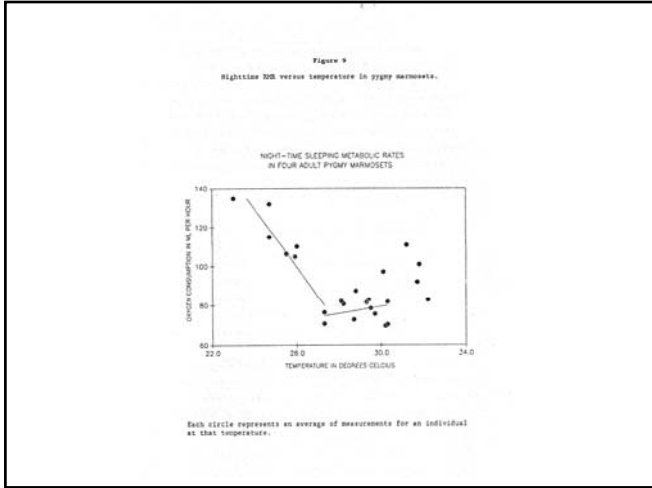
Goeldi's monkey (*Callimico goeldii*)

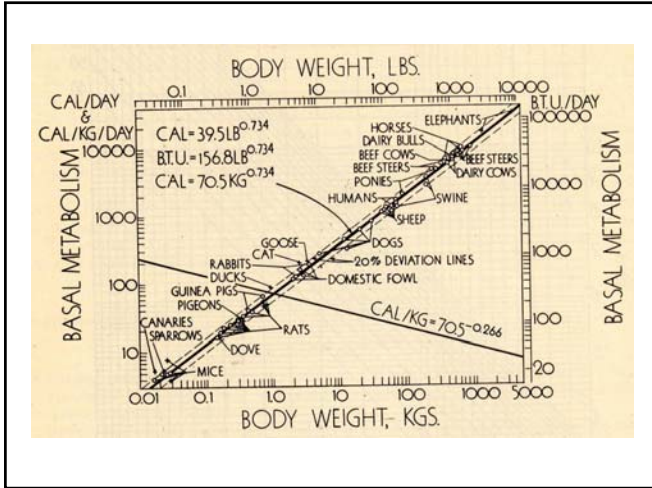


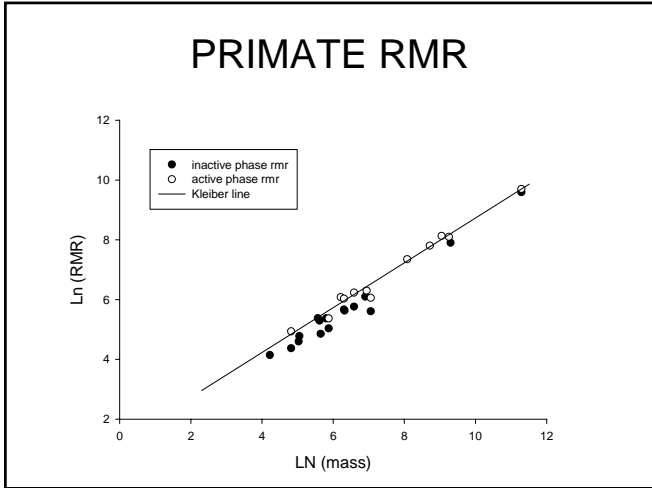
RMR vs environmental temperature

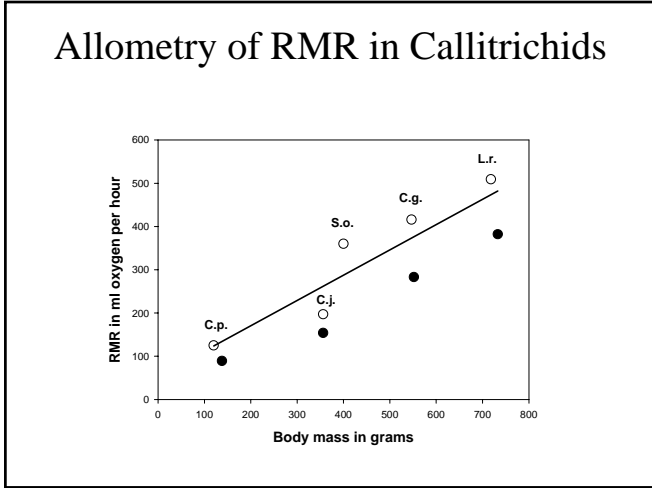








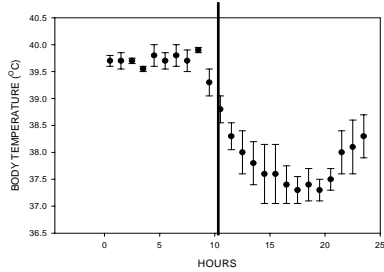




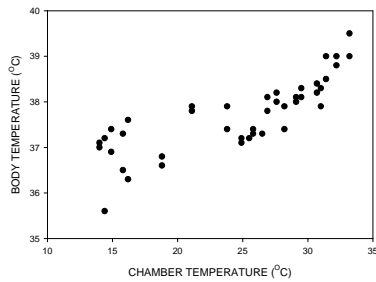
CIRCADIAN RHYTHM OF T_B IN *LEONTOPITHEUS* *ROSALIA*

Lights on Lights out

N = 4

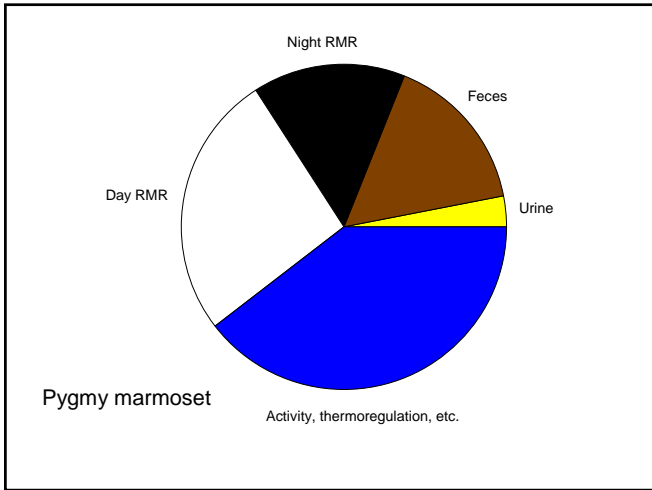


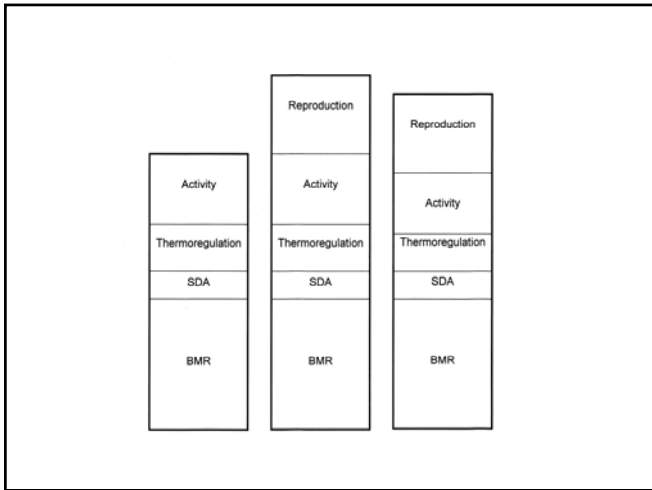
Body temperature as a function of chamber temperature in *Leontopithecus rosalia*



Thermal neutral zone for callitrichids (single animal)

27 – 30 degrees C





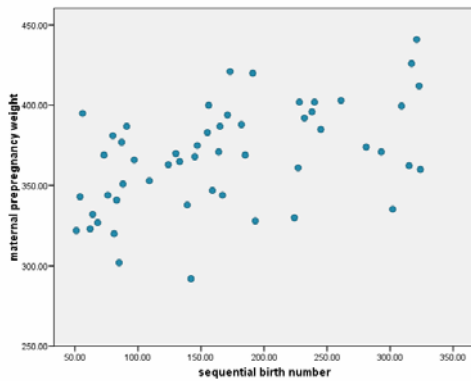
Anecdotal evidence of “diabetes”

- Golden headed lion tamarins (possibly familial)
- *Callithrix* spp.
- Obesity concerns in many spp.
- Geriatric populations

Data on common marmosets



Maternal weight increasing over time

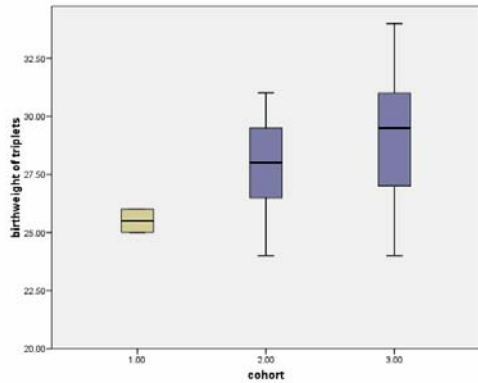


Body weight and serum chemistry in marmosets on normal diet

	<430g	>430g
Body weight (g)	393 ± 9.8	485 ± 9.1*
Glucose (mg/dL)	118.3 ± 14.0	161.6 ± 20.6*
HbA1c (%)	3.9 ± 0.3	6.6 ± 0.3
Alkaline Phosphatase (U/L)	76.8 ± 8.6	50.4 ± 3.3*
Alanine Aminotransferase (U/L)	13.4 ± 5.4	24.7 ± 9.7
Aspartate Aminotransferase (U/L)	107.1 ± 8.0	135.2 ± 22.1
T-Bilirubin (mg/dL)	0.11 ± 0.01	0.11 ± 0.01
Blood Urea Nitrogen (mg/dL)	23.3 ± 1.5	22.5 ± 1.3
Lactate Dehydrogenase (U/L)	273.8 ± 56.6	473.3 ± 116.1*
Cholesterol (mg/dL)	145.8 ± 7.6	159.2 ± 7.8
HDL-Cholesterol (mg/dL)	78.7 ± 7.4	78.1 ± 7.0
Triglycerides (mg/dL)	77.0 ± 15.6	310.3 ± 45.9*
Non-Esterified Free Fatty Acids (mEq/L)	0.3 ± 0.1	0.4 ± 0.03
Glycerol (mg/dL)	11.3 ± 2.5	13.3 ± 1.8
β-hydroxybutyrate (mg/dL)	0.9 ± 0.2	1.1 ± 0.1

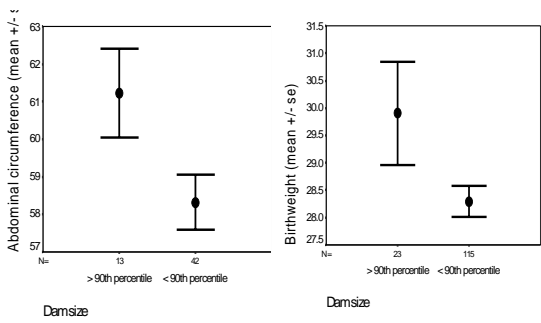
Tardif & Paulik, presentation, Annual meeting of the Obesity Society, Boston, MA October 20-24, 2006

Mothers are also producing more extreme birth weights, relative to litter size as the colony ages



And as mothers become larger...

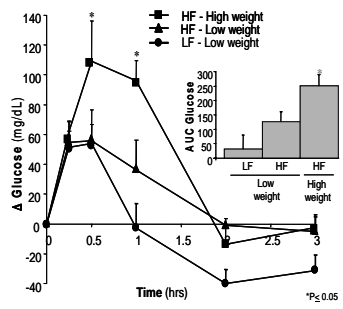
Relation of weight and abdominal circumference to maternal weight
Within triplet litters, only



Reliable OGTT results can be safely obtained from habituated, unsexed animals



Approximately 40% of animals do not develop obesity in response to a high fat diet



Oral glucose tolerance test (OGTT) in responsive and non-responsive marmosets supplemented a HF diet.
M. Paulik, unpublished observation – DO NOT CITE without permission of author
