

The postnatal growth and physical development of fat-tailed gerbils *Pachyuromys duprasi* in the laboratory colony

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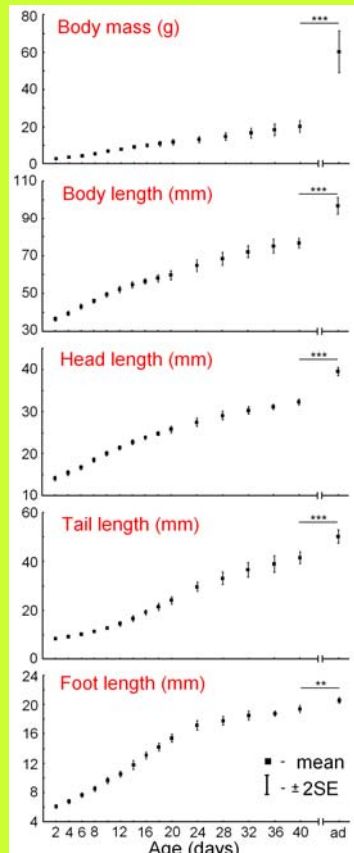


AIM

The fat-tailed gerbil represents a good model for medical, neurological and thermoregulatory studies across development. This study of postnatal growth and physical development of pups from birth to 40 days of age provides a basis for further integrative studies.

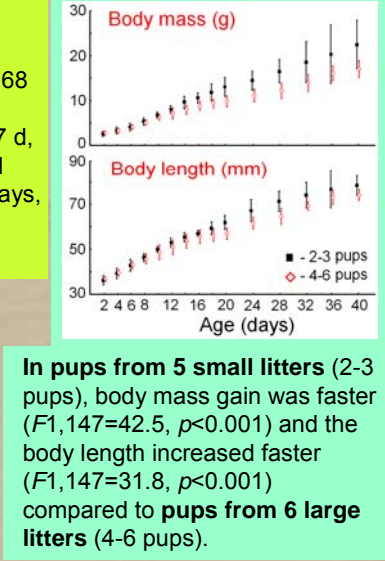
PUP DEVELOPMENT

Litter size: 2-6, average 4.00 ± 1.34 pups.
Average neonate body mass: (2.58 ± 0.45 g) comprises 4.3% of the average adult body mass (60.0 ± 24.3 g).
Average neonate body length: 36.22 ± 1.85 mm, **head length** 14.06 ± 1.01 mm, **tail length** 8.84 ± 0.68 mm, **foot length** 6.17 ± 0.43 mm.
Upper incisors eruption: 13.5 ± 1.7 d, **walking at four feet:** 16 days, **hind leg fingers separation:** 21.4 ± 3.0 days, **eye opening:** 23.7 ± 0.9 days, **ear opening:** 27.2 ± 1.2 days.



Average body mass gain per day was 0.491 g between 0-10 days, 0.498 g between 11-20 days and 0.421 g between 21-40 days.
At 40 days, pup body mass (20.02 ± 4.7 g) was 33.0% of adult body mass, **body length** (76.6 ± 3.9 mm) was 79.1% of adult body length, **head length** 81.7%, **tail length** 82.8%, **foot length** 94.3%.
No sex differences in body mass gain and body growth ($F_{1,324} = 0.18$, $p = 0.67$).

LITTER SIZE EFFECT



In pups from 5 small litters (2-3 pups), body mass gain was faster ($F_{1,147} = 42.5$, $p < 0.001$) and the body length increased faster ($F_{1,147} = 31.8$, $p < 0.001$) compared to pups from 6 large litters (4-6 pups).

METHODS

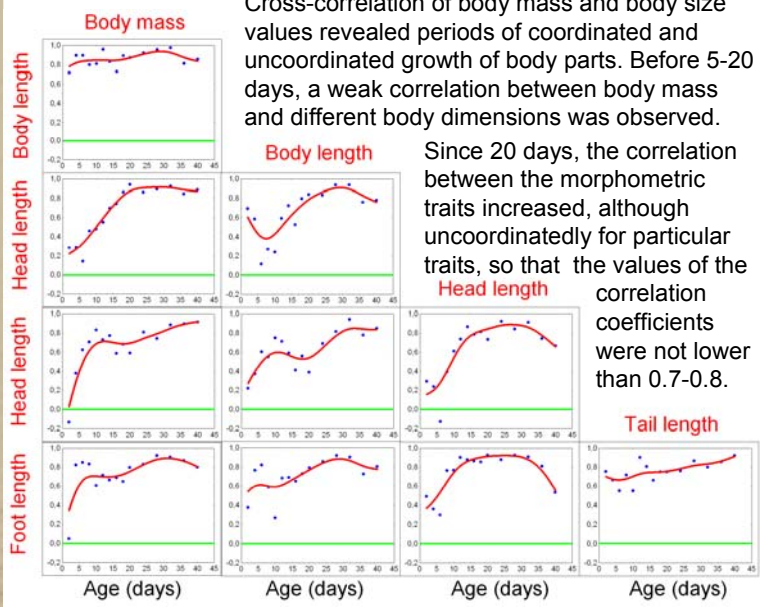
Laboratory colony of Moscow Zoo
11 litters, 40 pups (17 male, 23 female).
20 adults (10 male, 10 female).



Total 610 trials

BODY TRAITS CORRELATION

Cross-correlation of body mass and body size values revealed periods of coordinated and uncoordinated growth of body parts. Before 5-20 days, a weak correlation between body mass and different body dimensions was observed. Since 20 days, the correlation between the morphometric traits increased, although uncoordinatedly for particular traits, so that the values of the correlation coefficients were not lower than 0.7-0.8.



COMPARISON OF BODY MASS AND DEVELOPMENTAL MILESTONES ACROSS GERBIL SPECIES

Species	Adult body mass (g)	Newborn body mass (g)	Ear opening (days)	Eye opening (days)
<i>Meriones unguiculatus</i> ^{1,2}	Male: 61.7 ¹ ; 70.1 ² Female: 55.4 ¹ ; 60.3 ²	Male: 2.9 ¹ ; 3.3 ² Female: 2.8 ¹ ; 2.9 ²	12-15 ^{3,4}	17-20 ^{5,6,7}
<i>Meriones meridianus</i> ^{8,9}	60.0 ⁸	2.45 ⁸	27-28 ⁸ ; 15 ⁹	18-19 ⁸ ; 15 ⁹
<i>Gerbilliscus leucogaster</i> ^{10,11}	72.0 ¹⁰ ; 78.1 ¹¹	2.8 ¹⁰ ; 3.7 ¹¹	14-16 ¹¹	19-21 ¹⁰ ; 16-18 ¹¹
<i>Gerbilliscus brantsii</i> ^{10,11}	92.0 ¹⁰ ; 115.0 ¹¹	5.5 ¹⁰ ; 4.7 ¹¹	14-17 ¹¹	20 ¹⁰ ; 15-22 ¹¹
<i>Gerbilliscus afra</i> ^{11,12}	97.1 ¹¹ ; 95.0 ¹²	4.1 ¹¹ ; 4.1 ¹²		18-21 ¹¹ ; 20 ¹²
<i>Psammomys obesus</i> ¹³	172-188	6.6		
<i>Gerbillurus paebea exilis</i> ¹⁴	32.4	2.3	17	17
<i>Gerbillurus paebea paebea</i> ¹⁵	22	1.9		14-18
<i>Gerbillurus tytonis</i> ¹⁵	25	1.9		22-24
<i>Gerbillurus vallinus</i> ¹⁶	31.5	2.0		16-20
<i>Gerbillurus setzeri</i> ¹⁶	37.6	2.3		18
<i>Desmodillus auricularis</i> ¹⁷	29.0 (45 days)	1.84	23	22
<i>Pachyuromys duprasi</i> ¹⁸	Male: 81.0 Female: 57.7	2.4 - 2.6		16
<i>Pachyuromys duprasi</i> ¹⁹	60	2.58	27	24

1 Norris, Adams, 1972; 2 Cheal, Foley, 1985; 3 Woolf, Ryan, 1984; 4 McFadden et al., 1996; 5 Elwood, Broom, 1978; 6 Clark, Galef, 1980, 1981; 7 Salo, French, 1989; 8 Özkurt et al., 2001; 9 Smirnov, 1979; 10 Neal, 1990; 11 Lötter, Pillay, 2008; 12 Dempster et al., 1992; 13 Kam, Degen, 1993, 1994; 14 Ascaray, McLachlan, 1991; 15 Dempster, Perrin, 1989; 16 Dempster, Perrin, 1991; 17 Nel, Stutterheim, 1973; 18 Felt et al., 2008; 19 Zaytseva et al., 2016.



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