Mammalian development does not recapitulate suspected key transformations in the evolution of the mammalian middle ear

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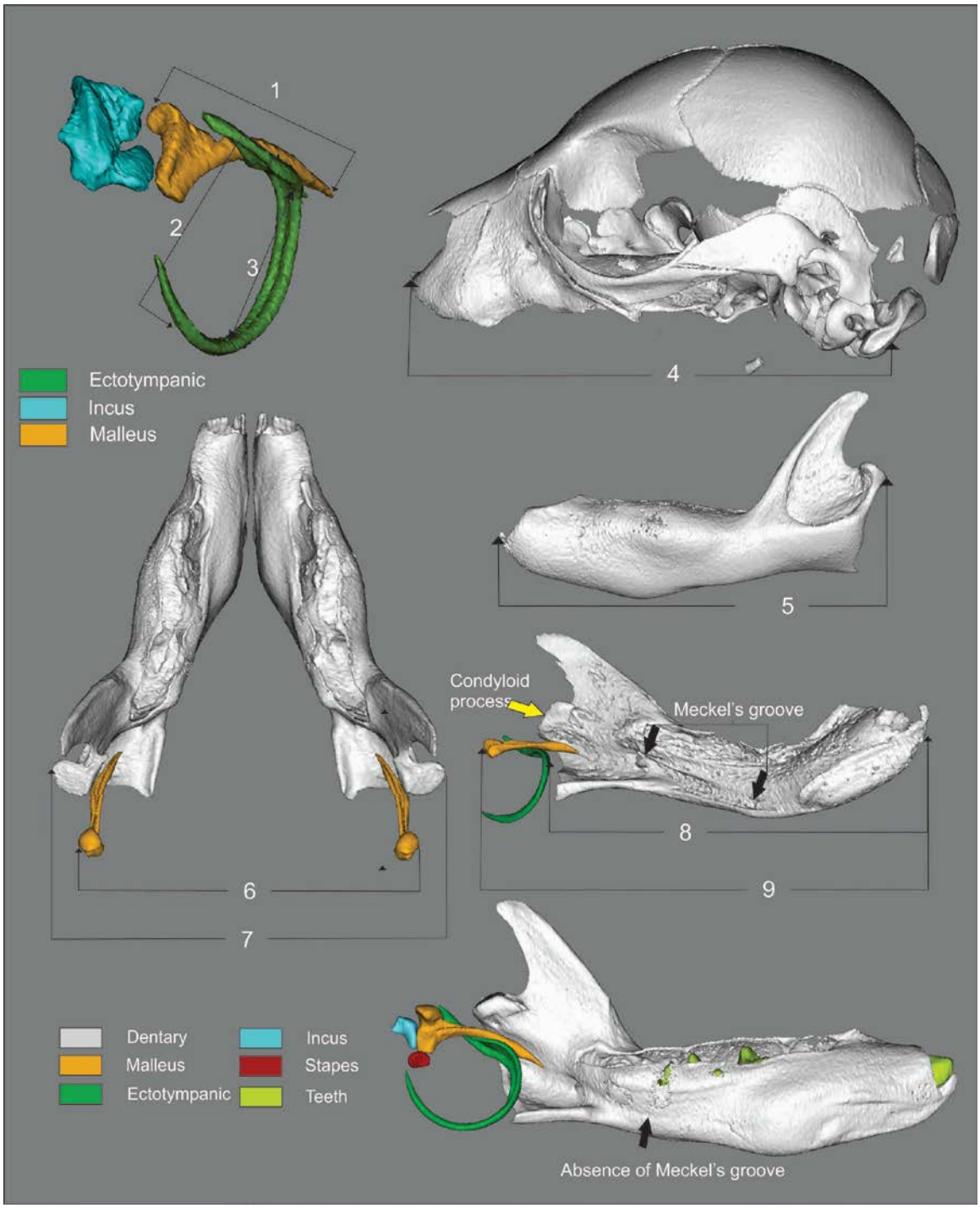
Supplementary information

Supplementary Methods

CT-scans

Specimens were scanned using micro-computed tomography (µCT) scanners at the Helmholtz-Zentrum in Berlin, the Cambridge University Department of Engineering, University College London, and the Centre for Advanced Imaging at the University of Queensland. Scanning involves the transmission of X-rays through the specimens under different rotation angles; in this way 2D angular projections are collected over 180° or 360°. The set of projections is used for 3D reconstruction of the matrix of absorption coefficients in the sample by a back-projection algorithm. The achieved spatial resolution is in the range of dozens to a few hundred micrometers.

Supplementary figure 1. Measurements taken for the analyses. 1, Malleus length; 2, Tympanic annulus diameter; 3, Diameter of bullar part of ectotympanic; 4, Skull length; 5, Dentary length; 6, Inter-malleus length; 7, Intercondylar length; 8, Distance from tip to dentary to anterior rim of ectotympanic; 9, Distance from dentary tip to posterior end of malleus head.



Supplementary table 1. Summary of log-log bivariate regressions for four species of marsupials and one monotreme, before and after detachment of middle ear bones, regressing dentary length and condylobasal (CB) lengths against dimensions of the bullar part of the ectotympanic (bullar part), annulus of the ectotympanic (annulus), antero-posterior length of the malleus (malleus a.-p length), and external auditory meatus (EAM). N, Sample size; R2, adjusted coefficient of correlation; slope, coefficient of allometry under Standardised Major Axis (SMA); P , P-value for SMA regressions; P1 , probability that the slope is equal to 1. Significant allometric slopes are in bold.

Pre-detachment					
Macropus eugenii					
Regression:X-Y	n	R^2	Slope	*p*	p^1
Dentary – bullar part	13	0.987	**1.212**	0.000	0.000
Dentary – annulus	13	0.975	**1.325**	0.000	0.000
Dentary – malleus a.-p. length	13	0.915	**1.889**	0.000	0.000
CB length – bullar part	13	0.986	**1.452**	0.000	0.000
CB length – annulus	13	0.979	**1.588**	0.000	0.000
CB length – malleus a.-p. length	13	0.929	**2.264**	0.000	0.000
Phascolarctos cinereus					
Dentary –bullar part	9	0.987	**1.754**	0.000	0.000
Dentary – annulus	9	0.974	**1.779**	0.000	0.000
Dentary – malleus a.-p. length	9	0.959	**1.694**	0.000	0.000
CB length – bullar part	9	0.991	**1.935**	0.000	0.000
CB length – annulus	9	0.979	**1.963**	0.000	0.000
CB length – malleus a.-p. length	9	0.969	**1.868**	0.000	0.000
Sminthopsis macroura					
Dentary –bullar part	-	-	-	-	-
Dentary – annulus	-	-	-	-	-
Dentary – malleus a.-p. length	4	0.992	**2.225**	0.0039	0.0048
CB length – bullar part	-	-	-	-	-
CB length – annulus	-	-	**-**	-	-
CB length – malleus a.-p. length	3	0.990	**3.030**	0.0625	0.0462
Trichosurus vulpecula					
Dentary –bullar part	9	0.987	**1.557**	0.000	0.000
Dentary – annulus	9	0.955	**1.752**	0.000	0.000
Dentary – malleus a.-p. length	10	0.956	**2.350**	0.000	0.000
CB length – bullar part	9	0.978	**1.470**	0.000	0.00019
CB length – annulus	9	0.944	**1.655**	0.000	0.00061
CB length – malleus a.-p. length	9	0.871	**2.084**	0.00023	0.00059
Tachyglossus aculeatus					
Dentary – annulus	7	0.974	**1.388**	0.000	0.0057

Dentary – malleus a.-p. length	7	0.988	**1.939**	0.000	0.000
CB length – annulus	5	0.940	1.298	0.006	0.15886
CB length – malleus a.-p. length	5	0.976	**1.873**	0.002	0.005
Post-detachment					
Bettongia penicillata					
Dentary –bullar part	14	0.789	**0.486**	0.000	0.000
Dentary – annulus	14	0.762	**0.540**	0.000	0.000
Dentary – malleus a.-p. length	14	0.920	**0.549**	0.000	0.000
CB length – bullar part	14	0.807	**0.469**	0.000	0.000
CB length – annulus	14	0.783	**0.522**	0.000	0.000
CB length – malleus a.-p. length	14	0.929	**0.530**	0.000	0.000
CB length – EAM	9	0.254	**0.317**	0.167	0.0034
Dentary – EAM	9	0.293	**0.314**	0.132	0.0027
Tachyglossus aculeatus					
Dentary – annulus	6	0.772	**0.390**	0.009	0.0038
Dentary – malleus a.-p. length	5	0.915	0.794	0.003	0.186
CB length – annulus	6	0.723	**0.606**	0.004	0.034
CB length – malleus a.-p. length	7	0.925	1.007	0.000	0.954

Supplementary table 2. Tests for posterior and medial replacement of the post-dentary bones during development. Antero-posterior positioning defines the dentary length (distance between dentary tip and dentary condyle) as one and determining the distances between dentary tip and ectotympanic/malleus as a percentage of dentary length. Light grey fields identify overall posterior movement of ossicles relative to dentary condyle, dark grey fields identify overall anterior movement; white fields suggest no change.

Species	n before(b) and after (a) detachment		Antero-posterior position relative to dentary condyle		Spearman rank correlation: Inter-malleus vs. inter-condylar width	*p*
			Anterior rim of ectotympanic	Posterior end of malleus head		
Macropus eugenii	**b**	13	1.01-0.88	1.10-1.13	1	0.000
	a	2	**1.09-1.15**	**1.12-1.14**		
Phascolarctos cinereus	**b**	9	0.92-1.00	1.12-1.17	0.99	0.000
	a	2	**0.92-0.94**	**1.07-1.11**		
Trichosurus vulpecula	**b**	10	0.89-0.98	1.06-1.14	1	0.000
	a	5	**0.85-0.87**	**1.02-1.09**		
Sminthopsis macroura	**b**	2	0.96-0.93	1.02-1.08	0.95	0.003
	a	6	**0.85-0.93**	**1.09-1.16**		
Bettongia penicillata	**b**	3	0.91-0.94	1.11-1.12	0.99	0.000
	a	14	**0.84-0.95**	**1.06-1.14**		
Monodelphis domestica	**b**	9	0.86-0.97	1.10-1.17	0.96	0.000
	a	11	**0.88-1.00**	**1.10-1.18**		
Ornithorhynchus anatinus	**b**	3	0.77-0.81	0.86-0.91	1	0.017
	a	2	**0.84-0.88**	**0.94-0.94**		
Tachyglossus aculeatus	**b**	8	0.94-1.06	1.05-1.13	0.96	0.000
	a	2	**0.97-1.00**	**1.08-1.12**		

Supplementary table 3. Accession number, age, references for aging of the specimens used in this study. *Bettongia penicillata*; South Australian Museum (SAM). *Macropus eugenii*; CSIRO Sustainable Ecosystems Canberra, colony collected (ACT permit K1606); CSIRO Sustainable Ecosystems Animal Ethics Approval 06-36. *Phascolarctos cinereus*; Adelaide University, field collected (DENWR (SA) License Nos. K23749 /1 to 25). *Sminthopsis macroura*, collected from a colony (MAEC (Vic) License No. 06117). *Trichosurus vulpecula*, collected from a colony (MAEC (Vic) License No. 06118). *Monodelphis domestica*, collected from preserved specimens University Museum of University of Tokyo (UMUT), and scans courtesy of by T. Rowe and T. Macrini. *Ornithorhynchus anatinus*, collected from preserved specimens at Queensland Museum (J and JM), Australian Museum (AusMusM). *Tachyglossus aculeatus*, collected from preserved specimens at Queensland Museum (J and JM), Australian Museum (AusMusM), and South Australian Museum (SAM).

Accession Number	Estimated age	References
Tachyglossus aculeatus		
SAM2788		
AusMusM5014	~35	1
JM14948	<34	2
SAM9592	~45	1
SAM9591	~45	1
JM9741	~50	2,3
J8664	~70	2,3
JM11130	~70	2,3
JM4994	~70	2,3
JM8684	~80	1
JM7688	>100	2,3
Ornithorhynchus anatinus		
M646	~16	
AusMus5017	~35	1
JM11450	~45	1
QM 348	~60	1
JM no number	>100	
Sminthopsis macroura		
Scrassd4	4	Actual age
Scrassd5	5	Actual age
Scrassd6	6	Actual age
Scrassd7	7	Actual age
Scrassd19	19	Actual age
Scrassd21	21	Actual age
Scrassd22	22	Actual age
Scrassd31	31	Actual age

Smac54dPYA_No44_08	54	Actual age
Smacd64d_9_09	64	Actual age
SmacPYE74d_No14_08	74	Actual age
SmacAdult33_08	Adult	Actual age
Trichosurus vulpecula		
TVAB	0-7	4
SmTV	~11	4
TVAC	~14	4
TVAB-08	10	4
TVAD	9-14	4
TVPYE	~15	4
TVPYF_08_NoName	~14	4
TVPYK	~21	4
TVPYF_08	~21	4
TV7	~35	4
TV6	35-42	4
TV8	~68	4
TV3	~85	4
TV2	>100	4
TV1	Adult	5
Bettongia penicillata		
SAM24233	13-15	6
SAM24239	~20	6
SAM24235	~28	6
SAM24229	~28	6
SAM24244	~28	6
SAM24238	~35	6
SAM24230	~46	6
SAM24232	~49	6
SAM24240	~56	6
SAM24246	60-69	6
SAM24228	~80	6
SAM24241	>85	6
SAM24243	>85	6
SAM24242	>85	6
SAM24248	>85	6
SAM24252	>85	6
SAM24247	Adult	6
Phascolarctos cinereus		
Pcin3_14	~10	
Pcin3_9	~15	
Pcin3_7	~21	
Pcin3_6	~25	

Pcin3_10	~28	
Pcin3_8	~30	
Pcin3_5	~46	7
Pcin3_13	~51	7
Pcin3_11	~52	
Pcin3_1	~57	7
PcinLge01	>100	7
PcinLge03	>101	7
PcinLge02	>102	7
Macropus eugenii		
Meug1621	3-5	8
Meug8647	~10	8
Meug1694	~17	8
Meug8931	17-26	8,9
Meug1658	~26-28	8
Meug8770	~26	8
Meug2957	~27	8
Meug2965	~27	8
Meug1682	~28	8
Meug8858	~42	8
Meug2912	~49	8
Meug17162	42-59	9
Meug1723	~58	
Meug1720	>58	
Meug8737	>90	
Monodelphis domestica		
UMUT-DK150001	10	Actual age
UMUT-DK150002	12	Actual age
UMUT-DK150003	12	Actual age
UMUT-DK150004	13	Actual age
UMUT-DK150005	14	Actual age
UMUT-DK150006	~14	Actual age
UMUT-DK150007	15	Actual age
UMUT-DK150008	16	Actual age
UMUT-DK150009	17	Actual age
Day 27 TMM M 7595	27	Actual age
Day 27 TMM M 8261	27	Actual age
Day 27 TMM M 8265	27	Actual age
Day 48 TMM M 7536	48	Actual age
Day 48 TMM M 8269	48	Actual age
Day 56 TMM M 8266	56	Actual age
Day 57 TMM M 7539	57	Actual age

Day 75 TMM M 7542	75	Actual age
Day 76 TMM M 8267	76	Actual age
Day 90 TMM M 7545	90	Actual age
Day 90 TMM M 8268	90	Actual age

References for Table S3.

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Supplementary table 4. Measurements used for the analyses. Maximum distance between the posterior part of the malleus (PPM). Maximum distance of the condyloid process (CDP). Anterior-most part of the dentary until the anterior part of the ectotympanic (ECT). Anterior-most part of the dentary and the posterior part of the malleus (MAL). Anteroposterior length of the dentary at the level of the condyloid process (CON). Dentary length (DL). Condylobasal length (CBL). Malleus antero-posterior length (MP). Bullar part of ectotympanic (BPE). Annulus of ectotympanic (ANE). Auditory meatus (AM).

Accession Number	PPM	CDP	ECT	MAL	CON	DL	CBL	MP	BPE	ANE	AM
Tachyglossus aculeatus											
SAM2788	-	-	-	-	1.9	1.9	-	-	-	-	-
AusMusM5014	3.62	4.26	6.12	6.5	5.89	5.78	-	0.19	-	0.32	-
JM14948	8.6	9.18	14.88	15.91	15.17	15	24.05	1.24	-	1.34	-
SAM9592	11.27	11.71	19.18	19.73	18.07	18.07	-	1.4	-	1.5	-
SAM9591	12.03	12.27	18.84	19.96	18.11	18.07	29.19	1.71	-	1.52	-
JM9741	19.07	18.76	24.37	27.69	25.55	25.55	43.71	4	-	3.13	-
J8664	19.35	18.72	19.42	23.32	20.65	28.09	41.55	3.73	-	2.4	-
JM11130	18.67	17.59	27.09	30.39	28.45	28.23	47.28	3.83	-	2.83	-
JM4994	19.23	19.33	27.54	30.91	28.43	-	-	4.22	-	2.93	-
JM8684	22.84	21.42	33.57	38.59	34.46	34.55	51.67	6.06	-	3.64	-
JM7688	40.96	42.03	93.68	100.59	93.48	93.48	112.98	13.19	-	5.48	-
Ornithorhynchus anatinus											
M646	2.4	4	3.6	4.01	4.65	-	-	-	-	-	-
AusMus5017	3.33	5.98	4.62	5.08	5.93	-	-	-	-	-	-
JM11450	14.3	24.26	26.04	29.39	32.26	-	-	-	-	-	-
QM 348	17.19	32.66	48.61	53.99	57.66	-	-	-	-	-	-
JM no number	20.67	39.44	69.66	74.55	79.12	-	-	-	-	-	-
Sminthopsis macroura											
Scrassd4			-	-	1.63	1.63	-	-	-	-	-
Scrassd5	1.96	1.82	-	1.7	1.66	1.66	2.77	0.13	-	-	-
Scrassd6			-	-	1.83	1.83	-	-	-	-	-
Scrassd7	2.17	2.24	2.02	2.24	2.1	2.1	3.15	0.24	-	-	-
Scrassd19			3.31	3.87	3.57	3.57		0.65	0.61	0.51	-
Scrassd21	2.01	2.27									
Scrassd22	4.35	4.5	3.87	4.77	4.39	4.39	5.7	1.24	0.97	0.86	-
Scrassd31	6.15	6.3	5.37	7.31	6.3	6.3	8.82	2.36	1.73	1.54	1.39
Smac54dPYA_No44_08	7.71	11.29	11.87	14.96	13.43	13.43	18.78	2.92	2.99	2.38	1.86
Smacd64d_9_09	7.26	11.43	13.82	16.54	14.96	14.96	20.19	2.64	2.76	2.4	1.75
SmacPYE74d_No14_08			13.96	16.95	15.78	15.78	21.45	2.65	2.55	2.33	1.67

SmacAdult33_08	8.29	14.05	17.81	20.6	19.06	19.06	25.23	3.07	2.66	2.17	1.7
Trichosurus vulpecula											
TVAB			-	-	3.22	3.22	-	-	-	-	-
SmTV	4.14	4.33	4.2	4.79	4.28	4.28	-	0.35	-	-	-
TVAC	5.5	5.91	5.75	6.31	5.93	5.93	8.19	0.67	1.08	0.94	-
TVAB-08	5.85	6.14	6.14	7.29	6.55	6.55	8.95	1.24	1.22	0.9	-
TVAD	6.45	6.98	6.37	7.63	6.97	6.97	9.17	1.37	1.27	1.01	-
TVPYE	7.5	8.18	7.05	8.7	7.81	7.81	10.95	1.83	1.7	1.49	-
TVPYF_08_NoName	7.4	8.36	7.36	8.91	8.1	8.1	11.15	1.76	1.77	1.46	-
TVPYK	8.52	8.91	8.3	10.39	9.14	9.14	12.06	2.32	2.11	1.88	-
TVPYF_08	8.19	8.73	8.06	9.94	9.08	9.08	12.23	2.06	1.98	1.75	-
TV7	9.58	10.65	9.03	11.3	10.18	10.18	13.92	2.93	2.51	2.26	-
TV6	11.14	12.34	9.9	12.94	11.6	11.6	16.91	3.15	2.91	2.52	-
TV8	15.95	19.08	17.52	23.01	20.26	20.26	27.67	6.08	5.39	4.86	4.34
TV3	17.56	21.48	20.71	27.52	23.87	23.87	33.89	7.13	6.7	6.35	4.26
TV2	46.11	63.51	67.81	84	76.85	76.85	105.35	18.81	18.23	13.8	7.86
TV1	51.17	67.24	68.54	87.4	79.63	79.63	106.59	19.88	18.96	15.83	5.67
Bettongia penicillata											
SAM24233	6.4	7.07	6.92	8.14	7.36	7.36	10.85	1.78	1.6	1.29	-
SAM24239	8.87	9.72	9.06	10.79	9.71	9.71	13.96	2.6	2.17	1.87	-
SAM24235	10.71	11.46	10.72	13.14	11.75	11.75	16.23	3.83	2.45	2.18	-
SAM24229	12.14	14.07	11.57	15.19	13.6	13.6	19	4.65	3.23	2.79	-
SAM24244	11.87	13.18	11.81	15.37	13.93	13.93	18.99	4.81	3.37	3.08	-
SAM24238	13.05	14.31	12.35	16.5	14.45	14.45	20.62	4.81	3.62	3.3	-
SAM24230	14.39	16.77	14.68	19.59	17.45	17.45	25.24	6.3	4.59	4.07	-
SAM24232	14.8	17.49	15.52	20.69	18.1	18.1	26.02	5.95	4.6	4.3	-
SAM24240	16.72	20.31	17.41	23.07	20.55	20.55	29.3	6.94	5.46	5.04	4.03
SAM24246	16.65	21.54	19.62	25.8	23.15	23.15	33.78	6.97	6.31	5.02	3.74
SAM24228	19.42	27.08	24.34	30.42	27.12	27.12	40.36	7.2	6.12	5.11	3.28
SAM24241	20.31	27.65	24.82	30.82	29.01	29.01	44.59	7.32	7.01	5.25	3.54
SAM24243	19.73	28.89	26.62	32.76	30.04	30.04	44.62	7.14	7.38	4.88	3.64
SAM24242	21.79	31.2	29.93	35.95	33.27	33.27	47.06	7.38	6.84	5.55	3.66
SAM24248	23.61	35.96	37.3	42.95	40.2	40.2	59.85	9.54	7.25	5.57	3.98
SAM24252	24.68	38.21	43.02	48.76	45.15	45.15	67.64	9.42	7.77	5.39	4.39
SAM24247	24.94	39.11	44.13	51.31	48.64	48.64	66.93	9.17	7.24	5.5	4.23
Phascolarctos cinereus											
Pcin3_14			-	-	3.78	3.78	-	-	-		
Pcin3_9	4.78	5.08	5.33	6.06	5.3	5.3	8.09	0.87	0.5	0.41	-

Pcin3_7	5.95	6.27	6.47	7.45	6.44	6.44	9.82	1.36	0.78	0.63	-
Pcin3_6	6.86	6.8	7.08	8.27	7.08	7.08	10.59	1.26	0.93	0.79	-
Pcin3_10	7.85	7.88	7.82	9.41	8.12	8.12	12.57	2.06	1.15	0.99	0.81
Pcin3_8	9.07	9.48	8.63	10.54	9.37	9.37	13.77	2.84	1.54	1.23	1.13
Pcin3_5	10.98	11.93	10.34	12.68	10.98	10.98	16.16	3.38	2.19	1.66	1.42
Pcin3_13	10.53	11.48	10.78	13.38	11.66	11.66	16.65	3.45	2.11	1.6	1.38
Pcin3_11	11.71	13.18	11.48	14.07	12.53	12.53	17.88	3.94	2.42	2.42	1.65
Pcin3_1	13.45	15.99	13.49	16.6	14.74	14.74	20.47	4.32	2.93	2.37	1.82
PcinT			59.94	79.81	71.46	71.46	96.74	25.3	14.38	12.44	7.92
PcinLge01			-	-	79.21	79.21	106.44	12.66	12.99	10.25	6.03
PcinLge03	47.21	65.64	81.52	95.31	88.81	88.81	114.01	16.6	17.23	12.81	7.12
PcinLge02	47.18	70.7	86.66	101.83	92.1	92.1	117	15.35	16.86	12.81	8.82
Macropus eugenii											
Meug1621	4.8	5.02	5.41	6.06	5.35	5.34	8.02	0.4	0.81	0.62	-
Meug8647	6.03	6.36	6.72	7.66	6.91	6.79	10.11	1.14	1.33	1.09	-
Meug1694	6.82	7.28	7.29	8.43	7.56	7.53	11.05	1.6	1.4	1.23	-
Meug8931	6.89	8.74	8.34	9.68	8.79	8.67	12.68	1.77	1.64	1.47	-
Meug1658	7.61	8.29	8.29	9.62	8.69	8.7	12.17	1.54	1.75	1.56	-
Meug8770	8.33	9.2	9.07	10.47	9.46	9.49	13.45	1.87	1.81	1.57	-
Meug2957	8.87	10.16	10.04	11.67	10.65	10.64	14.58	2.35	2.03	1.83	-
Meug2965	9.5	10.86	10.21	12.03	10.83	10.89	14.92	2.57	2.11	1.99	-
Meug1682	10.04	11.38	10.47	12.37	11.29	11.21	15.2	2.81	2.21	2.02	-
Meug8858	11.03	12.57	12.64	15.03	13.63	13.64	18.21	3.12	2.72	2.43	-
Meug2912	12.11	14.3	13.03	16.35	14.82	14.85	19.09	3.93	3.17	2.74	-
Meug17162	12.86	14.51	14.24	17.38	15.57	15.58	19.68	4.21	3.29	2.89	-
Meug1723	13.8	16.01	15.28	18.87	17.15	16.89	21.5	4.31	3.53	3.27	-
Meug1720	14.52	17.77	17.43	21.76	19.51	19.48	25.66	5.24	4.42	3.87	-
Meug8737	17.56	20.5	19.32	25.03	22	21.88	30.21	6.57	5.45	5	4.24
Monodelphis domestica											
UMUT-DK150001	3.39	3.1	3.98	4.88	4.27	4.27	6.44	0.98	0.77	0.66	-
UMUT-DK150002	5.2	5.28	4.41	5.71	5.08	5.08	7.85	1.89	1.03	0.93	-
UMUT-DK150003	4.54	4.63	5.52	6.59	5.97	5.97	8.24	1.9	1.05	0.96	-
UMUT-DK150004	4.36	4.49	4.83	5.64	4.95	4.95	7.21	1.66	0.91	0.83	-
UMUT-DK150005	4.93	4.87	5.13	6.6	5.79	5.79	8.28	1.89	0.94	0.97	-
UMUT-DK150006	4.75	4.68	4.7	5.93	5.2	5.2	7.88	1.8	0.99	1	-
UMUT-DK150007	5.89	5.93	5.9	7.84	6.66	6.66	9.15	2.07	1.23	1.15	-
UMUT-DK150008	6.4	6.27	5.85	7.61	6.6	6.6	9.83	2.23	1.35	1.28	-

UMUT-DK150009	6.77	6.84	6.6	8.37	7.44	7.44	10.41	2.46	1.49	1.34	-
Day 27 TMM M 7595	7.2	8.83	11.23	14.38	12.68	12.68	17.05	3.45	1.99	2.37	-
Day 27 TMM M 8261	8.07	8.53	8.18	10.83	9.43	9.43	13.61	3.17	2.24	2.09	-
Day 27 TMM M 8265	7.95	8.71	8.88	11.5	9.7	9.7	13.46	2.97	2.46	1.91	-
Day 48 TMM M 7536	8.49	11.02	14.79	17.87	15.92	15.92	21.94	3.41	2.68	2.49	-
Day 48 TMM M 8269	8.39	11.62	15.69	19.11	16.96	16.96	23.78	3.83	2.84	2.56	-
Day 56 TMM M 8266	8.98	12.52	17.66	21	18.44	18.44	25.7	3.62	2.73	2.54	-
Day 57 TMM M 7539	8.39	12.74	17.27	20.51	18.61	18.61	25.11	3.48	2.57	2.6	-
Day 75 TMM M 7542	9.59	15.14	19.8	23.29	21.08	21.08	28.28	3.33	2.55	2.26	-
Day 76 TMM M 8267	10.2	16.2	22.28	25.61	23.01	23.01	31.54	3.71	2.83	2.6	-
Day 90 TMM M 7545	7.9	12.54	21.29	24.46	21.92	21.92	30.49	3.34	2.27	2.11	-
Day 90 TMM M 8268	10.39	17.12	24.15	27.52	24.09	24.09	33.14	3.7	3.27	2.54	-