

Supplementary Note 1. Definition of diet, locomotion and activity pattern categories used in this study.

Diet :

Carnivorous : Diet including a significant portion of vertebrates

Frugivorous : Diet including a significant portion of fruits

Herbivorous and folivorous : Diet including a significant portion of leaves and /or grass

Invertivorous : Diet including a significant portion of arthropods and worms

Omnivorous : Diet consisting in animal prey, in addition to a variety of fruits or other vegetable matter

Piscivorous : Diet including a significant portion of fish

Locomotion:

Aquatic : Spend more time in the water than on the ground and can even sleep in water

Arboreal : Spend more time in the trees than on the ground and forage actively in trees

Semi-arboreal : Spend a significant part of their time in the trees

Semi-fossorial : Spend a significant part of their time on the ground and often dig to make a burrow or find food

Terrestrial : Spend a significant part of their time on the ground, but occasionally climb, swim or dig

Activity pattern :

Cathemeral or crepuscular : Animals with an irregularly active pattern at any time of day or night and animals more active at dawn

Diurnal : More active at day

Nocturnal : More active at night

Supplementary Note 2. Definition of social complexity categories.

Category 0: Obligatory solitary species (except for mating).

Category 1: Solitary specie but can stand with other (e.g. temporary coalition).

Category 2: Pair-living, the young quitting the family unit before the next litter.

Category 3: Pair-living and young staying in the family units for multiple litters.

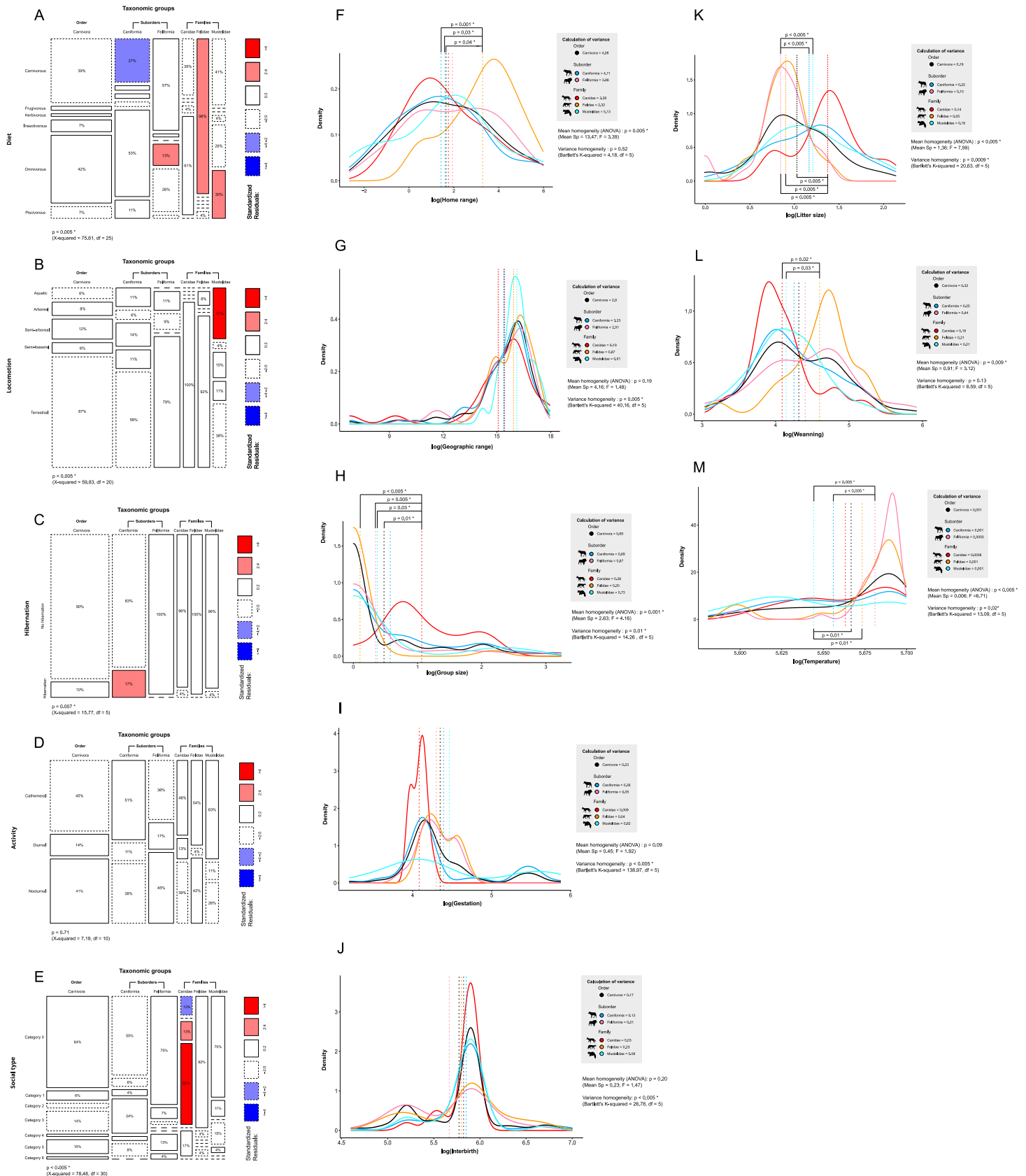
Category 4: Group-living, not only close relatives, no hierarchical level.

Category 5: Group-living, not only close relatives, one hierarchical level (i.e. dominants versus others).

Category 6: Group-living, not only close relatives, multiple hierarchical levels.

Supplementary Figure 1. Analyses of the differences of means, variances and proportions of the predictors used in this study.

For categorical predictors (A-E), chi-squared contingency tables were used to test for proportions homogeneity of the different categories according to the taxonomic groups. Test result are provided at the bottom left of each graph. The proportion of each category is indicated as a percentage for values greater than 4%. Cells representing negative residuals - values smaller than expected from a normal distribution - are drawn in blue and with broken edges while positive values - values larger than expected from a normal distribution - are drawn in red with solid borders. For continuous predictors (F-M), Bartlett's test were performed to assess the homogeneity of variances at different taxonomic scales in parallel with ANOVA tests which provides information on the differences in means between these groups. Test results are provided to the right of each graph, below the legend box. Figures associated represent the density distribution of each predictor according to taxonomic groups with dotted lines representing the mean of each of the groups. P-values are shown for each significantly positive Tukey post-hoc pairwise test between two taxonomic groups. In addition, the variance of each taxonomic group is indicated in the gray legend box.



Supplementary Table 1. Percentage of correct identification of significant shifts in evolutionary rates of the relative brain size identified in the random computed topologies.

Node	% Accelerated rate of evolution	% Deccelerated rate of evolution
Herpestidae + Hyaenidae + Eupleridae	1%	23%
Canidae	81%	0%
Helictindinae + Guloninae + Ictonychinae + Mustelinae + Lutrinae (Mustelidae)	76%	0%

Diet: Carn: carnivorous; Fru: frugivorous; Herb: herbivorous and folivorous; Inv: invertivorous (i.e. invertebrate-eaters); Omn: omnivorous; Pisc: piscivorous;
Locomotion: Aq: aquatic; Arb: arboreal; Sarb: semi-arboreal; Sfos: semi-fossorial; Terr: terrestrial.
Activity pattern: Cath/Cre: Cathemeral or crepuscular; Diu: Diurnal; Noc: Nocturnal.

Species	Family	Average body mass (g)	Diet	Locomotion	Hibernation	Activity pattern	Social complexity	Group size	Gestation (days)	Interbirth (days)	Weaning (days)	Geographic range (km²)	Home range (km²)	Mean temperature (K)
<i>Aizoon subulatus</i>	Felidae	50577.92	Carn	Terr	No	Diu	0	1,4	92	547,5	91,42	10586306.53	88,27	296,23
<i>Alurapoda melanoleuca</i>	Ursidae	117999.99	Herb	Terr	No	Cath/Cre	0	1	127,5	638,75	178,98	36206.89	3,55	279,7
<i>Alturus fulgens</i>	Aluridae	5170.08	Herb	Arb	No	Cath/Cre	0	1	135	365	136,87	107540,59	1,43	277,623
<i>Amblyonyx cinereus</i>	Mustelidae	3527.59	Pisc	Aq	No	Noc	4	12,5	63	182,5	79,54	3673360.97	17	295,807
<i>Anonyx capensis</i>	Mustelidae	19322.22	Pisc	Aq	No	Cath/Cre	1	1	62,99	365	52,5	14162350.57	99,74	296,46
<i>Arctictes burlingtoni</i>	Viverridae	12599.99	Omn	Arb	No	Noc	0	1	91,5	317,6	117,57	291388,88	6,2	286,144
<i>Arctictes viverrina</i>	Viverridae	2123.79	Omn	Arb	No	Noc	0	1	70,2	182,5	49,8	276607,4	1,15	293,87
<i>Atlas palmirostris</i>	Herpestidae	3600.16	Omn	Terr	No	Cath/Cre	0	1	74,5	182,5	35,89	14296310.45	1,73	296,489
<i>Bassarisicyon alleni</i>	Procyonidae	1235.01	Fru	Arb	No	Noc	0	1	74	182,5	35,89	441326.32	0,375	297,139
<i>Bassarisicyon astutus</i>	Procyonidae	1010.37	Omn	Sarb	No	Noc	0	1	52,5	365	52,89	3916072,44	0,74	288,549
<i>Bassarisicyon sumichrasti</i>	Procyonidae	906	Omn	Sarb	No	Noc	0	1	64	365	119,32	625977,74	0,2	296,181
<i>Canis aureus</i>	Canidae	9658.7	Omn	Terr	No	Cath/Cre	3	2,75	63	365	61,3	2573957,43	2,95	294,873
<i>Canis latrans</i>	Canidae	11989.1	Omn	Terr	No	Cath/Cre	3	4,33	63	365	43,71	17099904,3	18,88	278,968
<i>Canis lupus</i>	Canidae	31756.51	Carn	Terr	No	Cath/Cre	5	7	63	365	44,82	50803439,7	159,86	273,632
<i>Canis simensis</i>	Canidae	14361.86	Carn	Terr	No	Noc	5	8	61	365	68,6	11402.81	4,2	283,053
<i>Canis variscus</i>	Felidae	11366.38	Carn	Terr	No	Noc	0	1	74,5	365	100	366989,46	283,84	296,23
<i>Canis lupus baileyi</i>	Felidae	7725.46	Carn	Terr	No	Noc	0	1	70,2	365	180	343728,13	40,15	292,874
<i>Candiacyon thomasi</i>	Canidae	5741.96	Omn	Terr	No	Noc	3	2	56	243,33	72,33	7091683.47	1,41	296,146
<i>Chrysocyon brachyris</i>	Canidae	23325	Omn	Terr	No	Cath/Cre	0	2	63,48	365	119	5038801	21,36	295,499
<i>Civettictis civetta</i>	Viverridae	12075.58	Omn	Terr	No	Noc	0	1	70,5	212,14	82,91	14207678,6	11,1	296,864
<i>Conepatus chinga</i>	Mephitidae	1918	Omn	Sfos	Yes	Noc	0	1	60	365	63	324730,52	16,67	286,541
<i>Conepatus leuconotus</i>	Mephitidae	3293.51	Omn	Sfos	Yes	Noc	0	1	70	182,5	45,56	250959,21	1,27	291,222
<i>Crocuta crocuta</i>	Hyenidae	63169.98	Omn	Terr	No	Noc	6	25,5	112,3	441,04	371,37	14790149,69	21,93	296,996
<i>Cryptoprocta ferox</i>	Eupleridae	15800	Omn	Arb	No	Cath/Cre	0	1	92	365	136,1	124312.12	0,75	295,348
<i>Cynopithecus</i>	Canidae	9540	Omn	Terr	No	Cath/Cre	5	7,5	63	365	57,33	10546280,1	33,64	282,798
<i>Genetta genetta</i>	Eupleridae	6944.41	Inv	Terr	No	Cath/Cre	3,5	3,5	60	365	41,7	21362,74	1,88	291,46
<i>Genetta genetta</i>	Mustelidae	4134.99	Omn	Arb	No	Cath/Cre	0	1	65	365	94,46	13411787,9	10,7	296,732
<i>Felis chaus</i>	Felidae	7157.99	Omn	Terr	No	Cath/Cre	0	1	64,5	130,01	95,49	898883,66	112,5	293,257
<i>Felis margarita</i>	Felidae	2823.36	Carn	Terr	No	Noc	0	1	63	197,7	120	12141993,7	9	295,537
<i>Felis silvestris</i>	Felidae	4573.08	Omn	Terr	No	Cath/Cre	0	1	60,5	148,25	76,01	32110980,1	1,29	292,428
<i>Fossa fossana</i>	Eupleridae	1853.98	Omn	Terr	No	Noc	0	1	84,5	365	66,84	106522,05	0,75	293,431
<i>Galeraia sanguinea</i>	Herpestidae	543.83	Inv	Terr	No	Diu	1	1	65	182,5	54,44	16368169,48	0,66	296,477
<i>Galidia elegans</i>	Eupleridae	810	Omn	Sarb	No	Cath/Cre	0	1	75	365	59,27	120561,29	0,24	296,181
<i>Galerella fasciata</i>	Eupleridae	974.995	Carn	Terr	No	Cath/Cre	0	1	85,5	365	60	87337,59	1,08	292,928
<i>Genetta genetta</i>	Viverridae	1756.17	Omn	Sarb	No	Noc	0	1	73,5	182,5	71,8	17769480,65	11,58	296,996
<i>Genetta maculata</i>	Viverridae	1950	Carn	Sarb	No	Noc	0	1	72,5	182,5	41,5	12805950,61	4,35	296,467
<i>Gulo gulo</i>	Mustelidae	12792.49	Omn	Terr	No	Noc	0	1	230,5	821,25	83,64	24495951,71	343,27	265,945
<i>Heterocyon malayensis</i>	Ursidae	57075.78	Omn	Terr	No	Noc	0	1	105	100	90,36	2525772,13	12	297,538
<i>Heteropogon parvulus</i>	Herpestidae	281.83	Inv	Terr	No	Diu	6	11,0	49	141,94	21	694753,53	0,21	295,394
<i>Heterosia yagouaroundi</i>	Felidae	6875	Carn	Terr	No	Cath/Cre	0	1	72,5	182,5	48,46	1509338,56	52,35	296,503
<i>Herpessia ichneumon</i>	Herpestidae	2980.02	Omn	Terr	No	Cath/Cre	1	1	60	365	58,09	14429050,1	2,18	296,364
<i>Hyena hyena</i>	Hyenidae	35070.51	Carn	Terr	No	Cath/Cre	1	2,3	90,5	237,25	118,93	24254343,2	45,19	296,047
<i>Hydricus maculoides</i>	Mustelidae	41850.53	Pisc	Aq	No	Cath/Cre	0	1	59,6	365	60,48	1136394,46	11	296,923
<i>Ichnemia albicauda</i>	Herpestidae	3628.4	Inv	Terr	No	Noc	0	1	60	365	270	4326821,09	0,5	296,865
<i>Isopoda gregalis</i>	Felidae	4590	Carn	Terr	No	Noc	0	1	70,2	240	60	305384,32	23,25	296,732
<i>Isopoda gregalis</i>	Felidae	11880	Carn	Terr	No	Cath/Cre	0	1	80,5	365	90,6	16040024,42	0,38	296,865
<i>Isopoda gregalis</i>	Felidae	11999.96	Carn	Terr	No	Cath/Cre	0	1	74	182,5	104,68	12526196,74	1,84	296,707
<i>Lontra canadensis</i>	Mustelidae	8087.42	Pisc	Aq	No	Cath/Cre	3	15	62	365	121,66	1188702,15	16,95	294,213
<i>Lontra longicauda</i>	Mustelidae	6554.97	Pisc	Aq	No	Cath/Cre	0	1	71	365	180	1085820,36	5,5	296,656
<i>Lupulella adusta</i>	Canidae	10392.49	Omn	Terr	No	Noc	3	2	60	365	52,89	12581413,14	1,01	296,801
<i>Lupulella mesoleuca</i>	Canidae	8247.3	Omn	Terr	No	Noc	3	2	60	273,75	34,1	6248779,95	11,93	294,483
<i>Lutra lutra</i>	Mustelidae	8868.69	Pisc	Aq	No	Noc	1	1	61,5	365	100,8	25877469,45	25,48	278,176
<i>Lutra lutra</i>	Mustelidae	8812.49	Pisc	Aq	No	Noc	3	8	61,5	365	72,53	5567880,5	5,31	297,858
<i>Lutra lutra</i>	Mustelidae	8616.24	Carn	Terr	No	Noc	0	1	60	365	48,22	268062,22	5,35	286,072
<i>Lutra lutra</i>	Mustelidae	1000	Omn	Terr	No	Cath/Cre	2,5	5,5	36	180	16,08	162086,23	1	284,289
<i>Lutra lutra</i>	Mustelidae	21999.99	Carn	Terr	No	Noc	5	8	72	355,87	27,28	10539675,81	395,88	296,705
<i>Lutra lutra</i>	Felidae	9682.82	Carn	Terr	No	Noc	0	1	63,4	365	111,36	8252985,31	30,6	269,974
<i>Lutra lutra</i>	Felidae	19300	Carn	Terr	No	Cath/Cre	0	1	70	365	81,85	23827627,14	136,35	271,426
<i>Lutra lutra</i>	Felidae	6374.47	Carn	Terr	No	Cath/Cre	0	1	62	365	59,99	9702533,02	31,2	283,981
<i>Martes americana</i>	Mustelidae	873.69	Carn	Sarb	No	Cath/Cre	0	1	247,5	365	45,73	762017,14	1,66	270,538
<i>Martes flavigula</i>	Mustelidae	2504.64	Omn	Sarb	No	Diu	3	2	255	182,5	89,49	5260689,7	1,5	288,059
<i>Martes foina</i>	Mustelidae	1675	Omn	Sarb	No	Cath/Cre	0	1	252,5	365	74,11	7011029,37	2,15	277,405
<i>Martes martes</i>	Mustelidae	1289.99	Omn	Sarb	No	Cath/Cre	0	1	252,5	365	54,19	836147,29	2,15	280,605
<i>Martes pennanti</i>	Mustelidae	1750	Omn	Sarb	No	Cath/Cre	0	1	315,5	365	81,4	34161,46	34,86	274,075
<i>Martes schistaceus</i>	Mustelidae	1173.91	Carn	Sarb	No	Cath/Cre	0	1	275	365	52,23	6492749,47	15,2	265,322
<i>Mellivora capensis</i>	Mustelidae	8999.99	Omn	Sfos	No	Cath/Cre	1	1	60	182,5	23,86	27823522,11	333,5	296,806
<i>Mellivora moschata</i>	Mustelidae	938.5	Inv	Sfos	No	Cath/Cre	0	1	70	365	75	1476533,73	0,65	289,526
<i>Meleopus urinus</i>	Ursidae	99999.99	Omn	Terr	Yes	Cath/Cre	0	1	203,4	1095	194,67	417387,69	8,15	297,329
<i>Mephitis mephitis</i>	Mephitidae	2399.99	Omn	Sfos	Yes	Noc	0	1	68	365	55,15	12277338,73	2,32	280,747
<i>Mungos mungo</i>	Herpestidae	1260	Inv	Terr	No	Diu	5	23,7	63	365	20,88	15894555,38	1,66	297,005
<i>Mungotia decemlineata</i>	Eupleridae	657.03	Omn	Terr	No	Diu	5	4	97,5	365	45,91	17099,69	0,19	297,282
<i>Mustela erminea</i>	Mustelidae	284.5	Carn	Terr	No	Cath/Cre	0	1	66,4	365	60,93	3971806,44	1,11	270,328
<i>Mustela lenaxa</i>	Mustelidae	12400.03	Carn	Terr	No	Cath/Cre	0	1	245,5	365	24,5	123086,16	26,21	286,361
<i>Mustela lenaxa</i>	Mustelidae	556.44	Carn	Terr	No	Cath/Cre	0	1	53,5	365	58,71	356895,30	0,17	277,321
<i>Mustela mellea</i>	Mustelidae	78.45	Carn	Terr	No	Cath/Cre	0	1	35,5	273,75	36,74	43656881,02	0,07	272,447
<i>Mustela putorius</i>	Mustelidae	975.55	Carn	Terr	No	Noc	0	1	42	252,5	54,39	756541,29	0,53	279,538
<i>Mustela sibirica</i>	Mustelidae	530.85	Carn	Terr	No	Cath/Cre	0	1	35	365	58,2	20179461,96	3,41	275,998
<i>Neandria binodina</i>	Neandriidae	2167.2	Omn	Arb	No	Noc	0	1	64	182,5	63,81	5977079,52	0,55	297,147
<i>Nasua narica</i>	Procyonidae	4578.43	Omn	Sarb	No	Cath/Cre	5	6,5	73,5	365	132,63	2329129,95	0,78	293,711
<i>Nasua nasua</i>	Procyonidae	3775.5	Omn	Sarb	No	Diu	5	20	75,5	365	113,15	10694990,22	0,79	296,066
<i>Nasua nasua</i>	Procyonidae	14945.05	Omn	Arb	No	Cath/Cre	0	1	91,5	390	111,67	2913590,85	3,5	294,979
<i>Neovison vison</i>	Mustelidae	945	Carn	Terr	No	Noc	0	1	57,5	365	42	1321855,49	4,35	274,641
<i>Nictocatus procyonoides</i>	Canidae	4214.09	Omn	Yes	Yes	Noc	2	4,3	67,3	365	40,68	670442,182	1,15	278,821
<i>Onychomys leucogaster</i>	Canidae	4098.12	Inv	Terr	No	Cath/Cre	3	4,3	67,3	182,5	42,46	5001827,67	2,74	296,155
<i>Panthera leo</i>	Viverridae	4300	Omn	Sarb	No	Noc	0	1	53,5	182,5	109,13	5422715,54	2,88	290,761
<i>Panthera leo</i>	Felidae	158623.93	Carn	Terr	No	Noc	5	8,7	110	730	197,86	11237685,34	55,19	296,588
<i>Panthera onca</i>	Felidae	83943.09	Carn	Terr	No	Cath/Cre	0	1	99	365	156,6	10500825,25	52,55	297,353
<i>Panthera pardus</i>	Felidae	52399.99	Carn	Terr	No	Cath/Cre	0	1	96	476,37	123,54	29348601,36	18,78	293,913
<i>Panthera tigris</i>	Felidae	161914.66	Carn	Terr	No	Noc	0	1	103	821,25	118,55	2494993,45	64,89	294,301
<i>Panthera tigris</i>	Felidae	32500	Carn	Terr	No	Cath/Cre	0	1	99	365	101,42	274445		

Supplementary Table 3. PGLS analyses performed on each 13 variables separately using the entire carnivoran dataset (N= 124). Asterisks indicate the level of significance of p-values (*: < 0.05; **: < 0.01; and ***: < 0.001 respectively).

<i>Diet</i>			
Predictor	SE	<i>F</i>	<i>p</i>
Diet	0.002	1.41	0.23
Model summary: $\lambda = 0.67$, $R^2 = 0.02$, $p = 0.23$			

<i>Locomotion</i>			
Predictor	SE	<i>F</i>	<i>p</i>
Locomotion	0.001	0.76	0.55
Model summary: $\lambda = 0.70$, $R^2 = -0.007$, $p = 0.55$			

<i>Activity pattern</i>			
Predictor	SE	<i>F</i>	<i>p</i>
Activity pattern	0.001	0.35	0.71
Model summary: $\lambda = 0.70$, $R^2 = -0.01$, $p = 0.71$			

<i>Home range</i>			
Predictor	SE	<i>F</i>	<i>p</i>
Home range	0.006	4.03	0.046*
Model summary: $\lambda = 0.61$, $R^2 = 0.02$, $p = 0.046^*$			

<i>Geographic range</i>			
Predictor	SE	<i>F</i>	<i>p</i>
Geographic range	0.03	14.87	< 0.001***
Model summary: $\lambda = 0.83$, $R^2 = 0.10$, $p = < 0.001^{***}$			

<i>Mean temperature</i>			
Predictor	SE	<i>F</i>	<i>p</i>
Mean temperature	0.0005	0.27	0.6
Model summary: $\lambda = 0.71$, $R^2 = -0.006$, $p = 0.6$			

<i>Ability to hibernate</i>			
Predictor	SE	<i>F</i>	<i>p</i>
Hibernation	0.006	3.44	0.07
Model summary: $\lambda = 0.69$, $R^2 = 0.02$, $p = 0.07$			

<i>Gestation length</i>			
Predictor	SE	<i>F</i>	<i>p</i>
Gestation length	0.002	0.83	0.36
Model summary: $\lambda = 0.73$, $R^2 = -0.001$, $p = 0.36$			

<i>Weaning time</i>			
Predictor	SE	<i>F</i>	<i>p</i>
Weaning time	0.006	3.75	0.055
Model summary: $\lambda = 0.67$, $R^2 = 0.02$, $p = 0.055$			

<i>Interbirth length</i>			
Predictor	SE	<i>F</i>	<i>p</i>
Interbirth length	0.001	0.45	0.50
Model summary: $\lambda = 0.69$, $R^2 = -0.004$, $p = 0.50$			

<i>Litter size</i>			
Predictor	SE	<i>F</i>	<i>p</i>
Litter size	0.007	4.35	0.04*
Model summary: $\lambda = 0.67$, $R^2 = 0.03$, $p = 0.04^*$			

<i>Group size</i>			
Predictor	SE	<i>F</i>	<i>p</i>
Group size	0.001	0.78	0.40
Model summary: $\lambda = 0.69$, $R^2 = -0.002$, $p = 0.40$			

<i>Social complexity</i>			
Predictor	SE	<i>F</i>	<i>p</i>
Social complexity	0.01	0.97	0.45
Model summary: $\lambda = 0.72$, $R^2 = -0.001$, $p = 0.45$			