SUPPORTING INFORMATION

Phylogenetic hypothesis

Using PartitionFinder v.1.1.1 (Lanfear et al. 2012), we found the best partitioning scheme is between mitochondrial and nuclear loci, and that best substitution model for both partitions is GTR+I+G. However, we decided to use GTR+G instead, since the gamma distribution (G) with an alpha parameter can already allow for a proportion of sites with very low rates of evolution, and several problems have been know with using a proportion of invariant sites parameter (I) (Yang 2006).

To estimate the phylogenetic tree and divergence times we used a Bayesian inference with node calibration on BEAST v.2.4.2 (Bouckaert et al. 2014). We used a relaxed lognormal molecular clock for the rate variation in each partition and Yule model of speciation for the branching of the tree. See Table S2 for node calibrations, based on Head (2015). We ran two independent Markov chain Monte Carlo chains for 200 million generations. Details on how we set the parameters can be obtained from the xml file that can be found on the dryad repository. We assessed proper mixing and convergence of the chains using the program Tracer v.1.6.0 (Rambaut et al. 2014) and checked that the effective sample sizes were >200 for every parameter. We also ensured that both runs converged on tree topologies using the R package *rwty* v. 1.0.1. We combined the results of both runs on LogCombiner v.2.4.2 and summarized a maximum clade credibility tree keeping the median heights on TreeAnnotator v.2.4.2. Finally, we pruned the tree to include only the taxa present on this study with the R package *ape* v. 4.1 (Paradis et al. 2004).

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Table S1. Summary of the species used in this study, the sample size for each species, their snout-vent length (SVL) range and head size range. SVL ranges with an asterisk mean that the largest specimen(s) of that species did not have its body preserved. Therefore, for head shape analyses the SVL range is an underrepresentation of the range sampled for that species. All specimens were measured in the following collections: the Queensland Museum, the Museum and Art Gallery of the Northern Territory, the South Australian Museum, the Western Australian Museum, the Australian Museum, the California Academy of Sciences, the University of Texas at Arlington, the American Museum of Natural History and the Museum of Comparative Zoology.

Species	Sample size	SVL range (cm)	Head size range (cm)
Python anchietae	4	72-180	2.15-5.11
Python bivittatus	24	54-274	2.88-8.67
Python brongersmai	10	65-163	3.08-7.06
Python curtus	13	36-151	2.41-6.11
Python molurus	9	51-214*	3.1-8.56
Python regius	31	36-155*	2.43-7.34
Python sebae	48	45-310*	2.49-12.73
Malayopython reticulatus	47	70-718	3.57-19.19
Malayopython timoriensis	7	45-292	2.4-8.41
Antaresia childreni	70	23-131	1.24-3.5
Antaresia maculosa	42	40-132	1.41-4.01
Antaresia perthensis	55	19-67	1.07-2.5
Antaresia stimsoni	88	19-135	1.1-3.37
Morelia bredli	25	52-242	2.17-7.12
Morelia carinata	3	42-156	1.8-5.54
Morelia spilota	153	26-294	1.5-8.62
Morelia viridis	53	33-180	1.53.5.54
Simalia amethistina	29	68-309	2.76-10.5
Simalia boeleni	15	112-306	3.65-9.18
Simalia clastolepis	9	52-344	2.29-9.47
Simalia kinghorni	36	65-469	2.55-12.03
Simalia nauta	8	111-242	3.77-7.26
Simalia oenpelliensis	10	210-406	4.63-9.11
Bothrochilus boa	33	20-185	131-5.25
Leiopython albertisii	67	35-283	1.86-9.21
Aspidites melanocephalus	69	68-245	2.15-6.8
Aspidites ramsayi	45	37-258	1.84-7.56
Liasis fuscus	26	116-205	3.18-6.3
Liasis mackloti	44	39-207	1.73-6.15
Liasis olivaceus	37	64-302	2.5-9.26
Liasis papuana	20	93-378	2.83-9.54
Boa constrictor	61	45-269	2.46-9.39

Table S2: Fossil calibrations used for the time-calibrated phylogeny. These calibrations are based on Head (2015). Minimum ages given as millions of years ago (MY).

Taxon	Clade	Minimum age (MY)
Coniophis sp.	Serpentes / (Iguania + Anguimorpha)	98.32
Haasophis terrasanctus	(Aniliidae + Tropidophiinae) / Macrostomata	93.9
Australophis anilioides	Aniliidae / Tropidophiidae	72.1
Titanoboa cerrejonensis	Boinae / Erycinae	58
Corallus priscus	*Corallus* / (*Chilabothrus*+(*Epicrates*+*Eunectes*))	50.2
Eunectes stirtoni	*Epicrates* / *Eunectes*	12.375
Calamagras weigeli	Ungaliophiinae / Charininae	35.2
Unnaimed taxon (UNSM 125562)	*Charina* / *Lichanura*	18.7
Ogmophis compactus	Loxocemidae / Pythonidae	35.2
Morelia riversleighensis	Malayopython / Australo-Papuan Pythonidae	12.5

Table S3. Tests statistics from the test for allometry for each species. Isometry is the null hypothesis; *P*-values less than 0.05 reject the null hypothesis.

	Head shape							Body shape						
Species	Df	SS	MS	Rsq	F	Z	*P*	Df	SS	MS	Rsq	F	Z	*P*
Python anchietae	2	0.002	0.002	0.388	1.268	1.102	0.3092	2	0.387	0.387	0.865	12.856	2.087	0.0644
Python bivittatus	22	0.012	0.012	0.243	7.053	4.551	**<0.0001**	20	0.712	0.712	0.542	23.631	8.385	**<0.0001**
Python brongersmai	8	0.002	0.002	0.108	0.966	0.771	0.3709	7	0.131	0.131	0.248	2.312	1.548	0.1874
Python curtus	11	0.005	0.005	0.208	2.893	2.071	**0.0369**	11	1.621	1.621	0.814	47.982	6.413	**<0.0001**
Python molurus	7	0.006	0.006	0.399	4.640	2.778	**0.0003**	5	0.393	0.393	0.600	7.511	2.808	**0.0024**
Python regius	29	0.007	0.007	0.118	3.868	2.908	**0.0081**	27	1.801	1.801	0.616	43.233	12.507	**<0.0001**
Python sebae	46	0.055	0.055	0.356	25.377	12.701	**<0.0001**	36	1.163	1.163	0.422	26.255	12.266	**<0.0001**
Malayopython reticulatus	45	0.051	0.051	0.362	25.566	12.736	**<0.0001**	38	0.500	0.500	0.195	9.210	6.063	**<0.0001**
Malayopython timoriensis	5	0.004	0.004	0.248	1.649	1.254	0.1993	5	0.244	0.244	0.536	5.785	2.509	**0.0195**
Antaresia childreni	68	0.010	0.010	0.088	6.550	5.075	**0.0002**	65	0.640	0.640	0.221	18.407	11.588	**<0.0001**
Antaresia maculosa	40	0.013	0.013	0.133	6.144	4.358	**0.0015**	40	0.286	0.286	0.107	4.795	3.521	**0.0025**
Antaresia perthensis	53	0.010	0.010	0.099	5.834	4.492	**0.0003**	53	0.481	0.481	0.223	15.240	9.653	**<0.0001**
Antaresia stimsoni	86	0.039	0.039	0.220	24.188	15.192	**<0.0001**	82	2.366	2.366	0.455	68.495	27.127	**<0.0001**
Morelia bredli	23	0.047	0.047	0.522	25.130	8.888	**<0.0001**	22	0.190	0.190	0.224	6.334	4.099	**0.0020**
Morelia carinata	1	0.005	0.005	0.692	2.252	1.298	0.2460	1	0.065	0.065	0.851	5.724	1.532	0.0813
Morelia spilota	151	0.148	0.148	0.304	65.816	32.371	**<0.0001**	149	0.998	0.998	0.105	17.502	12.469	**<0.0001**
Morelia viridis	51	0.011	0.011	0.078	4.303	3.124	**0.0101**	50	0.955	0.955	0.275	18.924	11.456	**<0.0001**
Simalia amethistina	27	0.027	0.027	0.320	12.732	7.005	**<0.0001**	16	0.182	0.182	0.162	3.089	2.150	**0.0408**
Simalia boeleni	13	0.015	0.015	0.306	5.741	3.234	**0.0091**	12	0.214	0.214	0.171	2.472	1.915	**0.0430**
Simalia clastolepis	7	0.030	0.030	0.724	18.353	4.207	**<0.0001**	6	0.299	0.299	0.568	7.891	3.175	**0.0005**
Simalia kinghorni	34	0.031	0.031	0.325	16.360	8.827	**<0.0001**	27	0.447	0.447	0.221	7.670	4.835	**0.0004**
Simalia nauta	6	0.017	0.017	0.612	9.456	2.956	**0.0125**	6	0.114	0.114	0.310	2.702	1.825	0.0646
Simalia oenpelliensis	8	0.003	0.003	0.185	1.818	1.468	0.1211	7	0.087	0.087	0.249	2.318	1.669	0.0778
Aspidites melanocephalus	67	0.049	0.049	0.259	23.478	13.012	**<0.0001**	66	0.390	0.390	0.117	8.759	6.268	**<0.0001**
Aspidites ramsayi	43	0.052	0.052	0.332	21.358	11.265	**<0.0001**	42	0.396	0.396	0.147	7.243	5.036	**<0.0001**
Bothrochilus boa	31	0.014	0.014	0.195	7.524	5.044	**0.0002**	31	1.851	1.851	0.585	43.610	13.648	**<0.0001**
Leiopython albertisii	65	0.031	0.031	0.214	17.690	11.131	**<0.0001**	52	0.330	0.330	0.100	5.760	4.100	**0.0016**
Liasis fuscus	24	0.012	0.012	0.232	7.264	4.515	**0.0008**	22	0.127	0.127	0.076	1.798	1.543	0.0905
Liasis mackloti	42	0.025	0.025	0.283	16.543	9.878	**<0.0001**	41	1.269	1.269	0.423	30.030	13.624	**<0.0001**
Liasis olivaceus	35	0.032	0.032	0.362	19.854	10.364	**<0.0001**	33	0.806	0.806	0.408	22.704	10.630	**<0.0001**
Liasis papuana	18	0.008	0.008	0.223	5.155	3.595	**0.0008**	12	0.135	0.135	0.266	4.345	2.999	**0.0016**
Boa constrictor	59	0.041	0.041	0.240	18.665	10.982	**<0.0001**	54	1.540	1.540	0.300	23.196	12.506	**<0.0001**

Table S4. Head shape slope angle differences. Pairwise comparisons of the angle between the slopes (direction of allometry) for head shape data in degrees (bottom triangle), and *P*-values of the difference between them computed with 10,000 iterations (upper triangle). Significant values indicating different slope angles are highlighted in green. Black boxes outline comparisons within clades.

	Python anchietae	*Python bivittatus*	*Python brongersmai*	*Python curtus*	*Python molurus*	*Python regius*	*Python sebae*	*Malayopython reticulatus*	*Malayopython timoriensis*	*Antaresia childreni*	*Antaresia maculosa*	*Antaresia perthensis*	*Antaresia stimsoni*	*Morelia bredli*	*Morelia carinata*	*Morelia spilota*	*Morelia viridis*	*Simalia amethistina*	*Simalia boeleni*	*Simalia clastolepis*	*Simalia kinghorni*	*Simalia nauta*	*Simalia oenpelliensis*	*Bothrochilus boa*	*Leiopython albertisii*	*Aspidites melanocephalus*	*Aspidites ramsayi*	*Liasis fuscus*	*Liasis mackloti*	*Liasis olivaceus*	*Liasis papuana*	*Boa constrictor*
Python anchietae		0.11	**0.04**	0.10	0.43	0.08	**0.03**	**0.01**	**0.03**	0.18	0.05	0.06	0.06	**0.02**	0.27	**0.01**	0.27	**0.02**	**0.00**	**0.01**	**0.02**	**0.00**	**0.02**	0.21	0.30	**0.00**	**0.02**	**0.01**	0.06	**0.05**	**0.04**	0.06
Python bivittatus	72.11		0.25	0.09	0.14	0.11	**0.01**	**0.01**	0.12	0.06	**0.03**	**0.01**	**0.00**	**0.01**	0.15	**0.00**	**0.00**	**0.01**	0.10	**0.02**	**0.02**	0.10	0.37	**0.01**	**0.00**	**0.00**	**0.02**	0.28	**0.02**	**0.02**	0.15	**0.01**
Python brongersmai	108.28	62.47		0.34	0.06	0.34	0.59	0.82	0.82	0.17	0.37	0.30	0.24	0.67	0.45	0.62	**0.00**	0.59	0.82	0.81	0.78	0.76	0.61	0.17	0.10	0.68	0.49	0.85	0.49	0.70	0.59	0.33
Python curtus	76.90	43.21	57.94		0.17	0.15	0.07	0.10	0.38	**0.05**	**0.04**	**0.01**	**0.01**	**0.02**	0.14	**0.01**	**0.00**	**0.03**	0.09	**0.03**	0.07	0.07	0.23	**0.02**	**0.01**	**0.01**	**0.02**	0.40	0.20	0.11	0.11	**0.00**
Python molurus	50.82	44.80	94.84	48.76		0.05	**0.02**	**0.01**	**0.03**	0.13	**0.02**	**0.01**	**0.01**	**0.00**	0.06	**0.00**	**0.03**	**0.00**	**0.01**	**0.00**	**0.01**	**0.00**	0.10	0.07	0.09	**0.00**	**0.00**	0.06	**0.04**	**0.02**	**0.02**	**0.00**
Python regius	79.82	38.99	56.92	41.89	60.06		0.08	0.09	0.35	0.11	0.21	0.09	**0.04**	0.18	0.26	0.07	**0.00**	0.27	0.33	0.18	0.23	0.18	0.53	**0.02**	**0.02**	0.11	0.25	0.45	0.13	0.13	0.46	0.11
Python sebae	90.93	44.99	39.89	41.26	67.49	36.43		0.17	0.41	**0.04**	0.27	0.11	**0.01**	0.08	0.16	**0.02**	**0.00**	0.18	0.23	0.17	0.24	0.24	0.44	**0.01**	**0.00**	**0.03**	**0.03**	0.49	0.67	0.76	0.70	**0.00**
Malayopython reticulatus	100.05	47.31	30.47	38.91	74.86	35.43	19.96		0.94	**0.01**	0.07	**0.03**	**0.00**	0.12	0.13	**0.02**	**0.00**	0.26	0.52	0.32	0.91	0.32	0.59	**0.00**	**0.00**	0.11	**0.04**	0.92	0.15	0.33	0.38	**0.00**
Malayopython timoriensis	97.20	49.80	34.54	38.67	77.36	38.05	30.40	15.45		0.07	0.21	0.10	0.07	0.54	0.32	0.35	**0.00**	0.56	0.66	0.53	0.88	0.41	0.61	**0.04**	**0.02**	0.45	0.34	0.86	0.39	0.56	0.50	0.10
Antaresia childreni	63.55	41.20	72.49	51.76	48.73	41.37	39.37	52.55	57.70		0.46	0.32	0.18	**0.02**	0.23	**0.01**	**0.00**	**0.04**	0.05	**0.03**	**0.02**	0.07	0.25	0.61	0.37	**0.01**	**0.02**	0.11	0.14	0.07	0.32	**0.03**
Antaresia maculosa	84.96	49.89	55.13	58.12	72.78	37.73	27.52	38.95	45.93	28.08		0.90	0.92	0.35	0.32	0.41	**0.00**	0.55	0.29	0.34	0.17	0.30	0.48	0.16	**0.05**	0.17	0.32	0.26	0.27	0.30	0.90	0.32
Antaresia perthensis	83.04	61.60	60.54	68.53	78.42	47.25	36.08	49.11	56.01	32.93	17.04		0.79	0.17	0.27	0.15	**0.00**	0.30	0.17	0.22	0.06	0.25	0.33	0.18	0.06	0.07	0.11	0.13	0.13	0.13	0.51	0.19
Antaresia stimsoni	81.70	55.42	62.23	64.38	76.80	43.73	37.36	48.90	53.78	30.30	13.50	17.26		0.07	0.24	**0.01**	**0.00**	0.12	0.12	0.13	**0.01**	0.23	0.29	**0.02**	**0.00**	**0.02**	**0.04**	0.11	**0.01**	**0.01**	0.45	0.06
Morelia bredli	96.71	54.46	38.04	55.64	87.00	34.69	30.52	28.11	29.27	51.10	29.06	37.09	33.34		0.38	0.80	**0.00**	0.84	0.74	0.87	0.32	0.53	0.51	**0.00**	**0.00**	0.61	0.63	0.44	0.05	0.16	0.65	0.15
Morelia carinata	66.42	53.23	56.77	59.58	75.47	48.15	50.83	54.25	50.42	49.29	45.22	48.82	44.58	39.07		0.21	**0.02**	0.21	0.22	0.22	0.17	0.22	0.20	0.20	0.21	0.16	0.24	0.19	0.19	0.29	0.37	0.38
Morelia spilota	99.84	53.43	38.12	55.73	84.50	35.53	25.68	25.29	31.46	46.64	22.85	31.86	30.27	12.20	45.07		**0.00**	0.91	0.68	0.85	0.22	0.49	0.57	**0.00**	**0.00**	0.36	0.25	0.42	**0.02**	0.08	0.74	**0.00**
Morelia viridis	54.43	72.08	119.35	85.64	61.94	73.40	102.80	102.46	96.41	78.33	94.01	96.51	90.47	96.72	83.45	101.42		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.04**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Simalia amethistina	99.12	54.79	42.52	54.80	83.33	32.03	27.10	24.94	29.87	46.54	24.59	32.73	31.52	15.21	49.45	10.86	95.95		0.74	0.87	0.56	0.51	0.69	**0.01**	**0.00**	0.67	0.61	0.52	0.12	0.21	0.77	0.12
Simalia boeleni	113.44	55.39	35.02	61.11	92.73	40.77	39.95	29.14	33.02	64.37	43.51	52.15	49.66	24.82	58.28	23.98	99.66	25.36		0.98	0.76	0.89	0.93	**0.02**	**0.01**	0.98	0.77	0.89	0.14	0.25	0.58	0.26
Simalia clastolepis	110.43	61.84	34.01	64.18	96.87	43.00	36.10	29.88	34.39	60.43	35.71	41.74	40.70	17.48	54.02	15.95	105.09	17.81	15.32		0.54	0.86	0.77	**0.01**	**0.00**	0.96	0.62	0.63	0.10	0.20	0.56	0.21
Simalia kinghorni	99.00	44.39	33.22	44.87	75.21	31.69	22.87	10.80	19.17	49.95	35.56	45.55	45.86	25.22	52.04	21.50	97.54	20.86	24.11	26.18		0.39	0.78	**0.00**	**0.00**	0.36	0.24	0.90	0.18	0.42	0.62	**0.02**
Simalia nauta	131.27	73.85	43.31	82.32	113.11	65.24	56.14	49.69	53.21	80.08	55.60	60.04	57.51	41.24	70.99	39.85	113.08	42.83	28.63	28.96	47.29		0.76	**0.05**	**0.03**	0.84	0.54	0.62	0.14	0.23	0.42	0.28
Simalia oenpelliensis	111.73	50.16	52.89	62.95	81.47	43.62	44.20	37.37	43.23	59.61	46.05	55.42	53.54	42.68	73.37	37.40	91.60	35.41	26.16	34.47	31.17	41.80		0.12	0.09	0.81	0.72	0.90	0.33	0.39	0.69	0.39
Bothrochilus boa	58.79	52.43	71.10	55.10	52.47	52.75	41.99	57.42	63.11	20.14	35.39	35.33	37.57	57.00	48.58	52.87	89.43	54.51	73.74	66.83	57.07	87.57	73.23		0.28	**0.00**	**0.00**	0.06	0.06	**0.02**	0.09	**0.00**
Leiopython albertisii	49.54	52.19	82.41	57.90	46.56	49.32	51.63	65.88	69.12	22.26	41.77	41.21	41.05	60.64	45.74	59.01	73.66	59.61	78.45	73.26	64.01	94.17	77.77	20.13		**0.00**	**0.00**	**0.03**	**0.00**	**0.00**	**0.04**	**0.00**
Aspidites melanocephalus	108.89	53.91	37.53	61.20	90.95	38.90	35.46	28.63	32.11	58.66	36.16	45.16	41.30	19.18	54.06	19.02	97.80	19.15	13.54	13.36	24.24	28.44	29.71	68.18	72.91		0.76	0.66	**0.02**	0.06	0.50	0.05
Aspidites ramsayi	96.17	44.25	45.32	56.57	80.03	29.68	32.42	31.37	34.57	47.29	28.66	38.79	32.82	17.58	45.37	18.89	87.58	19.16	22.99	23.06	25.63	39.89	33.18	58.75	60.22	15.21		0.49	**0.02**	0.06	0.80	0.21
Liasis fuscus	109.36	45.68	34.11	43.58	76.84	40.31	33.75	19.33	26.48	62.83	50.12	61.85	59.63	38.36	65.64	35.39	101.17	35.85	25.63	34.55	20.95	45.22	29.11	70.98	78.16	30.03	35.33		0.38	0.51	0.58	0.16
Liasis mackloti	81.64	44.42	46.16	34.68	59.05	36.26	14.30	25.38	33.45	33.94	30.82	38.70	40.73	38.06	49.48	33.25	99.23	33.97	49.24	45.48	28.57	67.84	51.76	34.12	44.51	45.75	41.29	40.10		0.80	0.49	**0.00**
Liasis olivaceus	86.60	42.30	36.18	39.91	66.85	36.25	13.01	20.10	28.16	39.17	29.66	37.99	39.31	29.89	42.95	25.90	101.43	29.02	40.73	37.38	21.79	57.83	48.30	40.66	50.24	36.82	33.16	35.01	14.19		0.74	**0.01**
Liasis papuana	89.04	39.35	44.37	49.16	70.23	30.24	19.39	27.03	34.64	34.00	17.33	29.77	25.85	22.89	43.81	17.56	93.57	20.56	32.91	29.65	23.26	49.47	37.72	43.10	48.94	26.58	18.28	36.06	26.29	20.11		0.45
Boa constrictor	81.68	46.82	53.85	64.67	78.72	33.23	40.49	44.88	47.69	40.88	25.81	31.06	25.94	25.57	36.22	27.49	81.95	29.07	37.83	33.54	38.19	51.94	46.31	50.09	49.46	31.87	20.82	51.85	45.50	38.80	24.41	

Table S5. Body shape slope angle differences. Pairwise comparisons of the angle between the slopes (direction of allometry) for body shape data in degrees (bottom triangle), and *P*-values of the difference between them computed with 10,000 iterations (upper triangle). Significant values indicating different slope angles are highlighted in green. Black boxes outline comparisons within clades.

	Python anchietae	*Python bivittatus*	*Python brongersmai*	*Python curtus*	*Python molurus*	*Python regius*	*Python sebae*	*Malayopython reticulatus*	*Malayopython timoriensis*	*Antaresia childreni*	*Antaresia maculosa*	*Antaresia perthensis*	*Antaresia stimsoni*	*Morelia bredli*	*Morelia carinata*	*Morelia spilota*	*Morelia viridis*	*Simalia amethistina*	*Simalia boeleni*	*Simalia clastolepis*	*Simalia kinghorni*	*Simalia nauta*	*Simalia oenpelliensis*	*Bothrochilus boa*	*Leiopython albertisii*	*Aspidites melanocephalus*	*Aspidites ramsayi*	*Liasis fuscus*	*Liasis mackloti*	*Liasis olivaceus*	*Liasis papuana*	*Boa constrictor*
Python anchietae		0.99	0.95	0.95	0.95	1.00	0.95	0.84	0.65	0.73	0.13	0.75	0.71	**0.04**	0.37	0.05	0.77	0.21	0.14	0.15	0.53	**0.03**	**0.01**	0.87	0.95	0.13	0.42	0.13	0.56	0.07	0.84	0.82
Python bivittatus	10.09		0.75	0.61	0.94	0.99	0.54	0.52	0.44	0.25	**0.00**	0.37	0.11	**0.00**	0.15	**0.00**	0.26	**0.02**	**0.01**	**0.01**	0.05	**0.01**	**0.00**	0.35	0.86	**0.00**	**0.04**	**0.04**	**0.04**	**0.00**	0.69	0.47
Python brongersmai	20.67	29.40		0.94	0.71	0.86	0.82	0.70	0.58	0.74	0.27	0.71	0.76	0.15	0.47	0.20	0.59	0.44	0.41	0.42	0.83	0.09	**0.01**	0.78	0.70	0.27	0.54	0.32	0.74	0.20	0.73	0.64
Python curtus	14.49	19.07	18.86		0.78	0.79	0.24	0.15	0.21	0.10	**0.00**	0.13	**0.04**	**0.00**	0.08	**0.00**	0.07	**0.01**	**0.02**	**0.01**	0.12	**0.01**	**0.00**	0.12	0.21	**0.00**	**0.01**	0.07	**0.03**	**0.00**	0.85	0.08
Python molurus	17.56	13.41	35.01	20.72		0.90	0.62	0.49	0.33	0.36	**0.03**	0.35	0.23	**0.00**	0.12	**0.00**	0.44	0.05	**0.03**	**0.02**	0.24	**0.01**	**0.01**	0.38	0.72	0.05	0.14	0.07	0.19	**0.01**	0.96	0.40
Python regius	6.28	5.82	23.89	15.45	15.28		0.72	0.57	0.42	0.36	**0.01**	0.46	0.20	**0.00**	0.16	**0.00**	0.29	**0.03**	**0.02**	**0.01**	0.13	**0.01**	**0.00**	0.48	0.84	**0.00**	0.08	0.06	0.10	**0.00**	0.73	0.49
Python sebae	13.83	17.79	25.16	26.64	24.08	15.21		0.91	0.30	0.84	**0.03**	0.76	0.61	**0.00**	0.25	**0.00**	0.63	0.09	0.06	**0.04**	0.22	**0.02**	**0.01**	0.83	0.78	**0.01**	0.23	0.06	0.40	**0.00**	0.38	0.33
Malayopython reticulatus	20.63	20.99	32.11	34.17	29.86	20.30	10.24		0.52	0.91	0.07	0.98	0.83	**0.01**	0.40	**0.00**	0.70	0.14	0.07	0.06	0.14	**0.02**	**0.01**	0.95	0.88	**0.02**	0.60	0.06	0.38	**0.01**	0.25	0.81
Malayopython timoriensis	32.00	30.06	41.55	41.15	42.73	31.68	33.96	28.37		0.27	**0.02**	0.58	0.34	**0.03**	0.64	**0.01**	0.32	0.05	**0.04**	**0.04**	**0.04**	**0.01**	**0.00**	0.54	0.48	**0.01**	0.18	**0.03**	0.10	**0.01**	0.18	0.76
Antaresia childreni	25.05	28.21	29.90	36.55	34.79	25.57	12.02	11.03	37.29		0.20	0.94	0.93	**0.02**	0.38	**0.01**	0.49	0.37	0.17	0.18	0.38	**0.05**	**0.02**	0.77	0.46	0.09	0.86	0.12	0.82	**0.03**	0.21	0.32
Antaresia maculosa	56.69	60.48	54.30	66.05	63.70	57.75	43.55	42.07	64.74	32.85		0.12	0.06	0.23	0.23	0.78	**0.03**	0.96	0.62	0.70	0.14	0.32	0.12	**0.02**	**0.00**	0.57	0.27	0.25	0.24	0.96	**0.02**	**0.00**
Antaresia perthensis	24.76	26.19	31.56	37.19	36.31	24.65	15.11	7.61	27.22	10.78	39.62		0.96	**0.03**	0.54	**0.01**	0.53	0.24	0.12	0.14	0.17	**0.04**	**0.01**	0.94	0.67	**0.03**	0.81	0.08	0.46	**0.02**	0.19	0.79
Antaresia stimsoni	24.18	28.63	27.52	36.15	37.49	25.97	13.73	11.55	31.50	8.84	36.51	8.27		**0.00**	0.49	**0.00**	0.35	0.21	0.13	0.12	0.12	**0.03**	**0.01**	0.87	0.21	**0.01**	0.51	0.07	0.48	**0.00**	0.12	0.18
Morelia bredli	68.31	70.35	63.02	76.81	79.01	67.86	57.48	51.80	61.29	45.88	31.26	45.52	46.07		0.30	0.20	**0.00**	0.34	0.31	0.40	**0.00**	0.45	0.12	**0.00**	**0.00**	**0.01**	0.05	0.21	**0.00**	0.07	**0.00**	**0.00**
Morelia carinata	49.86	53.33	49.55	60.63	64.64	52.35	44.02	38.33	32.93	39.51	48.10	33.21	32.03	42.77		0.15	**0.34**	0.33	0.32	0.38	0.11	0.11	**0.03**	0.46	0.22	0.05	0.38	0.06	0.28	0.16	0.06	0.34
Morelia spilota	62.36	66.74	55.65	69.98	71.41	63.25	50.32	48.66	68.07	39.01	12.86	44.42	41.47	23.23	48.98		**0.00**	0.88	0.69	0.79	**0.01**	0.43	0.10	**0.00**	**0.00**	0.07	**0.01**	0.30	**0.00**	0.55	**0.00**	**0.00**
Morelia viridis	22.54	25.26	35.60	36.30	29.96	25.42	14.96	15.80	33.85	20.15	44.89	20.96	18.86	61.22	39.65	53.94		0.06	**0.05**	**0.03**	0.05	**0.01**	**0.01**	0.63	0.42	**0.00**	0.10	**0.03**	0.22	**0.00**	0.20	0.18
Simalia amethistina	51.66	56.72	45.80	59.66	61.24	53.10	39.74	39.23	60.43	29.05	10.79	35.60	31.47	29.67	44.22	11.44	43.48		0.83	0.94	0.34	0.32	0.08	0.09	**0.02**	0.54	0.45	0.33	0.49	0.88	**0.04**	**0.02**
Simalia boeleni	62.99	70.59	50.37	67.66	74.97	65.96	54.03	55.55	71.88	45.61	27.50	51.28	45.25	37.50	49.37	21.27	57.02	21.01		0.97	0.29	0.51	0.08	0.06	**0.02**	0.30	0.17	0.43	0.28	0.73	**0.03**	**0.02**
Simalia clastolepis	57.01	63.36	46.74	63.49	69.26	59.15	46.89	46.62	62.91	37.00	21.01	41.64	36.77	28.25	42.11	14.17	50.59	12.52	11.75		0.21	0.40	0.06	**0.05**	**0.01**	0.22	0.21	0.34	0.25	0.69	**0.02**	**0.01**
Simalia kinghorni	32.27	38.96	24.97	34.64	39.37	34.00	26.34	33.50	56.79	24.66	36.00	33.82	28.77	54.77	56.62	39.30	36.47	29.74	38.10	35.20		0.08	**0.01**	0.07	**0.03**	0.21	0.12	0.31	0.53	**0.03**	0.28	**0.01**
Simalia nauta	102.55	106.69	90.46	106.06	110.27	102.71	91.82	90.01	104.37	80.62	52.14	84.96	82.93	43.80	80.40	42.40	96.24	53.23	46.19	48.72	74.55		0.59	**0.02**	**0.01**	0.22	0.08	0.64	0.06	0.35	**0.01**	**0.01**
Simalia oenpelliensis	126.99	124.15	129.72	134.86	120.79	124.73	114.45	110.25	125.50	105.41	77.99	109.56	110.92	77.45	108.80	77.42	112.30	86.59	89.09	89.67	106.27	52.52		**0.01**	**0.00**	0.11	**0.03**	0.21	**0.02**	0.12	**0.01**	**0.00**
Bothrochilus boa	18.06	21.55	27.16	31.47	31.48	19.91	10.54	8.24	25.69	13.67	44.30	9.40	8.71	53.45	34.14	50.02	14.62	39.96	53.41	45.35	33.07	91.54	116.39		0.65	**0.00**	0.25	**0.04**	0.24	**0.00**	0.20	0.63
Leiopython albertisii	13.36	10.59	30.56	26.68	20.75	11.57	11.17	10.66	26.76	19.57	51.72	16.63	19.91	61.49	45.24	58.39	17.95	48.61	63.93	55.75	36.44	99.35	117.26	12.94		**0.00**	0.08	**0.04**	**0.05**	**0.00**	0.39	0.74
Aspidites melanocephalus	53.68	56.85	52.28	59.76	55.41	53.91	42.38	44.57	72.01	35.03	20.33	44.86	42.00	46.67	64.27	27.12	47.13	23.50	37.10	34.01	28.20	58.18	78.50	48.12	51.04		0.06	0.37	0.10	0.29	**0.05**	**0.00**
Aspidites ramsayi	35.22	36.74	38.17	46.21	44.11	34.64	22.91	17.77	39.85	11.49	27.56	13.91	15.47	35.45	37.64	32.19	28.93	24.64	43.45	32.94	30.92	72.47	97.22	21.71	27.51	33.82		0.13	0.36	**0.03**	0.07	0.06
Liasis fuscus	75.61	78.97	63.17	72.16	78.59	74.36	70.81	73.82	92.37	64.64	53.84	71.14	69.44	55.23	87.14	46.51	82.79	50.00	48.63	49.59	48.69	44.37	79.43	75.72	77.64	45.15	61.54		0.12	0.22	0.12	**0.03**
Liasis mackloti	29.74	35.76	29.18	39.15	39.66	32.20	18.19	21.79	46.31	12.27	27.95	21.59	15.17	47.38	41.90	34.57	23.15	23.26	36.82	30.67	17.85	76.06	104.03	21.20	28.76	29.42	19.21	61.23		**0.04**	0.13	**0.01**
Liasis olivaceus	61.44	66.46	56.67	69.89	69.20	63.30	48.96	48.58	70.39	38.99	8.82	46.00	41.65	34.26	50.27	13.12	49.51	13.19	21.58	18.76	38.17	48.30	77.06	49.61	58.05	23.26	34.96	53.41	31.76		**0.01**	**0.00**
Liasis papuana	24.64	23.48	34.16	18.07	14.39	22.65	33.03	40.43	52.42	42.73	69.41	45.58	45.84	84.53	74.40	75.30	41.89	65.61	76.51	72.46	38.82	109.42	123.80	41.23	32.05	57.68	51.85	71.40	45.59	74.02		0.19
Boa constrictor	19.47	17.27	32.54	31.75	29.66	18.02	17.35	11.64	18.21	21.42	52.51	13.28	18.81	56.61	38.11	57.62	22.05	48.75	63.57	54.39	41.44	97.45	118.05	12.18	9.96	55.57	26.28	79.67	31.89	58.98	40.07	

Table S6. Head shape slope length differences. Pairwise comparisons of the differences in slope length, i.e., amount of shape change per unit of log centroid size change (bottom triangle), and *P*-values of the difference between them computed with 10,000 iterations (upper triangle). Significant values denoting differences in magnitude of shape change per unit of size are highlighted in green. Black boxes outline comparisons within clades.

	Python anchietae	*Python bivittatus*	*Python brongersmai*	*Python curtus*	*Python molurus*	*Python regius*	*Python sebae*	*Malayopython reticulatus*	*Malayopython timoriensis*	*Antaresia childreni*	*Antaresia maculosa*	*Antaresia perthensis*	*Antaresia stimsoni*	*Morelia bredli*	*Morelia carinata*	*Morelia spilota*	*Morelia viridis*	*Simalia amethistina*	*Simalia boeleni*	*Simalia clastolepis*	*Simalia kinghorni*	*Simalia tasmanica*	*Simalia nauta*	*Simalia oenpelliensis*	*Bothrochilus boa*	*Leiopython albertisii*	*Aspidites melanocephalus*	*Aspidites ramsayi*	*Liasis fuscus*	*Liasis mackloti*	*Liasis olivaceus*	*Liasis papuana*	*Boa constrictor*
Python anchietae		0.59	0.73	0.48	0.90	0.54	0.93	0.87	0.70	0.70	0.87	0.94	0.87	0.29	0.88	0.60	0.46	0.56	0.17	0.09	0.64	**0.00**	0.68	0.56	0.49	0.26	0.43	0.12	0.98	0.77	0.89	0.68
Python bivittatus	0.04		0.44	0.75	0.51	0.87	0.13	0.10	0.83	0.76	0.21	0.41	0.11	**0.00**	0.35	**0.01**	0.63	**0.03**	**0.01**	**0.00**	**0.04**	**0.00**	0.36	0.93	0.70	**0.00**	**0.00**	**0.02**	0.22	0.07	0.48	0.71
Python brongersmai	0.03	0.07		0.36	0.64	0.40	0.77	0.82	0.50	0.51	0.83	0.67	0.82	0.56	0.83	0.95	0.36	0.90	0.37	0.23	0.99	**0.01**	0.96	0.43	0.39	0.51	0.75	0.28	0.73	0.90	0.64	0.51
Python curtus	0.06	0.01	0.09		0.40	0.88	0.13	0.10	0.65	0.57	0.16	0.31	0.10	**0.00**	0.28	**0.02**	0.94	**0.03**	**0.01**	**0.00**	**0.05**	**0.00**	0.29	0.79	0.94	**0.00**	**0.01**	**0.01**	0.18	0.07	0.37	0.51
Python molurus	0.01	0.03	0.04	0.05		0.46	0.71	0.63	0.73	0.70	0.67	0.94	0.64	0.06	0.72	0.28	0.32	0.28	**0.05**	**0.01**	0.37	**0.00**	0.57	0.47	0.34	0.05	0.15	**0.04**	0.80	0.51	0.99	0.64
Python regius	0.05	0.01	0.08	0.01	0.04		0.14	0.11	0.74	0.67	0.20	0.37	0.13	**0.00**	0.32	**0.02**	0.79	**0.03**	**0.01**	**0.00**	**0.05**	**0.00**	0.32	0.93	0.89	**0.00**	**0.01**	**0.02**	0.22	0.09	0.45	0.62
Python sebae	0.01	0.05	0.03	0.06	0.02	0.05		0.84	0.44	0.31	0.87	0.75	0.83	**0.01**	0.91	0.13	**0.03**	0.26	0.06	**0.00**	0.37	**0.00**	0.69	0.09	**0.01**	**0.01**	0.05	0.06	0.88	0.62	0.66	0.12
Malayopython reticulatus	0.01	0.05	0.02	0.07	0.02	0.06	0.01		0.38	0.25	0.97	0.65	0.99	**0.02**	0.98	0.22	**0.02**	0.32	0.07	**0.00**	0.47	**0.00**	0.73	0.06	**0.01**	**0.01**	0.08	0.07	0.74	0.75	0.58	0.08
Malayopython timoriensis	0.03	0.01	0.06	0.03	0.02	0.02	0.04	0.04		0.98	0.43	0.67	0.38	**0.04**	0.51	0.17	0.57	0.17	**0.03**	**0.00**	0.22	**0.00**	0.43	0.78	0.62	**0.03**	0.09	**0.03**	0.51	0.31	0.72	1.00
Antaresia childreni	0.03	0.01	0.06	0.03	0.02	0.02	0.04	0.04	0.00		0.35	0.60	0.26	**0.00**	0.48	0.05	0.45	0.08	**0.02**	**0.00**	0.11	**0.00**	0.43	0.70	0.49	**0.00**	**0.02**	**0.03**	0.43	0.19	0.69	0.98
Antaresia maculosa	0.01	0.05	0.02	0.07	0.02	0.06	0.01	0.00	0.04	0.04		0.69	0.98	0.09	1.00	0.48	0.09	0.47	0.08	**0.01**	0.61	**0.00**	0.76	0.17	0.09	0.06	0.24	0.08	0.79	0.84	0.63	0.25
Antaresia perthensis	0.01	0.04	0.04	0.05	0.00	0.04	0.01	0.02	0.02	0.02	0.02		0.65	**0.04**	0.75	0.23	0.21	0.25	**0.04**	**0.00**	0.34	**0.00**	0.59	0.35	0.22	**0.03**	0.10	0.05	0.85	0.52	0.93	0.52
Antaresia stimsoni	0.01	0.05	0.02	0.07	0.02	0.06	0.01	0.00	0.04	0.04	0.00	0.02		**0.02**	0.99	0.28	**0.03**	0.35	0.07	**0.00**	0.49	**0.00**	0.74	0.08	**0.01**	**0.02**	0.11	0.08	0.74	0.77	0.58	0.10
Morelia bredli	0.09	0.13	0.05	0.14	0.10	0.14	0.08	0.08	0.12	0.12	0.07	0.09	0.08		0.22	0.09	**0.00**	0.27	0.55	0.16	0.15	**0.02**	0.54	**0.00**	**0.00**	0.86	0.46	0.42	**0.02**	0.06	**0.03**	**0.00**
Morelia carinata	0.01	0.05	0.02	0.07	0.02	0.06	0.01	0.00	0.04	0.04	0.00	0.02	0.00	0.07		0.61	**0.24**	0.58	0.13	**0.04**	0.69	**0.00**	0.76	0.33	0.26	0.19	0.38	0.11	0.84	0.88	0.70	0.43
Morelia spilota	0.04	0.08	0.01	0.09	0.05	0.09	0.03	0.03	0.07	0.07	0.03	0.04	0.03	0.05	0.03		**0.00**	0.84	0.14	**0.02**	0.88	**0.01**	0.99	**0.00**	**0.00**	0.06	0.38	0.14	0.18	0.51	0.21	**0.00**
Morelia viridis	0.06	0.02	0.09	0.00	0.05	0.01	0.06	0.07	0.03	0.03	0.07	0.05	0.07	0.15	0.07	0.10		**0.01**	**0.00**	**0.00**	**0.01**	**0.00**	0.28	0.67	0.84	**0.00**	**0.00**	**0.01**	0.08	**0.02**	0.28	0.32
Simalia amethistina	0.04	0.09	0.01	0.10	0.05	0.09	0.04	0.03	0.08	0.07	0.03	0.05	0.03	0.04	0.03	0.01	0.10		0.19	**0.03**	0.77	**0.01**	0.92	**0.02**	**0.01**	0.20	0.64	0.17	0.25	0.51	0.23	**0.03**
Simalia boeleni	0.12	0.16	0.09	0.17	0.13	0.17	0.11	0.11	0.15	0.15	0.11	0.12	0.11	0.03	0.11	0.08	0.18	0.07		0.55	0.14	**0.03**	0.35	**0.01**	**0.01**	0.63	0.28	0.79	**0.05**	0.09	**0.04**	**0.01**
Simalia clastolepis	0.15	0.19	0.12	0.21	0.16	0.20	0.15	0.14	0.18	0.18	0.14	0.16	0.14	0.07	0.14	0.11	0.21	0.11	0.03		**0.02**	0.08	0.21	**0.00**	**0.00**	0.21	**0.05**	0.81	**0.00**	**0.01**	**0.00**	**0.00**
Simalia kinghorni	0.03	0.08	0.00	0.09	0.04	0.08	0.03	0.02	0.06	0.06	0.02	0.04	0.02	0.05	0.02	0.00	0.09	0.01	0.08	0.12		**0.01**	0.96	**0.02**	**0.01**	0.10	0.42	0.13	0.35	0.71	0.31	**0.04**
Simalia tasmanica nauta	0.32	0.36	0.29	0.37	0.33	0.37	0.31	0.31	0.35	0.35	0.31	0.33	0.31	0.23	0.31	0.28	0.38	0.27	0.20	0.17	0.29		**0.01**	**0.00**	**0.00**	**0.02**	**0.01**	0.05	**0.00**	**0.00**	**0.00**	**0.00**
Simalia oenpelliensis	0.04	0.08	0.00	0.09	0.05	0.09	0.03	0.03	0.07	0.07	0.02	0.04	0.03	0.05	0.03	0.00	0.10	0.01	0.08	0.11	0.00	0.28		0.34	0.31	0.49	0.76	0.26	0.65	0.83	0.56	0.42
Bothrochilus boa	0.04	0.00	0.08	0.01	0.03	0.00	0.05	0.06	0.01	0.01	0.06	0.04	0.06	0.13	0.06	0.08	0.01	0.09	0.16	0.20	0.08	0.36	0.08		0.77	**0.00**	**0.00**	**0.02**	0.17	0.05	0.43	0.61
Leiopython albertisii	0.05	0.01	0.09	0.00	0.04	0.00	0.06	0.06	0.02	0.02	0.07	0.05	0.06	0.14	0.07	0.09	0.01	0.10	0.17	0.21	0.09	0.37	0.09	0.01		**0.00**	**0.00**	**0.01**	0.06	**0.01**	0.29	0.30
Aspidites melanocephalus	0.09	0.14	0.06	0.15	0.10	0.14	0.09	0.08	0.12	0.12	0.08	0.10	0.08	0.01	0.08	0.06	0.15	0.05	0.02	0.06	0.06	0.23	0.06	0.14	0.15		0.34	0.48	**0.01**	**0.04**	**0.03**	**0.00**
Aspidites ramsayi	0.06	0.10	0.03	0.12	0.07	0.11	0.06	0.05	0.09	0.09	0.05	0.07	0.05	0.03	0.05	0.02	0.12	0.02	0.06	0.09	0.03	0.26	0.02	0.11	0.11	0.03		0.23	0.07	0.21	0.10	**0.00**
Liasis fuscus	0.14	0.18	0.10	0.19	0.15	0.18	0.13	0.13	0.17	0.17	0.12	0.14	0.12	0.05	0.12	0.10	0.20	0.09	0.02	0.02	0.10	0.18	0.10	0.18	0.19	0.04	0.08		0.06	0.09	**0.04**	**0.02**
Liasis mackloti	0.00	0.04	0.03	0.06	0.01	0.05	0.00	0.01	0.03	0.03	0.01	0.01	0.01	0.09	0.01	0.04	0.06	0.04	0.12	0.15	0.03	0.32	0.04	0.05	0.05	0.09	0.06	0.13		0.57	0.77	0.27
Liasis olivaceus	0.02	0.06	0.01	0.08	0.03	0.07	0.01	0.01	0.05	0.05	0.01	0.03	0.01	0.07	0.01	0.02	0.08	0.02	0.10	0.13	0.01	0.30	0.02	0.07	0.07	0.07	0.04	0.12	0.02		0.46	0.07
Liasis papuana	0.01	0.03	0.04	0.04	0.00	0.04	0.02	0.02	0.02	0.02	0.02	0.00	0.02	0.10	0.02	0.05	0.05	0.06	0.13	0.16	0.04	0.33	0.05	0.03	0.04	0.10	0.07	0.15	0.01	0.03		0.61
Boa constrictor	0.03	0.01	0.06	0.03	0.02	0.02	0.04	0.04	0.00	0.00	0.04	0.02	0.04	0.12	0.04	0.07	0.03	0.08	0.15	0.18	0.06	0.35	0.07	0.01	0.02	0.12	0.09	0.17	0.03	0.05	0.02	

Table S7. Body shape slope length differences. Pairwise comparisons of the differences in slope length, i.e., amount of shape change per unit of log centroid size change (bottom triangle), and *P*-values of the difference between them computed with 10,000 iterations (upper triangle). Significant values denoting differences in magnitude of shape change per unit of size are highlighted in green. Black boxes outline comparisons within clades.

	Python anchietae	*Python bivittatus*	*Python brongersmai*	*Python curtus*	*Python molurus*	*Python regius*	*Python sebae*	*Malayopython reticulatus*	*Malayopython timoriensis*	*Antaresia childreni*	*Antaresia maculosa*	*Antaresia perthensis*	*Antaresia stimsoni*	*Morelia bredli*	*Morelia carinata*	*Morelia spilota*	*Morelia viridis*	*Simalia amethistina*	*Simalia boeleni*	*Simalia clastolepis*	*Simalia kinghorni*	*Simalia nauta*	*Simalia oenpelliensis*	*Bothrochilus boa*	*Leiopython albertisii*	*Aspidites melanocephalus*	*Aspidites ramsayi*	*Liasis fuscus*	*Liasis mackloti*	*Liasis olivaceus*	*Liasis papuana*	*Boa constrictor*
Python anchietae		**0.03**	0.36	0.90	0.30	0.97	**0.04**	**0.02**	0.06	**0.03**	**0.01**	**0.03**	0.10	**0.00**	**0.01**	**0.00**	**0.03**	**0.01**	0.06	**0.02**	**0.01**	0.28	0.54	0.12	**0.00**	**0.01**	**0.00**	0.20	**0.04**	**0.02**	**0.02**	**0.01**
Python bivittatus	0.28		0.44	**0.00**	0.16	**0.00**	0.81	0.59	0.84	0.96	0.23	0.95	0.17	**0.01**	0.31	**0.00**	0.97	0.18	0.85	0.73	0.27	0.57	0.48	0.13	**0.00**	0.08	**0.01**	0.63	0.93	0.47	0.50	0.23
Python brongersmai	0.16	0.12		0.36	0.90	0.34	0.49	0.32	0.51	0.45	0.21	0.43	0.78	0.09	0.17	0.09	0.44	0.18	0.53	0.35	0.24	0.88	0.89	0.83	0.08	0.16	0.12	0.79	0.46	0.31	0.25	0.26
Python curtus	0.01	0.27	0.15		0.21	0.89	**0.00**	**0.00**	**0.02**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.02**	**0.00**	**0.00**	0.30	0.59	**0.01**	**0.00**	**0.00**	**0.00**	0.20	**0.00**	**0.00**	**0.00**	**0.00**
Python molurus	0.14	0.14	0.02	0.13		0.18	0.19	0.08	0.29	0.17	**0.03**	0.16	0.50	**0.00**	0.06	**0.00**	0.14	**0.02**	0.31	0.12	**0.03**	0.77	0.96	0.58	**0.00**	**0.01**	**0.01**	0.65	0.16	0.06	0.08	**0.03**
Python regius	0.01	0.28	0.16	0.01	0.14		**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.02**	**0.00**	**0.00**	0.28	0.57	**0.00**	**0.00**	**0.00**	**0.00**	0.19	**0.00**	**0.00**	**0.00**	**0.00**
Python sebae	0.27	0.01	0.11	0.25	0.13	0.26		0.41	0.96	0.86	0.14	0.79	0.19	**0.00**	0.26	**0.00**	0.77	0.11	0.96	0.59	0.15	0.63	0.53	0.15	**0.00**	**0.03**	**0.00**	0.69	0.85	0.28	0.41	0.08
Malayopython reticulatus	0.32	0.04	0.16	0.31	0.18	0.32	0.05		0.56	0.57	0.51	0.65	0.05	**0.03**	0.49	**0.01**	0.58	0.39	0.58	0.91	0.62	0.43	0.39	**0.04**	**0.01**	0.24	0.08	0.46	0.49	0.92	0.76	0.63
Malayopython timoriensis	0.26	0.02	0.10	0.25	0.12	0.26	0.00	0.06		0.87	0.29	0.82	0.51	**0.04**	0.30	**0.03**	0.81	0.22	1.00	0.66	0.33	0.65	0.53	0.45	**0.03**	0.16	0.08	0.72	0.88	0.49	0.45	0.34
Antaresia childreni	0.28	0.00	0.12	0.26	0.14	0.27	0.01	0.04	0.02		0.23	0.93	0.21	**0.01**	0.31	**0.00**	0.93	0.18	0.87	0.71	0.26	0.59	0.49	0.16	**0.00**	0.07	**0.02**	0.64	0.97	0.45	0.48	0.23
Antaresia maculosa	0.37	0.09	0.21	0.36	0.23	0.37	0.10	0.05	0.11	0.09		0.29	**0.01**	0.18	0.79	0.12	0.23	0.81	0.31	0.50	0.85	0.28	0.29	**0.01**	0.09	0.69	0.38	0.29	0.17	0.53	0.85	0.73
Antaresia perthensis	0.29	0.00	0.13	0.27	0.15	0.28	0.02	0.03	0.02	0.01	0.08		0.21	**0.01**	0.35	**0.01**	0.98	0.22	0.82	0.78	0.35	0.56	0.47	0.17	**0.00**	0.12	**0.03**	0.61	0.89	0.56	0.54	0.34
Antaresia stimsoni	0.20	0.08	0.04	0.19	0.06	0.20	0.06	0.12	0.06	0.08	0.17	0.08		**0.00**	0.11	**0.00**	0.11	**0.02**	0.53	0.16	**0.01**	0.93	0.73	0.82	**0.00**	**0.00**	**0.00**	0.97	0.12	**0.01**	0.14	**0.00**
Morelia bredli	0.47	0.19	0.31	0.45	0.33	0.46	0.20	0.15	0.21	0.19	0.10	0.18	0.27		0.58	0.99	**0.00**	0.34	0.06	0.06	0.10	0.11	0.16	**0.00**	0.78	0.28	0.54	0.10	**0.00**	**0.02**	0.25	**0.03**
Morelia carinata	0.40	0.12	0.24	0.39	0.26	0.40	0.13	0.08	0.14	0.12	0.03	0.12	0.20	0.07		0.56	**0.33**	0.93	0.30	0.47	0.70	0.22	0.22	0.09	0.47	0.98	0.79	0.24	0.29	0.51	0.71	0.63
Morelia spilota	0.47	0.19	0.31	0.45	0.33	0.46	0.20	0.15	0.21	0.19	0.10	0.18	0.27	0.00	0.07		**0.00**	0.29	0.05	**0.04**	**0.04**	0.12	0.17	**0.00**	0.67	0.17	0.42	0.10	**0.00**	**0.00**	0.23	**0.00**
Morelia viridis	0.28	0.00	0.12	0.27	0.14	0.28	0.02	0.04	0.02	0.01	0.09	0.00	0.08	0.18	0.12	0.18		0.18	0.82	0.74	0.26	0.57	0.48	0.09	**0.00**	0.05	**0.01**	0.61	0.89	0.45	0.50	0.19
Simalia amethistina	0.39	0.11	0.23	0.38	0.25	0.39	0.12	0.07	0.13	0.11	0.02	0.11	0.19	0.08	0.01	0.08	0.11		0.24	0.38	0.66	0.23	0.25	**0.01**	0.22	0.93	0.60	0.24	0.14	0.41	0.71	0.55
Simalia boeleni	0.26	0.02	0.10	0.25	0.12	0.26	0.01	0.06	0.00	0.02	0.11	0.02	0.06	0.21	0.14	0.21	0.02	0.13		0.65	0.36	0.66	0.53	0.47	**0.04**	0.19	0.10	0.73	0.88	0.52	0.47	0.37
Simalia clastolepis	0.31	0.03	0.15	0.30	0.17	0.31	0.04	0.01	0.05	0.03	0.06	0.02	0.11	0.16	0.09	0.16	0.03	0.08	0.05		0.59	0.47	0.41	0.13	**0.03**	0.29	0.13	0.50	0.67	0.84	0.71	0.62
Simalia kinghorni	0.36	0.07	0.20	0.34	0.22	0.35	0.09	0.04	0.09	0.08	0.01	0.07	0.15	0.11	0.05	0.11	0.07	0.04	0.09	0.05		0.32	0.32	**0.01**	**0.03**	0.51	0.21	0.34	0.19	0.64	0.96	0.90
Simalia nauta	0.19	0.09	0.03	0.17	0.05	0.18	0.08	0.13	0.08	0.09	0.18	0.10	0.02	0.28	0.21	0.28	0.10	0.20	0.07	0.12	0.17		0.78	0.98	0.10	0.22	0.16	0.91	0.60	0.41	0.34	0.35
Simalia oenpelliensis	0.13	0.15	0.03	0.11	0.01	0.12	0.14	0.19	0.13	0.15	0.24	0.16	0.07	0.34	0.27	0.34	0.16	0.26	0.13	0.18	0.23	0.06		0.77	0.15	0.25	0.21	0.71	0.51	0.38	0.30	0.34
Bothrochilus boa	0.19	0.09	0.03	0.18	0.05	0.19	0.07	0.13	0.07	0.09	0.18	0.09	0.01	0.28	0.21	0.28	0.09	0.20	0.07	0.12	0.16	0.00	0.06		**0.00**	**0.00**	**0.00**	0.91	0.10	**0.01**	0.12	**0.00**
Leiopython albertisii	0.49	0.20	0.33	0.47	0.35	0.48	0.22	0.17	0.22	0.21	0.11	0.20	0.28	0.02	0.08	0.02	0.20	0.09	0.22	0.17	0.13	0.30	0.36	0.29		0.13	0.30	0.08	**0.00**	**0.00**	0.18	**0.00**
Aspidites melanocephalus	0.40	0.12	0.24	0.39	0.26	0.39	0.13	0.08	0.14	0.12	0.03	0.11	0.20	0.07	0.00	0.07	0.11	0.01	0.14	0.09	0.04	0.21	0.27	0.21	0.09		0.57	0.22	**0.04**	0.22	0.64	0.33
Aspidites ramsayi	0.43	0.15	0.27	0.42	0.29	0.43	0.16	0.11	0.17	0.15	0.06	0.15	0.23	0.04	0.03	0.04	0.15	0.04	0.17	0.12	0.08	0.24	0.30	0.24	0.05	0.03		0.15	**0.00**	0.05	0.42	0.08
Liasis fuscus	0.21	0.07	0.05	0.19	0.07	0.20	0.06	0.11	0.05	0.07	0.16	0.08	0.01	0.26	0.19	0.26	0.08	0.18	0.05	0.10	0.15	0.02	0.08	0.02	0.28	0.19	0.22		0.65	0.44	0.36	0.36
Liasis mackloti	0.28	0.01	0.12	0.26	0.14	0.27	0.01	0.04	0.01	0.00	0.09	0.01	0.07	0.19	0.13	0.19	0.01	0.12	0.01	0.03	0.08	0.09	0.15	0.08	0.21	0.12	0.16	0.07		0.34	0.46	0.11
Liasis olivaceus	0.33	0.04	0.17	0.31	0.19	0.32	0.06	0.01	0.06	0.05	0.04	0.04	0.12	0.14	0.08	0.14	0.04	0.07	0.06	0.02	0.03	0.14	0.20	0.13	0.16	0.07	0.11	0.12	0.05		0.81	0.65
Liasis papuana	0.35	0.07	0.19	0.34	0.21	0.35	0.08	0.03	0.09	0.07	0.02	0.07	0.15	0.12	0.05	0.12	0.07	0.04	0.09	0.04	0.00	0.16	0.22	0.16	0.13	0.05	0.08	0.14	0.07	0.02		0.98
Boa constrictor	0.35	0.07	0.19	0.33	0.21	0.34	0.08	0.03	0.09	0.07	0.02	0.06	0.14	0.12	0.05	0.12	0.06	0.04	0.09	0.04	0.01	0.16	0.22	0.16	0.14	0.05	0.08	0.14	0.07	0.02	0.00	

Table S8. Head shape intercept differences. Pairwise differences in the intercept of the allometric regressions (bottom triangle), and the Benjamini-Hochberg corrected *P*-values of the difference between them computed with 10,000 iterations (upper triangle). This test only applies to pairs of taxa for which the null hypothesis of common slopes has not been rejected. Cells highlighted in green correspond to species where they have a common slope but different intercept (parallel allometric trajectories). Black boxes outline comparisons within clades.

	Python anchietae	*Python bivittatus*	*Python brongersmai*	*Python curtus*	*Python molurus*	*Python regius*	*Python sebae*	*Malayopython reticulatus*	*Malayopython timoriensis*	*Antaresia childreni*	*Antaresia maculosa*	*Antaresia perthensis*	*Antaresia stimsoni*	*Morelia bredli*	*Morelia carinata*	*Morelia spilota*	*Morelia viridis*	*Simalia amethistina*	*Simalia boeleni*	*Simalia clastolepis*	*Simalia kinghorni*	*Simalia nauta*	*Simalia oenpelliensis*	*Bothrochilus boa*	*Leiopython albertisii*	*Aspidites melanocephalus*	*Aspidites ramsayi*	*Liasis fuscus*	*Liasis mackloti*	*Liasis olivaceus*	*Liasis papuana*	*Boa constrictor*
Python anchietae	-	0.39	-	0.41	0.75	0.31	-	-	-	0.28	0.40	0.30	0.16	-	0.84	-	0.60	-	-	-	-	-	-	0.55	0.38	-	-	-	0.24	-	-	0.28
Python bivittatus	0.19	-	0.68	0.41	0.59	0.59	-	-	0.73	0.54	-	-	-	-	0.68	-	-	-	0.45	-	-	**0.03**	0.58	-	-	-	-	0.19	-	-	0.73	-
Python brongersmai	-	0.21	-	0.63	0.43	0.72	0.90	0.95	0.92	0.52	0.66	0.59	0.60	0.86	0.76	0.83	-	0.82	0.91	0.81	0.90	0.51	0.82	0.64	0.68	0.82	0.80	0.82	0.85	0.94	0.80	0.81
Python curtus	0.18	0.11	0.19	-	0.60	0.59	0.22	0.19	0.86	-	-	-	-	-	0.60	-	-	-	0.41	-	0.10	**0.04**	0.50	-	-	-	-	0.30	0.31	0.20	0.41	-
Python molurus	0.15	0.11	0.28	0.12	-	0.49	-	-	-	0.41	-	-	-	-	0.76	-	-	-	-	-	-	-	0.36	0.59	0.45	-	-	0.08	-	-	-	-
Python regius	0.18	0.08	0.19	0.09	0.13	-	0.33	0.20	0.91	0.60	0.65	0.51	-	0.48	0.72	0.42	-	0.15	0.48	0.11	0.16	**0.02**	0.57	-	-	0.51	0.44	0.33	0.59	0.31	0.66	0.60
Python sebae	-	-	0.15	0.15	-	0.12	-	0.55	0.77	-	0.30	**0.04**	-	0.65	0.51	-	-	0.61	0.75	0.39	0.65	0.16	0.81	-	-	-	-	0.41	0.83	0.80	0.65	-
Malayopython reticulatus	-	-	0.12	0.15	-	0.13	0.07	-	0.78	-	0.10	-	-	0.54	0.44	-	-	0.50	0.74	0.36	0.82	0.14	0.82	-	-	0.40	-	0.60	0.45	0.83	0.41	-
Malayopython timoriensis	-	0.10	0.15	0.09	-	0.07	0.10	0.10	-	0.55	0.65	0.49	0.51	0.76	0.94	0.72	-	0.53	0.59	0.42	0.58	0.20	0.72	-	-	0.60	0.59	0.48	0.80	0.71	0.70	0.73
Antaresia childreni	0.19	0.07	0.23	-	0.12	0.08	-	-	0.11	-	0.95	0.72	0.38	-	0.50	-	-	-	0.39	-	-	**0.02**	0.45	0.77	0.90	-	-	**0.04**	0.19	**0.03**	0.81	-
Antaresia maculosa	0.20	-	0.22	-	-	0.09	0.12	0.16	0.12	0.04	-	0.98	0.88	0.42	0.61	0.45	-	0.25	0.48	0.12	0.16	0.08	0.67	0.82	-	0.60	0.64	0.26	0.56	0.30	0.96	0.90
Antaresia perthensis	0.20	-	0.23	-	-	0.10	0.14	-	0.13	0.05	0.03	-	0.54	0.26	0.42	0.18	-	0.07	0.41	0.07	**0.04**	**0.02**	0.55	0.58	0.72	0.52	0.42	0.08	0.18	0.05	0.82	0.62
Antaresia stimsoni	0.23	-	0.21	-	-	-	-	-	0.12	0.06	0.04	0.05	-	0.41	0.41	-	-	0.12	0.49	0.12	-	**0.03**	0.59	-	-	-	-	0.09	-	-	0.90	0.45
Morelia bredli	-	-	0.18	-	-	0.12	0.08	0.10	0.12	-	0.12	0.13	0.10	-	0.60	0.76	-	0.83	0.87	0.55	0.65	0.31	0.85	-	-	0.78	0.70	0.60	0.78	0.76	0.77	0.42
Morelia carinata	0.16	0.12	0.23	0.14	0.14	0.11	0.17	0.18	0.11	0.12	0.13	0.14	0.15	0.15	-	0.54	-	0.35	0.54	0.36	0.41	0.18	0.57	0.60	0.59	0.53	0.60	0.30	0.48	0.41	0.78	0.55
Morelia spilota	-	-	0.17	-	-	0.10	-	-	0.10	-	0.08	0.10	-	0.05	0.14	-	-	0.56	0.71	0.30	0.52	0.16	0.82	-	-	0.70	0.52	0.47	-	0.59	0.85	-
Morelia viridis	0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Simalia amethistina	-	-	0.18	-	-	0.17	0.09	0.10	0.16	-	0.16	0.18	0.13	0.07	0.21	0.09	-	-	0.92	0.82	0.73	0.23	0.90	-	-	0.59	0.51	0.64	0.60	0.81	0.54	0.20
Simalia boeleni	-	0.22	0.19	0.27	-	0.21	0.16	0.15	0.20	0.22	0.20	0.21	0.18	0.12	0.25	0.13	-	0.11	-	0.97	0.82	0.60	0.98	-	-	0.75	0.76	0.91	0.73	0.83	0.58	0.64
Simalia clastolepis	-	-	0.22	-	-	0.26	0.18	0.18	0.24	-	0.24	0.25	0.21	0.15	0.30	0.17	-	0.10	0.10	-	0.50	0.59	0.90	-	-	0.40	0.33	0.76	0.33	0.52	0.28	0.16
Simalia kinghorni	-	-	0.15	0.19	-	0.16	0.08	0.06	0.13	-	0.17	0.18	-	0.09	0.19	0.09	-	0.08	0.12	0.15	-	0.16	0.87	-	-	0.48	0.33	0.70	0.59	0.91	0.45	-
Simalia nauta	-	0.47	0.37	0.50	-	0.47	0.39	0.38	0.45	0.47	0.44	0.45	0.42	0.38	0.51	0.39	-	0.34	0.30	0.27	0.38	-	0.51	-	-	0.26	0.22	0.48	0.09	0.16	0.14	0.09
Simalia oenpelliensis	-	0.22	0.23	0.27	0.29	0.23	0.17	0.17	0.23	0.22	0.21	0.22	0.20	0.17	0.29	0.16	-	0.14	0.13	0.16	0.14	0.32	-	0.54	0.59	0.82	0.87	0.95	0.78	0.82	0.78	0.78
Bothrochilus boa	0.17	-	0.24	-	0.12	-	-	-	-	0.04	0.05	0.05	-	-	0.12	-	-	-	-	-	-	-	0.25	-	0.56	-	-	0.09	0.10	-	0.76	-
Leiopython albertisii	0.20	-	0.20	-	0.13	-	-	-	-	0.03	-	0.05	-	-	0.12	-	-	-	-	-	-	-	0.21	0.06	-	-	-	-	-	-	-	-
Aspidites melanocephalus	-	-	0.18	-	-	0.12	-	0.13	0.13	-	0.09	0.10	-	0.07	0.16	0.06	-	0.12	0.12	0.17	0.13	0.37	0.18	-	-	-	0.90	0.59	-	0.59	0.82	0.76
Aspidites ramsayi	-	-	0.21	-	-	0.12	-	-	0.14	-	0.08	0.09	-	0.08	0.15	0.07	-	0.12	0.13	0.19	0.13	0.39	0.17	-	-	0.05	-	0.51	-	0.44	0.94	0.70
Liasis fuscus	-	0.26	0.20	0.28	0.34	0.26	0.19	0.16	0.24	0.27	0.27	0.28	0.25	0.19	0.32	0.20	-	0.16	0.13	0.15	0.15	0.29	0.12	0.31	-	0.21	0.22	-	0.18	0.46	0.42	0.33
Liasis mackloti	0.25	-	0.16	0.15	-	0.09	0.04	0.08	0.09	0.09	0.09	0.10	-	0.07	0.15	-	-	0.09	0.15	0.18	0.09	0.40	0.17	0.12	-	-	-	0.20	-	0.59	0.80	-
Liasis olivaceus	-	-	0.13	0.17	-	0.14	0.05	0.05	0.12	0.15	0.15	0.17	-	0.08	0.18	0.07	-	0.07	0.13	0.15	0.05	0.37	0.16	-	-	0.11	0.13	0.17	0.07	-	0.60	-
Liasis papuana	-	0.09	0.21	0.17	-	0.11	0.11	0.15	0.13	0.07	0.05	0.07	0.06	0.10	0.13	0.07	-	0.15	0.17	0.22	0.14	0.43	0.21	0.08	-	0.07	0.06	0.26	0.08	0.13	-	0.95
Boa constrictor	0.23	-	0.19	-	-	0.08	-	-	0.11	-	0.05	0.06	0.06	0.10	0.14	-	-	0.14	0.17	0.21	-	0.42	0.18	-	-	0.07	0.06	0.23	-	-	0.06	-

Table S9. Body shape intercept differences. Pairwise differences in the intercept of the allometric regressions (bottom triangle), and the Benjamini-Hochberg corrected *P*-values of the difference between them computed with 10,000 iterations (upper triangle). Details as in Table S8.

	Python anchietae	*Python bivittatus*	*Python brongersmai*	*Python curtus*	*Python molurus*	*Python regius*	*Python sebae*	*Malayopython reticulatus*	*Malayopython timoriensis*	*Antaresia childreni*	*Antaresia maculosa*	*Antaresia perthensis*	*Antaresia stimsoni*	*Morelia bredli*	*Morelia carinata*	*Morelia spilota*	*Morelia viridis*	*Simalia amethistina*	*Simalia boeleni*	*Simalia clastolepis*	*Simalia kinghorni*	*Simalia nauta*	*Simalia oenpelliensis*	*Bothrochilus boa*	*Leiopython albertisii*	*Aspidites melanocephalus*	*Aspidites ramsayi*	*Liasis fuscus*	*Liasis mackloti*	*Liasis olivaceus*	*Liasis papuana*	*Boa constrictor*
Python anchietae	-	0.71	0.98	0.67	0.98	0.79	0.52	0.31	0.63	0.12	0.10	0.13	0.24	-	0.54	**0.02**	0.21	0.27	0.27	0.27	0.27	-	-	0.47	0.21	0.08	0.17	0.28	0.21	0.07	0.56	0.44
Python bivittatus	0.48	-	0.86	0.24	0.67	0.28	0.64	0.35	0.71	0.17	-	0.24	0.27	-	0.29	-	0.16	-	-	-	0.25	-	-	0.48	0.11	-	-	-	-	-	0.61	0.70
Python brongersmai	0.43	0.74	-	0.88	0.95	0.95	0.73	0.62	0.82	0.41	0.40	0.46	0.52	0.50	0.63	0.24	0.50	0.64	0.63	0.65	0.64	0.59	-	0.75	0.46	0.35	0.53	0.63	0.52	0.44	0.80	0.67
Python curtus	0.74	1.15	0.55	-	0.64	0.64	0.10	0.17	0.44	**0.01**	-	**0.01**	-	-	0.31	-	0.06	-	-	-	0.24	-	-	0.08	**0.03**	-	-	0.44	-	-	0.53	**0.03**
Python molurus	0.31	0.47	0.62	0.87	-	0.74	0.49	0.29	0.51	0.09	-	0.11	0.22	-	0.34	-	0.19	0.27	-	-	0.26	-	-	0.37	0.18	0.08	0.18	0.27	0.17	-	0.59	0.47
Python regius	0.48	0.85	0.49	0.41	0.56	-	0.12	0.23	0.35	**0.02**	-	**0.01**	**0.01**	-	0.23	-	0.10	-	-	-	0.24	-	-	0.09	0.06	-	**0.01**	0.38	0.07	-	0.48	**0.05**
Python sebae	0.65	0.30	0.91	1.36	0.63	1.05	-	0.74	0.63	0.26	-	0.29	0.42	-	0.41	-	0.28	0.26	0.29	-	0.29	-	-	0.63	0.12	-	0.24	0.35	0.23	-	0.63	0.30
Malayopython reticulatus	0.95	0.58	1.21	1.67	0.93	1.36	0.32	-	0.60	0.52	0.52	0.48	0.63	-	0.66	-	0.64	0.28	0.48	0.30	0.33	-	-	0.70	0.29	-	0.44	0.34	0.59	-	0.54	0.38
Malayopython timoriensis	0.86	0.46	1.06	1.47	0.91	1.19	0.53	0.59	-	0.36	-	0.63	0.63	-	0.62	-	0.42	0.30	-	-	-	-	-	0.88	0.34	-	0.61	-	0.37	-	0.52	0.90
Antaresia childreni	1.01	0.59	1.18	1.67	0.97	1.41	0.45	0.40	0.59	-	0.80	0.71	0.68	-	0.59	-	0.27	0.28	0.26	0.19	0.33	-	-	0.27	0.86	0.28	0.68	0.30	0.43	-	0.79	0.19
Antaresia maculosa	1.19	-	1.34	-	-	-	-	0.59	-	0.25	-	0.44	0.31	0.49	0.68	0.34	-	0.51	0.44	0.35	0.53	0.43	0.47	-	-	0.76	0.76	0.63	0.61	0.29	-	-
Antaresia perthensis	0.86	0.41	1.04	1.51	0.83	1.24	0.37	0.44	0.42	0.22	0.39	-	0.79	-	0.39	-	0.26	0.27	0.21	0.11	0.30	-	-	0.45	0.49	-	0.71	0.36	0.30	-	0.74	0.38
Antaresia stimsoni	0.85	0.44	1.04	-	0.85	1.26	0.31	0.33	0.45	0.20	0.43	0.15	-	-	0.57	-	0.23	0.23	0.28	0.17	0.27	-	-	0.52	0.31	-	0.36	0.34	0.24	-	0.68	0.12
Morelia bredli	-	-	1.88	-	-	-	-	-	-	-	0.60	-	-	-	0.61	0.82	-	0.47	0.46	0.27	-	0.30	0.44	-	-	-	0.28	0.43	-	0.26	-	-
Morelia carinata	1.40	0.97	1.62	2.09	1.37	1.82	0.80	0.56	0.79	0.50	0.55	0.62	0.59	0.49	-	0.74	0.75	0.63	0.81	0.64	0.59	0.28	-	0.63	0.64	0.62	0.58	0.46	0.97	0.44	0.59	0.44
Morelia spilota	1.64	-	1.82	-	-	-	-	-	-	-	0.55	-	-	0.20	0.44	-	-	0.49	0.50	0.35	-	0.33	0.32	-	-	0.52	-	0.44	-	0.21	-	-
Morelia viridis	1.07	0.70	1.38	1.79	1.00	1.50	0.51	0.35	0.71	0.49	-	0.53	0.49	-	0.49	-	-	0.21	-	-	0.22	-	-	0.30	0.12	-	0.27	-	0.32	-	0.52	0.17
Simalia amethistina	1.84	-	2.03	-	1.81	-	1.23	0.96	1.40	0.96	0.95	1.16	1.08	0.62	0.71	0.51	0.97	-	0.98	0.98	0.64	0.57	0.38	0.27	-	0.45	0.35	0.68	0.52	0.99	-	-
Simalia boeleni	1.64	-	1.78	-	-	-	1.09	0.88	-	0.88	0.95	1.07	0.95	0.85	0.73	0.70	-	0.43	-	0.99	0.99	0.72	0.61	0.34	-	0.46	0.29	0.77	0.74	0.81	-	-
Simalia clastolepis	1.63	-	1.81	-	-	-	-	0.76	-	0.82	0.88	1.01	0.90	0.68	0.61	0.57	-	0.27	0.29	-	0.85	0.52	0.52	-	-	0.29	0.22	0.63	0.62	0.74	-	-
Simalia kinghorni	1.47	1.17	1.62	2.13	1.44	1.89	0.92	0.74	-	0.69	0.73	0.89	0.80	-	0.68	-	0.78	0.49	0.32	0.39	-	0.31	-	0.26	-	0.54	0.36	0.69	0.52	-	0.46	-
Simalia nauta	-	-	2.80	-	-	-	-	-	-	-	1.66	-	-	1.21	1.57	1.20	-	0.96	1.25	1.19	1.31	-	0.74	-	-	0.33	0.33	0.80	0.30	0.53	-	-
Simalia oenpelliensis	-	-	-	-	-	-	-	-	-	-	2.40	-	-	1.98	-	2.02	-	2.06	2.44	2.32	-	1.46	-	-	-	0.34	-	0.54	-	0.34	-	-
Bothrochilus boa	0.78	0.39	1.02	1.47	0.81	1.20	0.28	0.34	0.34	0.40	-	0.29	0.23	-	0.64	-	0.46	1.19	1.04	-	0.93	-	-	-	0.14	-	0.24	-	0.22	-	0.62	0.28
Leiopython albertisii	1.15	0.71	1.32	1.80	1.07	1.52	0.59	0.49	0.68	0.18	-	0.33	0.36	-	0.47	-	0.52	-	-	-	-	-	-	0.54	-	-	0.77	-	-	-	0.82	0.20
Aspidites melanocephalus	1.42	-	1.56	-	1.34	-	-	-	-	0.46	0.32	-	-	-	0.55	0.36	-	0.74	0.77	0.73	0.54	1.42	2.21	-	-	-	0.29	0.53	0.40	0.23	-	-
Aspidites ramsayi	1.05	-	1.17	-	1.00	1.40	0.60	0.62	0.58	0.26	0.28	0.25	0.34	0.78	0.64	-	0.69	1.15	1.09	1.04	0.91	1.87	-	0.53	0.27	0.55	-	0.49	0.32	-	0.87	0.29
Liasis fuscus	1.92	-	1.91	2.43	1.87	2.22	1.44	1.33	-	1.15	1.05	1.32	1.28	1.01	1.28	0.97	-	0.98	1.01	1.02	0.89	1.08	2.12	-	-	0.90	1.20	-	0.34	0.48	0.52	-
Liasis mackloti	1.29	-	1.49	-	1.26	1.71	0.66	0.41	0.80	0.38	0.45	0.55	0.48	-	0.26	-	0.46	0.62	0.61	0.49	0.49	1.50	-	0.59	-	0.44	0.59	1.10	-	-	0.53	-
Liasis olivaceus	1.90	-	2.09	-	-	-	-	-	-	-	0.95	-	-	0.56	0.72	0.46	-	0.13	0.55	0.39	-	0.91	1.94	-	-	0.73	-	1.00	-	-	-	-
Liasis papuana	1.13	0.80	1.24	1.70	1.04	1.51	0.74	0.77	0.93	0.43	-	0.52	0.56	-	0.77	-	0.74	-	-	-	0.77	-	-	0.74	0.42	-	0.45	1.12	0.67	-	-	0.63
Boa constrictor	0.74	0.28	0.95	1.34	0.68	1.04	0.43	0.59	0.36	0.52	-	0.33	0.42	-	0.87	-	0.69	-	-	-	-	-	-	0.42	0.58	-	0.47	-	-	-	0.77	-

Table S10. Head shape peramorphosis test. Pairwise comparisons of the predicted head shape differences at maximum per-group body size (bottom triangle), and the Benjamini-Hochberg corrected *P*-values of the difference between them computed with 10,000 iterations (upper triangle). This test only applies to pairs of taxa for which the null hypothesis of common slope and common intercept has not been rejected. Cells highlighted in green correspond to species where they have a common slope and intercept but different predicted head shape at maximum per group size (peramorphosis/paedomorphosis). Black boxes outline comparisons within clades.

	Python anchietae	*Python bivittatus*	*Python brongersmai*	*Python curtus*	*Python molurus*	*Python regius*	*Python sebae*	*Malayopython reticulatus*	*Malayopython timoriensis*	*Antaresia childreni*	*Antaresia maculosa*	*Antaresia perthensis*	*Antaresia stimsoni*	*Morelia bredli*	*Morelia carinata*	*Morelia spilota*	*Morelia viridis*	*Simalia amethistina*	*Simalia boeleni*	*Simalia clastolepis*	*Simalia kinghorni*	*Simalia nauta*	*Simalia oenpelliensis*	*Bothrochilus boa*	*Leiopython albertisii*	*Aspidites melanocephalus*	*Aspidites ramsayi*	*Liasis fuscus*	*Liasis mackloti*	*Liasis olivaceus*	*Liasis papuana*	*Boa constrictor*
Python anchietae	-	0.47	-	0.67	0.38	0.71	-	-	-	0.07	0.07	**0.04**	0.09	-	0.17	-	0.15	-	-	-	-	-	-	0.05	0.05	-	-	-	0.06	-	-	0.19
Python bivittatus	0.05	-	**0.04**	0.10	0.35	**0.02**	-	-	**0.05**	**0.00**	-	-	-	-	**0.00**	-	-	-	**0.00**	-	-	-	**0.02**	-	-	-	-	0.06	-	-	**0.01**	-
Python brongersmai	-	0.05	-	0.78	**0.02**	0.10	**0.02**	**0.01**	0.09	**0.00**	**0.00**	**0.00**	**0.01**	0.00	0.06	**0.00**	-	0.36	**0.00**	**0.02**	**0.04**	0.06	0.16	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.00**	**0.02**	**0.01**	**0.05**
Python curtus	0.04	0.05	0.02	-	**0.05**	0.47	**0.03**	**0.03**	0.14	-	-	-	-	-	**0.02**	-	-	-	**0.00**	-	0.12	-	0.11	-	-	-	-	**0.02**	**0.00**	**0.02**	**0.02**	-
Python molurus	0.06	0.03	0.05	0.05	-	**0.01**	-	-	-	**0.00**	-	-	-	-	**0.00**	-	-	-	-	-	-	-	0.05	**0.00**	**0.00**	-	-	0.19	-	-	-	-
Python regius	0.04	0.05	0.04	0.03	0.06	-	**0.00**	**0.01**	0.12	**0.00**	**0.00**	**0.00**	-	**0.00**	**0.01**	**0.00**	-	0.05	**0.00**	**0.00**	**0.02**	-	**0.02**	-	-	0.00	0.00	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Python sebae	-	-	0.06	0.06	-	0.07	-	0.07	**0.03**	-	**0.01**	-	-	**0.00**	**0.01**	-	-	**0.00**	**0.00**	**0.00**	**0.00**	0.01	**0.00**	-	-	-	-	**0.03**	**0.00**	**0.04**	**0.03**	-
Malayopython reticulatus	-	-	0.07	0.06	-	0.07	0.05	-	0.20	-	**0.04**	-	-	**0.02**	**0.01**	-	-	**0.02**	**0.03**	0.07	0.12	0.03	**0.00**	-	-	**0.02**	-	**0.00**	**0.00**	**0.00**	0.40	-
Malayopython timoriensis	-	0.06	0.06	0.05	-	0.05	0.08	0.05	-	**0.00**	**0.03**	**0.00**	**0.00**	**0.03**	0.05	**0.02**	-	0.25	0.11	0.22	0.70	0.34	0.06	-	-	0.01	0.09	**0.02**	**0.00**	**0.00**	0.27	**0.00**
Antaresia childreni	0.08	0.06	0.05	-	0.06	0.07	-	-	0.08	-	**0.00**	**0.00**	0.11	-	**0.00**	-	-	-	**0.00**	-	-	-	0.06	**0.00**	**0.00**	-	-	-	**0.00**	-	**0.00**	-
Antaresia maculosa	0.09	-	0.06	-	-	0.07	0.05	0.05	0.06	0.06	-	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	-	**0.01**	**0.00**	**0.00**	0.00	0.03	**0.00**	**0.01**	-	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**	**0.00**
Antaresia perthensis	0.09	-	0.07	-	-	0.08	0.07	-	0.08	0.04	0.04	-	**0.00**	**0.00**	**0.00**	**0.00**	-	**0.00**	**0.00**	**0.00**	-	-	**0.00**	**0.02**	**0.00**	0.00	0.00	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Antaresia stimsoni	0.07	-	0.05	-	-	-	-	-	0.08	0.02	0.05	0.04	-	**0.00**	**0.00**	-	-	**0.00**	**0.00**	**0.00**	-	-	0.07	-	-	-	-	**0.00**	-	-	**0.00**	**0.00**
Morelia bredli	-	-	0.09	-	-	0.10	0.10	0.07	0.08	-	0.08	0.11	0.11	-	0.16	0.22	-	**0.01**	**0.01**	0.46	**0.01**	0.18	**0.00**	-	-	**0.00**	**0.03**	**0.00**	**0.00**	**0.00**	**0.01**	**0.00**
Morelia carinata	0.09	0.10	0.08	0.08	0.12	0.09	0.11	0.10	0.08	0.10	0.09	0.11	0.09	0.07	-	**0.04**	-	0.10	**0.01**	0.32	**0.03**	0.59	**0.04**	**0.00**	**0.00**	**0.00**	**0.01**	**0.01**	**0.00**	**0.00**	**0.00**	0.11
Morelia spilota	-	-	0.09	-	-	0.09	-	-	0.07	-	0.07	0.10	-	0.02	0.07	-	-	**0.00**	**0.00**	0.27	**0.00**	0.07	**0.00**	-	-	0.00	0.00	**0.00**	-	**0.00**	**0.01**	-
Morelia viridis	0.07	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Simalia amethistina	-	-	0.03	-	-	0.05	0.07	0.06	0.05	-	0.05	0.07	0.06	0.08	0.07	0.07	-	-	**0.01**	**0.03**	0.23	0.09	**0.03**	-	-	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.04**	**0.01**
Simalia boeleni	-	0.11	0.12	0.11	-	0.11	0.12	0.08	0.07	0.14	0.10	0.13	0.14	0.08	0.11	0.07	-	0.10	-	0.15	**0.01**	0.17	**0.00**	-	-	0.12	0.05	**0.00**	**0.00**	**0.00**	**0.03**	**0.00**
Simalia clastolepis	-	-	0.08	-	-	0.09	0.09	0.06	0.06	-	0.07	0.09	0.10	0.03	0.06	0.03	-	0.07	0.06	-	0.06	0.47	**0.01**	-	-	**0.01**	0.17	**0.00**	**0.00**	**0.00**	0.07	**0.00**
Simalia kinghorni	-	-	0.05	0.04	-	0.05	0.06	0.04	0.03	-	0.05	0.08	-	0.07	0.08	0.07	-	0.03	0.08	0.06	-	0.09	**0.01**	-	-	**0.00**	**0.02**	**0.00**	**0.00**	**0.00**	0.17	-
Simalia nauta	-	0.08	0.08	0.07	-	0.07	0.09	0.08	0.06	0.09	0.07	0.09	0.08	0.07	0.05	0.07	-	0.07	0.08	0.05	0.06	-	**0.02**	-	-	**0.02**	0.11	**0.00**	**0.00**	**0.00**	0.07	**0.01**
Simalia oenpelliensis	-	0.06	0.04	0.05	0.06	0.06	0.08	0.10	0.08	0.04	0.08	0.06	0.04	0.12	0.09	0.12	-	0.06	0.14	0.11	0.07	0.09	-	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.00**	**0.01**	**0.01**	**0.00**
Bothrochilus boa	0.11	-	0.08	-	0.08	-	-	-	-	0.05	0.05	0.03	-	-	0.12	-	-	-	-	-	-	-	0.08	-	**0.00**	-	-	**0.04**	**0.03**	-	**0.00**	-
Leiopython albertisii	0.11	-	0.09	-	0.08	-	-	-	-	0.07	-	0.09	-	-	0.14	-	-	-	-	-	-	-	0.08	0.09	-	-	-	-	-	-	-	-
Aspidites melanocephalus	-	-	0.13	-	-	0.12	-	0.09	0.08	-	0.11	0.14	-	0.08	0.12	0.08	-	0.11	0.04	0.07	0.09	0.09	0.16	-	-	-	**0.01**	**0.00**	-	**0.00**	**0.00**	**0.00**
Aspidites ramsayi	-	-	0.09	-	-	0.09	-	-	0.06	-	0.08	0.11	-	0.05	0.09	0.05	-	0.08	0.05	0.04	0.06	0.07	0.12	-	-	0.05	-	0.00	-	**0.00**	0.07	**0.00**
Liasis fuscus	-	0.06	0.08	0.08	0.04	0.09	0.05	0.09	0.09	0.05	0.07	0.06	0.07	0.14	0.13	0.13	-	0.09	0.15	0.12	0.09	0.12	0.07	0.05	-	0.16	0.12	-	0.49	0.07	**0.02**	**0.00**
Liasis mackloti	0.10	-	0.08	0.09	-	0.10	0.06	0.10	0.10	0.05	0.08	0.06	-	0.14	0.14	-	-	0.09	0.16	0.13	0.10	0.13	0.07	0.05	-	-	-	0.02	-	**0.02**	**0.00**	-
Liasis olivaceus	-	-	0.06	0.07	-	0.08	0.05	0.09	0.10	0.05	0.08	0.07	-	0.13	0.12	0.12	-	0.08	0.16	0.12	0.09	0.11	0.06	-	-	0.17	0.12	0.04	0.04	-	**0.01**	-
Liasis papuana	-	0.07	0.08	0.07	-	0.08	0.07	0.04	0.04	0.09	0.05	0.08	0.09	0.08	0.10	0.07	-	0.06	0.06	0.06	0.04	0.07	0.10	0.08	-	0.07	0.05	0.09	0.10	0.10	-	**0.00**
Boa constrictor	0.07	-	0.04	-	-	0.07	-	-	0.08	-	0.08	0.09	0.07	0.08	0.06	-	-	0.05	0.13	0.08	-	0.08	0.07	-	-	0.14	0.10	0.10	-	-	0.10	-

Table S11. Body shape peramorphosis test. Pairwise comparisons of the predicted body shape differences at maximum per-group body size (bottom triangle), and the Benjamini-Hochberg corrected *P*-values of the difference between them computed with 10,000 iterations (upper triangle). Details as in Table S10.

	Python anchietae	*Python bivittatus*	*Python brongersmai*	*Python curtus*	*Python molurus*	*Python regius*	*Python sebae*	*Malayopython reticulatus*	*Malayopython timoriensis*	*Antaresia childreni*	*Antaresia maculosa*	*Antaresia perthensis*	*Antaresia stimsoni*	*Morelia bredli*	*Morelia carinata*	*Morelia spilota*	*Morelia viridis*	*Simalia amethistina*	*Simalia boeleni*	*Simalia clastolepis*	*Simalia kinghorni*	*Simalia nauta*	*Simalia tenpelliensis*	*Bothrochilus boa*	*Leiopython albertisii*	*Aspidites melanocephalus*	*Aspidites ramsayi*	*Liasis fuscus*	*Liasis mackloti*	*Liasis olivaceus*	*Liasis papuana*	*Boa constrictor*
Python anchietae	-	0.30	0.06	0.29	0.68	0.26	0.68	0.20	0.58	0.26	0.22	0.06	0.67	-	0.40	-	0.10	0.14	0.66	0.59	0.12	-	-	0.66	0.10	0.09	0.25	0.26	0.13	0.13	0.17	0.92
Python bivittatus	0.35	-	**0.00**	**0.01**	0.95	**0.00**	0.30	0.24	0.34	0.08	-	**0.00**	**0.03**	-	0.17	-	0.16	-	-	-	0.06	-	-	0.12	0.24	-	-	-	-	-	0.06	0.06
Python brongersmai	0.62	0.78	-	0.78	**0.01**	0.12	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**	0.00	**0.00**	**0.00**	**0.01**	**0.02**	**0.00**	**0.03**	-	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	-
Python curtus	0.55	0.70	0.13	-	0.08	0.34	**0.01**	**0.01**	0.06	-	-	-	-	-	0.06	-	**0.00**	-	-	-	**0.01**	-	-	**0.01**	-	-	-	**0.03**	-	-	**0.01**	**0.01**
Python molurus	0.29	0.08	0.73	0.64	-	**0.02**	0.70	0.23	0.53	0.16	-	**0.02**	0.19	-	0.33	-	0.13	0.07	-	-	**0.04**	-	-	0.31	0.19	**0.03**	**0.02**	0.34	0.05	-	0.07	0.33
Python regius	0.40	0.58	0.24	0.20	0.51	-	**0.00**	**0.01**	**0.01**	-	-	-	-	-	**0.01**	-	**0.00**	-	-	-	**0.00**	-	-	**0.00**	**0.00**	-	-	**0.00**	**0.00**	-	**0.00**	-
Python sebae	0.21	0.19	0.76	0.67	0.14	0.53	-	0.16	0.23	0.31	-	**0.00**	0.13	-	**0.04**	-	**0.01**	**0.01**	0.19	-	**0.02**	-	-	0.50	**0.01**	-	**0.01**	0.19	0.07	-	**0.02**	0.13
Malayopython reticulatus	0.44	0.25	0.98	0.90	0.29	0.76	0.27	-	0.41	**0.05**	**0.00**	**0.00**	**0.01**	-	0.17	-	0.44	0.11	**0.04**	0.27	0.15	-	-	0.13	0.25	-	**0.01**	0.22	**0.05**	-	0.23	**0.02**
Malayopython timoriensis	0.32	0.21	0.81	0.74	0.22	0.59	0.24	0.21	-	**0.03**	-	**0.00**	0.06	-	0.42	-	0.15	**0.03**	-	-	-	-	-	0.19	0.18	-	**0.00**	-	**0.00**	-	**0.02**	0.10
Antaresia childreni	0.26	0.22	0.77	0.69	0.20	0.54	0.14	0.28	0.24	-	**0.00**	**0.00**	0.07	-	**0.00**	-	**0.00**	**0.00**	**0.04**	0.02	**0.00**	-	-	0.62	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	-	**0.00**	**0.01**
Antaresia maculosa	0.32	-	0.46	-	-	-	-	0.60	-	0.34	-	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	-	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	-	-	**0.00**	**0.05**	**0.00**	**0.00**	**0.00**	-	-
Antaresia perthensis	0.40	0.27	0.62	0.55	0.27	0.43	0.36	0.47	0.32	0.31	0.27	-	**0.00**	-	**0.00**	-	**0.00**	**0.00**	0.05	**0.00**	**0.00**	-	-	**0.00**	**0.00**	-	**0.00**	**0.00**	**0.00**	-	**0.00**	**0.00**
Antaresia stimsoni	0.18	0.26	0.65	-	0.22	0.42	0.18	0.37	0.25	0.13	0.25	0.26	-	-	**0.00**	-	**0.00**	**0.00**	0.09	**0.01**	**0.00**	-	-	0.07	**0.00**	-	**0.01**	**0.00**	**0.00**	-	**0.00**	0.08
Morelia bredli	-	-	0.96	-	-	-	-	-	-	-	0.61	-	-	-	0.09	0.47	-	**0.00**	**0.01**	0.71	-	0.16	**0.00**	-	-	-	**0.00**	**0.01**	-	**0.00**	-	-
Morelia carinata	0.54	0.31	0.94	0.88	0.37	0.76	0.44	0.30	0.25	0.45	0.64	0.42	0.47	0.24	-	0.09	0.38	**0.04**	0.14	0.36	**0.02**	0.58	-	**0.04**	0.23	**0.00**	**0.00**	**0.02**	**0.00**	**0.01**	**0.00**	**0.02**
Morelia spilota	0.43	-	0.92	-	-	-	-	-	-	-	0.55	-	-	0.08	0.28	-	-	**0.00**	**0.01**	0.80	-	**0.04**	**0.00**	-	-	**0.00**	-	0.09	-	**0.00**	-	-
Morelia viridis	0.45	0.21	0.94	0.86	0.27	0.74	0.30	0.16	0.22	0.34	-	0.44	0.40	-	0.20	-	-	**0.00**	-	-	**0.00**	-	-	**0.00**	0.17	-	**0.00**	-	0.00	-	**0.00**	**0.00**
Simalia amethistina	0.74	-	1.27	-	0.56	-	0.57	0.32	0.49	0.59	0.90	0.72	0.68	0.37	0.40	0.40	0.33	-	**0.00**	**0.01**	0.16	0.25	0.10	**0.00**	-	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	-	-
Simalia boeleni	0.29	-	0.70	-	-	-	0.23	0.34	-	0.19	0.32	0.20	0.19	0.30	0.35	0.24	-	0.61	-	0.47	**0.00**	**0.05**	**0.01**	0.15	-	**0.00**	**0.01**	**0.02**	**0.00**	**0.00**	-	-
Simalia clastolepis	0.39	-	0.86	-	-	-	-	0.23	-	0.30	0.52	0.37	0.34	0.10	0.24	0.09	-	0.44	0.21	-	**0.00**	0.23	**0.02**	-	-	**0.00**	**0.00**	0.25	**0.01**	**0.02**	-	-
Simalia kinghorni	0.67	0.49	1.24	1.15	0.54	1.02	0.51	0.29	-	0.53	0.86	0.73	0.63	-	0.48	-	0.33	0.19	0.58	0.42	-	0.07	-	**0.01**	-	**0.00**	**0.00**	**0.02**	**0.00**	-	0.78	-
Simalia nauta	-	-	1.12	-	-	-	-	-	-	-	0.78	-	-	0.22	0.22	0.29	-	0.21	0.47	0.29	0.29	-	**0.02**	-	-	0.00	**0.00**	**0.04**	**0.00**	**0.02**	-	-
Simalia tenpelliensis	-	-	-	-	-	-	-	-	-	-	1.00	-	-	0.52	-	0.54	-	0.25	0.74	0.58	-	0.40	-	-	-	0.00	-	**0.00**	-	**0.00**	-	-
Bothrochilus boa	0.24	0.26	0.81	0.73	0.25	0.58	0.14	0.28	0.26	0.09	-	0.39	0.17	-	0.47	-	0.34	0.58	0.23	-	0.50	-	-	-	0.00	-	**0.00**	-	**0.02**	-	**0.01**	**0.03**
Leiopython albertisii	0.46	0.18	0.92	0.84	0.23	0.71	0.30	0.18	0.20	0.34	-	0.40	0.39	-	0.20	-	0.12	-	-	-	-	-	-	0.37	-	-	**0.00**	-	-	-	**0.00**	**0.00**
Aspidites melanocephalus	0.41	-	0.88	-	0.35	-	-	-	-	0.20	0.43	-	-	-	0.58	0.36	-	0.64	0.32	0.40	0.55	0.59	0.69	-	-	-	**0.00**	**0.00**	**0.00**	**0.00**	-	-
Aspidites ramsayi	0.32	-	0.61	-	0.36	0.39	0.34	0.53	0.43	0.25	0.16	0.29	0.20	0.57	0.62	-	0.56	0.83	0.29	0.49	0.78	0.73	-	0.30	0.55	0.30	-	**0.00**	**0.00**	-	**0.00**	**0.00**
Liasis fuscus	0.44	-	0.95	0.85	0.27	0.74	0.26	0.26	-	0.29	0.56	0.47	0.39	0.24	0.43	0.17	-	0.43	0.32	0.24	0.35	0.39	0.54	-	-	0.30	0.50	-	0.06	0.13	**0.00**	-
Liasis mackloti	0.44	-	1.01	-	0.39	0.79	0.30	0.34	0.46	0.36	0.63	0.62	0.45	-	0.58	-	0.38	0.51	0.45	0.39	0.37	0.51	-	0.30	-	0.34	0.56	0.21	-	-	**0.00**	-
Liasis olivaceus	0.50	-	1.06	-	-	-	-	-	-	-	0.67	-	-	0.28	0.43	0.26	-	0.31	0.43	0.31	-	0.33	0.37	-	-	0.38	-	0.19	-	-	-	-
Liasis papuana	0.62	0.47	1.21	1.12	0.51	0.98	0.46	0.26	0.46	0.47	-	0.70	0.58	-	0.49	-	0.34	-	-	-	0.10	-	-	0.43	0.40	-	0.72	0.33	0.33	-	-	**0.00**
Boa constrictor	0.15	0.27	0.57	0.49	0.22	0.35	0.22	0.43	0.29	0.24	-	0.26	0.15	-	0.47	-	0.41	-	-	-	-	-	-	0.26	0.41	-	0.27	-	-	-	0.64	-

Table S12. Head size-shape space overlap (ontogenetic scaling) tests for heterochrony (Tfh1). Pairwise tests with the null hypothesis that species overlap in size-shape space. Test statistics (see Materials and Methods for details) at bottom triangle, and the *P*-values of the of size-shape dissociation computed with 10,000 iterations at upper triangle. The hypothesis of interest is the null in this case. Cells highlighted in green correspond to pairs of taxa that have overlapping trajectories in size-shape space and no difference in slope. Cells with numbers in red correspond to pairs of taxa where they overlap in size-shape space with phenotype at maximum size differs, confirming strong ontogenetic scaling. Low sample numbers for comparisons with *Morelia carinata* call for extra caution. Black boxes outline comparisons within clades.

	Python anchietae	*Python bivittatus*	*Python brongersmai*	*Python curtus*	*Python molurus*	*Python regius*	*Python sebae*	*Malayopython reticulatus*	*Malayopython timoriensis*	*Antaresia childreni*	*Antaresia maculosa*	*Antaresia perthensis*	*Antaresia stimsoni*	*Morelia bredli*	*Morelia carinata*	*Morelia spilota*	*Morelia viridis*	*Simalia amethistina*	*Simalia boeleni*	*Simalia clastolepis*	*Simalia kinghorni*	*Simalia nauta*	*Simalia oenpelliensis*	*Bothrochilus boa*	*Leiopython albertisii*	*Aspidites melanocephalus*	*Aspidites ramsayi*	*Liasis fuscus*	*Liasis mackloti*	*Liasis olivaceus*	*Liasis papuana*	*Boa constrictor*
Python anchietae	-	0.00	-	0.01	0.02	0.01	-	-	-	0.00	0.00	0.00	0.00	-	0.03	-	0.00	-	-	-	-	-	-	0.00	0.00	-	-	-	0.00	-	-	0.00
Python bivittatus	0.04	-	0.00	0.00	**0.35**	0.00	-	-	0.02	0.00	-	-	-	-	0.00	-	-	-	0.00	-	-	0.00	0.00	-	-	-	-	0.00	-	-	0.00	-
Python brongersmai	-	0.06	-	**0.52**	0.01	0.02	0.01	**0.13**	**0.07**	0.01	0.00	0.00	0.00	0.00	-	0.00	-	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Python curtus	0.02	0.05	0.04	-	0.00	0.03	0.00	0.00	**0.09**	-	-	-	-	-	0.01	-	-	-	0.00	-	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	0.00	-
Python molurus	0.01	0.05	0.03	0.03	-	0.00	-	-	-	0.00	-	-	-	-	0.01	-	-	-	-	-	-	-	0.00	0.00	0.00	-	-	0.00	-	-	-	-
Python regius	0.05	0.09	0.07	0.07	0.06	-	0.00	0.00	**0.16**	0.00	0.00	0.00	-	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	-	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Python sebae	-	-	0.12	0.12	-	0.15	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	-	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	0.00	0.00	0.00	0.00	-
Malayopython reticulatus	-	-	0.11	0.11	-	0.14	0.19	-	0.00	-	0.00	-	-	0.00	**0.09**	-	-	0.00	0.00	0.00	0.00	0.01	0.00	-	-	0.00	-	0.00	0.00	0.00	0.00	-
Malayopython timoriensis	-	0.05	0.03	0.03	-	0.06	0.11	0.10	-	0.00	0.00	0.00	0.00	0.00	**0.09**	0.00	-	0.00	**0.19**	0.00	0.00	0.04	0.00	-	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Antaresia childreni	0.11	0.14	0.12	-	0.11	0.15	-	-	0.12	-	0.00	0.00	0.02	-	0.00	-	-	-	0.00	-	-	0.00	0.00	0.00	0.00	-	-	0.00	0.00	0.00	0.00	-
Antaresia maculosa	0.09	-	0.10	-	-	0.13	0.18	0.17	0.10	0.19	-	**0.21**	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Antaresia perthensis	0.09	-	0.11	-	-	0.14	0.19	-	0.10	0.19	0.17	-	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Antaresia stimsoni	0.14	-	0.16	-	-	-	-	-	0.15	0.24	0.22	0.23	-	0.00	0.00	-	-	0.00	0.00	0.00	-	0.00	0.00	-	-	-	-	0.00	-	-	0.00	0.00
Morelia bredli	-	-	0.06	-	-	0.09	0.14	0.13	0.06	-	0.13	0.13	0.18	-	**0.07**	0.04	-	0.00	0.00	0.00	0.00	0.00	0.00	-	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Morelia carinata	0.01	0.04	-	0.02	0.01	0.05	0.10	0.00	0.01	0.11	0.09	0.09	0.14	0.04	-	0.04	-	-	0.00	0.00	-	0.04	0.00	0.00	-	0.00	0.00	0.00	0.00	-	0.00	0.01
Morelia spilota	-	-	0.36	-	-	0.39	-	-	0.35	-	0.42	0.43	-	0.38	0.34	-	-	0.00	0.00	0.00	0.00	0.00	0.00	-	-	0.00	0.00	0.00	-	0.00	0.00	-
Morelia viridis	0.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Simalia amethistina	-	-	0.08	-	-	0.11	0.16	0.15	0.07	-	0.14	0.15	0.20	0.10	-	0.40	-	-	0.00	0.00	**0.12**	0.00	0.00	-	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Simalia boeleni	-	0.07	0.05	0.05	-	0.08	0.13	0.12	0.05	0.14	0.12	0.12	0.17	0.08	0.04	0.37	-	0.09	-	0.00	0.00	0.01	0.00	-	-	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Simalia clastolepis	-	-	0.03	-	-	0.06	0.11	0.10	0.02	-	0.10	0.10	0.15	0.05	0.01	0.35	-	0.07	0.05	-	0.00	**0.20**	0.00	-	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Simalia kinghorni	-	-	0.08	0.08	-	0.11	0.16	0.15	0.08	-	0.15	0.15	-	0.11	-	0.40	-	0.12	0.10	0.08	-	0.00	0.00	-	-	0.00	0.00	0.00	0.00	0.00	0.00	-
Simalia nauta	-	0.05	0.03	0.03	-	0.06	0.11	0.10	0.02	0.11	0.10	0.10	0.15	0.05	0.01	0.35	-	0.07	0.04	0.02	0.07	-	0.00	-	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Simalia oenpelliensis	-	0.05	0.03	0.03	0.02	0.06	0.11	0.10	0.03	0.12	0.10	0.10	0.15	0.06	0.01	0.35	-	0.07	0.05	0.02	0.08	0.02	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bothrochilus boa	0.06	-	0.07	-	0.06	-	-	-	-	0.16	0.14	0.15	-	-	0.06	-	-	-	-	-	-	-	0.07	-	0.00	-	-	0.00	0.00	-	0.00	-
Leiopython albertisii	0.12	-	0.13	-	0.12	-	-	-	-	0.22	-	0.20	-	-	-	-	-	-	-	-	-	-	0.13	0.17	-	-	-	-	-	-	-	-
Aspidites melanocephalus	-	-	0.16	-	-	0.19	-	0.23	0.15	-	0.22	0.23	-	0.18	0.14	0.48	-	0.20	0.17	0.15	0.20	0.15	0.15	-	-	-	0.00	0.00	-	0.00	0.00	0.00
Aspidites ramsayi	-	-	0.12	-	-	0.15	-	-	0.12	-	0.19	0.19	-	0.15	0.11	0.44	-	0.16	0.14	0.12	0.17	0.12	0.12	-	-	0.24	-	0.00	-	0.00	0.00	0.00
Liasis fuscus	-	0.08	0.06	0.06	0.05	0.09	0.14	0.13	0.05	0.14	0.12	0.13	0.18	0.08	0.04	0.38	-	0.10	0.07	0.05	0.10	0.05	0.05	0.10	-	0.18	0.14	-	0.01	0.00	0.00	0.00
Liasis mackloti	0.07	-	0.08	0.08	-	0.11	0.16	0.15	0.08	0.17	0.15	0.15	-	0.11	0.07	-	-	0.12	0.10	0.08	0.13	0.07	0.08	0.12	-	-	-	0.10	-	0.00	0.00	-
Liasis olivaceus	-	-	0.07	0.07	-	0.11	0.16	0.15	0.07	0.16	0.14	0.15	-	0.10	-	0.40	-	0.11	0.09	0.07	0.12	0.07	0.07	-	-	0.20	0.16	0.10	0.12	-	0.00	-
Liasis papuana	-	0.07	0.05	0.05	-	0.08	0.13	0.12	0.04	0.13	0.11	0.12	0.17	0.07	0.03	0.37	-	0.09	0.06	0.04	0.09	0.04	0.04	0.08	-	0.17	0.13	0.07	0.09	0.08	-	0.00
Boa constrictor	0.13	-	0.15	-	-	0.18	-	-	0.14	-	0.22	0.22	0.27	0.17	0.13	-	-	0.19	0.16	0.14	-	0.14	0.14	-	-	0.27	0.23	0.17	-	-	0.16	-

Table S13. Head shape space overlap tests for heterochrony (Tfh2). Pairwise tests with the null hypothesis that species overlap in shape space. Test statistics (see Materials and Methods for details) at bottom triangle, and the *P*-values of the of size-shape dissociation computed with 10,000 iterations at upper triangle. The hypothesis of interest is the null in this case. Cells highlighted in green and with white borders correspond to pairs of taxa that have overlapping trajectories in shape space only and not in size-shape, therefore heterochrony by size-shape dissociation. Cells highlighted in green without borders are pairs of taxa where the null has been accepted but they also overlap in size-shape space (tested in Thf1). Low sample numbers for comparisons with *Morelia carinata* call for extra caution. Black boxes outline comparisons within clades.

	Python anchietae	*Python bivittatus*	*Python brongersmai*	*Python curtus*	*Python molurus*	*Python regius*	*Python sebae*	*Malayopython reticulatus*	*Malayopython timoriensis*	*Antaresia childreni*	*Antaresia maculosa*	*Antaresia perthensis*	*Antaresia stimsoni*	*Morelia bredli*	*Morelia carinata*	*Morelia spilota*	*Morelia viridis*	*Simalia amethistina*	*Simalia boeleni*	*Simalia clastolepis*	*Simalia kinghorni*	*Simalia nauta*	*Simalia oenpelliensis*	*Bothrochilus boa*	*Leiopython albertisii*	*Aspidites melanocephalus*	*Aspidites ramsayi*	*Liasis fuscus*	*Liasis mackloti*	*Liasis olivaceus*	*Liasis papuana*	*Boa constrictor*
Python anchietae	-	0.00	-	0.04	**0.08**	0.01	-	-	-	0.00	0.00	0.00	0.00	-	**0.09**	-	0.01	-	-	-	-	-	-	0.00	0.00	-	-	-	0.00	-	-	0.00
Python bivittatus	0.04	-	0.00	0.00	**0.26**	0.00	-	-	**0.06**	**0.40**	-	-	-	-	0.00	-	-	-	0.00	-	-	0.00	0.00	-	-	-	-	0.00	-	-	0.00	-
Python brongersmai	-	0.05	-	**0.33**	0.00	0.01	0.02	**0.36**	**0.08**	**0.09**	0.00	0.00	0.00	0.00	0.01	0.00	-	**0.12**	0.00	0.01	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Python curtus	0.02	0.05	0.03	-	0.05	**0.07**	0.00	0.00	**0.11**	-	-	-	-	-	0.02	-	-	-	0.00	-	0.00	0.00	0.01	-	-	-	-	0.00	0.00	0.00	0.00	-
Python molurus	0.01	0.04	0.02	0.02	-	0.00	-	-	-	0.02	-	-	-	-	0.04	-	-	-	-	-	-	-	0.00	0.00	0.00	-	-	0.00	-	-	-	-
Python regius	0.04	0.07	0.05	0.06	0.05	-	0.00	0.00	**0.58**	0.05	0.00	0.00	-	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	-	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Python sebae	-	-	0.09	0.09	-	0.12	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	-	0.00	0.00	0.00	0.00	0.00	**0.07**	-	-	-	-	0.00	0.00	0.01	0.00	-
Malayopython reticulatus	-	-	0.08	0.08	-	0.11	0.14	-	0.04	-	0.00	-	-	0.00	0.00	-	-	0.00	0.00	0.00	0.00	0.01	0.01	-	-	0.00	-	0.00	0.00	0.00	0.00	-
Malayopython timoriensis	-	0.04	0.02	0.02	-	0.05	0.09	0.08	-	**1.00**	0.01	**0.71**	0.00	0.00	0.04	0.00	-	0.00	0.05	0.00	0.01	0.00	0.01	-	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Antaresia childreni	0.10	0.13	0.11	-	0.10	0.14	-	-	0.10	-	**0.45**	0.00	**0.51**	-	**0.07**	-	-	-	**1.00**	-	-	**0.06**	0.01	0.00	**0.07**	-	-	0.00	0.00	0.00	**1.00**	-
Antaresia maculosa	0.07	-	0.08	-	-	0.11	0.15	0.14	0.08	0.17	-	**1.00**	0.00	0.00	0.01	0.00	-	0.00	0.01	**0.10**	0.00	0.00	**0.09**	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Antaresia perthensis	0.08	-	0.09	-	-	0.12	0.15	-	0.09	0.17	0.15	-	0.00	0.01	**0.12**	0.00	-	0.00	**0.99**	**0.39**	0.00	0.00	0.00	0.02	0.00	**0.13**	**0.69**	0.00	0.00	0.00	**0.49**	0.00
Antaresia stimsoni	0.11	-	0.13	-	-	-	-	-	0.12	0.21	0.18	0.19	-	**0.99**	0.01	-	-	0.00	0.00	**0.99**	-	0.01	0.00	-	-	-	-	0.00	-	-	0.00	0.00
Morelia bredli	-	-	0.04	-	-	0.07	0.10	0.09	0.03	-	0.10	0.10	0.14	-	0.00	**0.10**	-	0.00	0.00	0.02	0.00	0.00	0.00	-	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Morelia carinata	0.00	0.03	0.02	0.02	0.01	0.04	0.08	0.07	0.01	0.10	0.07	0.08	0.11	0.03	-	0.01	-	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Morelia spilota	-	-	0.23	-	-	0.26	-	-	0.23	-	0.29	0.30	-	0.25	0.22	-	-	0.00	0.00	**0.37**	0.00	0.01	0.00	-	-	0.00	0.00	0.00	-	0.00	0.00	-
Morelia viridis	0.11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Simalia amethistina	-	-	0.05	-	-	0.08	0.12	0.11	0.05	-	0.11	0.12	0.15	0.07	0.04	0.26	-	-	0.00	0.00	0.04	0.00	**0.09**	-	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Simalia boeleni	-	0.05	0.03	0.03	-	0.06	0.09	0.09	0.03	0.11	0.09	0.09	0.13	0.04	0.02	0.24	-	0.06	-	0.00	0.00	0.00	0.00	-	-	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Simalia clastolepis	-	-	0.02	-	-	0.05	0.08	0.08	0.02	-	0.08	0.08	0.12	0.03	0.01	0.23	-	0.05	0.03	-	0.00	0.03	0.00	-	-	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Simalia kinghorni	-	-	0.06	0.06	-	0.08	0.12	0.11	0.05	-	0.11	0.12	-	0.07	0.04	0.26	-	0.08	0.06	0.05	-	0.00	0.00	-	-	0.00	0.00	0.00	0.00	0.00	0.00	-
Simalia nauta	-	0.04	0.02	0.02	-	0.04	0.08	0.07	0.01	0.10	0.07	0.08	0.12	0.03	0.01	0.22	-	0.04	0.02	0.01	0.05	-	0.00	-	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Simalia oenpelliensis	-	0.04	0.02	0.03	0.02	0.05	0.09	0.08	0.02	0.11	0.08	0.09	0.12	0.04	0.01	0.23	-	0.05	0.03	0.02	0.05	0.01	-	0.00	0.01	0.00	0.00	0.00	0.00	0.03	0.00	0.00
Bothrochilus boa	0.06	-	0.07	-	0.06	-	-	-	-	0.15	0.12	0.13	-	-	0.05	-	-	-	-	-	-	-	0.06	-	0.00	-	-	0.00	0.00	-	0.02	-
Leiopython albertisii	0.11	-	0.12	-	0.11	-	-	-	-	0.20	-	0.18	-	-	0.11	-	-	-	-	-	-	-	0.12	0.16	-	-	-	-	-	-	-	-
Aspidites melanocephalus	-	-	0.09	-	-	0.12	-	0.15	0.09	-	0.15	0.16	-	0.10	0.08	0.30	-	0.12	0.10	0.09	0.12	0.08	0.09	-	-	-	0.00	0.00	-	0.00	0.00	0.00
Aspidites ramsayi	-	-	0.09	-	-	0.12	-	-	0.09	-	0.15	0.15	-	0.10	0.08	0.30	-	0.12	0.09	0.08	0.12	0.08	0.09	-	-	0.16	-	0.00	-	0.00	0.01	0.00
Liasis fuscus	-	0.06	0.04	0.04	0.04	0.07	0.10	0.10	0.04	0.12	0.10	0.10	0.14	0.05	0.03	0.25	-	0.07	0.04	0.03	0.07	0.03	0.04	0.08	-	0.11	0.10	-	0.00	0.00	0.00	0.00
Liasis mackloti	0.06	-	0.07	0.07	-	0.09	0.13	0.12	0.06	0.15	0.12	0.13	-	0.08	0.05	-	-	0.09	0.07	0.06	0.09	0.06	0.06	0.11	-	-	-	0.08	-	0.00	0.00	-
Liasis olivaceus	-	-	0.06	0.06	-	0.09	0.12	0.11	0.05	0.14	0.12	0.12	-	0.07	0.05	0.26	-	0.09	0.06	0.05	0.09	0.05	0.06	-	-	0.12	0.12	0.07	0.10	-	0.00	-
Liasis papuana	-	0.06	0.04	0.04	-	0.06	0.10	0.09	0.03	0.12	0.09	0.10	0.14	0.05	0.03	0.24	-	0.06	0.04	0.03	0.07	0.03	0.03	0.08	-	0.10	0.10	0.05	0.08	0.07	-	0.00
Boa constrictor	0.11	-	0.12	-	-	0.14	-	-	0.11	-	0.17	0.18	0.21	0.13	0.10	-	-	0.14	0.12	0.11	-	0.11	0.11	-	-	0.18	0.18	0.13	-	-	0.13	-

Table S14. Body size-shape space overlap tests for heterochrony (Tfh1). Pairwise tests with the null hypothesis that species overlap in size-shape space. Test statistics (see Materials and Methods for details) at bottom triangle, and the *P*-values of the of size-shape dissociation computed with 10,000 iterations at upper triangle. Details as in Table S12.

	Python anchietae	*Python bivittatus*	*Python brongersmai*	*Python curtus*	*Python molurus*	*Python regius*	*Python sebae*	*Malayopython reticulatus*	*Malayopython timoriensis*	*Antaresia childreni*	*Antaresia maculosa*	*Antaresia perthensis*	*Antaresia stimsoni*	*Morelia bredli*	*Morelia carinata*	*Morelia spilota*	*Morelia viridis*	*Simalia amethistina*	*Simalia boeleni*	*Simalia clastolepis*	*Simalia kinghorni*	*Simalia nauta*	*Simalia oenpelliensis*	*Bothrochilus boa*	*Leiopython albertisii*	*Aspidites melanocephalus*	*Aspidites ramsayi*	*Liasis fuscus*	*Liasis mackloti*	*Liasis olivaceus*	*Liasis papuana*	*Boa constrictor*
Python anchietae	-	0.00	0.00	0.00	**0.23**	0.00	0.03	0.00	0.00	0.00	0.03	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	-	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	**0.13**
Python bivittatus	0.66	-	0.00	0.00	**0.17**	0.00	**0.07**	0.00	**0.09**	0.00	-	0.00	0.00	-	0.00	-	0.00	-	-	-	0.00	-	-	0.00	0.00	-	-	-	-	-	0.00	0.00
Python brongersmai	0.46	1.00	-	**0.68**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Python curtus	0.43	0.97	0.77	-	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	-	-	0.00	-	0.00	-	-	-	0.00	-	-	0.00	0.00	-	-	0.00	-	-	0.00	0.00
Python molurus	0.32	0.86	0.66	0.63	-	0.00	**0.17**	0.00	**0.09**	0.00	-	0.00	0.00	-	0.00	-	0.00	0.00	-	-	0.00	-	-	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	**0.13**
Python regius	1.18	1.73	1.52	1.50	1.39	-	0.00	0.00	0.00	0.00	-	0.00	0.00	-	0.00	-	0.00	-	-	-	0.00	-	-	0.00	0.00	-	0.00	0.00	0.00	-	0.00	0.00
Python sebae	1.66	2.20	1.99	1.97	1.86	2.72	-	0.00	**0.18**	0.00	-	0.00	0.00	-	0.04	-	0.00	0.00	0.00	-	0.00	-	-	0.00	0.00	-	0.00	0.00	0.00	-	0.00	0.00
Malayopython reticulatus	2.12	2.67	2.46	2.44	2.33	3.19	3.66	-	0.03	0.00	0.00	0.00	0.00	-	**0.33**	-	0.00	0.00	0.01	**0.07**	0.00	-	-	0.00	0.01	-	0.00	0.00	0.00	-	0.00	0.00
Malayopython timoriensis	0.27	0.81	0.61	0.58	0.47	1.34	1.81	2.27	-	0.00	-	0.00	0.00	-	**0.16**	-	0.00	0.00	-	-	-	-	-	0.00	**0.07**	-	0.00	-	0.00	-	0.00	0.01
Antaresia childreni	2.32	2.86	2.66	2.63	2.52	3.38	3.85	4.32	2.47	-	0.00	0.00	0.00	-	0.00	-	0.00	0.00	0.00	0.00	0.00	-	-	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00
Antaresia maculosa	2.45	-	2.78	-	-	-	-	4.45	-	4.65	-	0.01	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	-	-	0.00	0.01	0.00	0.00	0.00	-	-
Antaresia perthensis	1.73	2.27	2.07	2.04	1.93	2.80	3.27	3.74	1.88	3.93	4.06	-	0.00	-	0.00	-	0.00	0.00	0.00	0.00	0.00	-	-	0.00	0.00	-	**0.05**	0.00	0.00	-	0.00	0.00
Antaresia stimsoni	2.89	3.44	3.23	-	3.09	3.96	4.43	4.90	3.04	5.09	5.22	4.50	-	-	0.00	-	0.00	0.00	0.00	0.00	0.00	-	-	0.00	0.00	-	0.00	0.00	0.00	-	0.00	0.00
Morelia bredli	-	-	1.06	-	-	-	-	-	-	-	3.05	-	-	-	0.02	**0.62**	-	0.00	0.00	0.00	-	0.00	0.00	-	-	-	0.00	0.00	-	0.00	-	-
Morelia carinata	0.07	0.61	0.41	0.38	0.27	1.14	1.61	2.08	0.22	2.27	2.40	1.68	2.84	0.67	-	**0.29**	**0.58**	0.00	**0.52**	**0.20**	0.05	0.00	-	0.00	0.19	0.00	0.00	**0.06**	0.00	0.00	0.00	0.00
Morelia spilota	8.56	-	8.89	-	-	-	-	-	-	-	10.88	-	-	9.16	8.51	-	-	0.00	0.00	**0.06**	-	0.00	0.00	-	-	0.00	-	0.00	-	0.00	-	-
Morelia viridis	2.58	3.12	2.92	2.89	2.78	3.65	4.12	4.59	2.73	4.78	-	4.19	5.35	-	2.53	-	-	0.00	-	-	0.00	-	-	0.00	0.00	-	0.00	-	0.00	-	0.00	0.00
Simalia amethistina	1.00	-	1.34	-	1.20	-	2.54	3.01	1.15	3.20	3.33	2.61	3.78	1.60	0.95	9.44	3.46	-	0.00	0.00	**0.36**	**0.06**	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	-	-
Simalia boeleni	1.10	-	1.43	-	-	-	2.63	3.10	-	3.30	3.43	2.71	3.87	1.70	1.05	9.53	-	1.98	-	**0.07**	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	-	-
Simalia clastolepis	0.29	-	0.62	-	-	-	-	2.29	-	2.49	2.62	1.90	3.06	0.89	0.24	8.72	-	1.17	1.26	-	0.00	0.00	0.00	-	-	0.00	0.00	0.00	0.00	0.00	-	-
Simalia kinghorni	1.63	2.17	1.97	1.94	1.83	2.70	3.17	3.64	-	3.83	3.96	3.24	4.40	-	1.58	-	4.09	2.51	2.61	1.80	-	0.05	-	0.00	-	0.00	0.00	0.00	0.00	-	0.00	-
Simalia nauta	-	-	0.65	-	-	-	-	-	-	-	2.64	-	-	0.91	0.26	8.75	-	1.20	1.29	0.48	1.82	-	0.00	-	-	0.00	0.00	0.00	0.00	0.00	-	-
Simalia oenpelliensis	-	-	-	-	-	-	-	-	-	-	2.65	-	-	0.92	-	8.76	-	1.21	1.30	0.49	-	0.52	-	-	-	0.00	-	0.00	-	0.00	-	-
Bothrochilus boa	1.38	1.92	1.71	1.69	1.58	2.44	2.91	3.38	1.53	3.58	-	2.99	4.15	-	1.33	-	3.84	2.26	2.35	-	2.89	-	-	-	0.00	-	0.00	-	0.00	-	0.00	0.00
Leiopython albertisii	3.04	3.58	3.38	3.35	3.24	4.10	4.57	5.04	3.19	5.24	-	4.65	5.81	-	2.99	-	5.50	-	-	-	-	-	-	4.30	-	-	0.00	-	-	-	0.00	0.00
Aspidites melanocephalus	3.00	-	3.34	-	3.20	-	-	-	-	5.20	5.33	-	-	-	2.95	11.44	-	3.88	3.98	3.17	4.51	3.19	3.20	-	-	-	0.00	0.00	0.00	0.00	-	-
Aspidites ramsayi	2.36	-	2.69	-	2.56	3.42	3.89	4.36	2.51	4.56	4.68	3.97	5.13	2.96	2.31	-	4.82	3.24	3.33	2.52	3.87	2.55	-	3.61	5.28	5.24	-	0.00	0.00	-	0.00	0.00
Liasis fuscus	1.62	-	1.96	1.93	1.82	2.68	3.15	3.62	-	3.82	3.95	3.23	4.39	2.22	1.57	10.06	-	2.50	2.60	1.79	3.13	1.81	1.82	-	-	4.50	3.86	-	0.00	0.00	0.00	-
Liasis mackloti	1.79	-	2.13	-	1.99	2.86	3.33	3.80	1.94	3.99	4.12	3.40	4.56	-	1.74	-	4.25	2.67	2.77	1.96	3.30	1.98	-	3.05	-	4.67	4.03	3.29	-	-	0.00	-
Liasis olivaceus	1.23	-	1.57	-	-	-	-	-	-	-	3.56	-	-	1.83	1.18	9.67	-	2.11	2.21	1.40	-	1.42	1.43	-	-	4.11	-	2.73	-	-	-	-
Liasis papuana	0.43	0.97	0.77	0.74	0.63	1.50	1.97	2.44	0.58	2.63	-	2.04	3.21	-	0.38	-	2.89	-	-	-	1.94	-	-	1.69	3.35	-	2.67	1.93	2.10	-	-	0.00
Boa constrictor	3.64	4.19	3.98	3.96	3.85	4.71	5.18	5.65	3.80	5.84	-	5.26	6.42	-	3.60	-	6.11	-	-	-	-	-	-	4.90	6.56	-	5.88	-	-	-	3.96	-

Table S15. Body shape space overlap tests for heterochrony (Tfh2). Pairwise tests with the null hypothesis that species overlap in shape space. Test statistics (see Materials and Methods for details) at bottom triangle, and the *P*-values of the of size-shape dissociation computed with 10,000 iterations at upper triangle. Details as in Table S13.

	Python anchietae	*Python bivittatus*	*Python brongersmai*	*Python curtus*	*Python molurus*	*Python regius*	*Python sebae*	*Malayopython reticulatus*	*Malayopython timoriensis*	*Antaresia childreni*	*Antaresia maculosa*	*Antaresia perthensis*	*Antaresia stimsoni*	*Morelia bredli*	*Morelia carinata*	*Morelia spilota*	*Morelia viridis*	*Simalia amethistina*	*Simalia boeleni*	*Simalia clastolepis*	*Simalia kinghorni*	*Simalia nauta*	*Simalia oenpelliensis*	*Bothrochilus boa*	*Leiopython albertisii*	*Aspidites melanocephalus*	*Aspidites ramsayi*	*Liasis fuscus*	*Liasis mackloti*	*Liasis olivaceus*	*Liasis papuana*	*Boa constrictor*
Python anchietae	-	0.00	0.01	0.00	**0.334**	0.00	**0.07**	0.00	0.03	0.00	**0.07**	0.01	0.01	-	0.00	0.00	0.00	0.00	0.02	0.00	0.01	-	-	0.00	**0.05**	0.03	**0.46**	**0.08**	0.00	0.00	0.01	**0.93**
Python bivittatus	0.50	-	0.00	0.00	**0.23**	0.00	**0.16**	0.00	**0.662**	0.002	-	0.00	0.00	-	0.00	-	0.002	-	-	-	0.00	-	-	0.00	0.01	-	-	-	-	-	0.01	0.00
Python brongersmai	0.39	0.81	-	**0.52**	0.02	0.02	0.00	0.002	0.002	0.002	**0.21**	0.00	0.00	0.00	0.02	0.002	0.002	0.002	0.002	0.002	0.00	0.002	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Python curtus	0.28	0.70	0.58	-	0.00	0.008	0.00	0.00	0.002	0.00	-	0.00	-	-	0.00	-	0.002	-	-	-	0.00	-	-	0.00	0.00	-	-	0.002	-	-	0.00	0.00
Python molurus	0.28	0.70	0.59	0.48	-	0.00	**0.31**	0.00	**0.29**	0.00	-	**0.29**	0.02	-	0.00	-	0.002	0.002	-	-	0.00	-	-	0.02	**0.07**	0.00	**0.07**	0.04	0.00	-	0.02	**0.40**
Python regius	0.88	1.30	1.19	1.08	1.09	-	0.00	0.00	0.002	0.00	-	0.00	0.00	-	0.00	-	0.002	-	-	-	0.00	-	-	0.00	0.00	-	0.00	0.00	0.00	-	0.00	0.00
Python sebae	1.46	1.88	1.76	1.65	1.66	2.26	-	0.00	**0.22**	0.00	-	0.00	0.00	-	**0.058**	-	0.002	0.002	0.002	-	0.00	-	-	0.00	0.00	-	0.00	0.00	0.00	-	0.00	0.00
Malayopython reticulatus	1.81	2.23	2.12	2.01	2.01	2.61	3.18	-	**0.08**	0.00	0.00	**0.32**	0.00	-	**0.676**	-	0.002	0.002	**0.15**	**0.16**	0.00	-	-	0.00	**0.43**	-	0.00	0.00	0.00	-	**0.21**	0.00
Malayopython timoriensis	0.21	0.63	0.51	0.40	0.41	1.01	1.58	1.94	-	0.002	-	**0.89**	0.01	-	**0.126**	-	0.002	0.002	-	-	-	-	-	**0.06**	**0.12**	-	0.00	-	0.00	-	0.00	0.03
Antaresia childreni	1.91	2.33	2.21	2.11	2.11	2.71	3.28	3.64	2.03	-	0.002	0.00	0.002	-	0.002	-	0.002	0.002	0.002	0.002	0.00	-	-	0.00	0.002	**1**	0.002	0.00	0.00	-	0.002	0.00
Antaresia maculosa	2.09	-	2.39	-	-	-	-	3.82	-	3.92	-	**0.22**	0.00	0.00	0.00	0.00	-	**0.10**	0.02	0.002	**0.85**	0.00	**0.944**	-	-	0.03	0.02	0.03	0.00	0.00	-	-
Antaresia perthensis	1.45	1.87	1.75	1.64	1.65	2.25	2.82	3.18	1.57	3.27	3.45	-	**0.11**	-	0.002	-	0.002	0.00	0.036	0.002	0.04	-	-	0.00	**1.00**	-	**0.096**	0.01	0.002	-	**0.096**	0.00
Antaresia stimsoni	2.23	2.65	2.53	-	2.43	3.03	3.60	3.96	2.35	4.05	4.23	3.59	-	-	0.002	-	0.002	0.00	0.00	0.002	0.00	-	-	0.00	0.00	-	0.00	0.00	0.002	-	0.00	0.00
Morelia bredli	-	-	0.81	-	-	-	-	-	-	-	2.52	-	-	-	0.02	**0.426**	-	0.00	0.00	**0.07**	-	0.00	0.00	-	-	-	0.00	0.00	-	0.002	-	-
Morelia carinata	0.05	0.47	0.36	0.25	0.25	0.85	1.42	1.78	0.18	1.88	2.06	1.42	2.20	0.48	-	**0.21**	**0.64**	0.01	**0.60**	**0.46**	0.09	0.03	-	0.00	0.10	**0.064**	0.00	**0.144**	0.03	0.02	**0.102**	0.00
Morelia spilota	6.80	-	7.10	-	-	-	-	-	-	-	8.81	-	-	7.23	6.77	-	-	0.00	**0.06**	**0.86**	-	0.02	0.00	-	-	0.002	-	0.002	-	0.002	-	-
Morelia viridis	2.25	2.67	2.55	2.44	2.45	3.05	3.62	3.98	2.37	4.07	-	3.61	4.39	-	2.22	-	-	0.00	-	-	0.00	-	-	0.00	0.00	-	0.002	-	0.002	-	0.02	0.002
Simalia amethistina	0.73	-	1.04	-	0.94	-	2.11	2.46	0.86	2.56	2.74	2.10	2.88	1.16	0.70	7.45	2.90	-	0.00	0.00	**0.22**	**0.12**	0.004	0.002	-	0.00	0.00	0.00	0.00	0.00	-	-
Simalia boeleni	0.95	-	1.25	-	-	-	2.32	2.68	-	2.77	2.96	2.31	3.09	1.38	0.92	7.67	-	1.60	-	**0.18**	0.00	0.03	0.00	0.008	-	0.00	0.00	0.00	0.00	0.00	-	-
Simalia clastolepis	0.24	-	0.55	-	-	-	-	1.97	-	2.07	2.25	1.61	2.39	0.67	0.21	6.96	-	0.90	1.11	-	0.00	0.004	0.00	-	-	0.00	0.00	0.01	0.00	0.00	-	-
Simalia kinghorni	1.36	1.78	1.66	1.56	1.56	2.16	2.73	3.09	-	3.19	3.37	2.72	3.50	-	1.33	-	3.52	2.01	2.23	1.52	-	**0.12**	-	0.002	-	0.00	0.00	0.00	0.00	-	**0.05**	-
Simalia nauta	-	-	0.55	-	-	-	-	-	-	-	2.25	-	-	0.67	0.22	6.96	-	0.90	1.11	0.41	1.52	-	0.00	-	-	0.00	0.00	0.00	0.00	0.02	-	-
Simalia oenpelliensis	-	-	-	-	-	-	-	-	-	-	2.25	-	-	0.67	-	6.96	-	0.89	1.11	0.40	-	0.41	-	-	-	0.002	-	0.01	-	0.002	-	-
Bothrochilus boa	1.16	1.58	1.46	1.35	1.36	1.96	2.53	2.89	1.28	2.98	-	2.52	3.30	-	1.13	-	3.32	1.81	2.02	-	2.43	-	-	-	0.00	-	0.002	-	0.002	-	0.00	0.00
Leiopython albertisii	2.63	3.05	2.93	2.83	2.83	3.43	4.00	4.36	2.75	4.45	-	3.99	4.77	-	2.60	-	4.79	-	-	-	-	-	-	3.70	-	-	0.002	-	-	-	**0.10**	0.00
Aspidites melanocephalus	2.39	-	2.69	-	2.59	-	-	-	-	4.22	4.40	-	-	-	2.36	9.11	-	3.04	3.26	2.55	3.67	2.55	2.55	-	-	-	0.00	0.00	0.00	0.00	-	-
Aspidites ramsayi	1.87	-	2.17	-	2.07	2.67	3.24	3.60	1.99	3.69	3.87	3.23	4.01	2.29	1.84	-	4.03	2.52	2.73	2.03	3.14	2.03	-	2.94	4.41	4.17	-	0.00	0.00	-	0.002	0.002
Liasis fuscus	1.31	-	1.61	1.51	1.51	2.11	2.68	3.04	-	3.13	3.32	2.67	3.45	1.74	1.28	8.03	-	1.96	2.17	1.47	2.59	1.47	1.47	-	-	3.62	3.09	-	0.03	0.002	0.002	-
Liasis mackloti	1.36	-	1.66	-	1.56	2.16	2.73	3.09	1.48	3.18	3.36	2.72	3.50	-	1.33	-	3.52	2.01	2.22	1.52	2.63	1.52	-	2.43	-	3.67	3.14	2.58	-	-	0.002	-
Liasis olivaceus	0.91	-	1.21	-	-	-	-	-	-	-	2.91	-	-	1.33	0.88	7.62	-	1.56	1.77	1.07	-	1.07	1.07	-	-	3.21	-	2.13	-	-	-	-
Liasis papuana	0.36	0.78	0.66	0.56	0.56	1.16	1.73	2.09	0.48	2.19	-	1.72	2.50	-	0.33	-	2.52	-	-	-	1.64	-	-	1.43	2.91	-	2.14	1.59	1.63	-	-	0.00
Boa constrictor	2.89	3.31	3.19	3.09	3.09	3.69	4.26	4.62	3.01	4.71	-	4.25	5.03	-	2.86	-	5.05	-	-	-	-	-	-	3.96	5.43	-	4.67	-	-	-	3.16	-

Figure S1. Landmark and semilandmark configuration used to describe dorsal head shape in pythons. Description of numbered landmarks (large red dots) and semilandmarks (small red dots) is as follows: 1, tip of the snout; 2-3 anterior most points of the nostrils; 4-5, anterior most points of the eyes; 6-7, posterior most points of the eyes; 8-9, corners of the mouth; 10-22 and 23-35, semi-landmark curves describing the outline of the head going from the tip of the snout to the corner of the mouth for each side.

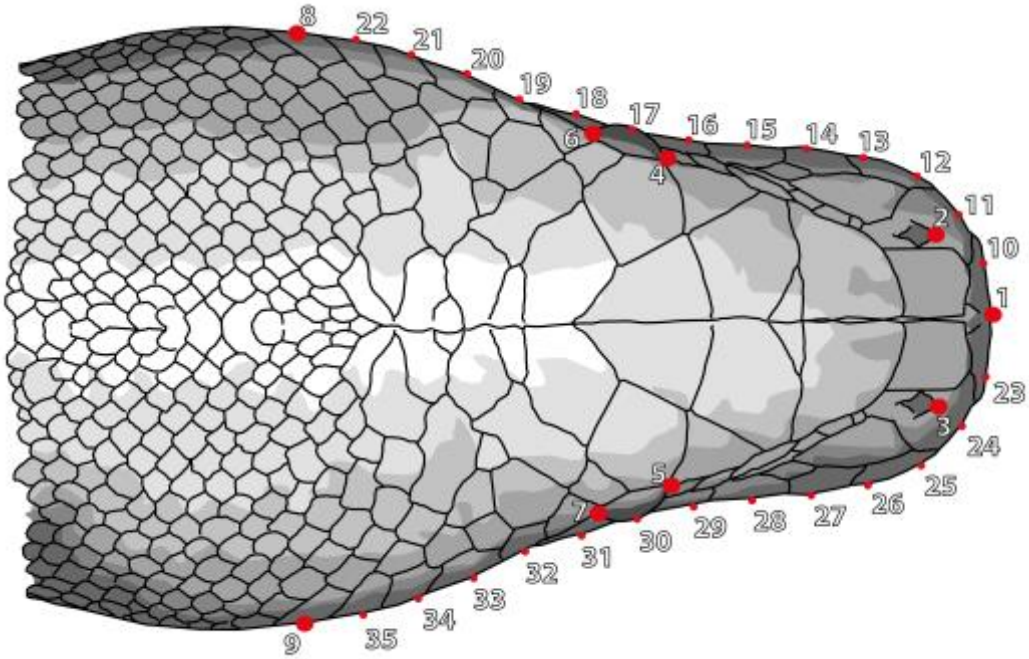

Figure S2. Regression scores (top), common allometric components (CAC; middle) and principal component analysis (PCA; bottom) of python head shape (left) and body shape (right). Dots are colored according to their species and clades as in Figs. 2 and 3. Dot size is proportional to size. The x axis of size in the regression score and CAC plots corresponds to log-transformed centroid size and log-transformed size for head and body shape, respectively. Principal component axes labels include the percentage of variance they each explain.

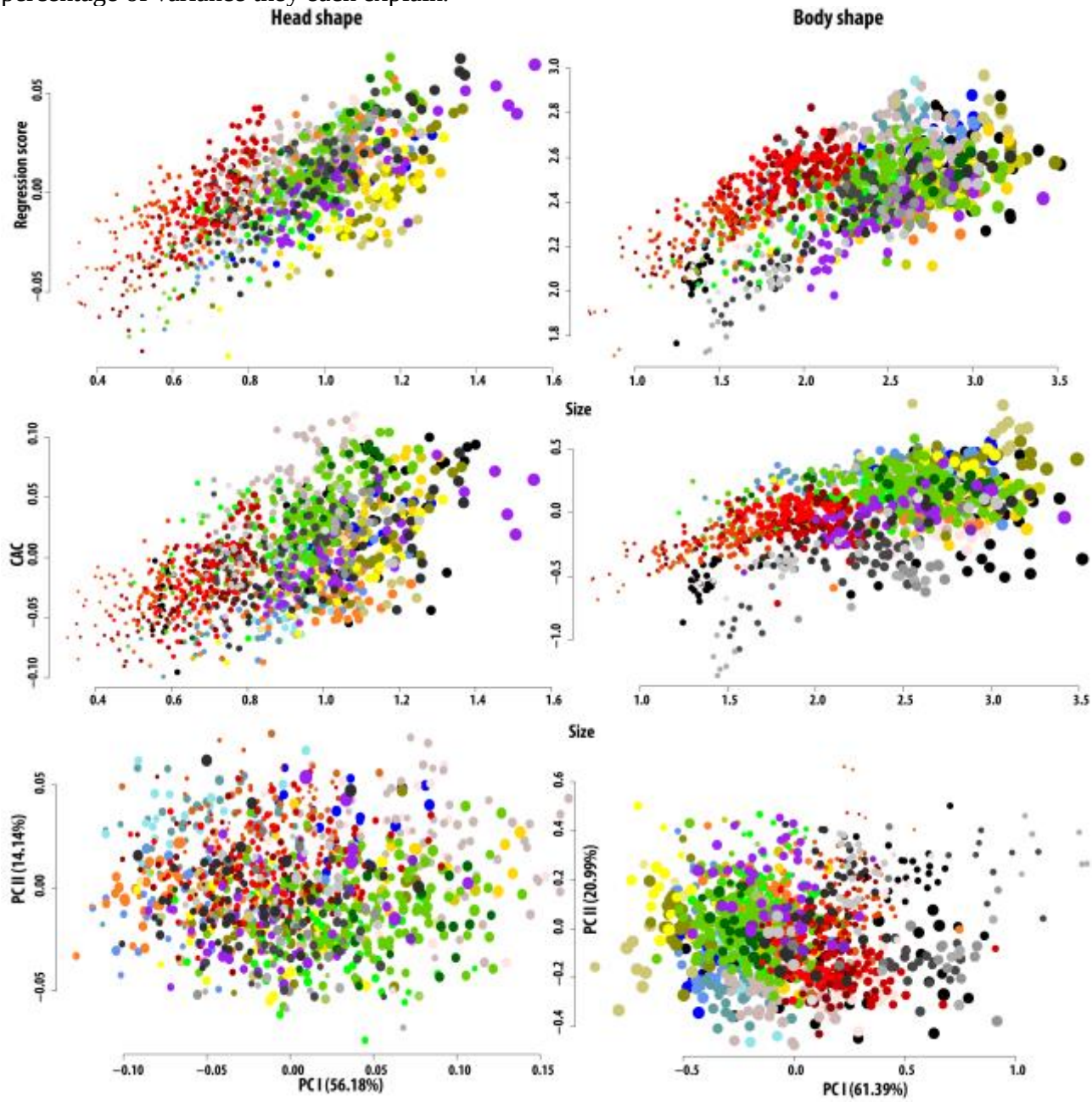

Figure S3. Regression scores, CAC and PCA as described in Fig. S2 for head and body shape, separated by clade.

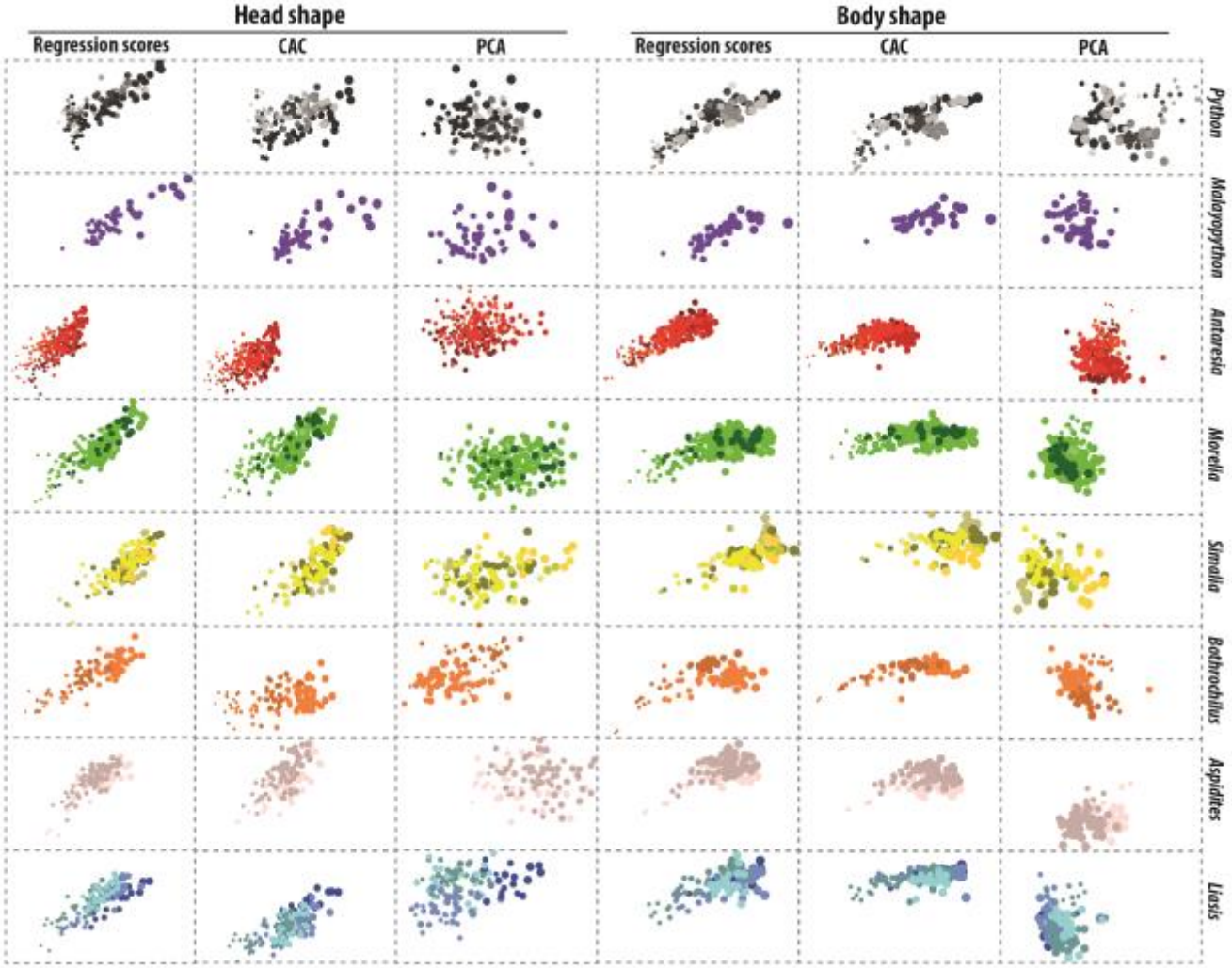

Figure S4. Slope vector lengths (the magnitude of shape change with unit of size change) for each species of python for head and body shape.

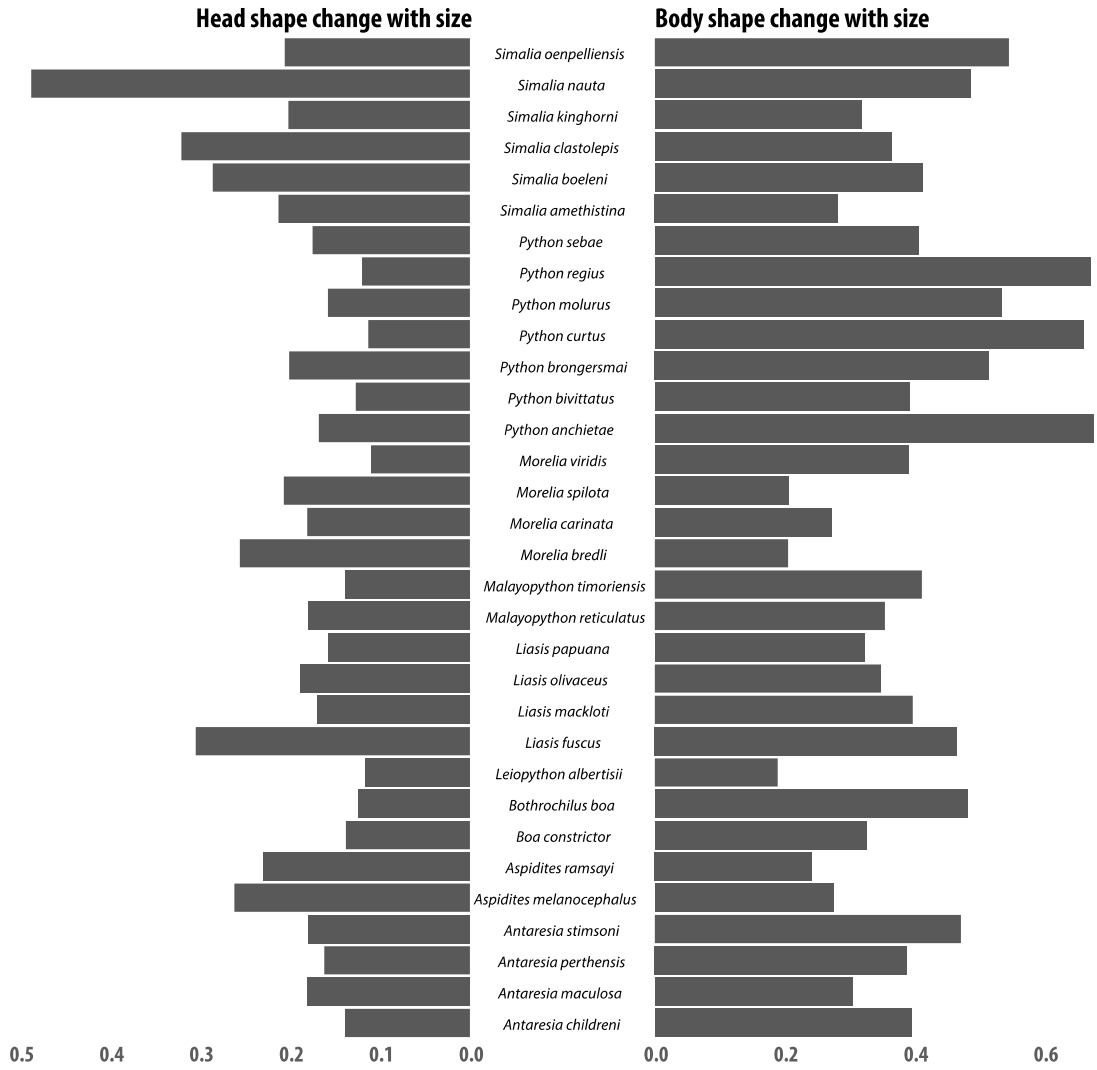

Figure S5. Maximum clade credibility time-calibrated tree of the pythons used in this study. Black circles at the nodes indicate a node supported with a posterior probability of 0.95 or higher. Blue bars at the nodes indicate the 95% highest posterior density of the divergence time estimated for that node. The scale at the bottom indicates the time frame in millions of years for the divergence of the nodes. From top to bottom, the scale indicates the geological ages, epochs and periods as a reference.

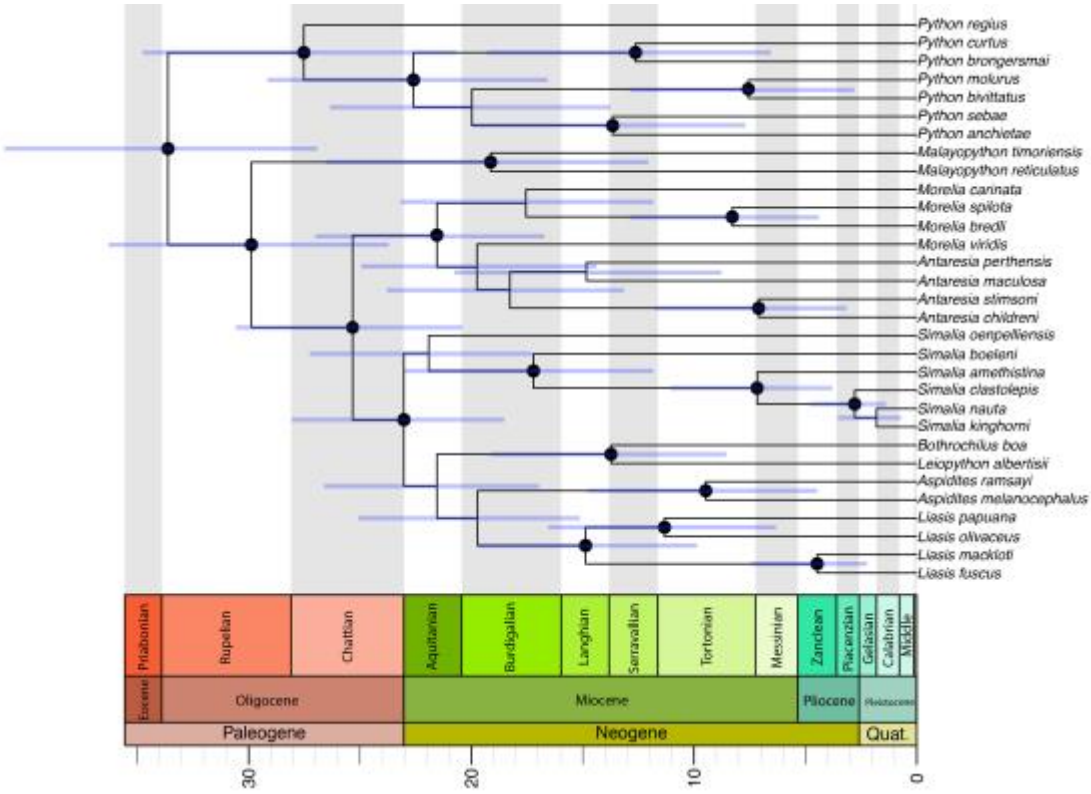

Figure S6. Ontogenetic allometric trajectories derived from the HOS (first and third columns) and PTA (second and fourth columns) tests, of head and body shape of the pythons, separated by micro-habitat choice. These are the same trajectories illustrated in Figures 2 and 3; see the respective legends for details.