

SUPPLEMENTARY MATERIAL

Adaptive or non-adaptive? Cranial evolution in a radiation of miniaturize day geckos

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Table S1. List of material used in the morphological analysis with information on the phylogenetic groups, catalog numbers, geographic distribution, ecological traits (macrohabitat, lifestyle), and the osteological measurements. Catalog abbreviations: BMNH (Natural History Museum of London), CAS (California Academy of Sciences), MCZ (Museum of Comparative Zoology) MNCN (Museo de Ciencias Naturales de Madrid), MNHN (Muséum national d'Histoire naturelle), MHNG (Muséum d'histoire naturelle de la Ville de Genève), PEM (Port Elizabeth Museum), RMCA (Royal Museum for Central Africa), SMF (Forschungsinstitut und Natur-Museum Senckenberg), UCM (University of Colorado Museum of Natural History), UF (University of Florida Museum), UTEP (University of Texas of El Paso), ZMB (Museum für Naturkunde Berlin), ZSM (Zoologische Staatssammlung München). Osteological abbreviations: BC (braincase), CB+S (compound bone+surangular), J (jugal), JL (jaw length), DTL (dentary tooth loci), F (frontal), MTL (maxillary tooth loci), P(parietal), POF (postorbitofrontal), PTL (premaxilla tooth loci), SL (skull length), SVL (snout–vent length), SW (skull width).

Group	Species	Catalog Number	Geographic distribution	Macrohabitat	Lifestyle	SLV (mm)	SL (mm)	SW (mm)	JL (mm)	PTL	MTL (R)	MTL (L)	DTL (L)	F	P	POF	BC	CB+S	J
<i>angularis</i> -group	<i>L. angularis</i>	PEM R08348	Africa	RainForest	Arboreal	38.7	11.00	6.77	9.52	11	20	19	23	Fused	Paired	Large	Fused	Fused	Small
	<i>L. paurospilus</i> (Holotype)	RMCA R.27408	Africa	RainForest	Arboreal	37.2	10.56	6.37	9.37	11	19	18	23	Fused	Paired	Large	Fused	Fused	Small
	<i>L. heeneni</i> (Holotype)	RMCA R.8477	Africa	Dry forest	Arboreal	34.6	10.50	6.11	9.32	11	19	19	24	Fused	Paired	Large	Fused	Fused	Medium
	<i>L. baptistai</i> (Holotype)	CAS 263551	Africa	RainForest	Arboreal	35.5	9.87	6.07	8.38	11	22	22	26	Fused	Paired	Medium	Fused	Fused	Small
<i>klugei</i> -group	<i>L. klugei</i>	MNHN 1990.3392	America	Dry forest	Arboreal	28.5	7.80	4.48	8.40	9	17	16	20	Paired	Paired	Small	Fused	Fused	Absent
	<i>L. wetzeli</i>	UCM 55597	America	Dry forest	Arboreal	27.0	7.68	4.89	6.78	11	17	16	20	Fused	Paired	Small	Fused	Fused	Absent
<i>bivittis</i> -group	<i>L. bivittis</i>	MNHN 1990.3569	Madagascar	RainForest	Arboreal	29.5	8.29	6.75	7.02	11	17	18	20	Paired	Paired	Medium	Fused	Fused	Absent
<i>bonisi</i> -group	<i>L. bonisi</i>	PEM R18513	Africa	Montane	Mixed	44.7	11.54	7.28	10.38	11	19	19	23	Fused	Fused	Large	Fused	Fused	Medium
	<i>L. regulus</i>	PEM R21168	Africa	Montane	Rupicolou s	35.1	10.26	6.19	8.97	11	18	18	22	Paired	Paired	Large	Unfused	Unfused	Medium
	<i>L. rex</i>	PEM R16300	Africa	RainForest	Arboreal	47.1	12.78	7.79	11.58	10	20	20	25	Fused	Paired	Large	Unfused	Fused	Large
	<i>L. sp. 'Ribaue'</i>	PEM R21196	Africa	Montane	Arboreal	42.3	11.18	6.69	8.45	11	21	20	24	Fused	Paired	Large	Unfused	Fused	Large
<i>capensis</i> -group	<i>L. angolensis</i>	PEM R22045	Africa	Dry forest	Arboreal	34.5	9.08	5.42	7.86	11	18	18	21	Semifused	Paired	Small	Fused	Fused	Small
	<i>L. bernardi</i>	PEM R05594	Africa	Dry forest	Rupicolou s	33.6	8.70	6.11	7.91	11	16	16	21	Fused	Paired	Medium	Fused	Fused	Small
	<i>L. bradfieldi</i>	PEM R14599	Africa	Dry forest	Arboreal	28.8	8.00	4.79	7.19	11	15	15	19	Fused	Paired	Medium	Fused	Fused	Absent
	<i>L. capensis</i>	PEM R20146	Africa	Dry forest	Arboreal	32.0	9.19	5.04	7.73	11	19	18	23	Fused	Paired	Medium	Fused	Fused	Small
	<i>L. grotei</i>	PEM R24380	Africa	Dry forest	Arboreal	29.4	8.74	5.16	7.57	11	16	17	21	Fused	Paired	Small	Semifuse d	Fused	Small
	<i>L. insularis</i> (Holotype)	SMF 8946	Island	RainForest	Arboreal	27.0	7.94	4.66	6.79	11	21	21	23	Fused	Paired	Small	Fused	Fused	Medium
<i>capensis</i> -group	<i>L. nyaneka</i>	PEM R21635	Africa	Dry forest	Arboreal	28.0	8.44	5.23	7.37	11	16	16	20	Paired	Paired	Small	Unfused	Paired	Small
	<i>L. stevensoni</i>	PEM R00103	Africa	Dry forest	Rupicolou s	34.7	8.74	6.20	7.87	11	16	16	21	Fused	Paired	Medium	Fused	Fused	Small

Group	Species	Catalog Number	Geographic distribution	Macrohabitat	Lifestyle	SLV (mm)	SL (mm)	SW (mm)	JL (mm)	PTL	MTL (R)	MTL (L)	DTL (L)	F	P	POF	BC	CB+S	J
<i>lawrencei</i> -group	<i>L. lawrencei</i>	PEM R02142	Africa	Dry forest	Arboreal	30.5	8.50	5.04	7.31	9	15	15	19	Fused	Paired	Large	Fused	Fused	Small
<i>fischeri</i> -group	<i>L. conraui</i>	PEM R05469	Africa	Dry forest	Arboreal	27.8	7.92	4.39	6.83	11	22	22	24	Fused	Paired	Small	Semifused	Fused	Vestigial
	<i>L. fischeri</i>	PEM R05403	Africa	Dry forest	Arboreal	33.1	9.32	5.14	8.13	11	20	20	22	Fused	Paired	Small	Fused	Fused	Vestigial
	<i>L. thomensis (Holotype)</i>	MCZ-R21940	Island	RainForest	Arboreal	30.0	8.49	4.23	7.53	11	20	20	23	Fused	Paired	Small	Fused	Fused	Vestigial
<i>madagascaren sis</i> -group	<i>L. wertmuthi</i>	MNCN 46133	Island	RainForest	Arboreal	30.7	9.16	4.99	7.91	11	22	22	24	Fused	Paired	Small	Fused	Fused	Vestigial
	<i>L. delicatus</i>	MNCN 51263	Island	RainForest	Arboreal	33.6	9.76	5.07	8.42	11	20	21	25	Fused	Paired	Small	Fused	Fused	Absent
	<i>L. expectatus</i>	MNHN 1933.0168	Madagascar	Montane	Arboreal	25.6	8.05	4.73	6.22	11	17	18	21	Fused	Paired	Medium	Semifused	Fused	Medium
	<i>L. guibei</i>	MNHN 1990.3567	Madagascar	RainForest	Arboreal	35.7	10.3	6.33	8.35	11	19	19	22	Fused	Paired	Small	Semifused	Fused	Medium
	<i>L. madagascariensis (Paralectotype)</i>	SMF 8938	Madagascar	RainForest	Arboreal	30.2	8.75	4.93	7.31	11	21	22	25	Fused	Paired	Medium	Fused	Fused	Large
	<i>L. miops</i>	MCZ R11685	Madagascar	RainForest	Arboreal	24.0	7.29	4.27	6.39	11	20	20	22	Fused	Paired	Medium	Fused	Unfused	Small
	<i>L. rarus</i>	ZSM 860/ 2003	Madagascar	Montane	Rupicolous	36.5	8.72	5.40	8.01	11	19	19	22	Fused	Paired	Large	Fused	Unfused	Small
<i>ocellatus</i> -group	<i>L. graniticolus</i>	PEM R25373	Africa	Montane	Rupicolous	34.6	9.98	6.05	8.40	11	18	18	23	Fused	Fused	Large	Fused	Fused	Small
	<i>L. incognitus</i>	PEM R25022	Africa	Montane	Rupicolous	32.1	9.32	5.91	8.06	11	18	18	21	Paired	Paired	Large	Semifused	Fused	Medium
	<i>L. methueni</i>	PEM R27649	Africa	Montane	Rupicolous	40.1	10.53	6.69	9.31	11	19	19	25	Fused	Paired	Large	Semifused	Unfused	Medium
	<i>L. cf. nigropunctatus</i>	PEM R27659	Africa	Montane	Rupicolous	29.2	8.21	5.16	6.95	11	19	19	22	Fused	Paired	Large	Fused	Fused	Small
	<i>L. ocellatus</i>	PEM R14378	Africa	Montane	Rupicolous	26.5	7.82	5.26	6.85	11	18	18	21	Fused	Fused	Large	Fused	Fused	Medium
<i>picturatus</i> -group	<i>L. soutpansbergensis</i>	PEM R00102	Africa	Montane	Rupicolous	28.1	8.53	5.56	7.31	11	17	17	20	Paired	Paired	Large	Unfused	Unfused	Small
	<i>L. waterbergensis</i>	MCZ R192342	Africa	Montane	Rupicolous	36.0	10.06	6.27	8.85	11	18	19	22	Fused	Paired	Large	Fused	Fused	Small
	<i>L. gutturalis</i>	MNCN 51219	Africa	Dry forest	Arboreal	34.4	9.28	4.45	8.00	11	17	16	20	Semifused	Paired	Small	Semifused	Fused	Small
	<i>L. depressus</i>	UTEP 22579	Africa	RainForest	Arboreal	37.8	10.17	5.72	8.79	11	16	16	18	Fused	Paired	Small	Fused	Fused	Small
	<i>L. dysmicus (Holotype)</i>	MHNG 1005.72	Africa	RainForest	Arboreal	27.6	8.25	5.03	7.24	11	16	16	20	Paired	Paired	Small	Unfused	Unfused	Small
	<i>L. mirabundus (Holotype)</i>	UTEP 22585	Africa	Dry forest	Arboreal	34.8	9.45	5.96	7.91	11	15	15	19	Semifused	Paired	Small	Unfused	Unfused	Small
	<i>L. karamoja (Holotype)</i>	UTEP 22590	Africa	Dry forest	Arboreal	34.3	9.50	5.82	8.48	11	17	17	20	Fused	Paired	Small	Unfused	Unfused	Small
	<i>L. kibera (Holotype)</i>	UTEP 22566	Africa	RainForest/ Montane	Arboreal	36.9	10.40	6.17	9.34	11	17	17	22	Fused	Paired	Small	Fused	Fused	Small

Group	Species	Catalog Number	Geographic distribution	Macrohabitat	Lifestyle	SLV (mm)	SL (mm)	SW (mm)	JL (mm)	PTL	MTL (R)	MTL (L)	DTL (L)	F	P	POF	BC	CB+S	J
picturatus-group	<i>L. kibera</i> *	UTEP 22576	Africa	RainForest/ Montane	Arboreal	25.5	8.0	4.7	6.9	11	17	17	20	Paired	Paired	Small	Unfused	Unfused	Small
	<i>L. gamblei</i> (Holotype)	UTEP 22584	Africa	Dry forest	Arboreal	35.0	8.43	5.25	7.22	11	18	17	20	Semifused	Paired	Small	Unfused	Semifused	Absent
	<i>L. leopardinus</i> (Holotype)	UTEP 22577	Africa	RainForest	Arboreal	32.4	9.56	5.48	8.31	11	18	18	21	Fused	Paired	Medium	Semifused	Fused	Absent
	<i>L. chobiensis</i>	PEM R21337	Africa	Dry forest	Arboreal	39.6	10.77	6.35	9.33	11	18	18	23	Fused	Paired	Small	Fused	Fused	Absent
picturatus-group	<i>L. inexpectatus</i> (Holotype)	MCZ R67121	Africa	Dry forest	Arboreal	32.0	8.19	4.96	7.46	9	15	15	17	Paired	Paired	Small	Semifused	Unfused	Vestigial
	<i>L. keniensis</i>	PEM R08585	Africa	Dry forest	Arboreal	34.0	9.32	6.04	8.35	10	18	18	22	Fused	Paired	Medium	Fused	Fused	Absent
	<i>L. kimhowelli</i>	PEM R16819	Africa	Dry forest	Arboreal	37.9	10.69	5.96	9.48	11	20	20	25	Fused	Paired	Small	Fused	Fused	Small
	<i>L. manni</i>	CAS 111906	Africa	Dry forest	Arboreal	35.4	10.34	6.16	9.10	11	19	18	23	Fused	Paired	Medium	Fused	Fused	Small
	<i>L. mombasicus</i> (Holotype)	MCZ R30590	Island	Dry forest	Arboreal	38.0	10.00	6.04	8.85	11	22	22	23	Fused	Paired	Medium	Fused	Fused	Vestigial
	<i>L. picturatus picturatus</i>	UF HERP 92206	Africa	Dry forest	Arboreal	35.6	10.50	6.17	9.01	11	18	18	21	Fused	Paired	Small	Fused	Fused	Small
	<i>L. p. sudanensis</i> (Holotype)	MCZ R8800	Africa	Dry forest	Arboreal	34.0	9.11	5.12	8.03	11	16	18	21	Semifused	Paired	Medium	Fused	Semifused	Absent
	<i>L. p. ukerewensis</i> (Holotype)	MCZ R30542	Africa	Dry forest	Arboreal	41.0	10.88	6.71	9.73	11	19	18	24	Fused	Paired	Medium	Fused	Fused	Small
	<i>L. scorteccii</i>	MNHN 1937.0089	Africa	Dry forest	Arboreal	30.0	8.94	5.75	8.06	11	20	20	21	Fused	Paired	Medium	Fused	Fused	Absent
	<i>L. williamsi</i>	UF HERP 60093	Africa	RainForest	Arboreal	38.7	10.98	6.45	9.41	11	23	23	24	Fused	Paired	Small	Fused	Fused	Absent
pictus-group	<i>L. blanci</i>	MNHN 1990.1892	Madagascar	Montane	Rupicolous	37.9	10.44	6.48	9.42	11	20	21	25	Fused	Paired	Large	Fused	Fused	Large
	<i>L. intermedius</i>	ZSM 2368/2007	Madagascar	Montane	Rupicolous	29.3	8.13	4.85	6.95	12	17	17	23	Fused	Paired	Large	Semifused	Fused	Large
	<i>L. mirabilis</i>	ZSM 389/2000	Madagascar	Montane	Rupicolous	27.3	7.39	4.54	6.39	12	20	20	25	Fused	Paired	Medium	Fused	Fused	Medium
	<i>L. montanus</i>	MNHN 1990.1877	Madagascar	Montane	Rupicolous	34.5	9.35	5.74	8.42	11	19	19	25	Fused	Paired	Large	Unfused	Fused	Small
pictus-group	<i>L. pictus</i> (Paralectotype)	SMF 8957	Madagascar	Montane	Mixed	29.2	10.27	6.83	9.20	11	20	20	24	Fused	Paired	Large	Fused	Fused	Medium
	<i>L. roavolana</i> (Holotype)	ZSM 5115/2005	Madagascar	RainForest	Arboreal	23.6	6.87	4.28	6.05	11	20	20	23	Fused	Paired	Medium	Fused	Fused	Small
	<i>L. tuberosus</i>	MNHN 1990.0420	Madagascar	Dry forest	Arboreal	31.5	9.14	5.18	8.11	11	16	17	20	Fused	Paired	Large	Fused	Fused	Vestigial
scheffleri-group	<i>L. broadleyi</i> (Holotype)	ZMB 48344	Africa	Dry forest	Arboreal	25.0	7.40	4.54	6.40	11	19	19	22	Paired	Paired	Small	Unfused	Unfused	Vestigial
	<i>L. conradti</i>	UF HERP 67216	Africa	RainForest	Arboreal	30.1	8.10	4.88	6.94	11	20	20	22	Semifused	Paired	Small	Fused	Fused	Vestigial
	<i>L. gravis</i>	PEM R17325	Africa	RainForest	Rupicolous	33.7	9.76	5.90	8.43	11	20	20	24	Fused	Paired	Small	Fused	Fused	Vestigial
	<i>L. laterimaculatus</i> (Holotype)	MCZ R40994	Africa	Dry forest	Arboreal	24.0	7.09	4.35	6.08	11	17	18	22	Fused	Fused	Small	Fused	Fused	Vestigial

Group	Species	Catalog Number	Geographic distribution	Macrohabitat	Lifestyle	SLV (mm)	SL (mm)	SW (mm)	JL (mm)	PTL	MTL (R)	MTL (L)	DTL (L)	F	P	POF	BC	CB+S	J
<i>scheffleri</i> -group <i>somalicus</i> -group	<i>L. scheffleri</i> (Lectotype)	ZMB 22712	Africa	Dry forest	Arboreal	23.0	6.85	3.91	5.90	11	16	16	20	Semifused	Paired	Small	Semifused	Fused	Vestigial
	<i>L. somalicus battersbyi</i>	MNHN 1990.3366	Africa	Dry forest	Arboreal	22.7	8.10	4.29	7.27	11	20	20	22	Fused	Paired	Vestigial	Fused	Fused	Absent
	<i>L. s. somalicus</i> (Holotype)	MCZ R35558	Africa	Dry forest	Arboreal	24.0	6.62	3.30	5.76	11	18	18	20	Fused	Paired	Small	Unfused	Fused	Absent
<i>verticillatus</i> -group <i>verticillatus</i> -group	<i>L. grandisonae</i> (Holotype)	BMNH 1952.1.8.10	Africa	Dry forest	Arboreal	27.5	7.45	3.98	6.41	11	18	18	23	Fused	Paired	Absent/Vestigial	Fused	Fused	Absent
	<i>L. arnoulti</i>	MNHN 1990.1874	Madagascar	Montane	Rupicolous	32.0	8.81	6.09	7.65	11	19	19	23	Fused	Paired	Small	Fused	Fused	Small
	<i>L. blancae</i>	ZSM 498/2001	Madagascar	Dry forest	Arboreal	33.2	8.51	5.63	7.70	10	18	18	25	Fused	Paired	Medium	Fused	Fused	Medium
	<i>L. decaryi</i>	MNHN 1950.0262	Madagascar	Dry forest	Mixed	27.0	6.50	3.93	5.59	11	18	19	25	Fused	Paired	Small	Fused	Fused	Small
	<i>L. heterurus heterurus</i> (Paratype)	SMF 8954	Island	Dry forest	Arboreal	24.1	6.93	4.29	5.94	11	19	18	–	Fused	Paired	Absent	Fused	Fused	Small
	<i>L. klemmeri</i>	ZSM 47/2006	Madagascar	Dry forest	Arboreal	25.3	7.30	4.74	6.21	11	19	19	23	Fused	Paired	Small	Fused	Fused	Medium
	<i>L. pauliani</i>	MNHN 1990.0202	Madagascar	Mixed	Rupicolous	29.8	9.14	4.94	7.80	11	18	18	23	Fused	Paired	Large	Fused	Fused	Small
	<i>L. tolampyae</i>	MNHN 1990.1867	Madagascar	Dry forest	Arboreal	23.6	7.25	4.35	6.18	11	19	19	21	Fused	Paired	Small	Unfused	Fused	Small
	<i>L. verticillatus</i>	MNHN 1990.2534	Madagascar	Dry forest	Arboreal	21.9	6.67	3.97	5.58	11	18	18	23	Fused	Paired	Small	Fused	Fused	Small

Table S2. List of material used in the morphological analysis with information on the country, locality, dataset and High-Resolution X-ray Computed Tomography (HRCT) parameters used to scan *Lygodactylus* skulls. For catalog abbreviations see [Table S1](#).

Group	Species	Catalog Number	Country / Locality	Voxel (µm)	Voltage (kV)	Current (µA)	Exposure Time (secs)	Morfosource (ARK/DOI)	CT-scan Machine	Dataset
<i>angularis</i> -group	<i>Lygodactylus angularis</i>	PEM R08348	Malawi / Zomba Forestry Station (Zomba)	6.99991	100	60	0.5	ark:/87602/m4/452097	General Electric Nanotom S	1, 2, 3
	<i>Lygodactylus paurospilus</i>	RMCA R.27408	DRC / Haute Lubitshako (1900-2000 m elevation), Terr. de Fizi, Kivu	18.75300	90	111	0.5	ark:/87602/m4/485968	RX EasyTom150	1, 3
	<i>Lygodactylus heeneni</i>	RMCA R.8477	DRC / Katanga	19.01430	100	100	0.5	ark:/87602/m4/485981	RX EasyTom150	1, 2, 3
	<i>Lygodactylus baptistai</i>	CAS 263551	Angola / Serra da Neve	10.92407	60	180	0.2	ark:/87602/m4/452102	Phoenix V Tome X M	1, 2, 3
<i>klugei</i> -group	<i>Lygodactylus klugei</i>	MNHN 1990.3392	Brazil / Pernambuco	8.21131	80	75	3.0	ark:/87602/m4/526047	Zeiss Xradia 510 Versa	1, 2, 3
	<i>Lygodactylus wetzeli</i>	UCM 55597	Paraguay / Boquerón, Filadelfia, Hotel Florida	8.08509	70	120	0.2	ark:/87602/m4/526041	Phoenix V Tome X M	1, 2, 3
<i>bivittis</i> -group	<i>Lygodactylus bivittis</i>	MNHN 1990.3569	Madagascar / Vallée de la Tsiribihina	7.89462	80	75	3.0	ark:/87602/m4/526052	Zeiss Xradia 510 Versa	1, 2, 3
<i>bonisi</i> -group	<i>Lygodactylus bonisi</i>	PEM R18513	Malawi / Chinzama hut (Mulanje)	6.99991	120	80	0.5	ark:/87602/m4/526057	General Electric Nanotom	1, 2, 3
	<i>Lygodactylus regulus</i>	PEM R21168	Mozambique / Mount Namuli	6.99991	100	60	0.5	ark:/87602/m4/526063	General Electric Nanotom	1, 2, 3
	<i>Lygodactylus rex</i>	PEM R16300	Malawi / Lichenya Hut (Mount Mulanje)	10.00000	100	70	0.5	ark:/87602/m4/526068	General Electric Nanotom	1, 2, 3
	<i>Lygodactylus</i> sp. ‘Ribae’	PEM R21196	Mozambique / M’páluwé Ridge Forest	6.99991	120	20	0.5	ark:/87602/m4/526077	General Electric Nanotom	1, 2, 3
	<i>Lygodactylus angolensis</i>	PEM R22045	Angola / Cangandala National Park	6.99991	100	50	0.5	ark:/87602/m4/526151	General Electric Nanotom	1, 2, 3
<i>capensis</i> -group	<i>Lygodactylus bernardi</i>	PEM R05594	Zimbabwe / Connemara area	6.99991	100	60	0.5	ark:/87602/m4/526156	General Electric Nanotom	1, 2, 3
	<i>Lygodactylus bradfieldi</i>	PEM R14599	Namibia / Omatjenne	6.99991	100	60	0.5	ark:/87602/m4/526161	General Electric Nanotom	1, 2, 3
	<i>Lygodactylus capensis</i>	PEM R20146	South Africa / Silaka Nature Reserve	6.99991	100	60	0.5	ark:/87602/m4/526166	General Electric Nanotom	1, 2, 3
	<i>Lygodactylus grotei</i>	PEM R24380	Mozambique / Malema	6.99991	100	50	0.5	ark:/87602/m4/526171	General Electric Nanotom	1, 2, 3
	<i>Lygodactylus insularis</i>	SMF 8946	Mozambique / Juan de Nova Island	6.85450	30	120	0.5	ark:/87602/m4/562932	Yxlon FF20	1, 3
	<i>Lygodactylus nyaneka</i>	PEM R21635	Angola / ISCED, Lubango	6.99991	100	60	0.5	ark:/87602/m4/526175	General Electric Nanotom	1, 2, 3
	<i>Lygodactylus stevensoni</i>	PEM R00103	Zimbabwe / Khami Dam	6.99991	100	60	0.5	ark:/87602/m4/526180	General Electric Nanotom	1, 2, 3
	<i>Lygodactylus lawrencei</i>	PEM R02142	Namibia / 60 miles East of Torraabai	6.99991	100	60	0.5	ark:/87602/m4/526074	General Electric Nanotom	1, 2, 3
<i>fischeri</i> -group	<i>Lygodactylus conraui</i>	PEM R05469	Cote d’Ivoire / Centre Suisse in Adiopodomoue	7.00001	100	60	0.5	ark:/87602/m4/526083	General Electric Nanotom	1, 2, 3
	<i>Lygodactylus fischeri</i>	PEM R05403	Gabon / Rabi	6.99991	120	60	0.5	ark:/87602/m4/526088	General Electric Nanotom	1, 3
	<i>Lygodactylus thomensis</i>	MCZ-R21940	Sao Thome and Principe / Sao Thome Island	6.12651	35	175	1.5	ark:/87602/m4/390073	Bruker SkyScan 1173	1, 2, 3
	<i>Lygodactylus delicatus</i>	MNCN 51263	Sao Thome and Principe / Principe	14.25460	80	75	3.0	ark:/87602/m4/526104	Zeiss Xradia 510 Versa	1, 2, 3

Group	Species	Catalog Number	Country / Locality	Voxel (µm)	Voltage (kV)	Current (µA)	Exposure Time (secs)	Morfosource (ARK/DOI)	CT-scan Machine	Dataset
<i>fischeri</i> -group	<i>Lygodactylus wertmuthi</i>	MNCN 46133	Equatorial Guinea / Annobon	14.44397	83	49	1.0	ark:/87602/m4/526099	Nikon XT H-160	1, 2, 3
<i>madagascarensis</i> -group	<i>Lygodactylus expectatus</i>	MNHN 1933.0168	Madagascar / Ambilobe	8.55246	80	75	3.0	ark:/87602/m4/526185	Zeiss Xradia 510 Versa	1, 2, 3
	<i>Lygodactylus guibei</i>	MNHN 1990.3567	Madagascar / Ambohitantely	8.21131	80	75	3.0	ark:/87602/m4/526190	Zeiss Xradia 510 Versa	1, 2, 3
	<i>Lygodactylus madagascariensis</i>	SMF 8938	Madagascar / Nosy Bé	10.02089	35	65	0.5	ark:/87602/m4/562928	Yxlon FF20	1, 2, 3
	<i>Lygodactylus miops</i>	MCZ R11685	Madagascar / East Forest Madagascar	6.48558	35	175	1.5	ark:/87602/m4/383610	Bruker SkyScan 1173	1, 2, 3
	<i>Lygodactylus rarus</i>	ZSM 860/2003	Madagascar / Ankarana	10.03499	80	75	3.0	ark:/87602/m4/562947	Yxlon FF20	1, 2, 3
<i>ocellatus</i> -group	<i>Lygodactylus graniticolus</i>	PEM R25373	South Africa / Makapans Valley	6.99991	120	60	0.5	ark:/87602/m4/526109	General Electric Nanotom S	1, 2, 3
	<i>Lygodactylus incognitus</i>	PEM R25022	South Africa / Lajuma, Soutpansberg	6.99991	100	50	0.5	ark:/87602/m4/526119	General Electric Nanotom S	1, 2, 3
	<i>Lygodactylus methueni</i>	PEM R27649	South Africa / Woodbush Plantation	6.99991	120	60	0.5	ark:/87602/m4/526125	General Electric Nanotom S	1, 2, 3
	<i>Lygodactylus</i> cf. <i>nigropunctatus</i>	PEM R27659	South Africa / Strydpoortberg	6.99991	120	60	0.5	ark:/87602/m4/526130	General Electric Nanotom S	1, 2, 3
	<i>Lygodactylus ocellatus</i>	PEM R14378	South Africa / Doornkop via Belfast	6.99991	100	60	0.5	ark:/87602/m4/526140	General Electric Nanotom S	1, 2, 3
	<i>Lygodactylus soutpansbergensis</i>	PEM R00102	South Africa / Louis Trichardt (Soutpansberg)	7.00001	100	60	0.5	ark:/87602/m4/526146	General Electric Nanotom S	1, 2, 3
	<i>Lygodactylus waterbergensis</i>	MCZ R192342	South Africa / Entabeni Game Reserve	6.84636	40	200	1.35	ark:/87602/m4/390066	Bruker SkyScan 1173	1, 2, 3
<i>picturatus</i> -group	<i>Lygodactylus gutturalis</i>	MNCN 51219	Guinea-Bissau / Bubaque	11.40270	80	75	3.0	ark:/87602/m4/483853	Zeiss Xradia 510 Versa	1, 2, 3
	<i>Lygodactylus depressus</i>	UTEP 22579	DRC / Npenda Village	11.46750	80	120	0.2	ark:/87602/m4/443718	Phoenix V Tome X M	1, 2, 3
	<i>Lygodactylus dysmicus</i>	MHNG 1005.72	Cameroon / Foulassi	6.93900	99	61	1.0	ark:/87602/m4/484113	Nikon XT H-160	1, 3
	<i>Lygodactylus mirabundus</i>	UTEP 22585	DRC / Katako Kombe	13.02243	80	170	0.2	ark:/87602/m4/460084	Phoenix V Tome X M	1, 2, 3
	<i>Lygodactylus karamoja</i>	UTEP 22590	Uganda / Imatong Foothills	12.86842	80	170	0.2	ark:/87602/m4/456473	Phoenix V Tome X M	1, 2, 3
	<i>Lygodactylus kibera</i>	UTEP 22566	Burundi / Mpishi, near Kibira National Park	13.02243	80	150	0.2	ark:/87602/m4/456432	Phoenix V Tome X M	1, 2, 3
	<i>Lygodactylus kibera</i>	UTEP 22567	Burundi / Mpishi, near Kibira National Park	13.02243	80	150	0.2	ark:/87602/m4/456437	Phoenix V Tome X M	3
	<i>Lygodactylus kibera</i>	UTEP 22568	Burundi / Mpishi, near Kibira National Park	13.02243	80	150	0.2	ark:/87602/m4/456441	Phoenix V Tome X M	3
	<i>Lygodactylus kibera</i>	UTEP 22569	Burundi / Mpishi, near Kibira National Park	13.02243	80	150	0.2	ark:/87602/m4/456445	Phoenix V Tome X M	3
	<i>Lygodactylus kibera</i>	UTEP 22570	Burundi / Mpishi, near Kibira National Park	13.02243	80	170	0.2	ark:/87602/m4/456449	Phoenix V Tome X M	3
	<i>Lygodactylus kibera</i>	UTEP 22571	Burundi / Mpishi, near Kibira National Park	13.02243	80	170	0.2	ark:/87602/m4/443742	Phoenix V Tome X M	3
	<i>Lygodactylus kibera</i>	UTEP 22572	Burundi / Mpishi, near Kibira National Park	13.02243	80	170	0.2	ark:/87602/m4/443737	Phoenix V Tome X M	3
	<i>Lygodactylus kibera</i>	UTEP 22573	Burundi / Mpishi, near Kibira National Park	13.02243	80	170	0.2	ark:/87602/m4/443736	Phoenix V Tome X M	3

Group	Species	Catalog Number	Country / Locality	Voxel (μm)	Voltage (kV)	Current (μA)	Exposure Time (secs)	Morfosource (ARK/DOI)	CT-scan Machine	Dataset
<i>picturatus</i> -group	<i>Lygodactylus kibera</i>	UTEP 22574	Burundi / Mpishi, near Kibira National Park	13.02243	80	170	0.2	ark:/87602/m4/443728	Phoenix V Tome X M	3
	<i>Lygodactylus kibera</i>	UTEP 22575	Burundi / Mpishi, near Kibira National Park	13.02243	80	170	0.2	ark:/87602/m4/443729	Phoenix V Tome X M	3
	<i>Lygodactylus kibera</i>	UTEP 22576	Burundi / Mpishi, near Kibira National Park	13.02243	80	150	0.2	ark:/87602/m4/456431	Phoenix V Tome X M	3
	<i>Lygodactylus gamblei</i>	UTEP 22584	DRC / Mulongo	9.33731	80	120	0.2	ark:/87602/m4/442697	Phoenix V Tome X M	1, 2, 3
	<i>Lygodactylus leopardinus</i>	UTEP 22577	DRC / Balolombo	11.46750	80	120	0.2	ark:/87602/m4/443697	Phoenix V Tome X M	1, 2, 3
	<i>Lygodactylus chobiensis</i>	PEM R21337	Zambia / Chiawa	6.99991	100	50	0.5	ark:/87602/m4/484197	General Electric Nanotom S	1, 2, 3
	<i>Lygodactylus inexpectatus</i>	MCZ R67121	Tanzania / Dar Es Salam	6.84636	35	175	1.5	ark:/87602/m4/383609	Bruker SkyScan 1173	1, 3
	<i>Lygodactylus keniensis</i>	PEM R08585	Ethiopia / Lake Langano	6.99991	100	50	0.5	ark:/87602/m4/485963	General Electric Nanotom S	1, 2, 3
	<i>Lygodactylus kimhowelli</i>	PEM R16819	Tanzania / Amani	6.99991	100	50	0.5	ark:/87602/m4/485958	General Electric Nanotom S	1, 2, 3
	<i>Lygodactylus manni</i>	CAS 111906	Kenya / Baringo	10.26995	60	180	0.2	ark:/87602/m4/484155	Phoenix V Tome X M	1, 3
	<i>Lygodactylus mombasicus</i>	MCZ R30590	Kenya / Kilindini	6.48558	40	200	1.35	ark:/87602/m4/388668	Bruker SkyScan 1173	1, 2, 3
	<i>L. picturatus picturatus</i>	UF HERP 92206	Kenya / –	10.68401	80	140	0.2	doi:10.17602/M2/M112454	Phoenix V Tome X M	1, 2, 3
	<i>L. picturatus sudanensis</i>	MCZ R8800	South Sudan / Abu Zor	6.24783	30	150	1.8	ark:/87602/m4/454398	Bruker SkyScan 1173	1, 3
	<i>L. picturatus ukerewensis</i>	MCZ R30542	Kenya, Ukerewe Island	6.90125	70	114	0.5	ark:/87602/m4/486665	Bruker SkyScan 1173	1, 3
	<i>Lygodactylus scoretcii</i>	MNHN 1937.0089	Ehiopia / Omo	10.13576	80	75	3.0	ark:/87602/m4/389176	Bruker SkyScan 1273	1, 3
	<i>Lygodactylus williamsi</i>	UF HERP 60093	Tanzania / Uluguru Mountains	10.68401	80	200	0.2	doi:10.17602/M2/M112456	Phoenix V Tome X M	1, 2, 3
<i>pictus</i> -group	<i>Lygodactylus blanci</i>	MNHN 1990.1892	Madagascar / Mont Ibity	7.89511	80	75	3.0	ark:/87602/m4/526205	Zeiss Xradia 510 Versa	1, 2, 3
	<i>Lygodactylus intermedius</i>	ZSM 2368/2007	Madagascar / Andringitra	6.30912	30	120	0.5	ark:/87602/m4/562952	Yxlon FF20	1, 2, 3
	<i>Lygodactylus mirabilis</i>	ZSM 389/2000	Madagascar / Tsiafajavona Plateau	6.76573	30	110	0.5	ark:/87602/m4/562962	Yxlon FF20	1, 2, 3
	<i>Lygodactylus montanus</i>	MNHN 1990.1877	Madagascar / Chaînes Anosyennes	8.55246	80	75	3.0	ark:/87602/m4/526196	Zeiss Xradia 510 Versa	1, 2, 3
	<i>Lygodactylus pictus</i>	SMF 8957	Madagascar / Ankarimbela	8.99219	35	65	3.3	ark:/87602/m4/562942	Yxlon FF20	1, 2, 3
	<i>Lygodactylus roavolana</i>	ZSM 5115/2005	Madagascar / Manantantely	5.75952	30	120	0.5	ark:/87602/m4/562957	Yxlon FF20	1, 2, 3
	<i>Lygodactylus tuberosus</i>	MNHN 1990.0420	Madagascar / Morobé	7.89462	80	75	3.0	ark:/87602/m4/526200	Zeiss Xradia 510 Versa	1, 2, 3
<i>scheffleri</i> -group	<i>Lygodactylus broadleyi</i>	ZMB 48344	Tanzania / Forêt Kilulu	5.00000	100	100	0.75	ark:/87602/m4/526215	General Electric Nanotom S	1, 3
	<i>Lygodactylus conradti</i>	UF HERP 67216	Tanzania / Karato	10.89722	80	140	0.2	doi:10.17602/M2/M112453	Phoenix V Tome X M	1, 2, 3
	<i>Lygodactylus gravis</i>	PEM R17325	Tanzania / Mgamba	6.99991	120	60	0.5	ark:/87602/m4/526210	General Electric Nanotom S	1, 2, 3
	<i>Lygodactylus laterimaculatus</i>	MCZ R40994	Kenya / Mbuyuni	6.48558	35	175	1.5	ark:/87602/m4/383139	Bruker SkyScan 1273	1, 2, 3
	<i>Lygodactylus scheffleri</i>	ZMB 22712	Kenya / Kibwezi	4.40000	100	100	0.75	ark:/87602/m4/526220	General Electric Nanotom S	1, 3

Group	Species	Catalog Number	Country / Locality	Voxel (µm)	Voltage (kV)	Current (µA)	Exposure Time (secs)	Morfosource (ARK/DOI)	CT-scan Machine	Dataset
<i>somalicus</i> -group	<i>L. somalicus battersbyi</i>	MNHN 1990.3366	Kenya / Loyengalani	8.21131	80	75	3.0	ark:/87602/m4/526498	Zeiss Xradia 510 Versa	1, 3
	<i>L. somalicus somalicus</i>	MCZ R35558	Somalia / Bar Madobe	6.48558	30	150	1.8	ark:/87602/m4/389176	Bruker SkyScan 1273	1, 2, 3
<i>verticillatus</i> -group	<i>Lygodactylus grandisonae</i>	BMNH 1952.1.8.10	Kenya / Murri	5.11596	90	89	4.0	ark:/87602/m4/526520	Nikon Metrology XT H225 ST	1, 2, 3
	<i>Lygodactylus arnoulti</i>	MNHN 1990.1874	Madagascar / Analabe	7.89444	80	75	3.0	ark:/87602/m4/526539	Zeiss Xradia 510 Versa	1, 2, 3
	<i>Lygodactylus blancae</i>	ZSM 498/2001	Madagascar / Lac Itasy	8.70492	45	85	3.3	ark:/87602/m4/562981	Yxlon FF20	1, 2, 3
	<i>Lygodactylus decaryi</i>	MNHN 1950.0262	Madagascar / Behara	10.13576	80	75	3.0	ark:/87602/m4/526519	Zeiss Xradia 510 Versa	1, 3
	<i>Lygodactylus heterurus heterurus</i>	SMF 8954	Madagascar / Nosy Bé	7.39598	35	85	3.3	ark:/87602/m4/562927	Yxlon FF20	1, 2, 3
	<i>Lygodactylus klemmeri</i>	ZSM 47/2006	Madagascar / Tsingy de Bemaraha	6.30422	30	110	0.5	ark:/87602/m4/562975	Yxlon FF20	1, 2, 3
	<i>Lygodactylus pauliani</i>	MNHN 1990.0202	Madagascar / Forêt d'Ambatomenapha	8.21131	80	75	3.0	ark:/87602/m4/526554	Zeiss Xradia 510 Versa	1, 3
	<i>Lygodactylus tolampyae</i>	MNHN 1990.1867	Madagascar / Forêt de l'Antsingy	8.21089	80	75	3.0	ark:/87602/m4/526546	Zeiss Xradia 510 Versa	1, 2, 3
	<i>Lygodactylus verticillatus</i>	MNHN 1990.2534	Madagascar / Ihotry	7.89444	80	75	3.0	ark:/87602/m4/526550	Zeiss Xradia 510 Versa	1, 2, 3

Table S3. Description of cranium landmarks used in this study, with information of the homologous mirrored landmarks and modules. M= represent sagittal landmarks, F = face landmarks, B= braincase landmarks.

ID	MIRRORED	DESCRIPTION	MODULE
1	M	Center of frontoparietal notch, in the frontal suture	F
2	67	Right lateral edge of fronto-parietal suture on frontal	F
3	68	Anteriormost point of right postorbitofrontal	F
4	69	Ventralmost point of right postorbitofrontal, on lateral process	F
5	70	Posteriormost point of right postorbitofrontal	F
6	71	Dorsalmost point of the prefrontal, on dorsal process	F
7	72	Anterodorsalmost point of the prefrontal, in the prefrontal-maxillary suture	F
8	73	Anteriormost point of the right frontal, on lateral process	F
9	74	Anterodorsalmost point of the maxillary, on the maxillary-nasal suture above the labial foramen	F
10	75	Anterolateralmost point of the right nasal, on the maxillary-nasal suture	F
11	76	Posterolateralmost point of the right nasal	F
12	M	Center of frontal-nasal suture	F
13	77	Center of the posteriormost point of the premaxilla, on the ascendent process	F
14	M	Anteriormost point of premaxilla	F
15	78	Anterior edge of nasal-maxillary suture on right maxilla	F
16	79	Ventral anteromedial most point of premaxilla, on the premaxillary process	F
17	80	Right ventral posteriormost point of premaxilla, on the palatal process	F
18	81	Center of the foramen for the posterior branch of the maxillary nerve, on naris edge	F
19	82	Nutritive foramen for a facial blood vessel on the posterior face of the prefrontal	F
20	83	Dorsalmost point of right lacrimal foramen, placed on prefrontal	F
21	84	Posteriormost point of right maxilla, on posterior process	F
22	85	Ventral anteromedial most point of right frontal, on medial process	F
23	86	Center of right ossea naris edge of the nasal	F
24	M	Anteriomedialmost point of the subofactory canal on the frontal	F
25	M	Posteromedialmost point of the subofactory canal on the frontal	F
26	87	Posteromedialmost point of the right vomer	F
27	88	Anterolateral edge of right palatine, on lateral process	F
28	89	Anterolateral edge of right ectopterygoid	F
29	90	Anteromedial edge of right pterygoid, on the palatine process	F
30	91	Anterolateral edge of right pterygoid, on the ectopterygoid process	F
31	92	Posteromedial edge of the right palatine, on the pterygoid shelf	F
32	93	Posterolateral edge of right ectopterygoid	F
33	94	Point where right epipterygoid contacts pterygoid, edge of fossa columella	F
34	95	Dorsalmost point of right epipterygoid	F
35	96	Right anterodorsalmost point of the crista alaris, on the prootic	F
36	97	Anteromedial edge of right palatine, on vomerine process	F
37	98	Posteriormost point of right pterygoid	F
38	99	Ventralmost point of right quadrate, between medial and lateral condyles	F
39	100	Dorsomedial point where right quadrate contacts the braincase	F
40	101	Posteriormost point of right quadrate, on cephalic condyle	F
41	102	Dorsolateralmost point of right quadrate	F
42	103	Lateral edge of the right otostapes	F
43	104	Medial edge of the right otostapes, on the base of stapedial foramen	F
44	105	Posteriormost point of parietal, at the end of right posterior process	F
45	106	Medial point in insertion of the posterior process of the right parietal	F
46	107	Dorsolateralmost point of the right paraoccipital process	B
47	108	Ventrolateralmost point of the right paraoccipital process	B
48	109	Lateral joint of the horizontal and posterior semicircular canals, on the right oto-occipital	B
49	110	Center of parietal notch	F
50	M	Center of the dorsalmost point of the supraoccipital	B
51	M	Center of the dorsalmost point of the foramen magnum	B
52	111	Right lateralmost point of the foramen magnum	B
53	M	Center of posteroventral edge of occipital condyle	B
54	112	Dorsal joint of the posterior and anterior semicircular canals, on the supraoccipital	B
55	M	Center point in the suture between the basioccipital and the parabasisphenoid, if not visible, center point in the ventralmost point of the basioccipital	B
56	M	Center of the anteriormost point of the parabasisphenoid, between the trabeculae	B
57	113	Anterolateralmost point of the right aperture of the scala tympani	B
58	114	Anteriormost point of the aperture for the head vein, on the base of the basyspterygoid process	B
59	115	Right VII facial face foramen	B
60	116	Ventralmost of the descending process of the right parietal	F
61	117	Lateralmost point of the right V foramen prootico	B
62	118	Anteriormost point of right basiptyergoid process of sphenoid	B
63	119	Right VI course of the abducent nerve	B
64	M	Center of pituitary fossa	B
65	120	Anteriormost edge of the premaxillary-nasal suture	F
66	121	Dorsal anteromedial most point of premaxilla, on the premaxillary process	F

Table S4. Description of mandible landmarks used in study.

ID	DESCRIPTION
1	Dorsalmost point of coronoid
2	Anterolateralmost point of the coronoid, on the anterolateral process
3	Laterally the posteriormost point of dentary, on the superior process
4	Ventrally the posteriormost point of dentary, on the inferior process
5	Anteriormost point of dentary
6	Dorsally the posteriormost point of dentary, on the coronoid process
7	Anteromedialmost point of the coronoid, on the anteromedial process
8	Anterodorsal point of splenial
9	Posteriormost point of coronoid
10	Anterior insertion of the mandibular fossa
11	Aperture of the mandibula fenestra
12	Dorsalmost point of the articular surface
13	Lateralmost point of the articular surface
14	Posterolateralmost point of the retroarticular process
15	Foramen for chorda tympani
16	Posteromedialmost point of the retroarticular process
17	Posterior surangular foramen
18	Anterior surangular foramen
19	Laterally the anteriormost point of surangular
20	Posteriormost point of the retroarticular process

Table S5. Principal component scores with their proportion of variance explained from the PCA performed at cranial variation.

PC scores	Eigenvalues	% Variance	Cumulative %
PC1	0.0009904	24.172	24.172
PC2	0.00067288	16.421	40.593
PC3	0.00027111	6.617	47.210
PC4	0.00024535	5.988	53.197
PC5	0.00022112	5.396	58.594
PC6	0.00016996	4.148	62.741
PC7	0.00012475	3.044	65.786
PC8	0.00011976	2.923	68.709
PC9	0.00008999	2.196	70.905
PC10	0.00008711	2.126	73.031
PC11	0.00008309	2.028	75.059
PC12	0.00006473	1.580	76.638
PC13	0.00005921	1.445	78.083
PC14	0.00005621	1.372	79.455
PC15	0.00004725	1.153	80.608
PC16	0.00004616	1.127	81.735
PC17	0.00004305	1.051	82.786
PC18	0.00003918	0.956	83.742
PC19	0.00003836	0.936	84.678
PC20	0.00003532	0.862	85.540
PC21	0.00003402	0.830	86.370
PC22	0.00002897	0.707	87.077
PC23	0.00002775	0.677	87.754
PC24	0.00002721	0.664	88.418
PC25	0.00002591	0.632	89.051
PC26	0.00002312	0.564	89.615
PC27	0.00002251	0.549	90.164
PC28	0.00002216	0.541	90.705
PC29	0.00002056	0.502	91.207
PC30	0.00001967	0.480	91.687

Table S6. Principal component scores with their proportion of variance explained from the PCA performed at mandible variation.

PC scores	Eigenvalues	% Variance	Cumulative %
PC1	0.00092156	20.736	20.736
PC2	0.00049192	11.069	31.805
PC3	0.00039806	8.957	40.761
PC4	0.00032609	7.337	48.099
PC5	0.00027309	6.145	54.243
PC6	0.00023546	5.298	59.541
PC7	0.00022681	5.103	64.645
PC8	0.00017178	3.865	68.510
PC9	0.00014122	3.177	71.687
PC10	0.00013257	2.983	74.670
PC11	0.00011938	2.686	77.357
PC12	0.00010902	2.453	79.810
PC13	0.00009048	2.036	81.845
PC14	0.00008480	1.908	83.754
PC15	0.00006683	1.504	85.257
PC16	0.00006438	1.449	86.706
PC17	0.00005779	1.300	88.006
PC18	0.00005411	1.218	89.224
PC19	0.00004637	1.043	90.267
PC20	0.00004230	0.952	91.219
PC21	0.00003947	0.888	92.107
PC22	0.00003704	0.833	92.940
PC23	0.00003362	0.756	93.697
PC24	0.00003023	0.680	94.377
PC25	0.00002763	0.622	94.999
PC26	0.00002576	0.580	95.578
PC27	0.00002354	0.530	96.108
PC28	0.00002018	0.454	96.562
PC29	0.00002004	0.451	97.013
PC30	0.00001512	0.340	97.353

Table S7. Principal component scores with their proportion of variance explained from the PCA performed at inner ear variation.

PC scores	Eigenvalues	% Variance	Cumulative %
PC1	0.00269801	28.728	28.728
PC2	0.00140901	15.003	43.731
PC3	0.00089944	9.577	53.308
PC4	0.00048874	5.204	58.512
PC5	0.00040048	4.264	62.776
PC6	0.00031836	3.390	66.166
PC7	0.00029738	3.166	69.332
PC8	0.00028605	3.046	72.378
PC9	0.00021756	2.316	74.695
PC10	0.00019453	2.071	76.766
PC11	0.00017233	1.835	78.601
PC12	0.00016512	1.758	80.359
PC13	0.00013508	1.438	81.798
PC14	0.00011927	1.270	83.068
PC15	0.00010057	1.071	84.138
PC16	0.00009649	1.027	85.166
PC17	0.00009206	0.980	86.146
PC18	0.00008726	0.929	87.075
PC19	0.00007822	0.833	87.908
PC20	0.00007014	0.747	88.655
PC21	0.00006668	0.710	89.365
PC22	0.00006083	0.648	90.013
PC23	0.00005699	0.607	90.619
PC24	0.00005590	0.595	91.215
PC25	0.00004787	0.510	91.724
PC26	0.00004582	0.488	92.212
PC27	0.00004375	0.466	92.678
PC28	0.00004300	0.458	93.136
PC29	0.00003963	0.422	93.558
PC30	0.00003582	0.381	93.939

Table S8. Results from phylogenetic generalized least squares (PGLS) tests run on the pruned dataset to explore the allometric effect on the shape variation of the different cranial elements (cranium, mandible and inner ear). Significant results are bolded. Cs= cranium centroid size; Ecs= inner ear centroid size; Mcs= mandible centroid size.

Model	Variable	SS	MS	R^2	F	Z	P value
Cranium							
shape ~ cranium size (cs)	Log(cs)	0.0365	0.0365	0.5869	89.5220	2.4633	<0.001
shape ~ SVL	Log(SVL)	0.0250	0.0249	0.4013	42.2300	2.5663	<0.001
shape ~ sizes.model (cs + svl)	Log(cs)	2.8809	2.8809	0.2347	49.9110	3.4417	<0.001
	Log(svl)	0.6534	0.6534	0.0532	11.3190	3.1014	<0.001
shape ~ sizes.model (ear cs + svl)	Log(Ecs)	1.6997	1.6997	0.1390	22.0032	3.1215	<0.001
	Log(svl)	0.1142	0.1142	0.0093	1.4788	0.9726	0.183
	Log(cs)	1.2257	1.2257	0.1001	21.2587	3.3209	<0.001
shape ~ sizes.model (cs + ear cs + svl)	Log(Ecs)	0.0987	0.0987	0.0081	1.7123	1.2089	0.123
	Log(svl)	0.6661	0.6661	0.0544	11.5536	3.0689	<0.001
Mandible							
shape ~ mandible centroid size (Mcs)	Log(Mcs)	5.7135	5.7135	0.5924	88.6510	2.4770	<0.001
shape ~ SVL	Log(svl)	4.0557	4.0557	0.4205	44.2640	2.5109	0.001
shape ~ sizes.model (mandible cs + svl)	Log(Mcs)	2.1905	2.1905	0.2271	38.6711	3.3649	<0.001
	Log(svl)	0.5327	0.5327	0.0552	9.4045	3.1953	<0.001
shape ~ sizes.model (cranium cs + svl)	Log(cs)	2.3164	2.3164	0.2402	42.4680	3.3594	<0.001
	log.svl	0.5902	0.5902	0.0612	10.8200	3.3697	<0.001
	Log(Mcs)	0.1241	0.1241	0.0129	2.3257	1.8671	0.032
shape ~ sizes.model (cs + cranium cs + svl)	Log(cs)	0.2500	0.2500	0.0259	4.6853	2.7313	0.001
	Log(svl)	0.5814	0.5814	0.0603	10.8940	3.3059	<0.001
Inner Ear							
shape ~ ear centroid size (Ecs)	Log(Ecs)	11.7552	11.7552	0.5636	77.4980	2.4712	<0.001
shape ~ SVL	Log(svl)	9.6031	9.6031	0.4604	51.2020	2.5692	<0.001
shape ~ sizes.model (ear cs + svl)	Log(Ecs)	2.3471	2.3471	0.1125	15.5485	3.2343	<0.001
	Log(svl)	0.1950	0.1950	0.0093	1.2917	0.7924	0.2244
shape ~ sizes.model (cranium cs + svl)	Log(cs)	4.2612	4.2612	0.2043	35.9563	3.7582	<0.001
	Log(svl)	0.8859	0.8859	0.0425	7.4757	3.2254	<0.001
	Log(Ecs)	0.4116	0.4116	0.0197	3.6280	2.5055	<0.001
shape ~ sizes.model (cs + cranium cs + svl)	Log(svl)	2.3257	2.3257	0.1115	20.4987	3.6877	<0.001
	Log(svl)	0.9593	0.9593	0.0460	8.4553	3.3655	<0.001

Table S9. Results from phylogenetic generalized least squares (PGLS) tests run on the pruned dataset to explore the effect of the different traits (geographic distribution [distribution], macrohabitat and lifestyle) on the shape variation of the different cranial elements (cranium, mandible and inner ear). Significant results are bolded.

Model	Variable	SS	MS	R^2	F	Z	P value
Cranium							
shape ~ geographic distribution	distribution	0.0007	0.0002	0.0111	0.2284	-1.1489	0.8511
shape ~ macrohabitat	macrohabitat	0.0015	0.0005	0.0236	0.4913	-0.2775	0.643
shape ~ lifestyle	lifestyle	0.0451	0.0226	0.7255	81.9190	2.2267	<0.001
shape ~ geographic distribution + lifestyle	distribution	0.0007	0.0003	0.0119	0.8910	-0.2909	0.6100
	lifestyle	0.0452	0.0226	0.7263	81.5760	2.2289	<0.001
shape ~ geographic distribution*lifestyle	distribution:lifestyle	0.0013	0.0013	0.0214	5.1492	3.8174	<0.001
shape ~ geographic distribution + macrohabitat	distribution	0.0007	0.0002	0.0110	0.2200	-1.1855	0.8697
	macrohabitat	0.0015	0.0005	0.0235	0.4700	-0.3378	0.6497
shape ~ geographic distribution*macrohabitat	distribution:macrohabitat	0.0008	0.0003	0.0125	0.2414	-1.3329	0.9028
shape ~ macrohabitat+lifestyle	macrohabitat	0.0026	0.0009	0.0414	3.4962	4.3666	<0.001
	lifestyle	0.0462	0.0231	0.7433	94.0721	2.2226	<0.001
shape ~ macrohabitat*lifestyle	macrohabitat:lifestyle	0.0020	0.0010	0.0308	4.3467	4.5407	<0.001
Mandible							
shape ~ geographic distribution	distribution	0.0008	0.0003	0.0162	0.3355	-0.8499	0.7520
shape ~ macrohabitat	macrohabitat	0.0017	0.0006	0.0339	0.7141	0.1502	0.4655
shape ~ lifestyle	lifestyle	0.0337	0.0169	0.6714	63.3450	2.2513	<0.001
shape ~ geographic distribution + lifestyle	distribution	0.0008	0.0003	0.0154	1.0124	0.1595	0.4362
	lifestyle	0.0337	0.0168	0.6705	66.3034	2.2573	0.0002
shape ~ geographic distribution*lifestyle	distribution:lifestyle	0.0010	0.0010	0.01994	3.9431	3.9702	<0.001
shape ~ geographic distribution + macrohabitat	distribution	0.0008	0.0003	0.0157	0.3093	-0.9176	0.7800
	macrohabitat	0.0017	0.0006	0.0334	0.6579	0.0339	0.4967
shape ~ geographic distribution*macrohabitat	distribution:macrohabitat	0.0010	0.0003	0.0199	0.3923	-0.8938	0.7912
shape ~ macrohabitat+lifestyle	macrohabitat	0.0022	0.0007	0.0436	3.2364	4.7404	<0.001
	lifestyle	0.0342	0.0171	0.6811	75.8329	2.2208	<0.001
shape ~ macrohabitat*lifestyle	macrohabitat:lifestyle	0.0015	0.0007	0.0290	3.2299	4.7301	<0.001
Inner Ear							
shape ~ geographic distribution	distribution	0.4336	0.1445	0.0208	0.4105	-0.3729	0.6116
shape ~ macrohabitat	macrohabitat	0.6289	0.2096	0.0302	0.6012	-0.02592	0.5422
shape ~ lifestyle	lifestyle	14.8386	7.4193	0.7116	72.7750	2.1814	<0.001
shape ~ geographic distribution + lifestyle	distribution	0.4536	0.1512	0.0217	1.5630	1.4824	0.0699
	lifestyle	14.8586	7.4293	0.7125	76.7960	2.1857	<0.001
shape ~ geographic distribution*lifestyle	distribution:lifestyle	0.2406	0.2406	0.01154	2.4866	2.0343	0.0196
shape ~ geographic distribution + macrohabitat	distribution	0.4218	0.1406	0.0202	0.3770	-0.4707	0.6408
	macrohabitat	0.6171	0.2057	0.0296	0.5515	-0.1170	0.5621
shape ~ geographic distribution*macrohabitat	distribution:macrohabitat	0.4070	0.13565	0.01951	0.3637	-0.8131	0.7619
shape ~ macrohabitat+lifestyle	macrohabitat	0.9829	0.3276	0.0471	3.8749	3.7320	<0.001
	lifestyle	15.1926	7.5963	0.7285	89.8392	2.1799	<0.001
shape ~ macrohabitat*lifestyle	macrohabitat:lifestyle	0.4661	0.233	0.02235	2.756	2.8269	<0.001

Table S10. Pairwise comparisons of phenotypic trait covariation on different lifestyles. Displayed values represent significance levels (*p*-values) obtained via permutation (RRPP). Different traits are: geographic distribution (distribution), macrohabitat and phylogenetic groups (phylo). Asterisk (*) depict significative values ($p \leq 0.05$).

MODELS

~Lifestyle.Macrohabitat							
	Arboreal.Dryforest	Rupicolus.Dryforest	Arboreal.Montane	Mix.Montane	Rupicolus.Montane	Arboreal.RainForest	Rupicolus.RainForest
Arboreal.Dryforest							
Rupicolus.Dryforest	0.023*						
Arboreal.Montane	0.271	0.296					
Mix.Montane	0.085	0.924	0.351				
Rupicolus.Montane	0.856	0.020*	0.243	0.079			
Arboreal.RainForest	0.209	0.005*	0.081	0.034*	0.357		
Rupicolus.RainForest	0.082	0.924	0.356	0.999	0.072	0.031*	
Rupicolus.Trasition Zone	0.083	0.924	0.354	1.000	0.080	0.032*	1.000
~Lifestyle.Distribution							
	Arboreal.Africa	Mix.Africa	Rupicolus.Africa	Arboreal.America	Arboreal.Oceanic Island	Arboreal.Madagascar	
Arboreal.Africa							
Mix.Africa	0.046*						
Rupicolus.Africa	0.767	0.065					
Arboreal.America	0.071	0.621	0.116				
Arboreal.Oceanic Island	0.274	0.018*	0.240	0.026*			
Arboreal.Madagascar	0.259	0.018*	0.227	0.022*	0.823		
Rupicolus.Madagascar	0.907	0.052	0.731	0.090	0.408	0.478	

~Lifestyle.Phylo

	Arboreal. <i>angularis</i> -group	Arboreal.bivittis- group	Arboreal. <i>bonsi</i> -group	Mix. <i>bonsi</i> -group	Rupicolus. <i>bonsi</i> - group	Arboreal. <i>capensis</i> - group	Rupicolus. <i>capensis</i> - group	Arboreal. <i>fischeri</i> - group
Arboreal. <i>angularis</i> -group								
Arboreal. <i>bivittis</i> -group	0.266							
Arboreal. <i>bonsi</i> -group	0.335	0.726						
Mix. <i>bonsi</i> -group	0.263	0.992	0.736					
Rupicolus. <i>bonsi</i> -group	0.254	0.990	0.734	0.996				
Arboreal. <i>capensis</i> -group	0.704	0.342	0.480	0.347	0.345			
Rupicolus. <i>capensis</i> -group	0.224	0.895	0.806	0.895	0.895	0.322		

~Lifestyle.Groups [Continuation]

	Arboreal. <i>angularis</i> -group	Arboreal.bivittis- group	Arboreal. <i>bonsi</i> -group	Mix. <i>bonsi</i> -group	Rupicolus. <i>bonsi</i> - group	Arboreal. <i>capensis</i> - group	Rupicolus. <i>capensis</i> - group	Arboreal. <i>fischeri</i> - group
Arboreal. <i>fischeri</i> -group	0.752	0.184	0.209	0.187	0.177	0.453	0.137	
Arboreal. <i>klugei</i> -group	0.537	0.549	0.756	0.546	0.546	0.729	0.586	0.373
Arboreal. <i>lawrencei</i> -group	0.263	0.991	0.732	0.996	0.996	0.352	0.897	0.185
Arboreal. <i>madagascarensis</i> - group	0.066	0.022*	0.009*	0.025*	0.021*	0.012*	0.005*	0.141
Rupicolus. <i>madagascarensis</i> -group	0.264	0.991	0.737	0.997	0.999	0.346	0.897	0.184
Rupicolus. <i>ocellatus</i> -group	0.321	0.077	0.049	0.077	0.077	0.099	0.024*	0.539
Arboreal. <i>picturatus</i> -group	0.337	0.073	0.045*	0.079	0.072	0.088	0.023*	0.582
Arboreal. <i>pictus</i> -group	0.684	0.161	0.181	0.167	0.167	0.413	0.116	0.932
Rupicolus. <i>pictus</i> -group	0.839	0.199	0.229	0.204	0.193	0.526	0.148	0.888
Arboreal. <i>scheffleri</i> -group	0.587	0.149	0.170	0.154	0.151	0.364	0.109	0.797
Rupicolus. <i>scheffleri</i> -group	0.259	0.990	0.734	0.996	0.999	0.352	0.899	0.184
Arboreal. <i>somaticus</i> -group	0.253	0.995	0.733	0.994	0.993	0.347	0.895	0.180

Arboreal.verticillatus-group	0.358	0.081	0.065	0.088	0.083	0.131	0.030	0.567
Rupicolus.verticillatus-group	0.621	0.156	0.184	0.166	0.164	0.394	0.120	0.847

~Lifestyle.Groups [Continuation...]

	Arboreal.klugei-group	Arboreal.lawrencei-group	Arboreal.madagascarensis-group	Rupicolus.madagascarensis-group	Rupicolus.ocellatus-group	Arboreal.picturatus-group	Arboreal.pictus-group	Rupicolus.pictus-group
Arboreal.lawrencei-group	0.547							
Arboreal.madagascarensis-group	0.022*	0.025*						
Rupicolus.madagascarensis-group	0.550	0.998	0.024					
Rupicolus.ocellatus-group	0.117	0.078	0.261	0.079				
Arboreal.picturatus-group	0.123	0.078	0.185	0.079	0.900			
Arboreal.pictus-group	0.329	0.166	0.170	0.169	0.604	0.648		
Rupicolus.pictus-group	0.411	0.202	0.079	0.201	0.389	0.409	0.813	
Arboreal.scheffleri-group	0.301	0.153	0.293	0.154	0.795	0.857	0.865	0.701
Rupicolus.scheffleri-group	0.546	0.999	0.021*	1.000	0.076	0.076	0.168	0.201
Arboreal.somalicus-group	0.541	0.995	0.022*	0.992	0.072	0.069	0.162	0.193
Arboreal.verticillatus-group	0.138	0.089	0.293	0.091	0.982	0.929	0.638	0.438
Rupicolus.verticillatus-group	0.320	0.166	0.276	0.166	0.752	0.805	0.906	0.742

~Lifestyle.Groups [Continuation...]

	Arboreal.scheffleri-group	Rupicolus.scheffleri-group	Arboreal.somalicus-group	Arboreal.verticillatus-group
Rupicolus.scheffleri-group	0.152			
Arboreal.somalicus-group	0.142	0.992		
Arboreal.verticillatus-group	0.827	0.083	0.080	
Rupicolus.verticillatus-group	0.962	0.163	0.161	0.773

Table S11. Results from phylogenetic generalized least squares (PGLS) tests run on the pruned dataset to explore the combined effect of the size (centroid size) and traits (distribution, macrohabitat and lifestyle) on the shape variation of the different cranial elements (cranium, mandible and inner ear). Significant results are bolded. Cs= cranium centroid size; Ecs= inner ear centroid size; Mcs= mandible centroid size.

Model	Variable	SS	MS	R^2	F	Z	P value
Cranium							
shape ~ ecology by size (lifestyle + cranium centroid size)	lifestyle	0.0104	0.0052	0.1671	20.7182	4.3416	<0.001
	Log(cs)	0.0018	0.0018	0.0286	7.0837	4.6356	<0.001
shape ~ ecology by size (macrohabitat + cranium centroid size)	macrohabitat	0.0020	0.0007	0.0325	1.7075	1.4131	0.0818
	Log(cs)	0.0371	0.0371	0.5958	93.9416	2.4698	<0.001
shape ~ ecology by size (geographic distribution + cranium centroid size)	distribution	0.0011	0.0004	0.0186	0.9417	0.1107	0.4564
	Log(cs)	0.0370	0.0370	0.5944	90.4096	2.4819	<0.001
shape ~ ecology by size (macrohabitat + lifestyle + cranium centroid size)	macrohabitat	0.0022	0.0008	0.0367	3.3900	3.9710	<0.001
	lifestyle	0.0107	0.0053	0.1713	23.7447	4.9162	<0.001
	Log(cs)	0.0014	0.0015	0.0238	6.6123	4.5749	<0.001
shape ~ ecology by size (lifestyle: macrohabitat + cranium centroid size)	lifestyle: macrohabitat	0.0144	0.0020	0.2308	0.1010	6.1067	<0.001
	Log(cs)	0.0012	0.0012	0.0200	6.1578	4.2213	<0.001
Mandible							
shape ~ ecology by size (lifestyle + mandible centroid size)	lifestyle	0.0092	0.0046	0.1824	17.7257	4.5321	<0.001
	Log(Mcs)	0.0007	0.0007	0.0147	2.8671	3.1968	<0.001
shape ~ ecology by size (macrohabitat + mandible centroid size)	macrohabitat	0.0021	0.0007	0.0417	1.8364	1.6959	0.0467
	Log(Mcs)	0.0257	0.0257	0.5116	67.5376	2.4569	<0.001
shape ~ ecology by size (geographic distribution + mandible centroid size)	distribution	0.0008	0.0003	0.0158	0.6583	-0.9698	0.8290
	Log(Mcs)	0.0253	0.0253	0.5034	62.8668	2.4731	<0.001
shape ~ ecology by size (macrohabitat + lifestyle + mandible centroid size)	macrohabitat	0.0021	0.0007	0.0426	3.0392	4.3894	<0.001
	lifestyle	0.0092	0.0046	0.1833	19.5997	4.8312	<0.001
	Log(Mcs)	0.0007	0.0007	0.0138	2.9476	3.5869	<0.001
Inner Ear							
shape ~ ecology by size (lifestyle + ear centroid size)	lifestyle	3.3074	1.6537	0.1586	16.5575	4.1076	<0.001
	Log(Ecs)	0.2221	0.2221	0.0106	2.2235	1.8450	0.0032
shape ~ ecology by size (macrohabitat + ear centroid size)	macrohabitat	0.9976	0.3325	0.0478	2.3393	2.0149	0.0199
	Log(Ecs)	12.122 0	12.122 0	0.5813	85.2750	2.4390	<0.001
shape ~ ecology by size (geographic distribution + ear centroid size)	distribution	0.7583	0.2528	0.0364	1.7271	1.4616	0.07350
	Log(Ecs)	12.077 9	12.077 9	0.5792	82.5276	2.4320	<0.001
shape ~ ecology by size (macrohabitat + lifestyle + ear centroid size)	macrohabitat	0.9413	0.3138	0.0451	3.5571	3.6002	<0.001
	lifestyle	3.2511	1.6256	0.1559	18.4284	4.1395	<0.001
	Log(Ecs)	0.1805	0.1805	0.0086	2.0461	1.7396	0.0040

Figure S1. Location of 66 and 20 fixed landmarks on the cranium and left mandible, respectively, of *Lygodactylus picturatus* (UF HERP 92206). Cranium in **A** – dorsal, **B** – ventral **C** – lateral and **D** – posterior views; and left mandible in **E** – lateral and **F** – medial views.

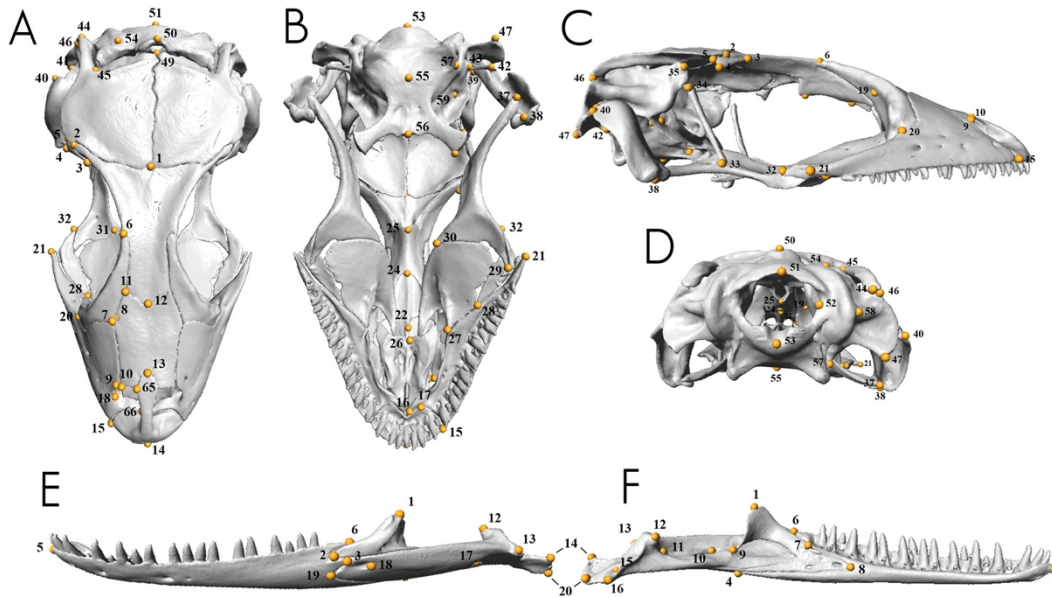


Figure S2. Lateral (above) and medial (below) views of right inner (A–C) of *Lygodactylus picturatus* (UF HERP 92206), displaying different landmark datasets used in this work. **A** – Location of 11 fixed landmarks and **B** – 48 sliding semi-landmarks on the right inner ear. **C** – Subsampled semi-landmark location performed automatically by Stratovan Checkpoint v.2018.08.07. **D** – Procrustes superimposition performed including only the semicircular canals (inner ear labyrinth).

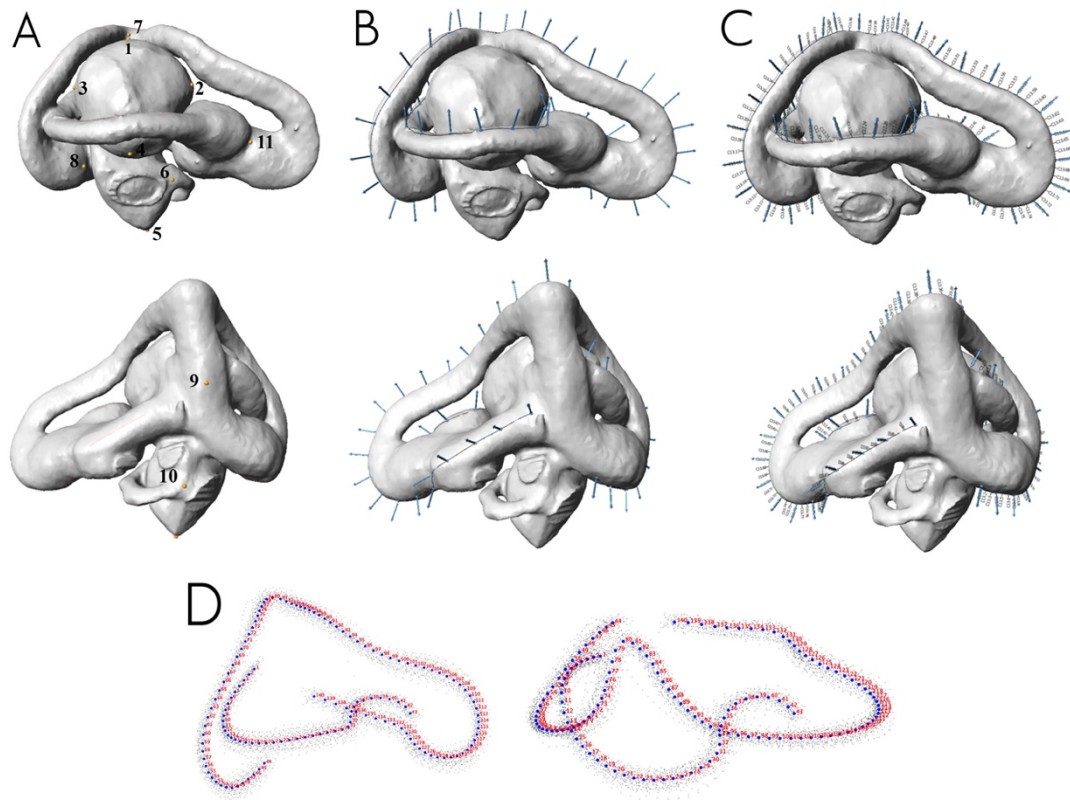


Figure S3. Procedure scheme used in this study for collecting high-dimensional coordinate data. **A** – 3D segmentation of articulated skull. **B** – Place of landmarks in Stratovan Checkpoint software. **C** – Identify sagittal (medial) landmarks. **D** – Mirroring of primarily right-sided coordinate data onto the left side using “mirror2plane” function of the R package *geomorph* v.4.0.1. **E** – Procrustes alignment to avoid artifact originating from aligning one-sided data of bilaterally symmetric elements. **F** – Landmark scheme for cranium modules use for evolutionary integration models. Specimen use as model: *Lygodactylus picturatus* (UF HERP 92206).

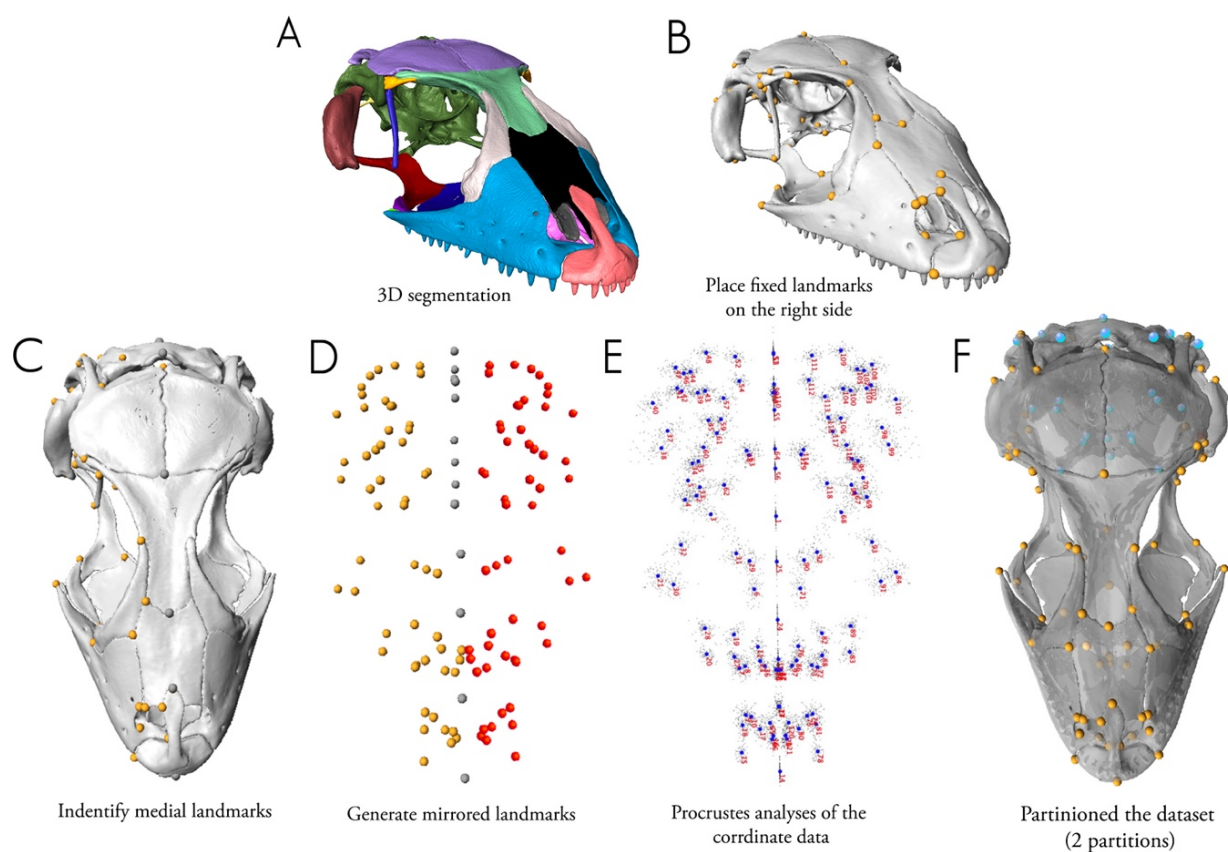


Figure S4. Shape configurations of the maximum positive (max) and minimum negative (min) PC scores of the cranium, along the first two principal component in in lateral (above) and dorsal (below) views, from left to right.

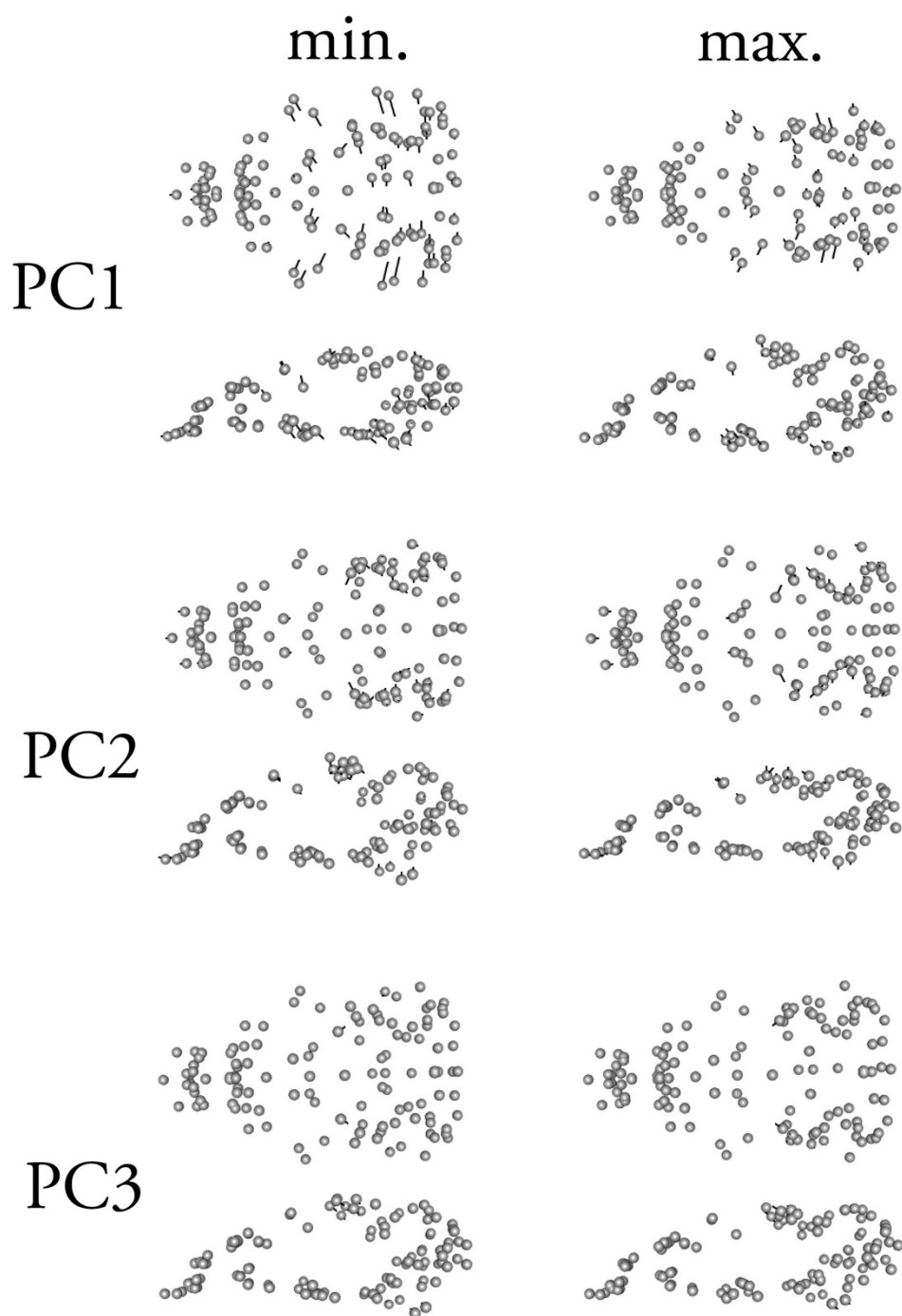


Figure S5. Shape configurations of the maximum positive (max) and minimum negative (min) PC scores of the jaw, along the first three principal component in lateral (above) and dorsal (below) views.

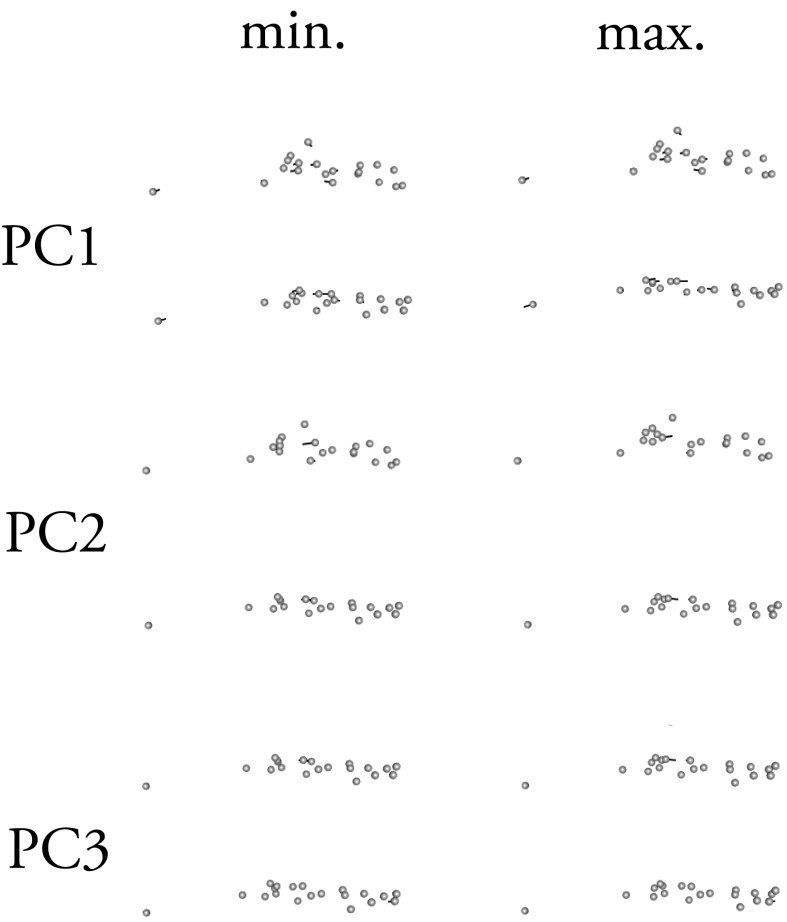


Figure S6. Shape configurations of the maximum positive (max) and minimum negative (min) PC scores of the inner ear, along the first two principal component in lateral, dorsal and medial views, from left to right.

