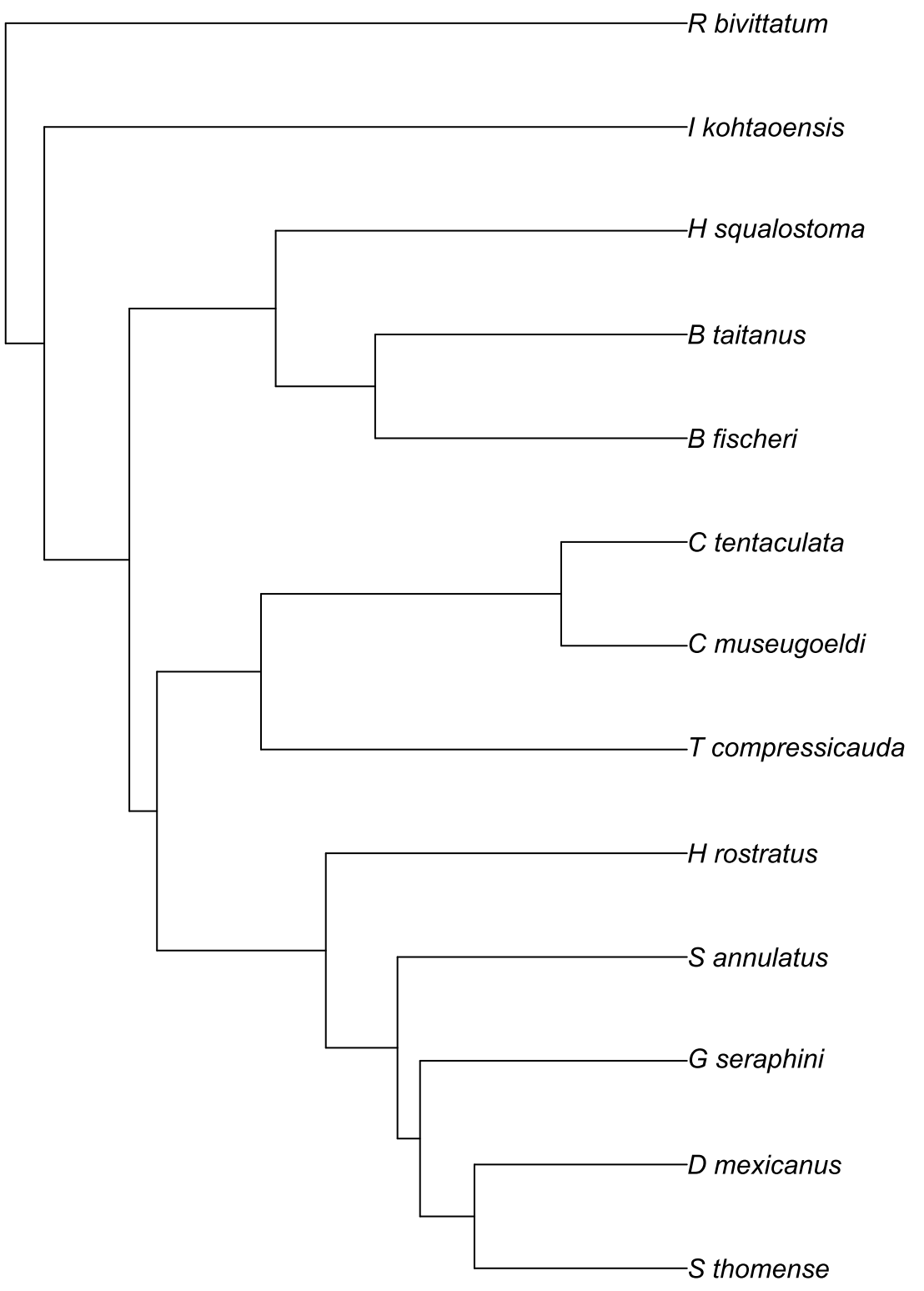

Fig. S1. Maximum credibility tree used in our analyses

Table S1. Details of the specimens/scans used in the study.

Family	Species	ID	Origin	Voxel size (µm)
Rhinatrematidae	*Rhinatrema bivittatum†*	Rhinatrema bivittatum byu:main:48675	MS	12.81
	*Rhinatrema bivittatum**	Rhinatrema bivittatum A53	AH	31.72
	Rhinatrema bivittatum†*	Rhinatrema bivittatum AL8	AH	31.72
	*Rhinatrema bivittatum**	Rhinatrema bivittatum B75	AH	33.07
	*Rhinatrema bivittatum**	Rhinatrema bivittatum B80	AH	28.34
Ichthyophiidae	*Ichthyophis kohtaoensis*	Ichthyophis kohtaoensis ncsm:herp:79201	MS	18.01
	Ichthyophis kohtaoensis†	Ichthyophis kohtaoensis ZMH A08981	ZMH	6.83
	*Ichthyophis kohtaoensis**	Ichthyophis kohtaoensis 218831	UMMZ	31.72
	*Ichthyophis kohtaoensis**	Ichthyophis kohtaoensis 218832	UMMZ	31.72
Herpelidae	*Boulengerula fischeri**	Boulengerula fischeri 3	AH	32.48
	*Boulengerula fischeri**	Boulengerula fischeri 4	AH	32.48
	*Boulengerula fischeri**	Boulengerula fischeri 5	AH	32.48
	*Boulengerula fischeri**	Boulengerula fischeri 7	AH	32.48
	Boulengerula fischeri†*	Boulengerula fischeri AH1	AH	9.74
	Boulengerula taitanus†*	Boulengerula taitanus AH2	AH	16.07
	*Boulengerula taitanus**	Boulengerula taitanus AL010401	AH	31.72
	Boulengerula taitanus†*	Boulengerula taitanus AL010402	AH	9.74
	*Boulengerula taitanus**	Boulengerula taitanus JM01452	AH	33.07
	*Boulengerula taitanus**	Boulengerula taitanus JM01584	AH	33.07
	*Herpele squalostoma**	Herpele squalostoma AL10	AH	34.37
	*Herpele squalostoma**	Herpele squalostoma AL2	AH	31.72
	*Herpele squalostoma**	Herpele squalostoma AL30	AH	31.72
	*Herpele squalostoma**	Herpele squalostoma AL31	AH	34.35
	*Herpele squalostoma**	Herpele squalostoma AL32	AH	32.48
Caeciliidae	*Caecilia museugoeldi**	Caecilia museugoeldi V2101	NHM	63.47
	*Caecilia tentaculata**	Caecilia tentaculata 3955	NHM	90.83
	Caecilia tentaculata	Caecilia tentaculata ku:kuh:175441	MS	77.33
Typhlonectidae	*Typhlonectes compressicauda†*	Typhlonectes compressicauda 11307	NHM	8.4
	Typhlonectes compressicauda	Typhlonectes compressicauda cas:herp:25421	MS	36.87
	*Typhlonectes compressicauda**	Typhlonectes compressicauda AL20	AH	17.65
	*Typhlonectes compressicauda**	Typhlonectes compressicauda AL6	AH	49.37

	Typhlonectes compressicauda†*	Typhlonectes compressicauda AL7	AH	46.81
Indotyphlidae	*Hypogeophis rostratus*	Hypogeophis rostratus 73_38_B_101	RMCA	20.99
	Hypogeophis rostratus	Hypogeophis rostratus 73_38_B_110	RMCA	20.99
	Hypogeophis rostratus	Hypogeophis rostratus 73_38_B_111	RMCA	25.94
	Hypogeophis rostratus†	Hypogeophis rostratus 73_48_B_1	RMCA	19.01
Siphonopidae	*Siphonops annulatus*	Siphonops annulatus cas:herp:74304	MS	22.17
	Siphonops annulatus†	Siphonops annulatus 1924_9_20_9_Red	NHM	9.82
	Siphonops annulatus†	Siphonops annulatus ZMH A00235	ZMH	9.2
Dermophiidae	*Dermophis mexicanus*	Dermophis mexicanus cas:herp:144523	MS	50.79
	*Dermophis mexicanus**	Dermophis mexicanus A-52188	UTACV	56.04
	*Dermophis mexicanus**	Dermophis mexicanus AL2101201	AL	88.52
	*Dermophis mexicanus**	Dermophis mexicanus AL2101202	AL	93.79
	Geotrypetes seraphini†*	Geotrypetes seraphini AL29041901	AL	49.37
	*Geotrypetes seraphini**	Geotrypetes seraphini 2	AH	49.37
	Geotrypetes seraphini†*	Geotrypetes seraphini 6	AH	15.17
	*Geotrypetes seraphini**	Geotrypetes seraphini AL1	AH	16
	*Geotrypetes seraphini**	Geotrypetes seraphini AL21	AH	56.62
	*Geotrypetes seraphini**	Geotrypetes seraphini AL5	AH	35.94
	*Schistometopum thomense**	Schistometopum thomense 6	AH	32.48
	*Schistometopum thomense**	Schistometopum thomense 7	AH	32.48
	*Schistometopum thomense**	Schistometopum thomense #8	AH	32.48
	*Schistometopum thomense**	Schistometopum thomense AL11	AH	32.48

*Specimens scanned using the HECTOR micro computed tomography (µCT) scanner

†Specimens for which only the atlas was available

Abbreviations are as follows:

Personal collection of Anthony Herrel (AH)
Personal collection of Aurélien Lowie (AL)
Morphosource.org (MS)
Natural History Museum, London (NHM)
Royal Museum of Central Africa (RMCA)
Staatliches Museum für Naturkunde Stuttgart (SMNS)
University of Michigan, Museum of Zoology (UMMZ)
University of Texas Arlington, Amphibian & Reptile Diversity Research Center (UTACV)
Zoological Museum, Hamburg (ZMH)

Table S2. Body width, push force and supposed ecology of the skinks, snakes and caecilians used in this study.

	Species	Body width (mm)	Push force (N)	Ecology
Skinks	*Acontias kgalagadi*	4.28	0.56	Active burrower
	Acontias litoralis	3.38	0.51	Active burrower
	Acontias meleagris	7.26	3.13	Active burrower
	Acontias percivali	9.28	5.32	Active burrower
	Chalcides ocellatus	10.77	4.56	leaf litter
	Chalcides sepsoides	7.45	2.46	sand swimmer
	Mochlus sundevallii	6.97	1.56	leaf litter
	Pygomeles braconnieri	7.99	7.5	sand swimmer
	Scelotes bipes	3.84	0.36	Active burrower
	Scelotes montispectus	3.55	0.55	Active burrower
	Scincus scincus	14.76	7.72	sand swimmer
	Typhlosaurus caecus	4.27	2.11	Active burrower
	Typhlosaurus lomiae	2.91	0.32	Active burrower
	Typhlosaurus vermis	3.56	1.58	Active burrower
Snakes	*Anilius scytale*	8.8	5.9	leaf litter
	Aparallactus guentheri	6	1.6	leaf litter
	Eryx colubrinus	16	2.8	Active burrower
	Farancia abacura	16.8	11.8	Active burrower
	Loxocemus bicolor	19.9	14.1	Active burrower
	Oxyrhopus melanogerys	10.3	2.9	leaf litter
	Afrotyphlos angolensis	15.4	18.2	Active burrower
	Rhinothyphlos lalandei	6.1	3.3	Active burrower
	Rhinotyphlops unitaeniatus	6.7	8.1	Active burrower
	Leptotyphlops scutifrons	3.1	0.4	Active burrower
	Myriopholis algeriensis	1.2	0.2	uses existing burrows
	Liotyphlops beui	4	1.5	uses existing burrows
Caecilians	*Boulengerula fischeri*	3.02	0.53	Active burrower
	Boulengerula taitanus	5.04	2.56	Active burrower
	Caecilia museugoeldi	10.24	3.23	Active burrower
	Caecilia tentaculata	19.84	3.88	Active burrower
	Dermophis mexicanus	18.85	16.11	Active burrower
	Geotrypetes seraphini	7.43	2.03	Active burrower
	Herpele squalostoma	6.6	1.77	Active burrower
	Hypogeophis rostratus	9.5	4.15	Active burrower
	Ichthyophis kohtaoensis	7.15	4.8	leaf litter
	Rhinatrema bivittatum	7.37	0.89	leaf litter
	Schistometopum thomense	6.47	1.37	leaf litter
	Siphonops annulatus	15	6.43	Active burrower
	Typhlonectes compressicauda	12.28	1.19	Aquatic

Data were extracted from Herrel *et al.* (2021) for snakes, Le Guilloux *et al.* (2021) for skinks and this paper for caecilians.