

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

Family	Species	ID	Origin	Voxel size (μm)
Rhinatremaidae	<i>Epicrionops bicolor</i>	Epicrionops bicolor lsumz:herps:27295	MS	13.14
	<i>Rhinatrema bivittatum</i> <sup>†</sup>	Rhinatrema bivittatum byu:main:48675	MS	12.81
	<i>Rhinatrema bivittatum</i> <sup>*</sup>	Rhinatrema bivittatum A53	AH	31.72
	<i>Rhinatrema bivittatum</i> <sup>*†</sup>	Rhinatrema bivittatum AL8	AH	31.72
	<i>Rhinatrema bivittatum</i> <sup>*</sup>	Rhinatrema bivittatum B75	AH	33.07
	<i>Rhinatrema bivittatum</i> <sup>*</sup>	Rhinatrema bivittatum B80	AH	28.34
Ichthyophiidae	<i>Ichthyophis bombayensis</i> <sup>†</sup>	Ichthyophis bombayensis uf:herp:76734	MS	15.72
	<i>Ichthyophis kohtaoensis</i>	Ichthyophis kohtaoensis ncsm:herp:79205	MS	18.01
	<i>Ichthyophis kohtaoensis</i> <sup>†</sup>	Ichthyophis kohtaoensis ZMH A08981	ZMH	6.83
	<i>Ichthyophis kohtaoensis</i> <sup>*</sup>	Ichthyophis kohtaoensis 218831	UMMZ	31.72
	<i>Ichthyophis kohtaoensis</i> <sup>*</sup>	Ichthyophis kohtaoensis 218832	UMMZ	31.72
	<i>Uraeotyphlus oxyurus</i> <sup>†</sup>	Uraeotyphlus oxyurus uf:herp:62870	MS	15.41
Scolecomorphidae	<i>Scolecomorphus kirkii</i>	Scolecomorphus kirkii 101889	RMCA	19.01
	<i>Scolecomorphus uluguruensis</i>	Scolecomorphus uluguruensis 11102	RMCA	20.99
	<i>Scolecomorphus uluguruensis</i>	Scolecomorphus uluguruensis 101890	RMCA	17.03
	<i>Scolecomorphus uluguruensis</i>	Scolecomorphus uluguruensis 101891	RMCA	20.99
	<i>Scolecomorphus uluguruensis</i>	Scolecomorphus uluguruensis 101892	RMCA	20.81
	<i>Scolecomorphus uluguruensis</i>	Scolecomorphus uluguruensis 101894	RMCA	20.99
	<i>Scolecomorphus uluguruensis</i> <sup>†</sup>	Scolecomorphus uluguruensis 101896	RMCA	15.86
Herpeliidae	<i>Boulengerula boulengeri</i>	Boulengerula boulengeri fmnh:amphibians and reptiles:251369	MS	23.74
	<i>Boulengerula fischeri</i> <sup>*</sup>	Boulengerula fischeri 3	AH	32.48
	<i>Boulengerula fischeri</i> <sup>*</sup>	Boulengerula fischeri 4	AH	32.48
	<i>Boulengerula fischeri</i> <sup>*</sup>	Boulengerula fischeri 5	AH	32.48
	<i>Boulengerula fischeri</i> <sup>*</sup>	Boulengerula fischeri 7	AH	32.48
	<i>Boulengerula fischeri</i> <sup>**†</sup>	Boulengerula fischeri AH1	AH	9.74
	<i>Boulengerula taitanus</i> <sup>*†</sup>	Boulengerula taitanus AH2	AH	16.07
	<i>Boulengerula taitanus</i> <sup>*</sup>	Boulengerula taitanus AL010401	AH	31.72
	<i>Boulengerula taitanus</i> <sup>*†</sup>	Boulengerula taitanus AL010402	AH	9.74
	<i>Boulengerula taitanus</i> <sup>*</sup>	Boulengerula taitanus JM01452	AH	33.07
	<i>Boulengerula taitanus</i> <sup>*</sup>	Boulengerula taitanus JM01584	AH	33.07
<i>Herpele squalostoma</i> <sup>*</sup>	Herpele squalostoma AL10	AH	34.37	

	<i>Herpele squalostoma*</i>	Herpele squalostoma AL2	AH	31.72
	<i>Herpele squalostoma*</i>	Herpele squalostoma AL30	AH	31.72
	<i>Herpele squalostoma*</i>	Herpele squalostoma AL31	AH	34.35
	<i>Herpele squalostoma*</i>	Herpele squalostoma AL32	AH	32.48
Caeciliidae	<i>Caecilia museugoeldi*</i>	Caecilia museugoeldi V2101	NHM	63.47
	<i>Caecilia tentaculata*</i>	Caecilia tentaculata 3955	NHM	90.83
	<i>Caecilia tentaculata</i>	Caecilia tentaculata ku:kuh:175441	MS	77.33
Typhlonectidae	<i>Atretochoana eiselti†</i>	Atretochoana eiselti 30919	AH	19.98
	<i>Atretochoana eiselti</i>	Atretochoana eiselti uf:herp:185560	MS	29
	<i>Potomotyphlus kaupii†</i>	Potomotyphlus kaupii PotomoH2_01_b	NHM	9.71
	<i>Potomotyphlus kaupii†</i>	Potomotyphlus kaupii PotomoH2_01_s	NHM	9.71
	<i>Typhlonectes compressicauda†</i>	Typhlonectes compressicauda 11307	NHM	8.4
	<i>Typhlonectes compressicauda</i>	Typhlonectes compressicauda cas:herp:125421	MS	36.87
	<i>Typhlonectes compressicauda*</i>	Typhlonectes compressicauda AL20	AH	17.65
	<i>Typhlonectes compressicauda*</i>	Typhlonectes compressicauda AL6	AH	49.37
	<i>Typhlonectes compressicauda*†</i>	Typhlonectes compressicauda AL7	AH	46.81
	<i>Typhlonectes natans*</i>	Typhlonectes natans SMNS16297	SMNS	55
	<i>Typhlonectes natans†</i>	Typhlonectes natans ZMH A08984	ZMH	3.89
Indotyphlidae	<i>Gegeneophis ramaswamii†</i>	Gegeneophis ramaswamii 151	NHM	6.52
	<i>Gegeneophis ramaswamii†</i>	Gegeneophis ramaswamii 616	NHM	6.57
	<i>Gegeneophis ramaswamii†</i>	Gegeneophis ramaswamii 654	NHM	6.57
	<i>Gegeneophis ramaswamii†</i>	Gegeneophis ramaswamii 1275	NHM	8.5
	<i>Grandisonia alternans</i>	Grandisonia alternans 109185	RMCA	20.3
	<i>Grandisonia alternans</i>	Grandisonia alternans 109186	RMCA	20
	<i>Grandisonia alternans†</i>	Grandisonia alternans 109187	RMCA	24.16
	<i>Grandisonia alternans</i>	Grandisonia alternans cas:herp:157086	MS	44.98
	<i>Hypogeophis rostratus</i>	Hypogeophis rostratus 73_38_B_101	RMCA	20.99
	<i>Hypogeophis rostratus</i>	Hypogeophis rostratus 73_38_B_110	RMCA	20.99
	<i>Hypogeophis rostratus</i>	Hypogeophis rostratus 73_38_B_111	RMCA	25.94
	<i>Hypogeophis rostratus†</i>	Hypogeophis rostratus 73_48_B_1	RMCA	19.01
	<i>Sylvacaecilia grandisonae</i>	Sylvacaecilia grandisonae ummz:herps:227904	MS	13.5
Siphonopidae	<i>Microcaecilia unicolor†</i>	Microcaecilia unicolor MU1	NHM	7.23
	<i>Microcaecilia unicolor*</i>	Microcaecilia unicolor prey	AH	22.93

	<i>Mimosiphonops vermiculatus</i>	Mimosiphonops vermiculatus ku:kuh:93271	MS	16.02
	<i>Siphonops annulatus</i>	Siphonops annulatus cas:herp:74304	MS	22.17
	<i>Siphonops annulatus</i> <sup>†</sup>	Siphonops annulatus 1924_9_20_9_Red0	NHM	9.82
	<i>Siphonops annulatus</i> <sup>†</sup>	Siphonops annulatus ZMH A00235	ZMH	9.2
Dermophiidae	<i>Dermophis mexicanus</i>	Dermophis mexicanus cas:herp:144523	MS	50.79
	<i>Dermophis mexicanus</i> *	Dermophis mexicanus A-52188	UTACV	56.04
	<i>Dermophis mexicanus</i> *	Dermophis mexicanus AL2101201	AL	88.52
	<i>Dermophis mexicanus</i> *	Dermophis mexicanus AL2101202	AL	93.79
	<i>Geotrypetes seraphini</i> * <sup>†</sup>	Geotrypetes seraphini AL29041901	AL	49.37
	<i>Geotrypetes seraphini</i> *	Geotrypetes seraphini 2	AH	49.37
	<i>Geotrypetes seraphini</i> * <sup>†</sup>	Geotrypetes seraphini 6	AH	15.17
	<i>Geotrypetes seraphini</i> *	Geotrypetes seraphini AL1	AH	16
	<i>Geotrypetes seraphini</i> *	Geotrypetes seraphini AL21	AH	56.62
	<i>Geotrypetes seraphini</i> *	Geotrypetes seraphini AL5	AH	35.94
	<i>Schistometopum gregorii</i>	Schistometopum gregorii cas:herp:245198	MS	38.66
	<i>Schistometopum thomense</i> *	Schistometopum thomense 6	AH	32.48
	<i>Schistometopum thomense</i> *	Schistometopum thomense 7	AH	32.48
	<i>Schistometopum thomense</i> *	Schistometopum thomense #8	AH	32.48
	<i>Schistometopum thomense</i> *	Schistometopum thomense AL11	AH	32.48

\*Specimens scanned using the HECTOR micro computed tomography ( $\mu$ CT) scanner

<sup>†</sup>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)

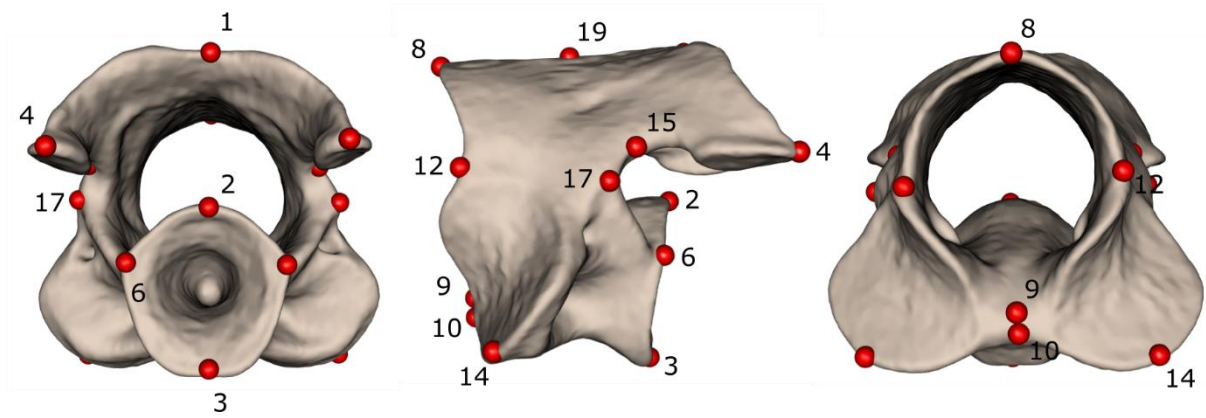
**Table S2.** Definition of the landmarks of the atlas used in geometric morphometric analyses.

Left side	Right side	Region	Definition
1	1	Posterior	Mid point of the neural arch
2	2	Posterior	Mid point of the dorsal side of the cotyle
3	3	Posterior	Mid point of the ventral side of the cotyle
4	5	Posterior	Posterior extreme of the postzygapophyses
6	7	Posterior	Junction between the neural arch and the cotyle
8	8	Anterior	Mid point of the neural arch
9	9	Anterior	Most dorsal point of the atlantal cotyles junction
10	10	Anterior	Most ventral point of the atlantal cotyles junction
12	11	Anterior	Junction between the neural arch and the atlantal cotyle
14	13	Anterior	Anterolateral extreme of the atlantal cotyle
15	16	Lateral	Inflection point on the junction between the postzygapophyses and the cotyle
17	18	Lateral	Junction between the neural arch and the atlantal cotyle
19	19	Dorsal	Mid point on the dorsal line of the neural arch

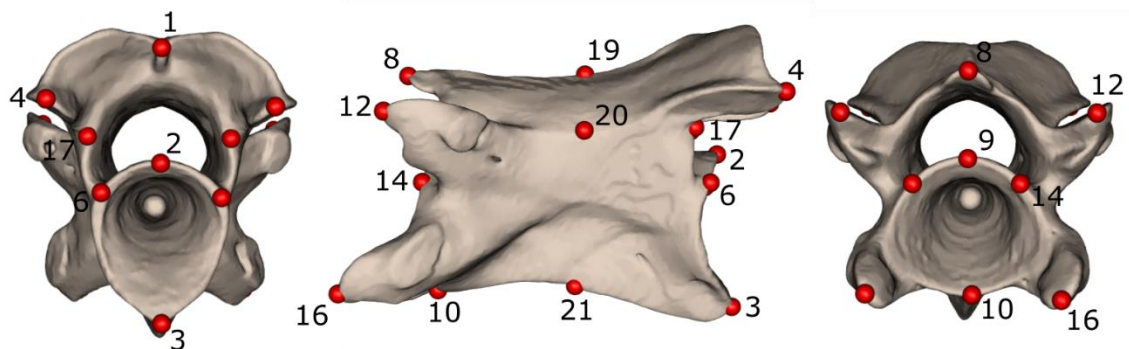
**Table S3.** Definition of the landmarks of the vertebrae used in geometric morphometric analyses.

Left side	Right side	Region	Definition
1	1	Posterior	Mid point of the neural arch
2	2	Posterior	Mid point of the dorsal side of the cotyle
3	3	Posterior	Mid point of the ventral side of the cotyle
4	5	Posterior	Posterior extreme of the postzygapophyses
6	7	Posterior	Junction between the neural arch and the cotyle
8	8	Anterior	Mid point of the neural arch
9	9	Anterior	Most dorsal point of the atlantal cotyles junction
10	10	Anterior	Most ventral point of the atlantal cotyles junction
12	11	Anterior	Anterior extreme of the prezygapophyses
14	13	Anterior	Junction between the neural arch and the atlantal cotyle
16	15	Anterior	Anterior extreme of the basapophyseal processes
17	18	Lateral	Inflection point on the junction between the postzygapophyses and the cotyle
19	19	Dorsal	Mid point on the dorsal line of the neural arch
20	22	Lateral	Mid point between the zygapophyses
21	21	Ventral	Mid point on the hypapophyseal keel

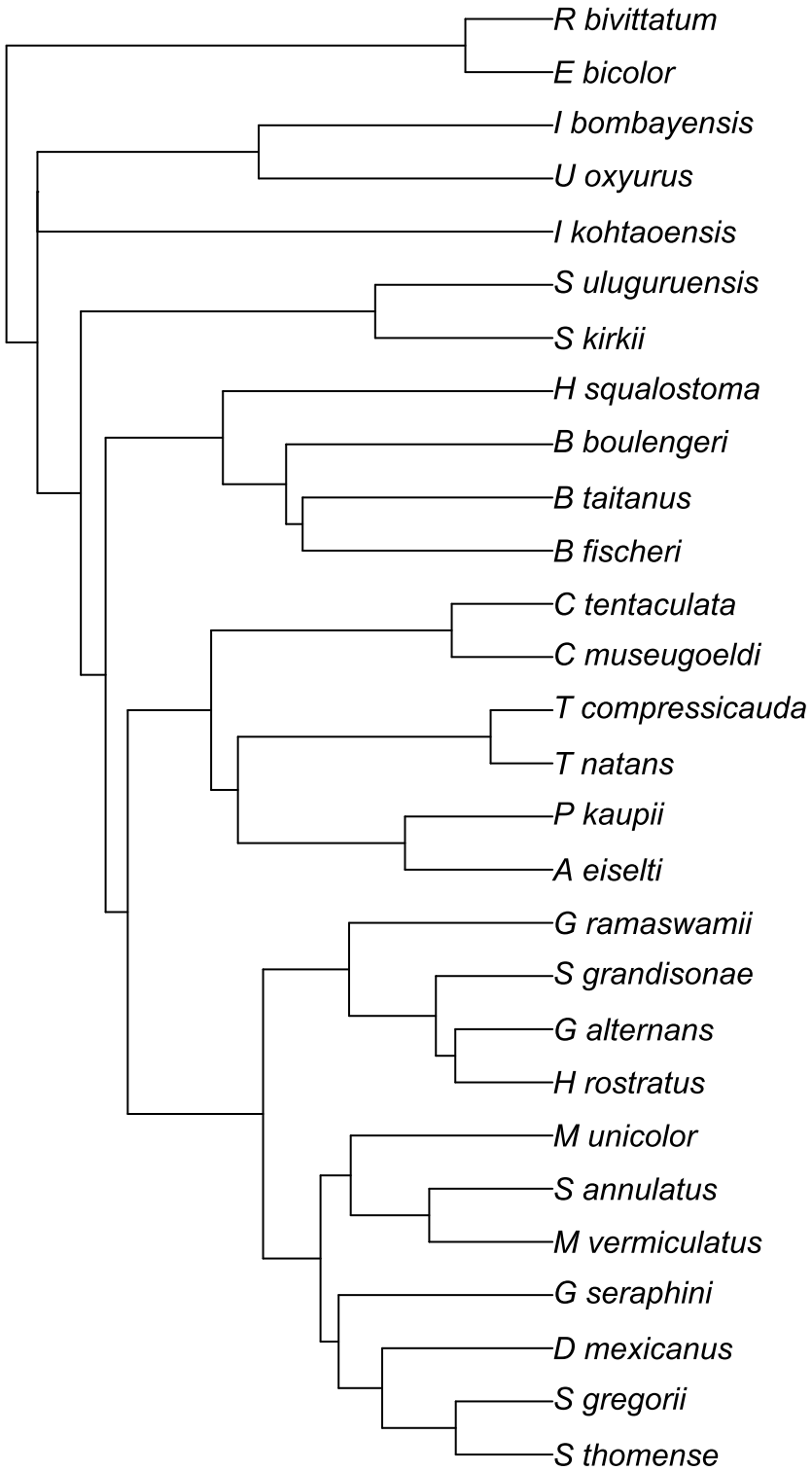
**Figure S1.** Landmarks used in our analyses to quantify shape variation of the Atlas. From left to right: caudal view, left lateral view, frontal view. Red circles represent homologous landmarks. For clarity, only the left side of the cranium is labelled. Shown on *Geotrypetes seraphini*. See supplementary table 2 for a complete description of the landmarks.



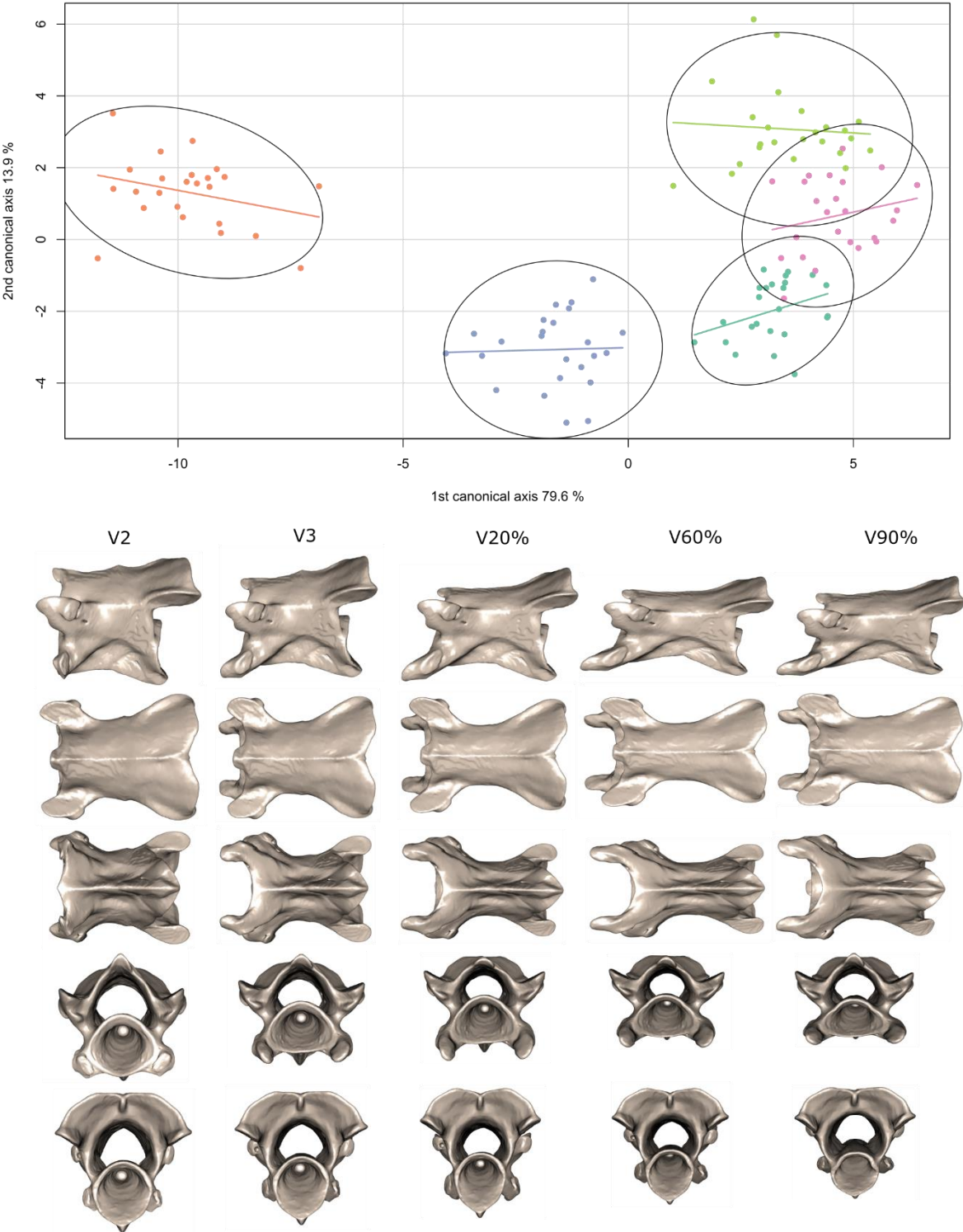
**Figure S2.** Landmarks used in our analyses to quantify shape variation of the vertebrae. From left to right: caudal view, left lateral view, frontal view. Red circles represent homologous landmarks. For clarity, only the left side of the cranium is labelled. Shown on *Geotrypetes seraphini*. See supplementary table 3 for a complete description of the landmarks.



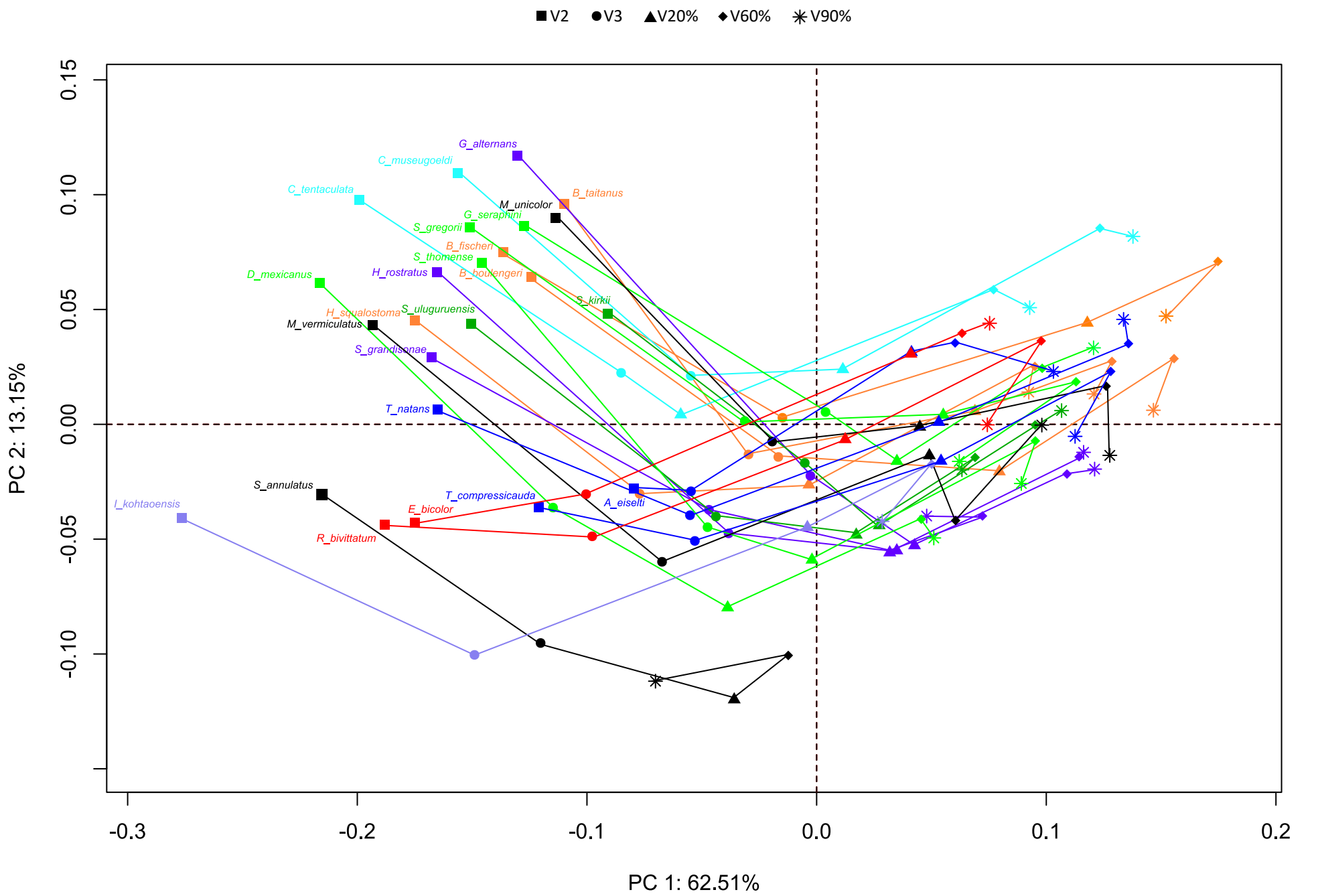
**Figure S3.** Maximum credibility tree used in our analyses.



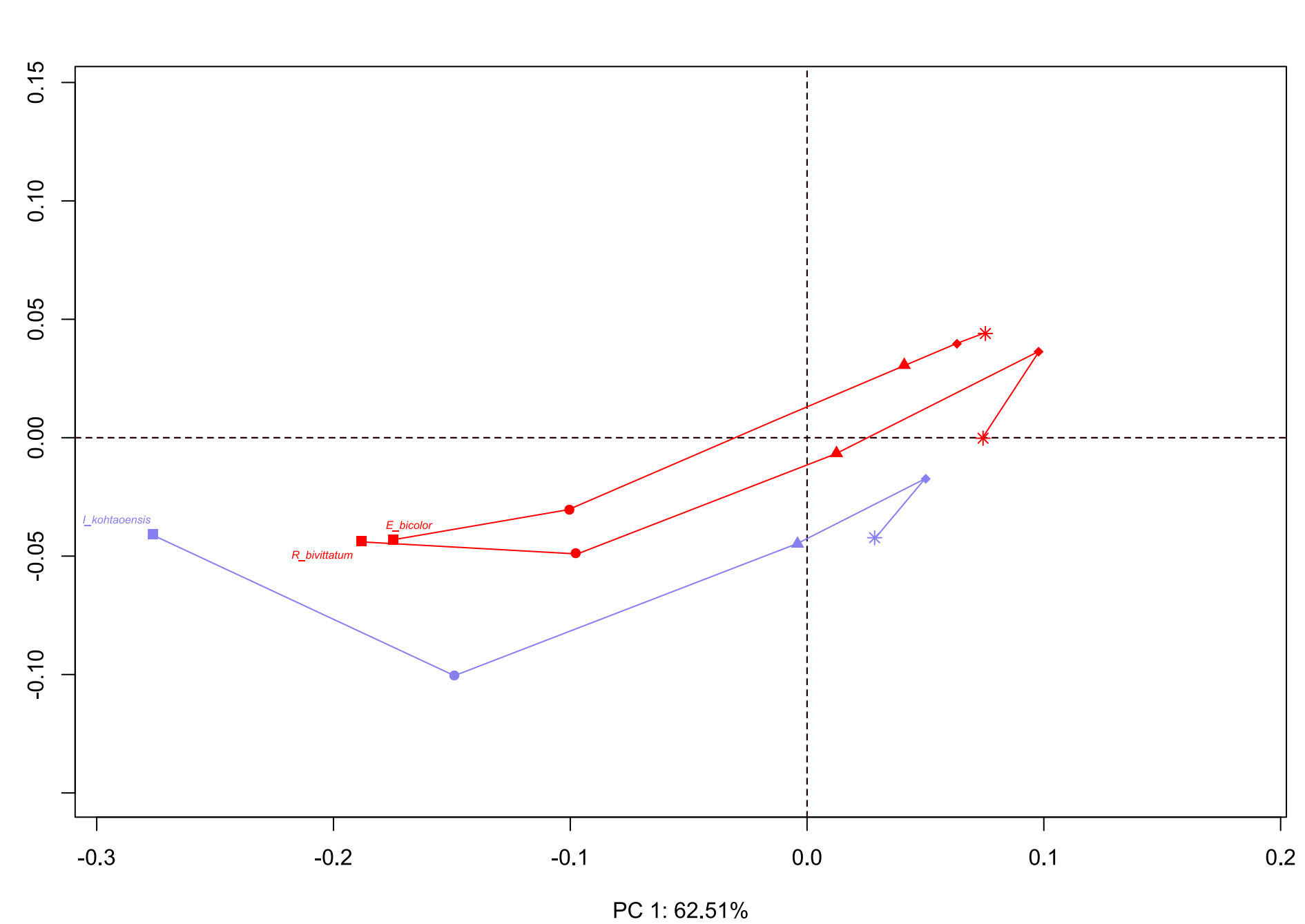
**Figure S4.** Scatterplot of the results of the canonical variate analysis discriminating the vertebral groups of caecilian amphibians not including the atlas (n=285). Circles represent species means (n=120) and are colored by vertebral position. Surfaces represent the mean shapes associated with each group of vertebrae. From top to bottom: lateral, dorsal, ventral, proximal, distal view. See figure 1 for complete legend of the vertebrae.



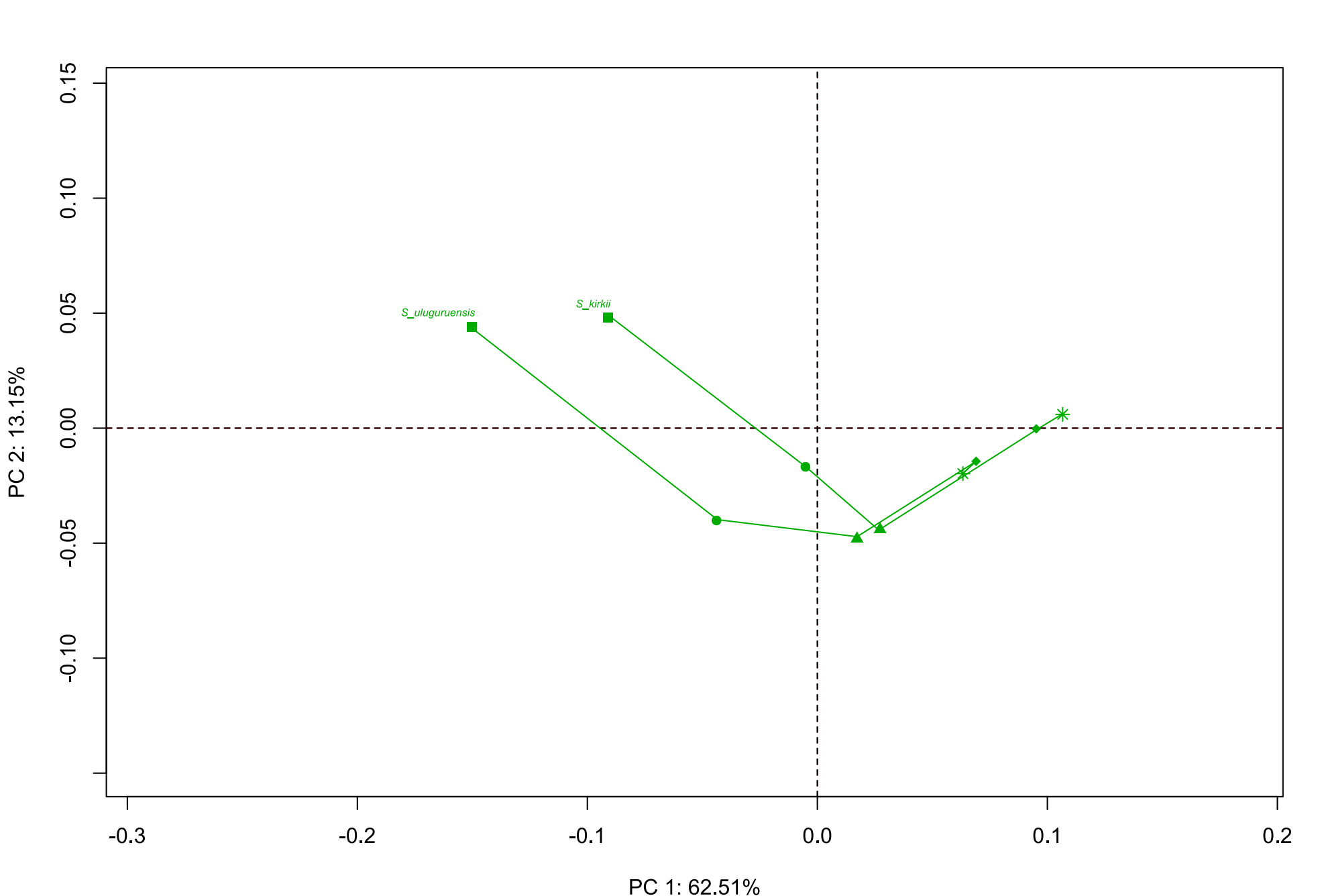
**A**



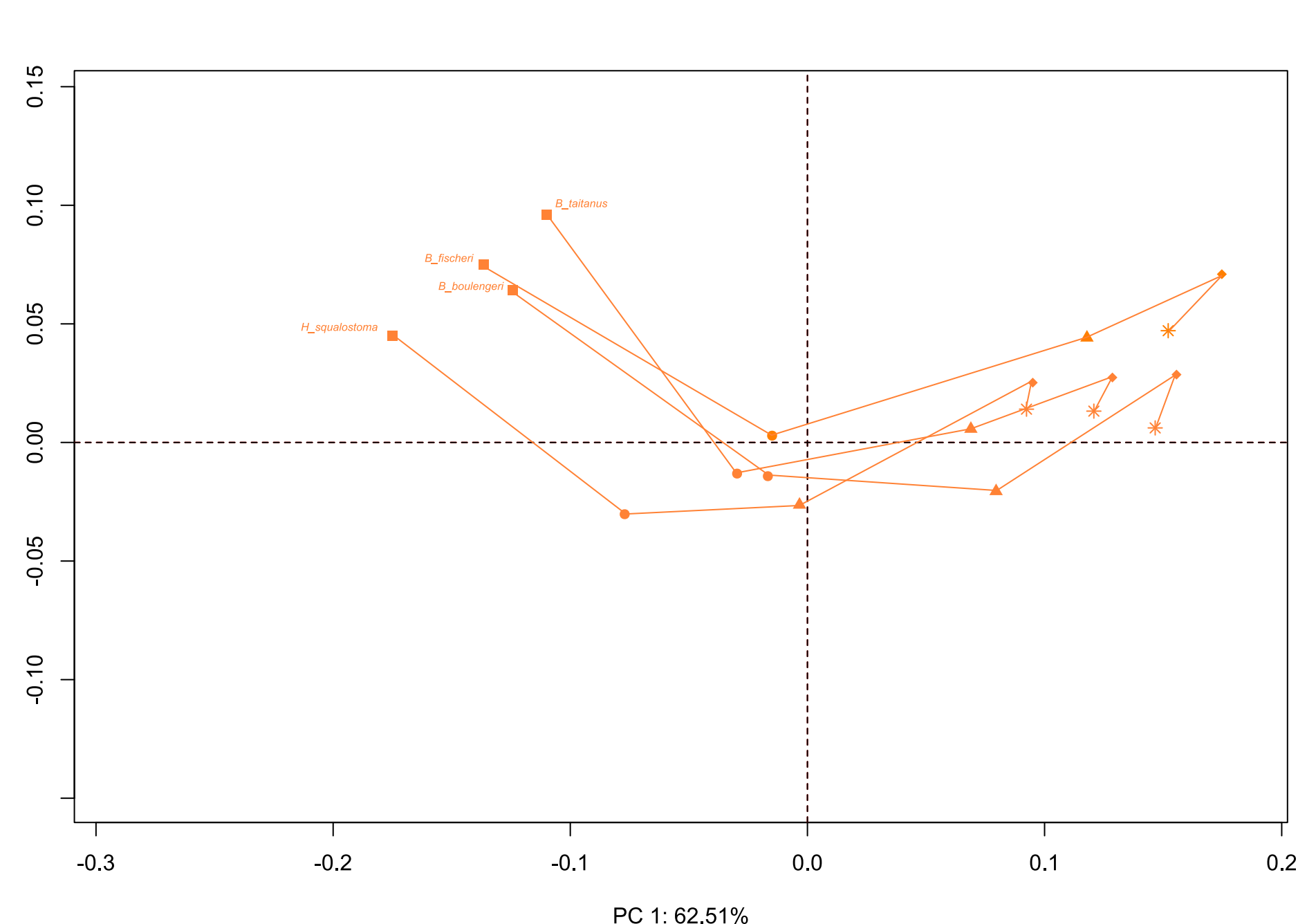
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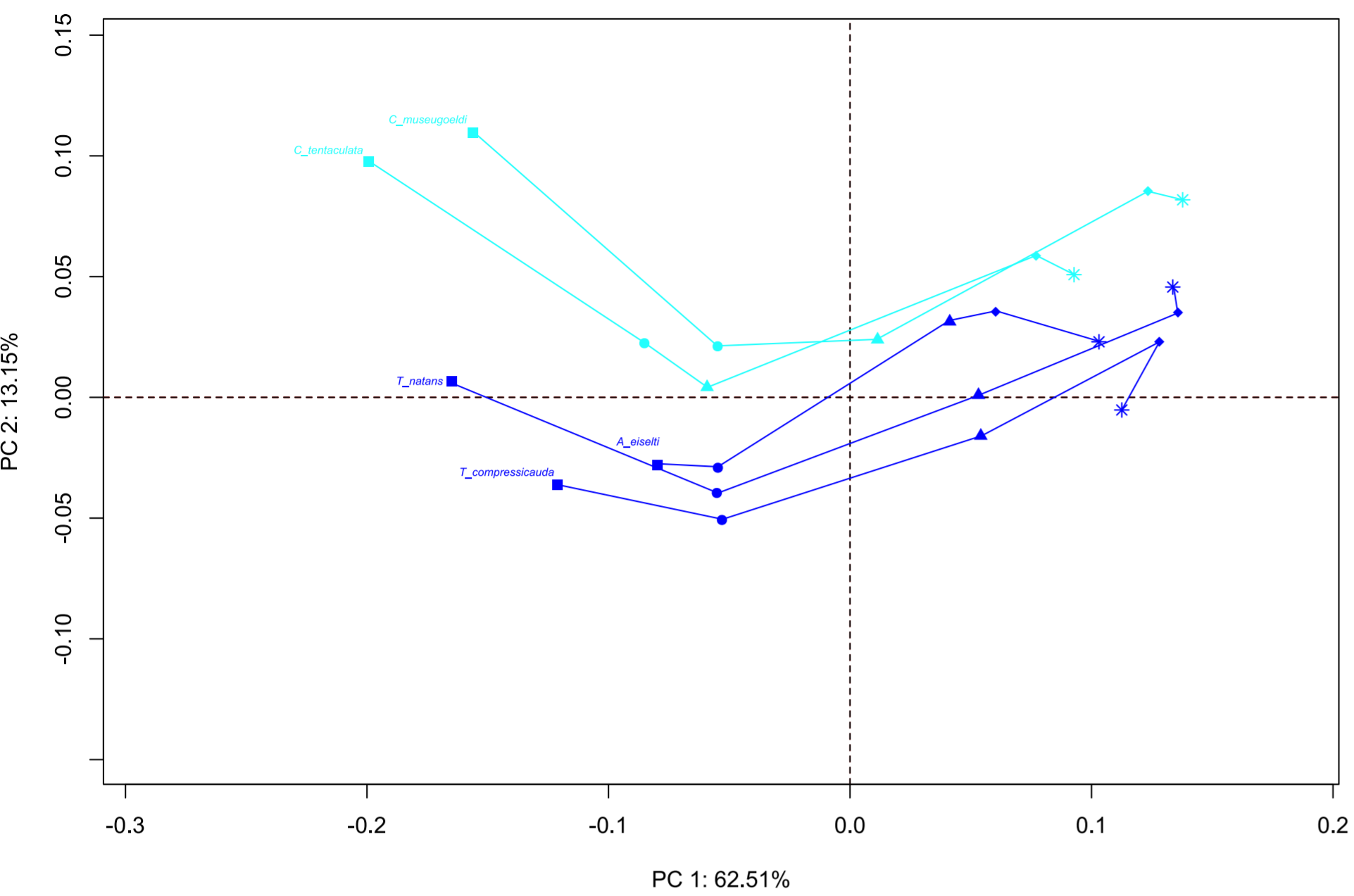
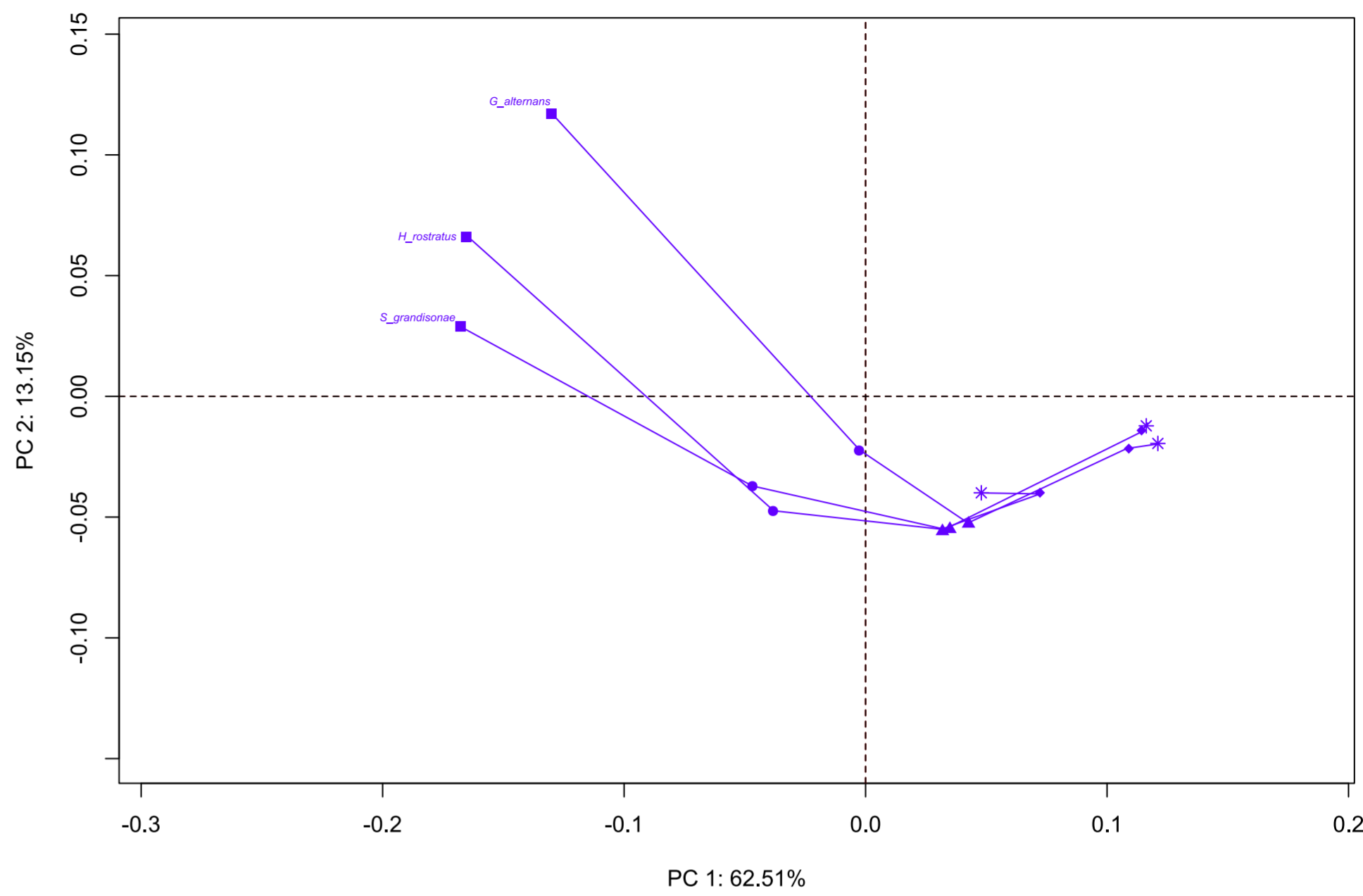
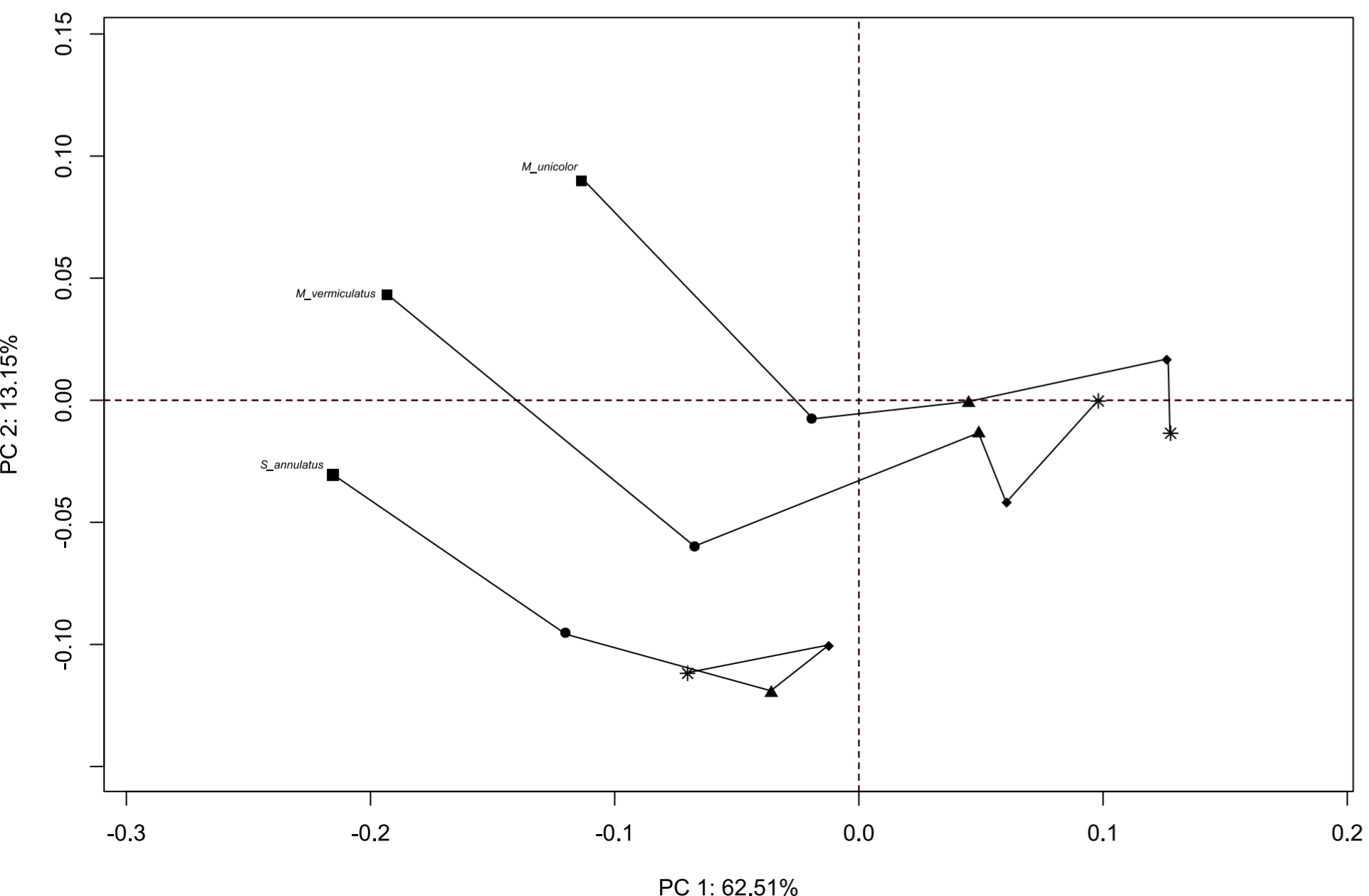
**C**



**D**





**E****F****G****H**