

Figure 1. Distribution map of the specimens used for this study. Labelled are *A. stuartii* south, *A. stuartii* north, *A. subtropicus*, specimens of unknown identity within the *A. stuartii* - *A. subtropicus* species complex, the holotype of *A. subtropicus* and the neotype of *A. stuartii*. All figures in this paper are labelled: *A. stuartii* south in blue, *A. stuartii* north in red and *A. subtropicus* in green. The phylogeny is adapted from Mutton et al. (2019).

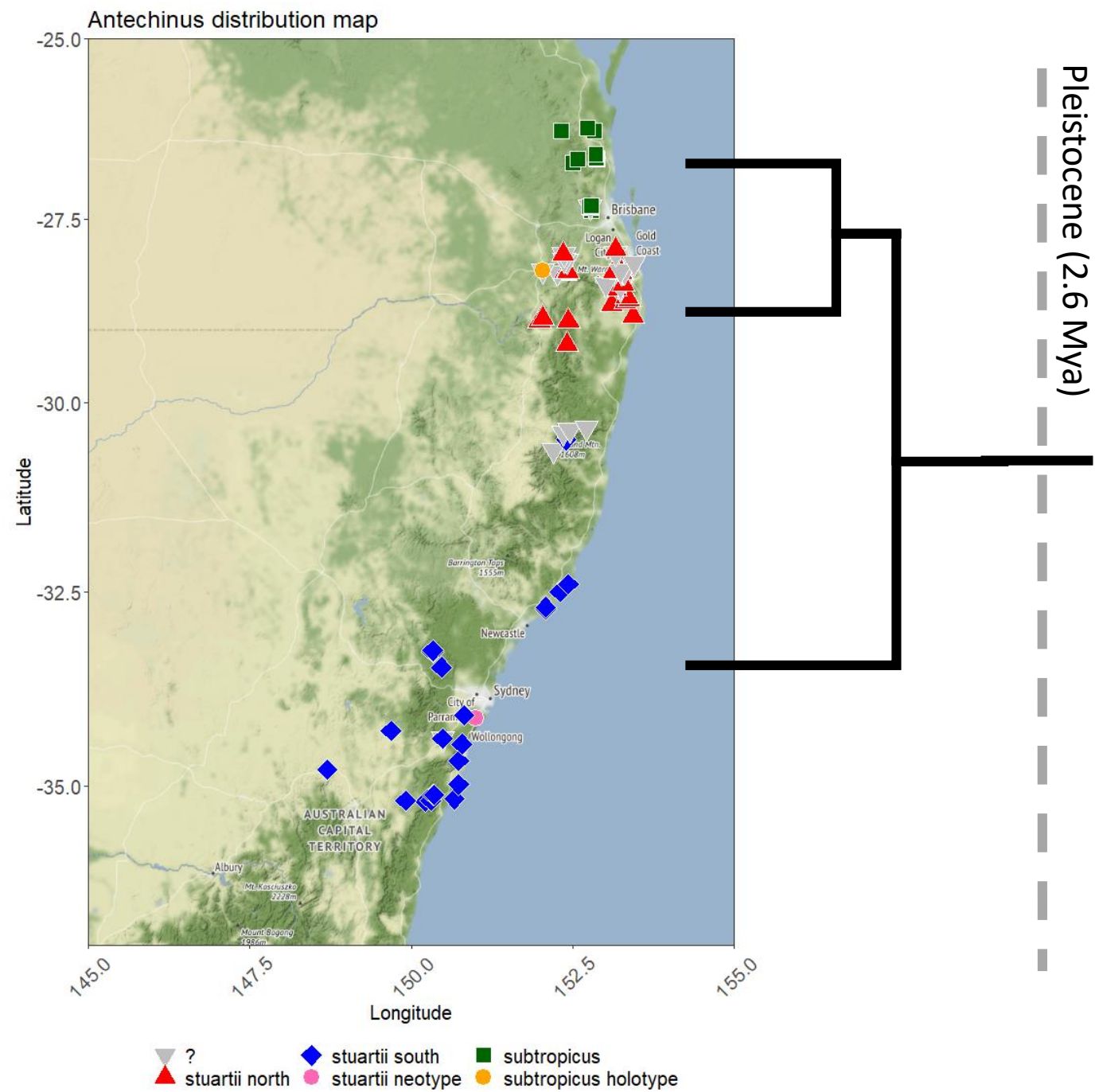
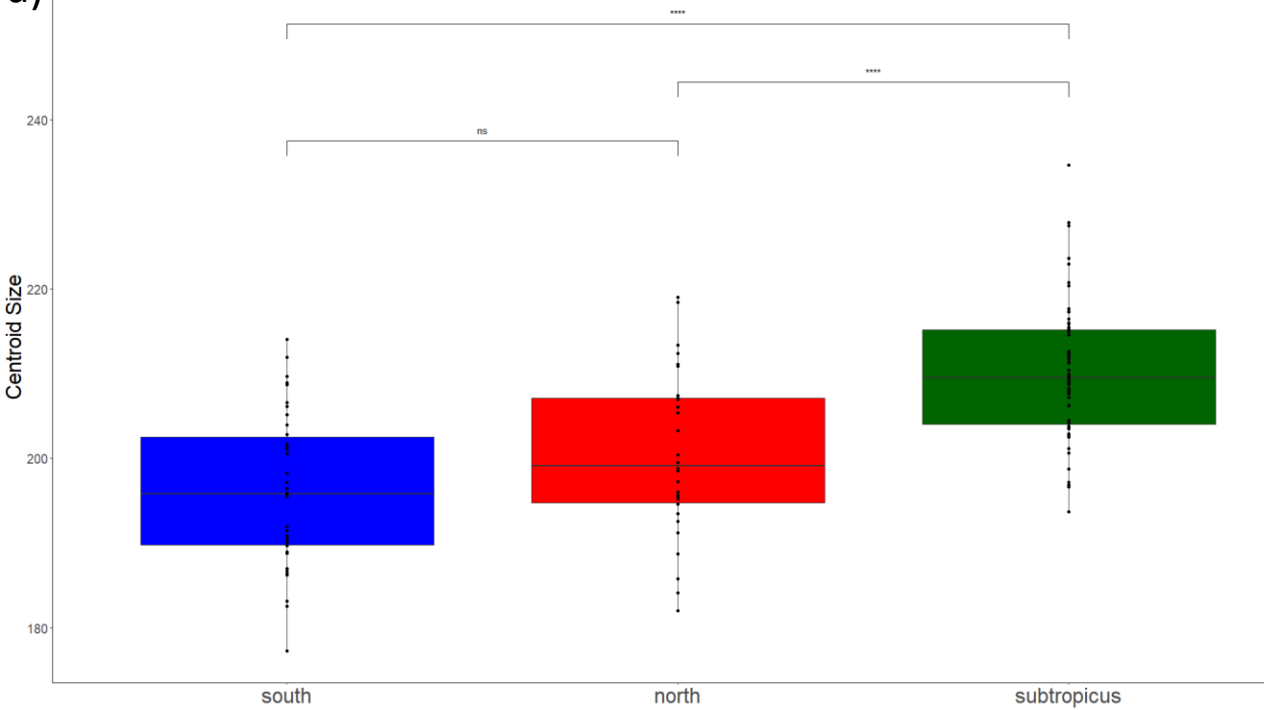


Figure 2. a) Box plot and dot plot of centroid size labelling each clade as per Figure 1. b) Allometry plot labelling each clade as per Figure 1, consisting of centroid sizes versus shape scores obtained from the regression of shape on size (Drake & Klingenberg, 2008).

a)



b)

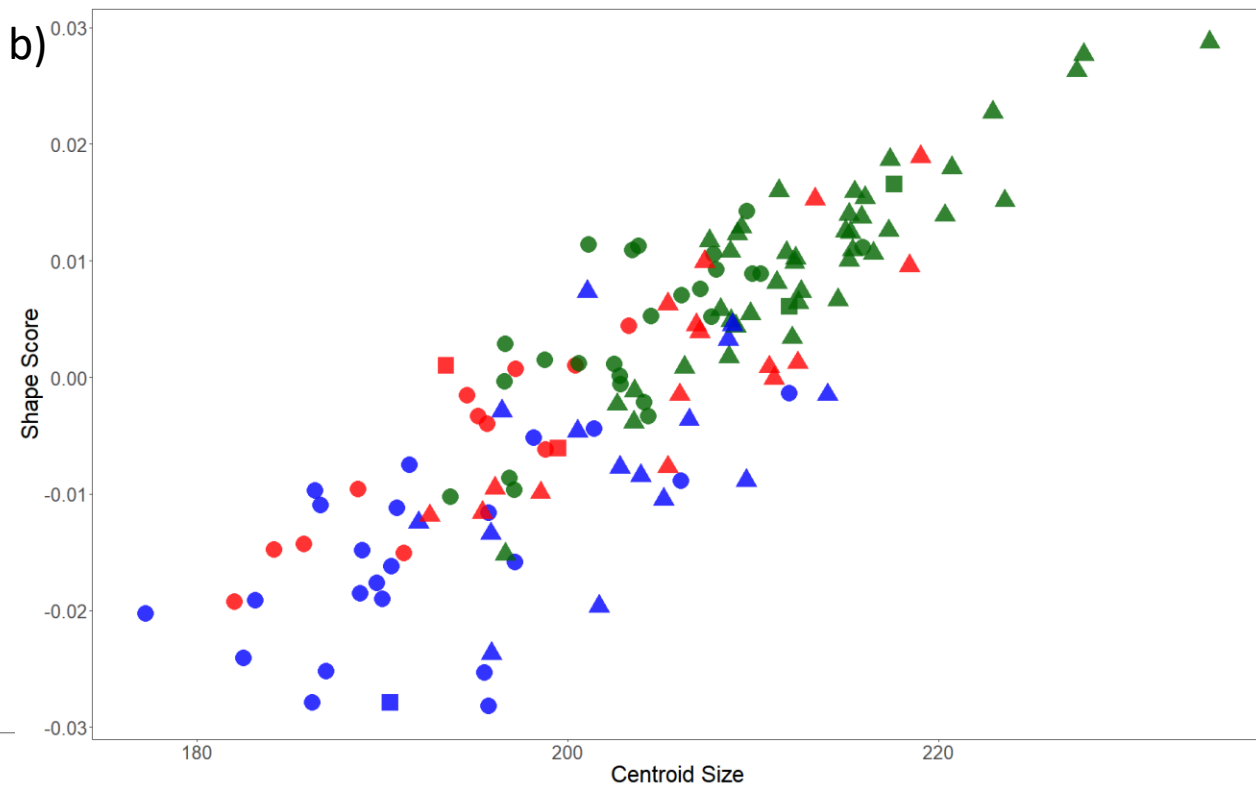


Figure 3. Pairwise comparisons between mean shapes of each clade (*A. stuartii* south vs *A. stuartii* north, $p = 0.001$; *A. stuartii* north vs *A. subtropicus*, $p = 0.001$; *A. stuartii* south vs *A. subtropicus*, $p = 0.001$). The 3D images are the specimen closest to the mean warped correspondingly to the mean shapes of each clade. For each comparison, we label the best differentiator diagnostic; i.e., the size of the major palatine foramina for differentiating *A. stuartii* south and *A. stuartii* north, the size of the incisive foramina for differentiating *A. stuartii* north and *A. subtropicus*, and the interpalatal difference for differentiating between the three clades. Clades are consistently labelled as per Figure 1.

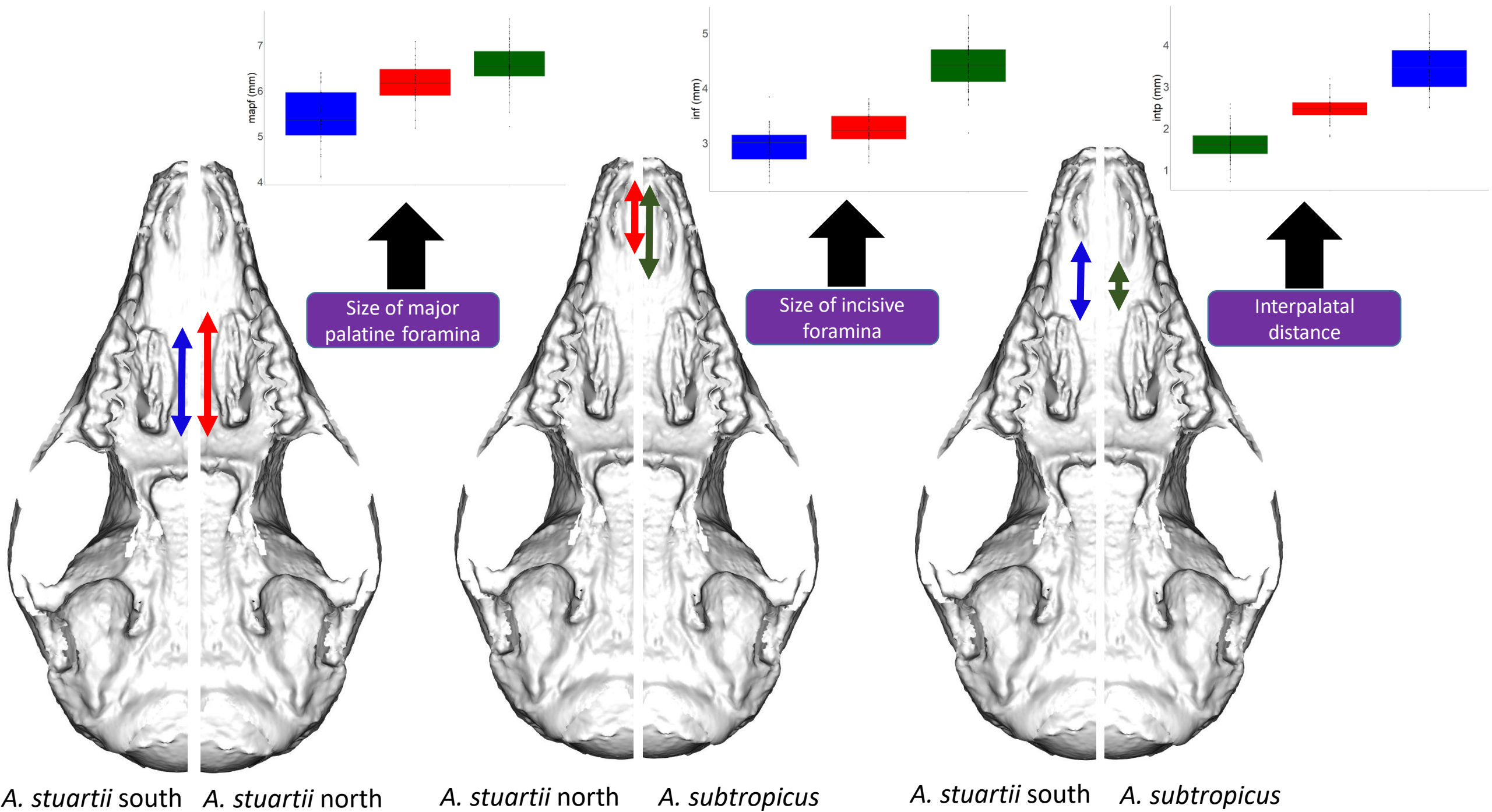
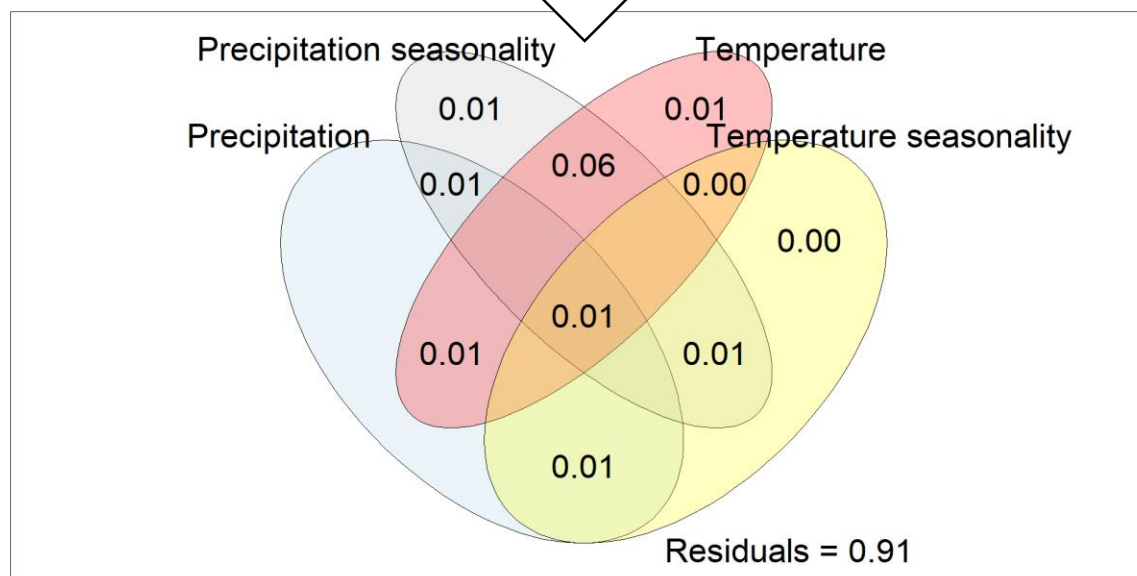
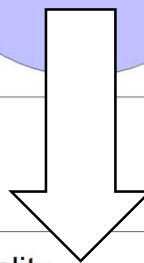
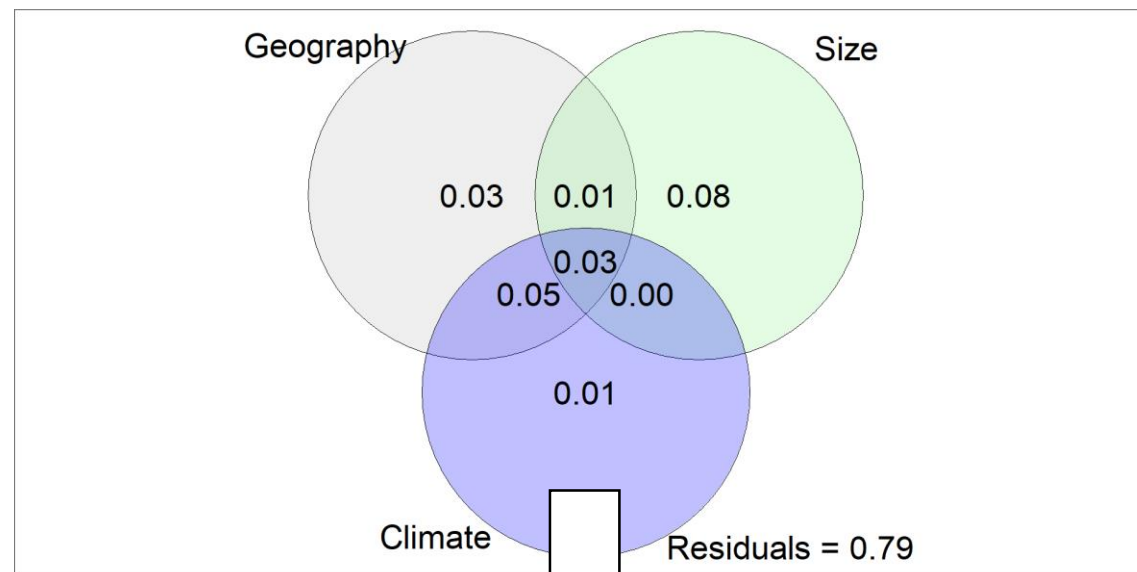


Figure 4. Venn diagrams illustrating variation partitioning analyses. Each individual fraction for each factor contributing to the model is shown in every set. Circle sizes and white space out of the circles representing the unexplained variation are schematic and not to scale.



Values <0 not shown

Table 1. ANOVA on predictors of size variation and Procrustes ANOVA on predictors of shape variation.

RESPONSE VARIABLE	PREDICTOR VARIABLE	QUESTION	D. F.	SS	R ²	F	Pr(>F)	INTERPRETATION
Size	Clade	Are clades different in size?	2	5104.8	0.338	33.925	0.001	Clear effect.
	Sex	Are sexes different in size?	1	5184.7	0.352	71.46	< 0.001	Clear effect.
Shape	Clade	Are clades different in shape?	2	0.017	0.143	11.082	0.001	Clear effect.
	Size	Is there allometry?	1	0.016	0.133	20.477	0.001	Clear effect.
	Sex	Are sexes different in shape?	1	0.004	0.038	5.051	0.001	Low effect sizes and low variance explained.
	Size : Sex	As there is sexual dimorphism and allometry, do sexes differ in allometric slopes?	1	0.001	0.006	0.907	0.587	No clear effect.
	Size + Sex	Adjusting for size, are sexes different in shape?	1	0.001	0.013	1.946	0.016	Low effect sizes and low variance explained.
	Size : Clade	Do clades differ in allometric slopes?	2	0.001	0.012	1.014	0.433	No clear effect.
	Size + Clade	Adjusting for size, are clades different in shape?	2	0.01	0.085	7.175	0.001	Clear effect.

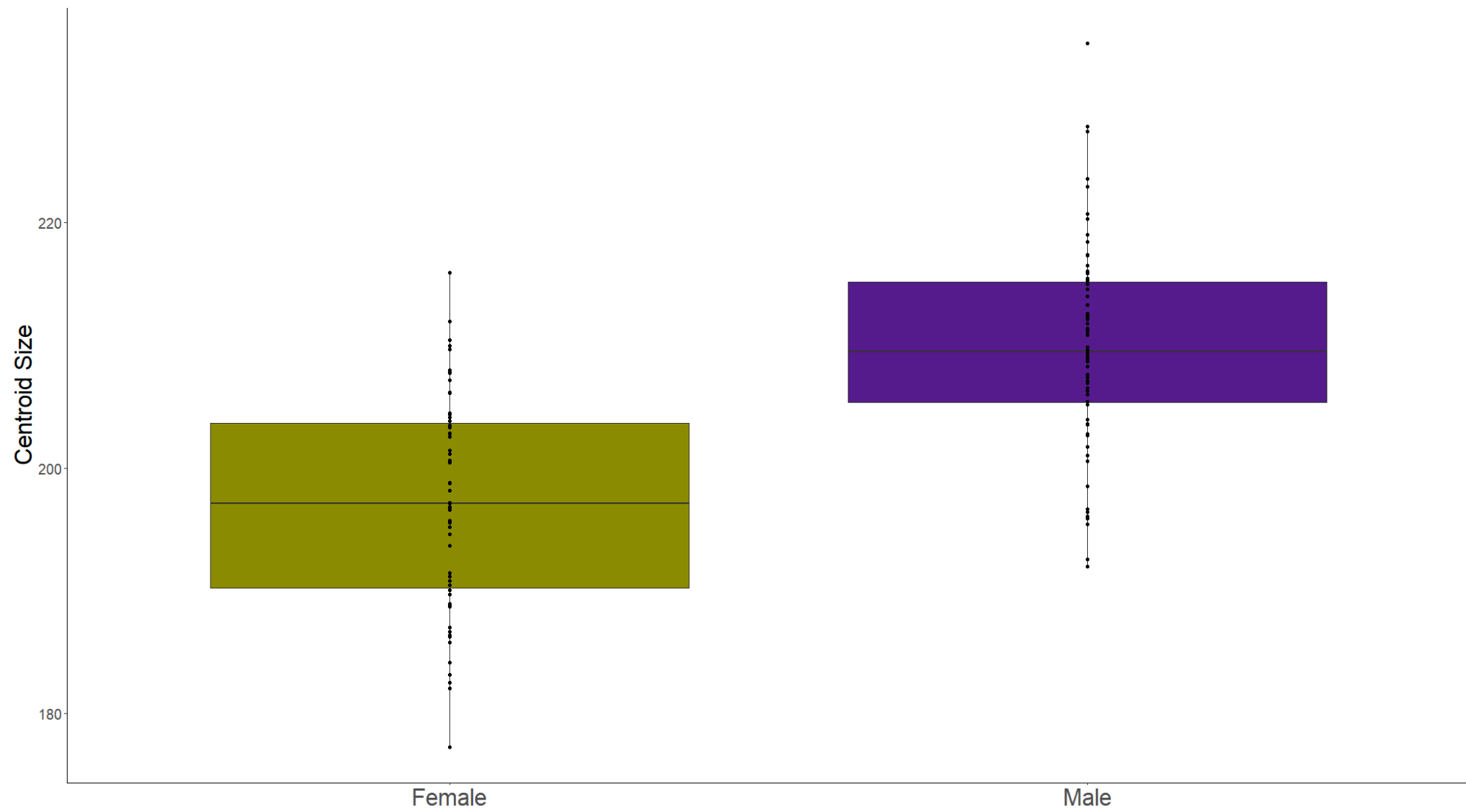
Table 2. Analyses of Variance on geographic sources of size and shape variation of the entire *A. stuartii* - *A. subtropicus* species complex and within each clade.

Response variable	Predictor variable	Question	SS	R ²	F	Pr (>F)	Interpretation
Size	Latitude	Is latitude covarying with size in this dataset?	3735.5	0.195	40.29	0.001	Clear effect.
	Latitude within each clade	Is latitude covarying with size within each clade?	South: 104.32 North: 303.04 Sub: 4.7	South: 0.035 North: 0.111 Sub: 0.001	South: 1.311 North: 1.08 Sub: 0.073	South: 0.261 North: 0.061 Sub: 0.813	No clear effect.
	Longitude	Is longitude covarying with size in this dataset?	3428.9	0.179	36.261	0.001	Clear effect.
	Longitude within each clade	Is longitude covarying with size within each clade?	South: 21.16 North: 485.53 Sub: 31	South: 0.007 North: 0.178 Sub: 0.007	South: 0.258 North: 6.07 Sub: 0.478	South: 0.629 North: 0.027 Sub: 0.461	No clear effect. North might have a biased sample.
Shape	Latitude	Is latitude covarying with shape in this dataset?	0.014	0.093	17.054	0.001	Clear effect
	Latitude within each clade	Is latitude covarying with shape within each clade?	South: 0.002 North: 0.001 Sub: 0.001	South: 0.07 North: 0.052 Sub: 0.025	South: 2.705 North: 1.543 Sub: 1.667	South: 0.001 North: 0.058 Sub: 0.039	Only south stuartii is varying latitudinally in shape with low effect.
	Longitude	Is longitude covarying with shape in this dataset?	0.012	0.081	14.645	0.001	Clear effect
	Longitude within each clade	Is longitude covarying with shape within each clade?	South: 0.002 North: 0.001 Sub: 0.001	South: 0.066 North: 0.051 Sub: 0.022	South: 2.554 North: 1.494 Sub: 1.461	South: 0.003 North: 0.09 Sub: 0.117	Only south stuartii is varying longitudinally in shape with low effect.

Table 3. ANOVA on climatic predictors of size variation and Procrustes ANOVA on climatic predictors of shape variation.

	d. f.	Size				Shape			
		SS	R ²	F	PR(>F)	SS	R ²	F	PR(>F)
Precipitation	1	731	0.032	6.596	0.011	0.002	0.013	2.135	0.012
Precipitation seasonality	1	3193.6	0.162	33.27	<0.001	0.012	0.08	14.521	0.001
Temperature	1	4550.7	0.233	51.83	<0.001	0.011	0.075	13.5	0.001
Temperature seasonality	1	1906.7	0.094	18.38	<0.001	0.002	0.016	2.69	0.004
Elevation	1	390.2	0.015	3.457	0.065	0.001	0.006	1.048	0.382

Supplementary Figure 1. Box plot and dot plot of centroid size labelling males and females.



Supplementary Figure 2. Principal Component Analysis on all specimens.

