The effects of mutualism on trait evolution - Residuals from ClimPC

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Contents

Submitted to Ecology Letters, Evolution or Evolution Letters – well let's see what we find!

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Analyses accounting for climate

The results below follow the same rationale as the ones from the main document. However, in the cases below all analyses use the plant traits already accounted for climatic effects by using the residuals from the regressions between each trait and the first three Principal Components of the climatic variables obtained from BioClim (REF).

Methods

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## here() starts at /docs/Documents/hydnoants
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MCC tree

- 1000 reconstructions of each discrete trait (namely Mutualistic Strategy, Presence of Warts, Presence of Reward, Plant Architecture, Domatium growth type, Mating System, Leaf Structure and Presence of appendages)
- Sampled 100 reconstructions and performed continuous trait evolution analysis (Stem Area, Leaf Area, Corolla Length and Petiole Length) using residuals of correlations between continuous traits and the first 3 climatic PCs.
- Fitted 7 models:
  - Single-rate Brownian Motion (BM1 - 1 parameter)
  - Multiple-rate Brownian Motion (BMS - 3 parameters)
  - Simple OU (OU1 - 3 parameters)
  - OU with different optima but same alpha and sigma (OUM - 5 parameters)
  - OU with different optima and alpha but same sigma (OUMA - 7 parameters)
  - OU with different optima and sigma but same alpha (OUMV - 7 parameters)
  - OU with different optima, alpha, and sigma (OUMVA - 9 parameters)

Summary of Results

Due to the elevated number of variables and models, we opted to use a model averaging approach by calculating the weighted average of parameter values. The final value of each parameter was calculated by multiplying the estimated value for a given parameter in a given model by the Akaike weight of the given model. Thus, we need not resort to any arbitrary criterium (such as δAIC > 2) and can evaluate the dynamics solely based on the parameter values. All plots below were filtered to exclude parameter values that were larger than -10 ($e^{-}10$) and smaller than 10 ($e^{1}0$), on the justification of representing bad fitting or unreasonable biological meaning.

Residuals from climatic PCs

Most tested correlations between each continuous trait and the climatic PC were non-significant regardless of accounting or not for the phylogenetic structuring of the residuals. The only trait that showed significant correlations to both climatic PC1 and PC2 was “Hole Diameter”, and therefore will be the only trait for which we will consider the parameter values for both climatic PCs. For practical purposes, the results for all PCs should be virtually identical for all other continuous traits, and therefore we will only analyse the results for the PC1.

Appendages

Species with “variable” appendages show increased θ values for corola length, leaf area, petiole length and stem area when compared to the other states.

Species with “spines” have intermediate θ values for petiole length and stem area.

On the other hand, species with no appendages undergo stronger selection for hole diameter (for both PC1 and PC2), leaf area, and stem area when compared to other states, with also faster evolutionary rates for corola length, petiole length and stem area.

Species with “variable” appendages undergo intermediate selection for leaf and stem area when compared to other states.

Architecture

Species with single stems evolve towards higher θ values for all traits. Conversely, species with multiple stems show higher high α values for corola length, hole diameter (for both PC1 and PC2), leaf area and petiole length, but not for stem area. Also, σ^2 is higher in species with multiple stems for all traits but hole diameter.

Domatium Growth

Species with apical growth show higher θ values for corola length, leaf and stem area and petiole length. For α values, species with apical growth show higher values for corola length and stem area, whereas species with diffuse growth show higher values for hole diameter and petiole length. Regarding σ^2, species with diffuse growth show higher values for all traits.

Species with diffuse growth show higher values of both θ, α and σ^2 for both PC1 and PC2.

Leaf Structure

Species with thin leaves have higher values of θ for hole diameter, leaf area, and stem area, whereas species with variable leaf structure have higher values of corola length and petiole length. Species with thick leaves show higher α values for corola length, hole diameter and leaf area, and succulent species for petiole length and stem area.

For σ^2, species with succulent leaves have higher values for corola and petiole length, whereas species with thick leaves show higer values for leaf and stem area.

Mating System

All differences in parameters for mating system were discrete, being hard to find any pattern.

Reward

Species that give rewards show higher θ values for all traits but hole diameter, for which the signal is mixed (both in PC1 and PC2). Also, these species show higher α values for all traits, and higher σ^2 for all traits but hole diameter (both in PC1 and PC2).

Strategy

Species that are obligate mutualistics show higer values of θ for all traits but hole diameter, for which species that lost this interaction have higher hole diameters than other species for PC1, and the facultative ones for PC2. On the other hand, species that are facultatively mutialistic show higher α values for corola length, hole diameter (for both PC1 and PC2) and petiole length, whereas for leaf area the higher α values are from species who lost this interaction, and for stem area the higher are obligate mutualists.

For σ^2, facultative species show higher values for all traits but leaf area, for which species that lost the interaction show higher values.

Warts

Species with differentiated warts have higher θ and σ^2 values for all traits but hole diameter, for which higher values belong to species that lost this structure (whereas for PC2 higher values are for species with variable warts). For α, species with variable warts show higher values for hole diameter and petiole length, whereas species who lost these structures show higher values for leaf and stem area.

Figures and tables

Appendages

PC1 - Parameters

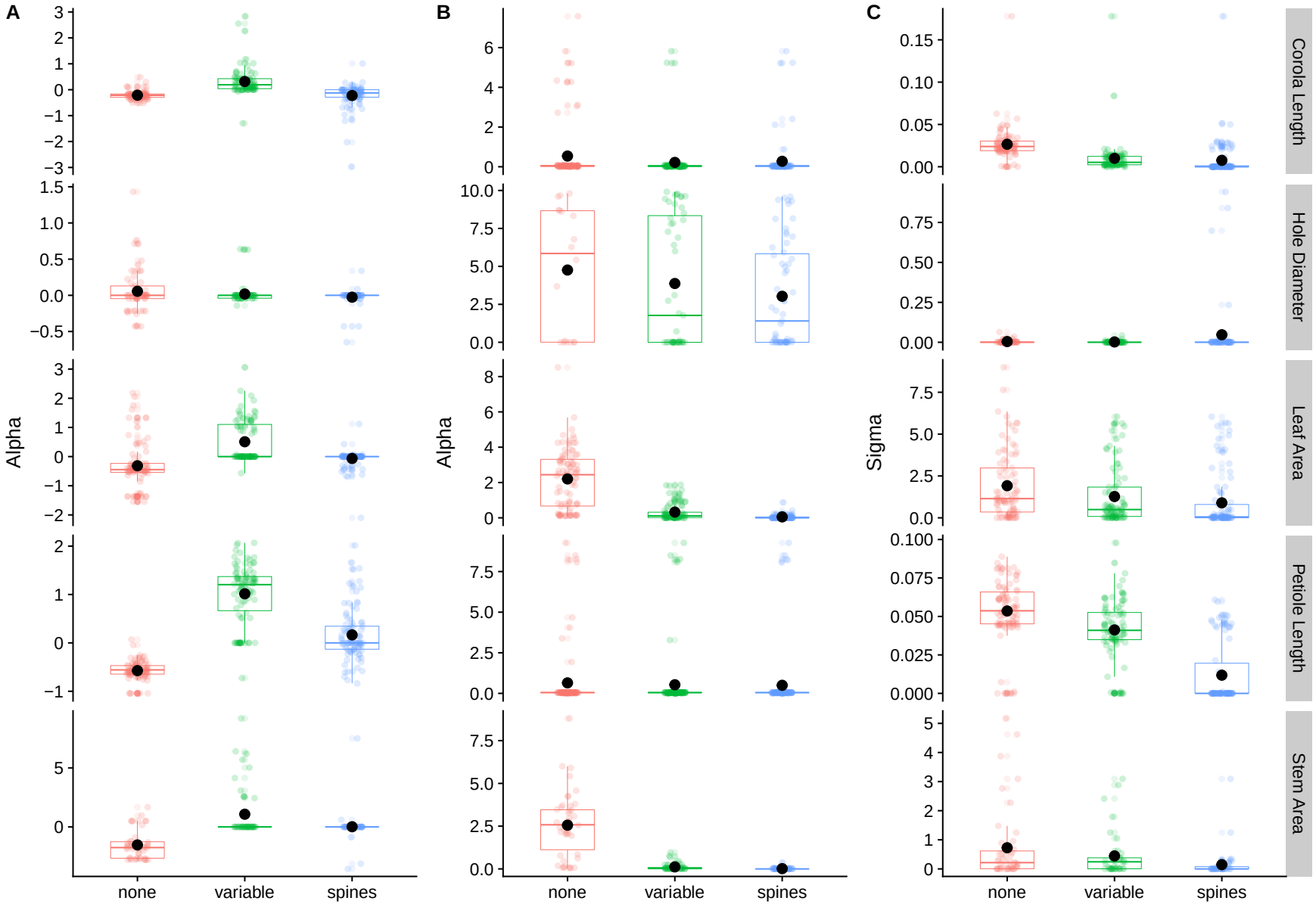

Figure 1: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Appendage.

PC1 - Parameter differences

Table 1: Differences in Theta values for PC1 analysis of Appendages. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	none	variable	spines	none	variable	spines	none	variable	spines	none	variable	spines	none	variable	spines
none	0	8	37	0	35	25	0	19	28	0	2	6	0	9	11
variable	**82**	0	**78**	27	0	21	**73**	0	46	**93**	0	**74**	37	0	16
spines	**53**	5	0	37	23	0	**64**	2	0	**89**	11	0	35	4	0

Table 2: Differences in Alpha values for PC1 analysis of Appendages. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	none	variable	spines	none	variable	spines	none	variable	spines	none	variable	spines	none	variable	spines
none	0	44	44	0	**57**	**61**	0	**67**	**84**	0	35	34	0	42	46
variable	2	0	5	5	0	32	25	0	**78**	1	0	1	4	0	41
spines	2	12	0	1	25	0	8	14	0	2	5	0	0	5	0

Table 3: Differences in Sigma values for PC1 analysis of Appendages. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	none	variable	spines	none	variable	spines	none	variable	spines	none	variable	spines	none	variable	spines
none	0	**82**	**68**	0	16	11	0	41	46	0	**70**	**76**	0	17	26
variable	4	0	**66**	9	0	9	6	0	44	21	0	**66**	12	0	23
spines	18	20	0	14	16	0	1	2	0	15	23	0	3	6	0

PC2 - Parameters

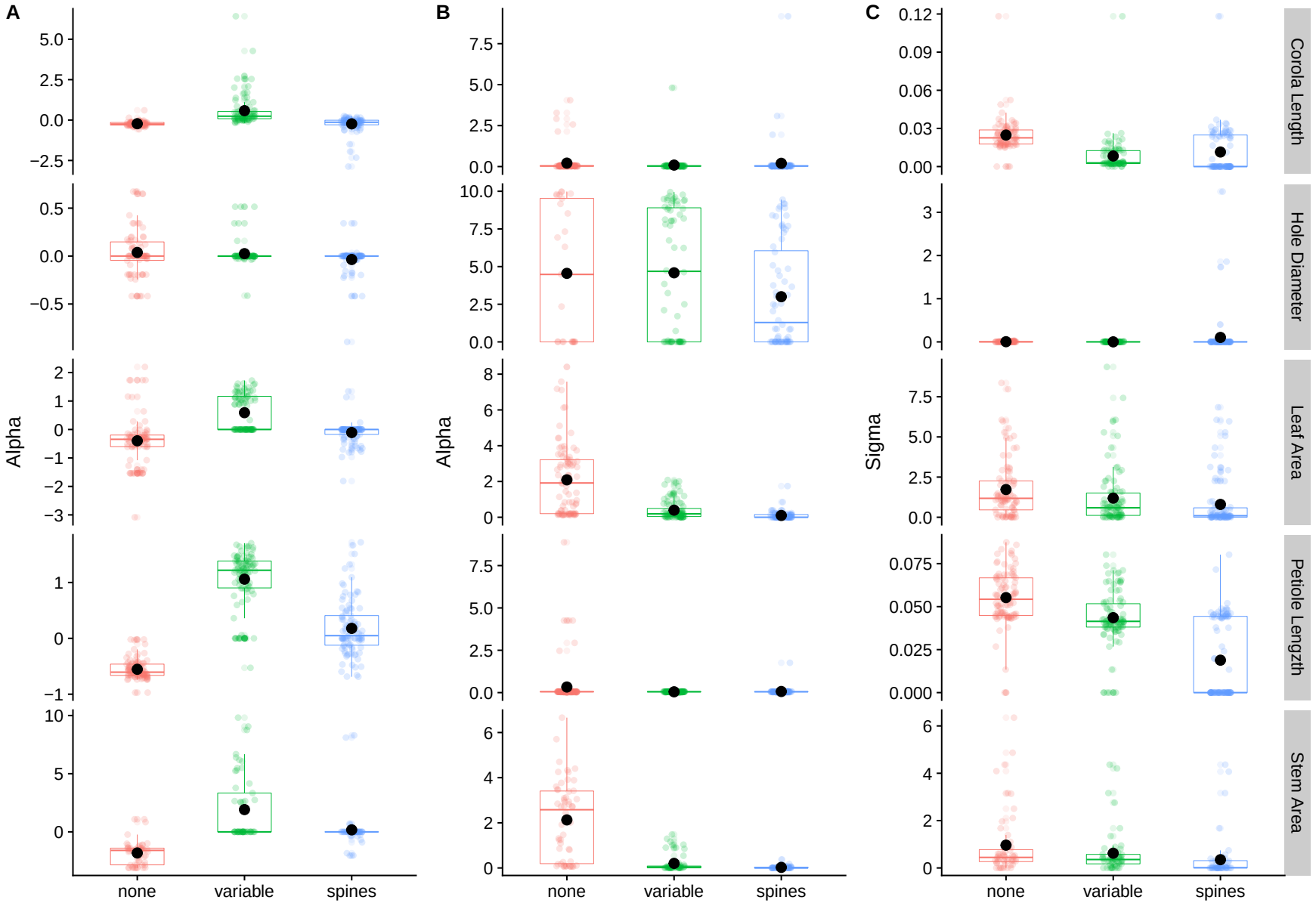

Figure 2: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Appendage.

PC2 - Parameter differences

Table 4: Differences in Theta values for PC2 analysis of Appendages. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	none	variable	spines	none	variable	spines	none	variable	spines	none	variable	spines	none	variable	spines
none	0	2	33	0	45	36	0	11	27	0	0	3	0	3	6
variable	**84**	0	**75**	29	0	29	**80**	0	50	**97**	0	**82**	**51**	0	26
spines	**53**	10	0	38	27	0	**64**	5	0	**94**	9	0	48	5	0

Table 5: Differences in Alpha values for PC2 analysis of Appendages. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	none	variable	spines	none	variable	spines	none	variable	spines	none	variable	spines	none	variable	spines
none	0	**53**	50	0	**72**	**72**	0	**68**	**78**	0	46	46	0	46	**54**
variable	0	0	3	2	0	42	23	0	**74**	0	0	2	8	0	43
spines	3	17	0	2	21	0	13	17	0	0	4	0	0	11	0

Table 6: Differences in Sigma values for PC2 analysis of Appendages. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	none	variable	spines	none	variable	spines	none	variable	spines	none	variable	spines	none	variable	spines
none	0	**77**	**52**	0	31	27	0	47	**52**	0	**76**	**69**	0	27	34
variable	5	0	48	12	0	25	6	0	48	15	0	**56**	10	0	34
spines	30	34	0	17	19	0	1	5	0	22	35	0	3	2	0

PC3 - Parameters

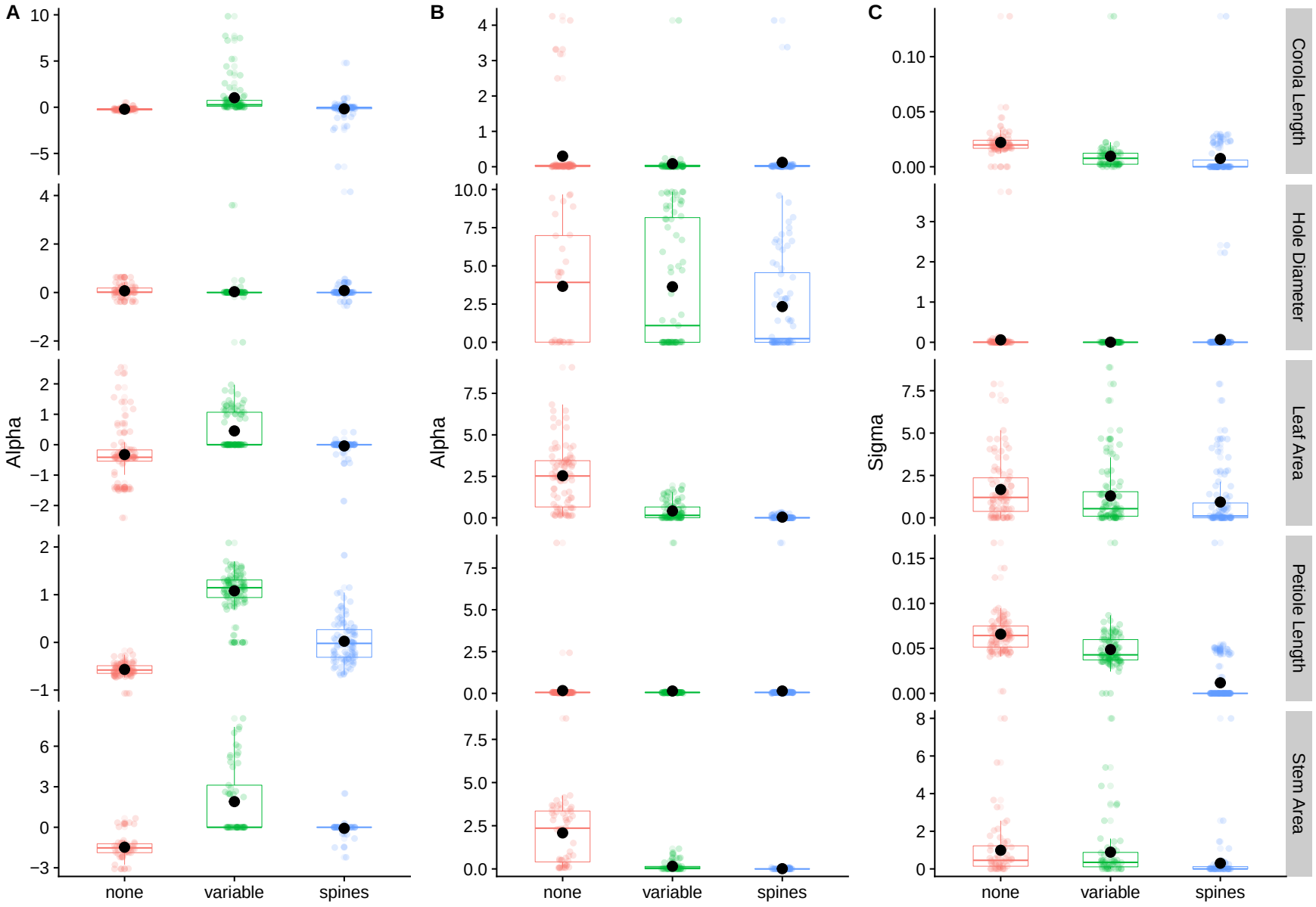

Figure 3: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Appendage.

PC3 - Parameter differences

Table 7: Differences in Theta values for PC3 analysis of Appendages. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	none	variable	spines	none	variable	spines	none	variable	spines	none	variable	spines	none	variable	spines
none	0	4	18	0	42	46	0	16	20	0	0	4	0	7	9
variable	**71**	0	**68**	32	0	31	**73**	0	39	**100**	0	**93**	46	0	25
spines	**57**	3	0	28	24	0	**69**	0	0	**96**	4	0	44	1	0

Table 8: Differences in Alpha values for PC3 analysis of Appendages. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	none	variable	spines	none	variable	spines	none	variable	spines	none	variable	spines	none	variable	spines
none	0	43	45	0	**66**	**70**	0	**67**	**83**	0	29	29	0	45	**53**
variable	6	0	7	8	0	36	22	0	**77**	0	0	0	8	0	47
spines	4	14	0	4	30	0	6	12	0	0	1	0	0	6	0

Table 9: Differences in Sigma values for PC3 analysis of Appendages. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	none	variable	spines	none	variable	spines	none	variable	spines	none	variable	spines	none	variable	spines
none	0	**67**	**54**	0	32	23	0	32	37	0	**85**	**82**	0	25	37
variable	4	0	**52**	6	0	15	6	0	35	14	0	**79**	13	0	37
spines	17	19	0	15	23	0	1	3	0	17	20	0	1	1	0

Architecture

PC1 - Parameters

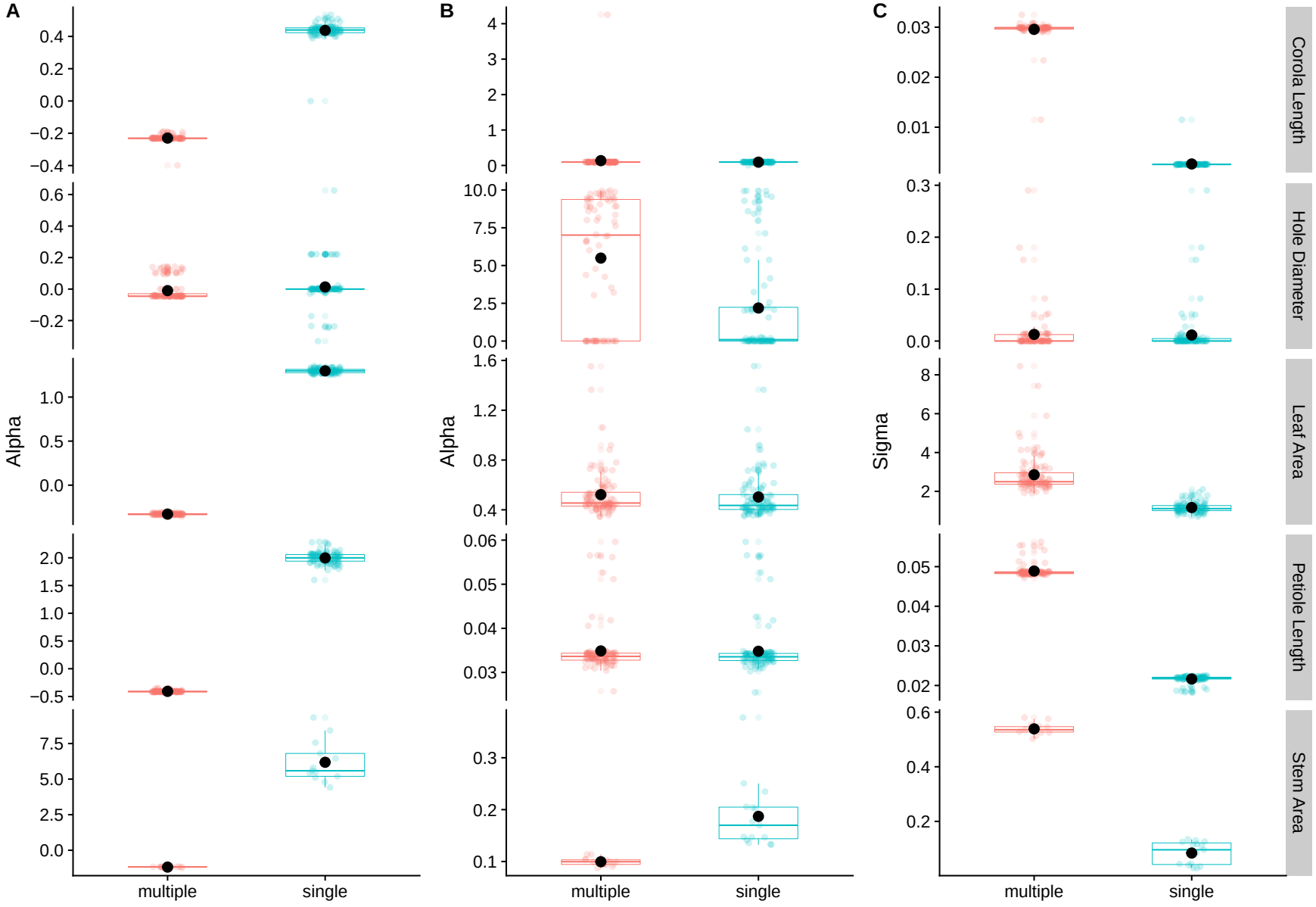

Figure 4: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Archendage.

PC1 - Parameter differences

Table 10: Differences in Theta values for PC1 analysis of Architecture. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	multiple	single	multiple	single	multiple	single	multiple	single	multiple	single
multiple	0	0	0	18	0	0	0	0	0	0
single	**100**	0	**78**	0	**100**	0	**100**	0	15	0

Table 11: Differences in Alpha values for PC1 analysis of Architecture. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	multiple	single	multiple	single	multiple	single	multiple	single	multiple	single
multiple	0	**100**	0	**71**	0	**93**	0	**100**	0	0
single	0	0	25	0	7	0	0	0	15	0

Table 12: Differences in Sigma values for PC1 analysis of Architecture. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	multiple	single	multiple	single	multiple	single	multiple	single	multiple	single
multiple	0	**99**	0	13	0	**100**	0	**100**	0	15
single	0	0	0	0	0	0	0	0	0	0

PC2 - Parameters

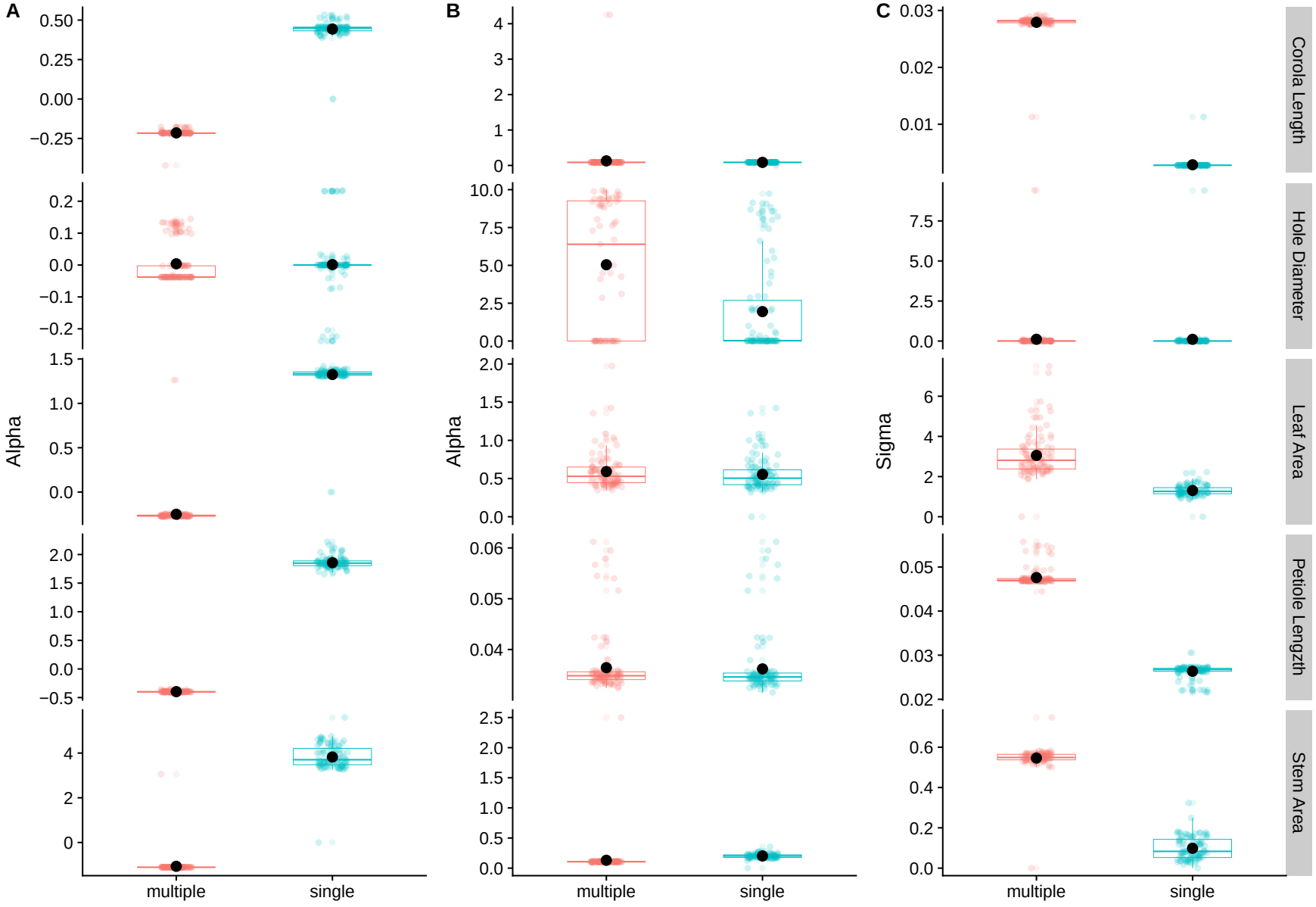

Figure 5: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Archendage.

PC2 - Parameter differences

Table 13: Differences in Theta values for PC2 analysis of Architecture. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	multiple	single	multiple	single	multiple	single	multiple	single	multiple	single
multiple	0	0	0	25	0	1	0	0	0	1
single	**100**	0	**73**	0	**99**	0	**100**	0	**99**	0

Table 14: Differences in Alpha values for PC2 analysis of Architecture. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	multiple	single	multiple	single	multiple	single	multiple	single	multiple	single
multiple	0	**100**	0	**81**	0	**99**	0	**100**	0	2
single	0	0	17	0	1	0	0	0	**98**	0

Table 15: Differences in Sigma values for PC2 analysis of Architecture. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	multiple	single	multiple	single	multiple	single	multiple	single	multiple	single
multiple	0	**99**	0	17	0	**99**	0	**100**	0	**99**
single	0	0	0	0	1	0	0	0	1	0

PC3 - Parameters

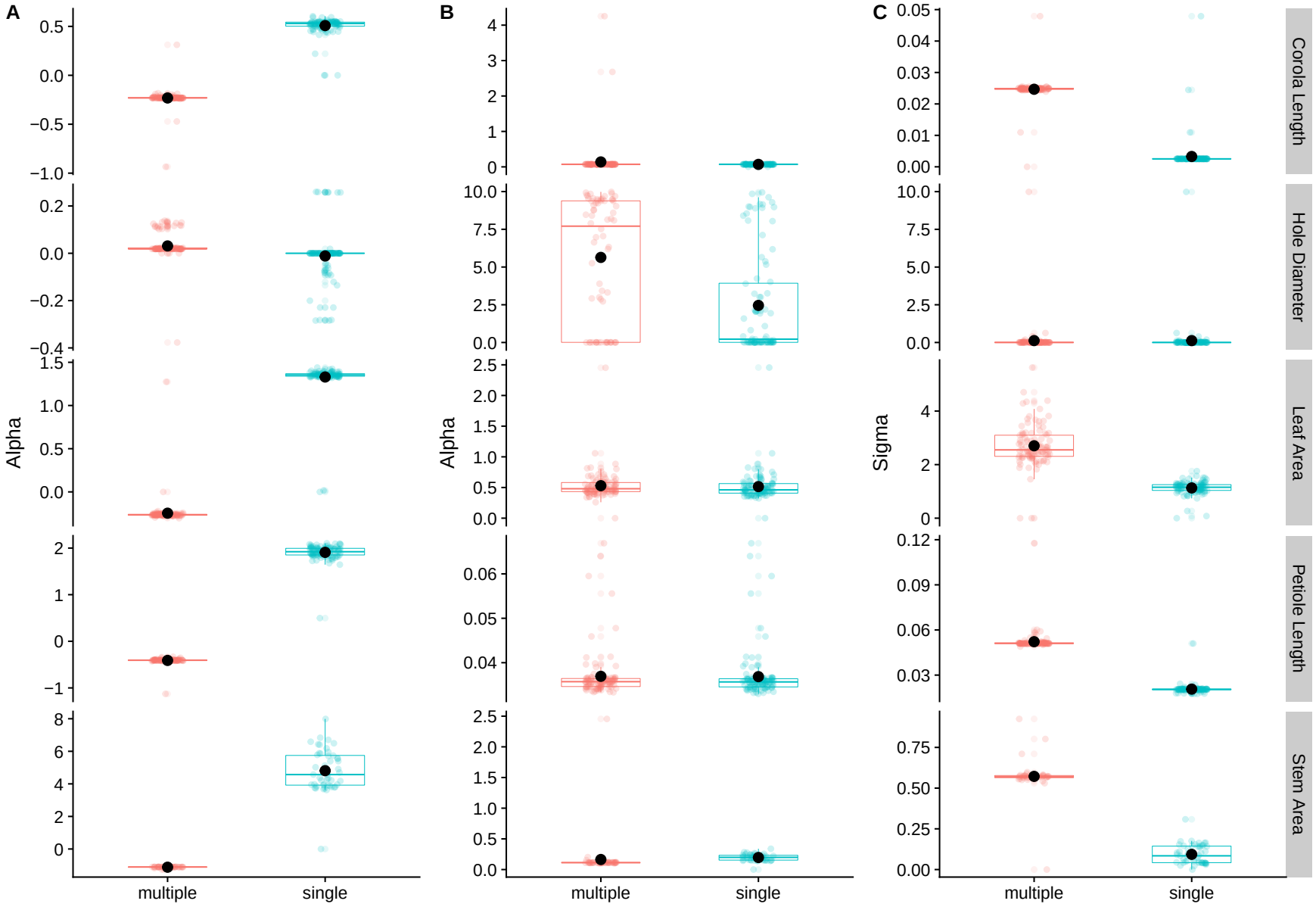

Figure 6: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Archendage.

PC3 - Parameter differences

Table 16: Differences in Theta values for PC3 analysis of Architecture. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	multiple	single	multiple	single	multiple	single	multiple	single	multiple	single
multiple	0	1	0	**90**	0	1	0	0	0	0
single	**99**	0	8	0	**99**	0	**100**	0	49	0

Table 17: Differences in Alpha values for PC3 analysis of Architecture. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	multiple	single	multiple	single	multiple	single	multiple	single	multiple	single
multiple	0	**100**	0	**77**	0	**93**	0	**100**	0	2
single	0	0	21	0	7	0	0	0	47	0

Table 18: Differences in Sigma values for PC3 analysis of Architecture. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	multiple	single	multiple	single	multiple	single	multiple	single	multiple	single
multiple	0	**97**	0	11	0	**99**	0	**100**	0	48
single	1	0	0	0	1	0	0	0	0	0

Domatium Growth

PC1 - Parameters

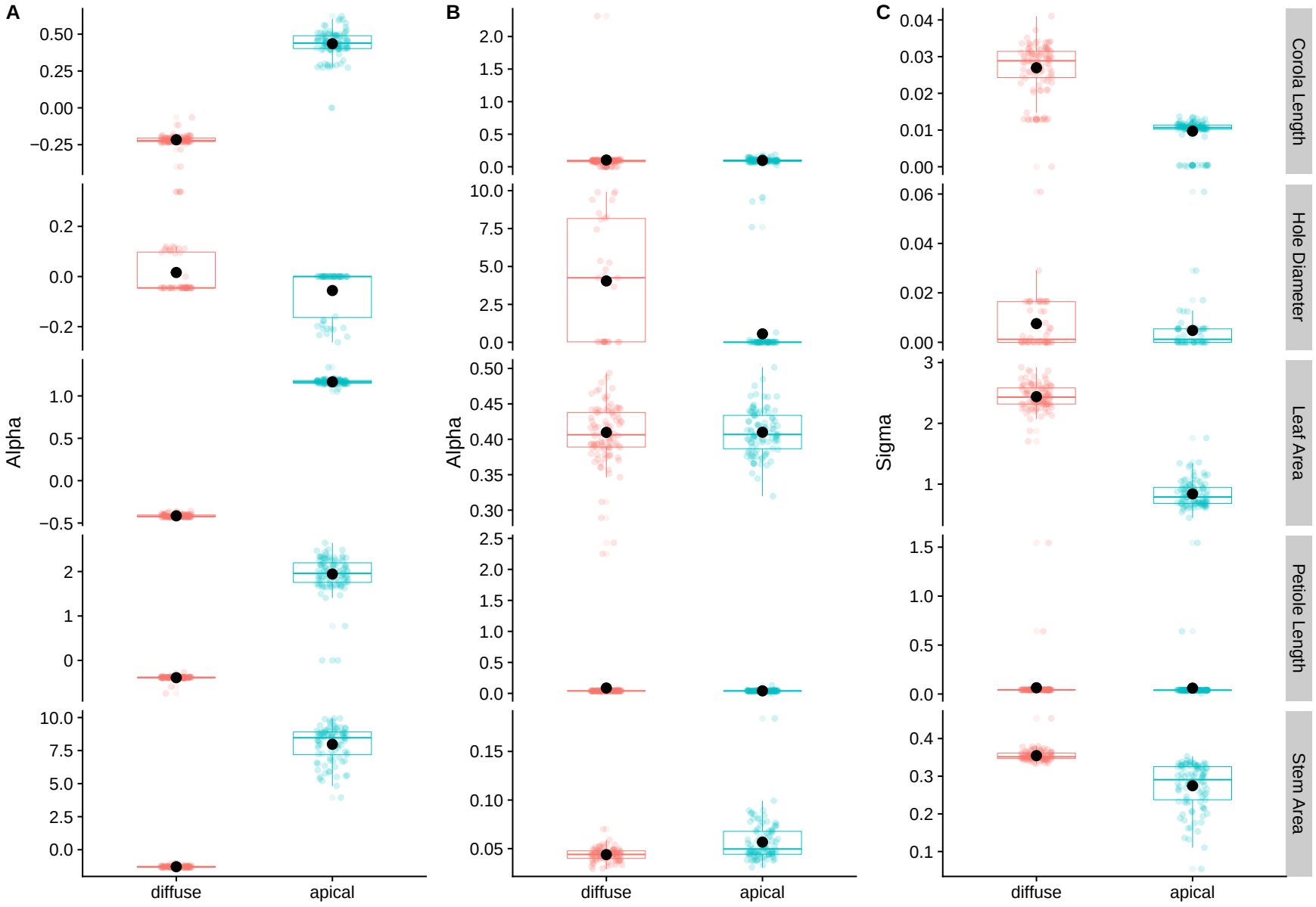

Figure 7: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Domgrowendage.

PC1 - Parameter differences

Table 19: Differences in Theta values for PC1 analysis of Domatium Growth. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	diffuse	apical	diffuse	apical	diffuse	apical	diffuse	apical	diffuse	apical
diffuse	0	0	0	17	0	0	0	0	0	0
apical	**100**	0	35	0	**100**	0	**100**	0	**98**	0

Table 20: Differences in Alpha values for PC1 analysis of Domatium Growth. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	diffuse	apical	diffuse	apical	diffuse	apical	diffuse	apical	diffuse	apical
diffuse	0	26	0	50	0	44	0	**98**	0	6
apical	**74**	0	2	0	**56**	0	2	0	**92**	0

Table 21: Differences in Sigma values for PC1 analysis of Domatium Growth. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	diffuse	apical	diffuse	apical	diffuse	apical	diffuse	apical	diffuse	apical
diffuse	0	**99**	0	13	0	**100**	0	**98**	0	**98**
apical	0	0	0	0	0	0	0	0	0	0

PC2 - Parameters

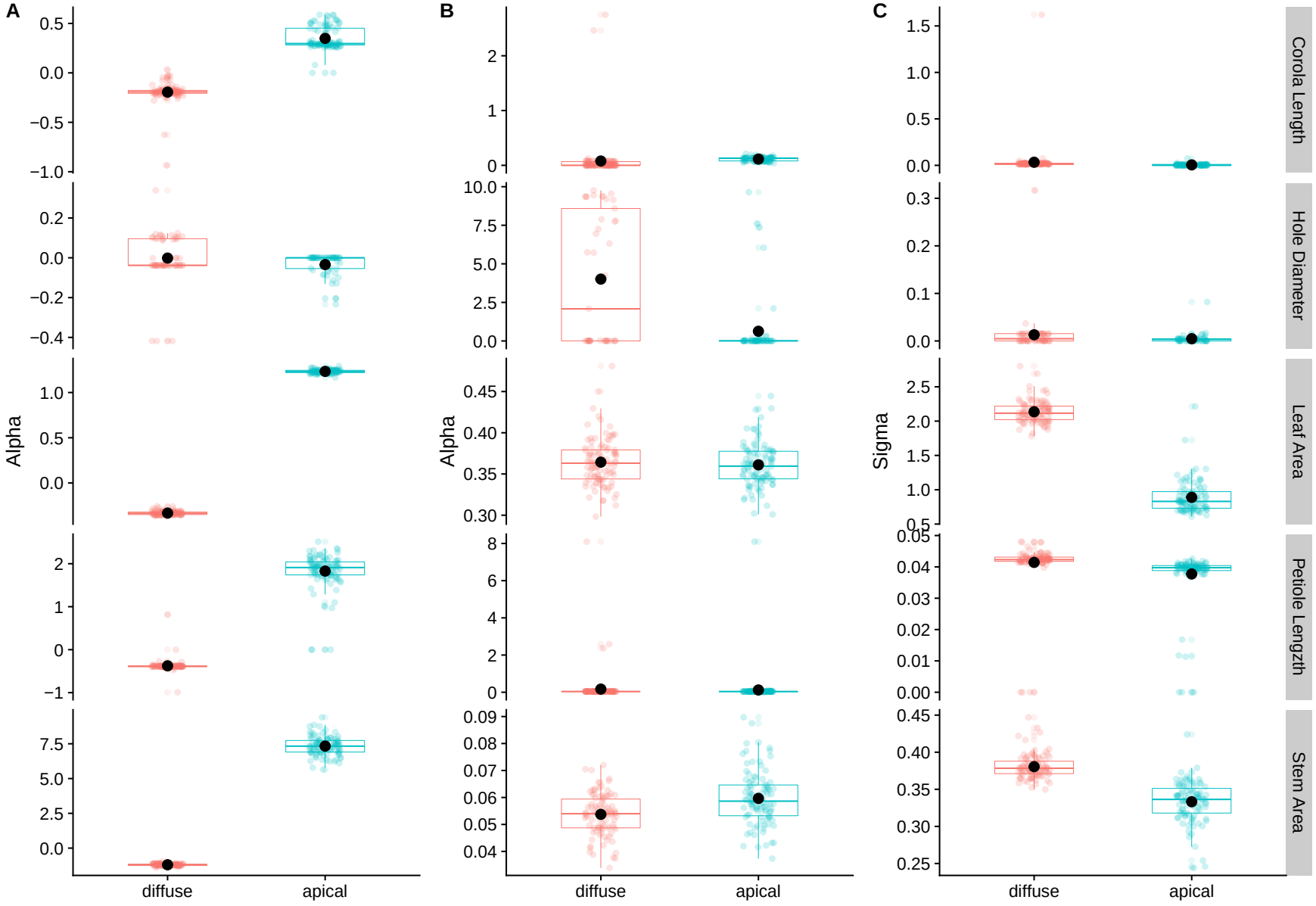

Figure 8: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Domgrowendage.

PC2 - Parameter differences

Table 22: Differences in Theta values for PC2 analysis of Domatium Growth. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	diffuse	apical	diffuse	apical	diffuse	apical	diffuse	apical	diffuse	apical
diffuse	0	1	0	23	0	0	0	2	0	0
apical	**99**	0	35	0	**99**	0	**98**	0	**99**	0

Table 23: Differences in Alpha values for PC2 analysis of Domatium Growth. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	diffuse	apical	diffuse	apical	diffuse	apical	diffuse	apical	diffuse	apical
diffuse	0	18	0	**54**	0	**57**	0	**93**	0	4
apical	**82**	0	4	0	42	0	6	0	**95**	0

Table 24: Differences in Sigma values for PC2 analysis of Domatium Growth. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	diffuse	apical	diffuse	apical	diffuse	apical	diffuse	apical	diffuse	apical
diffuse	0	**98**	0	25	0	**99**	0	**98**	0	**99**
apical	0	0	0	0	0	0	0	0	0	0

PC3 - Parameters

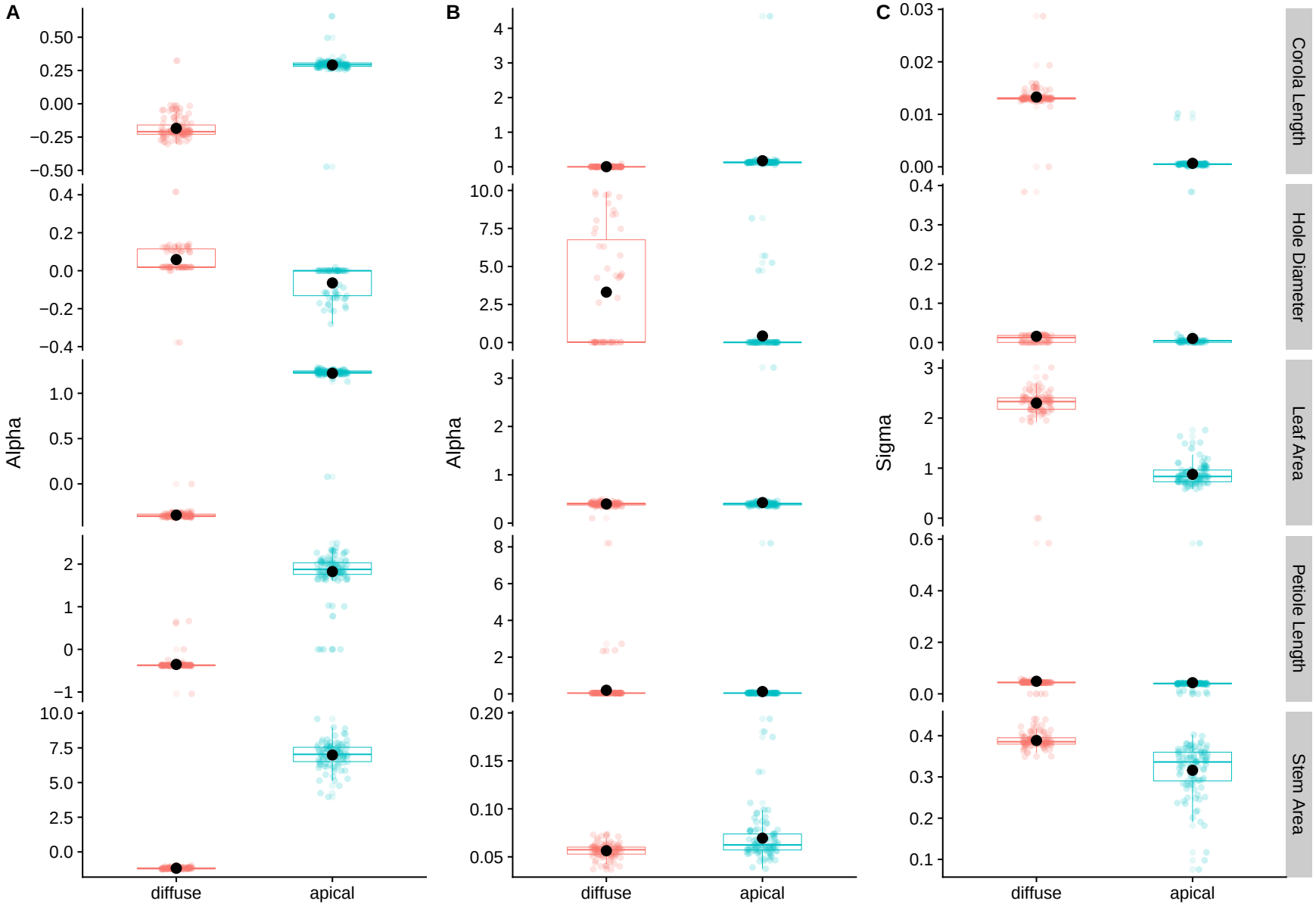

Figure 9: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Domgrowendage.

PC3 - Parameter differences

Table 25: Differences in Theta values for PC3 analysis of Domatium Growth. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	diffuse	apical	diffuse	apical	diffuse	apical	diffuse	apical	diffuse	apical
diffuse	0	1	0	**59**	0	0	0	3	0	0
apical	**99**	0	2	0	**100**	0	**97**	0	**99**	0

Table 26: Differences in Alpha values for PC3 analysis of Domatium Growth. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	diffuse	apical	diffuse	apical	diffuse	apical	diffuse	apical	diffuse	apical
diffuse	0	3	0	**58**	0	47	0	**96**	0	8
apical	**97**	0	3	0	**53**	0	3	0	**91**	0

Table 27: Differences in Sigma values for PC3 analysis of Domatium Growth. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	diffuse	apical	diffuse	apical	diffuse	apical	diffuse	apical	diffuse	apical
diffuse	0	**99**	0	25	0	**99**	0	**97**	0	**98**
apical	0	0	0	0	1	0	0	0	1	0

Leaf Structure

PC1 - Parameters

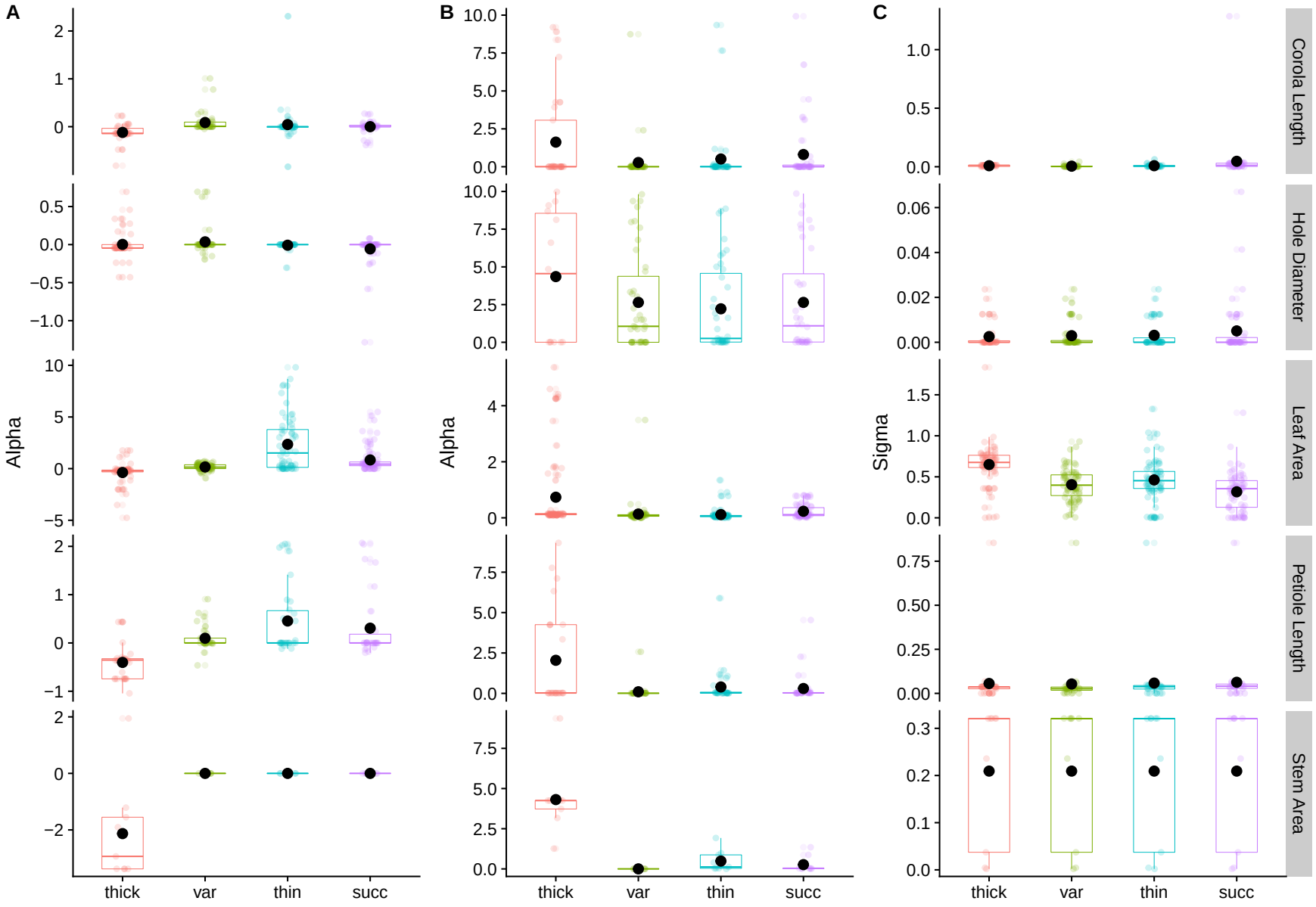

Figure 10: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Leafstrucendage.

PC1 - Parameter differences

Table 28: Differences in Theta values for PC1 analysis of Leaf Structure. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length				Hole Diameter				Leaf Area				Petiole Length				Stem Area			
	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ
thick	0	10	11	10	0	9	11	13	0	14	5	5	0	5	4	4	0	1	1	1
var	31	0	20	17	37	0	17	25	**60**	0	7	14	25	0	4	7	8	0	0	0
thin	30	7	0	11	35	12	0	26	**69**	**57**	0	47	26	12	0	10	8	1	0	0
succ	31	10	16	0	33	9	9	0	**69**	50	17	0	26	9	6	0	8	1	1	0

Table 29: Differences in Alpha values for PC1 analysis of Leaf Structure. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length				Hole Diameter				Leaf Area				Petiole Length				Stem Area			
	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ
thick	0	39	38	36	0	36	36	32	0	**57**	**72**	46	0	28	26	23	0	9	9	9
var	2	0	5	2	10	0	20	17	17	0	48	18	2	0	3	2	0	0	0	0
thin	3	15	0	6	10	26	0	17	2	26	0	20	4	20	0	13	0	9	0	5
succ	5	18	14	0	14	29	29	0	28	**56**	**54**	0	7	21	9	0	0	9	3	0

Table 30: Differences in Sigma values for PC1 analysis of Leaf Structure. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length				Hole Diameter				Leaf Area				Petiole Length				Stem Area			
	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ
thick	0	23	19	8	0	1	1	2	0	**57**	**53**	**61**	0	11	4	1	0	0	0	0
var	4	0	4	6	7	0	4	3	6	0	26	**53**	7	0	4	4	0	0	0	0
thin	8	23	0	5	7	4	0	4	10	37	0	47	14	14	0	3	0	0	0	0
succ	19	21	22	0	6	5	4	0	2	10	16	0	17	14	15	0	0	0	0	0

PC2 - Parameters

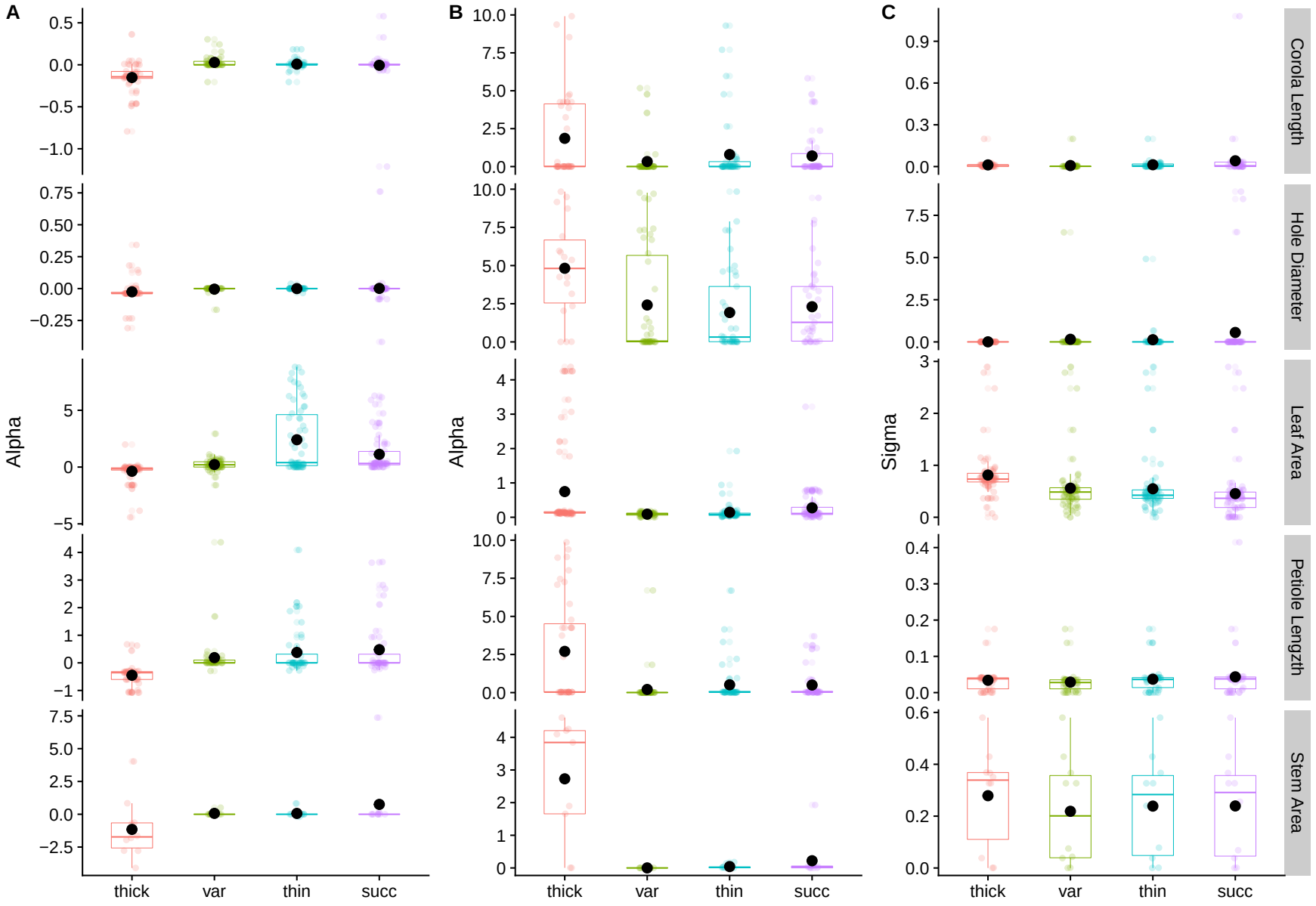

Figure 11: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Leafstrucendage.

PC2 - Parameter differences

Table 31: Differences in Theta values for PC2 analysis of Leaf Structure. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length				Hole Diameter				Leaf Area				Petiole Length				Stem Area			
	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ
thick	0	9	7	9	0	7	7	10	0	11	4	3	0	3	3	3	0	2	2	2
var	35	0	23	18	37	0	16	11	**56**	0	10	18	40	0	12	12	8	0	1	1
thin	37	6	0	12	37	9	0	11	**63**	47	0	36	40	12	0	11	8	1	0	1
succ	35	11	17	0	34	11	15	0	**64**	39	21	0	40	12	13	0	8	1	1	0

Table 32: Differences in Alpha values for PC2 analysis of Leaf Structure. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length				Hole Diameter				Leaf Area				Petiole Length				Stem Area			
	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ
thick	0	41	42	40	0	42	41	35	0	**55**	**61**	46	0	43	36	35	0	10	9	9
var	2	0	2	6	2	0	14	13	12	0	38	25	0	0	4	4	0	0	0	0
thin	1	18	0	8	3	28	0	15	6	29	0	28	7	33	0	17	1	10	0	4
succ	3	14	12	0	9	29	27	0	21	42	39	0	8	33	19	0	1	10	6	0

Table 33: Differences in Sigma values for PC2 analysis of Leaf Structure. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length				Hole Diameter				Leaf Area				Petiole Length				Stem Area			
	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ
thick	0	26	16	10	0	7	4	3	0	**52**	**52**	**54**	0	22	14	11	0	2	2	2
var	3	0	3	3	6	0	5	5	2	0	33	48	5	0	1	2	0	0	0	0
thin	13	25	0	12	9	8	0	5	2	21	0	34	13	25	0	12	0	2	0	1
succ	19	26	17	0	10	8	8	0	0	6	20	0	16	25	15	0	0	2	1	0

PC3 - Parameters

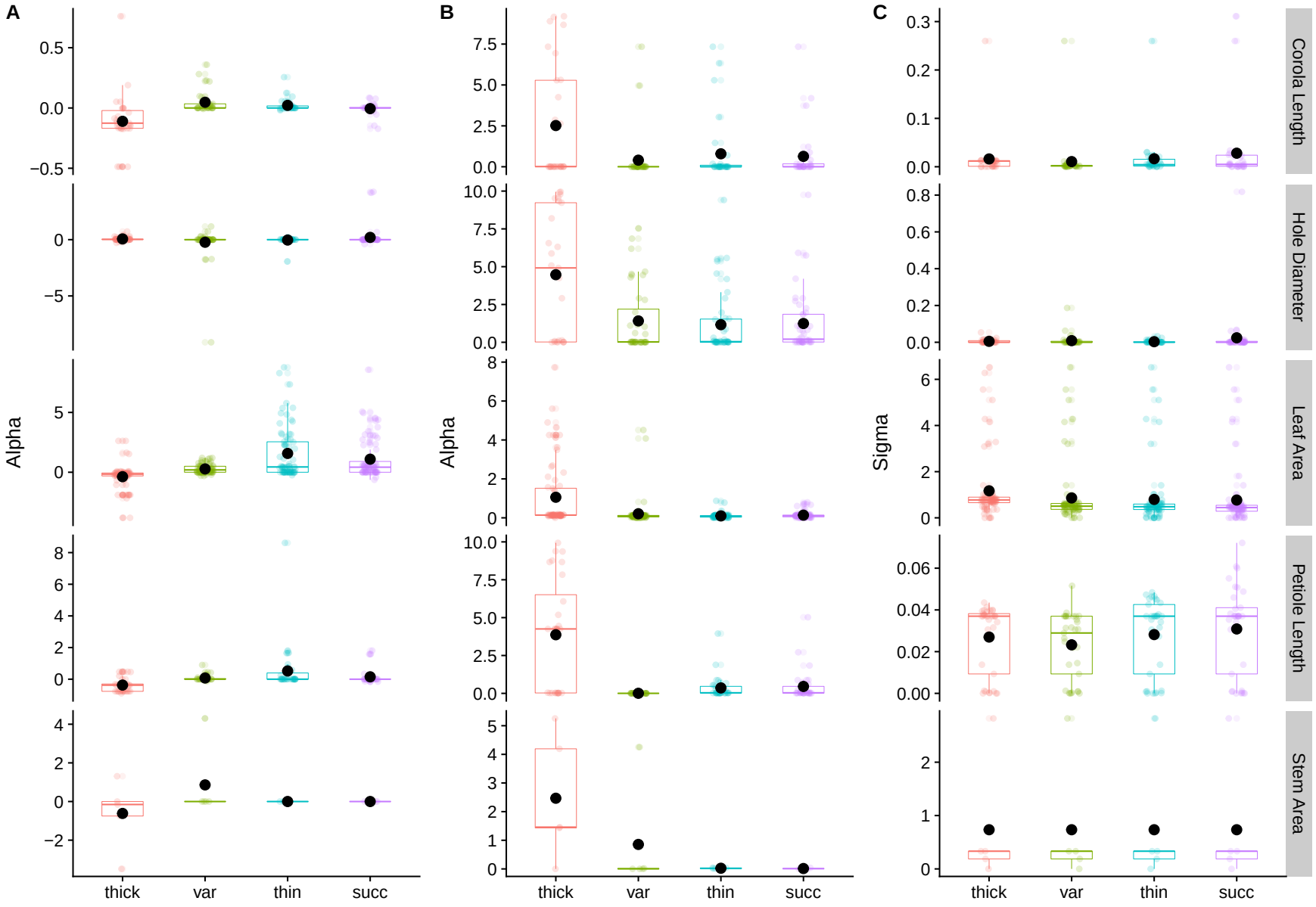

Figure 12: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Leafstrucendage.

PC3 - Parameter differences

Table 34: Differences in Theta values for PC3 analysis of Leaf Structure. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length				Hole Diameter				Leaf Area				Petiole Length				Stem Area			
	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ
thick	0	5	4	8	0	38	39	35	0	14	10	10	0	6	6	6	0	1	2	2
var	26	0	17	15	7	0	16	12	**60**	0	13	15	27	0	1	6	4	0	3	3
thin	27	3	0	12	6	13	0	11	**64**	48	0	37	27	11	0	8	3	0	0	2
succ	23	5	8	0	10	16	18	0	**64**	46	23	0	27	6	4	0	3	0	1	0

Table 35: Differences in Alpha values for PC3 analysis of Leaf Structure. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length				Hole Diameter				Leaf Area				Petiole Length				Stem Area			
	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ
thick	0	30	29	28	0	37	41	38	0	**68**	**70**	**59**	0	33	31	28	0	4	4	4
var	0	0	1	1	7	0	20	14	6	0	41	31	0	0	0	0	1	0	1	1
thin	1	12	0	4	3	18	0	13	4	33	0	30	2	28	0	13	1	4	0	5
succ	2	12	9	0	6	23	25	0	15	43	43	0	5	27	15	0	1	4	0	0

Table 36: Differences in Sigma values for PC3 analysis of Leaf Structure. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length				Hole Diameter				Leaf Area				Petiole Length				Stem Area			
	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ	thick	var	thin	succ
thick	0	18	10	8	0	8	9	5	0	**52**	**53**	**55**	0	10	2	2	0	0	0	0
var	3	0	0	1	6	0	8	4	5	0	37	**51**	1	0	1	1	0	0	0	0
thin	11	21	0	11	5	6	0	3	4	20	0	35	9	10	0	2	0	0	0	0
succ	13	20	10	0	9	10	11	0	2	6	22	0	9	10	9	0	0	0	0	0

Mating System

PC1 - Parameters

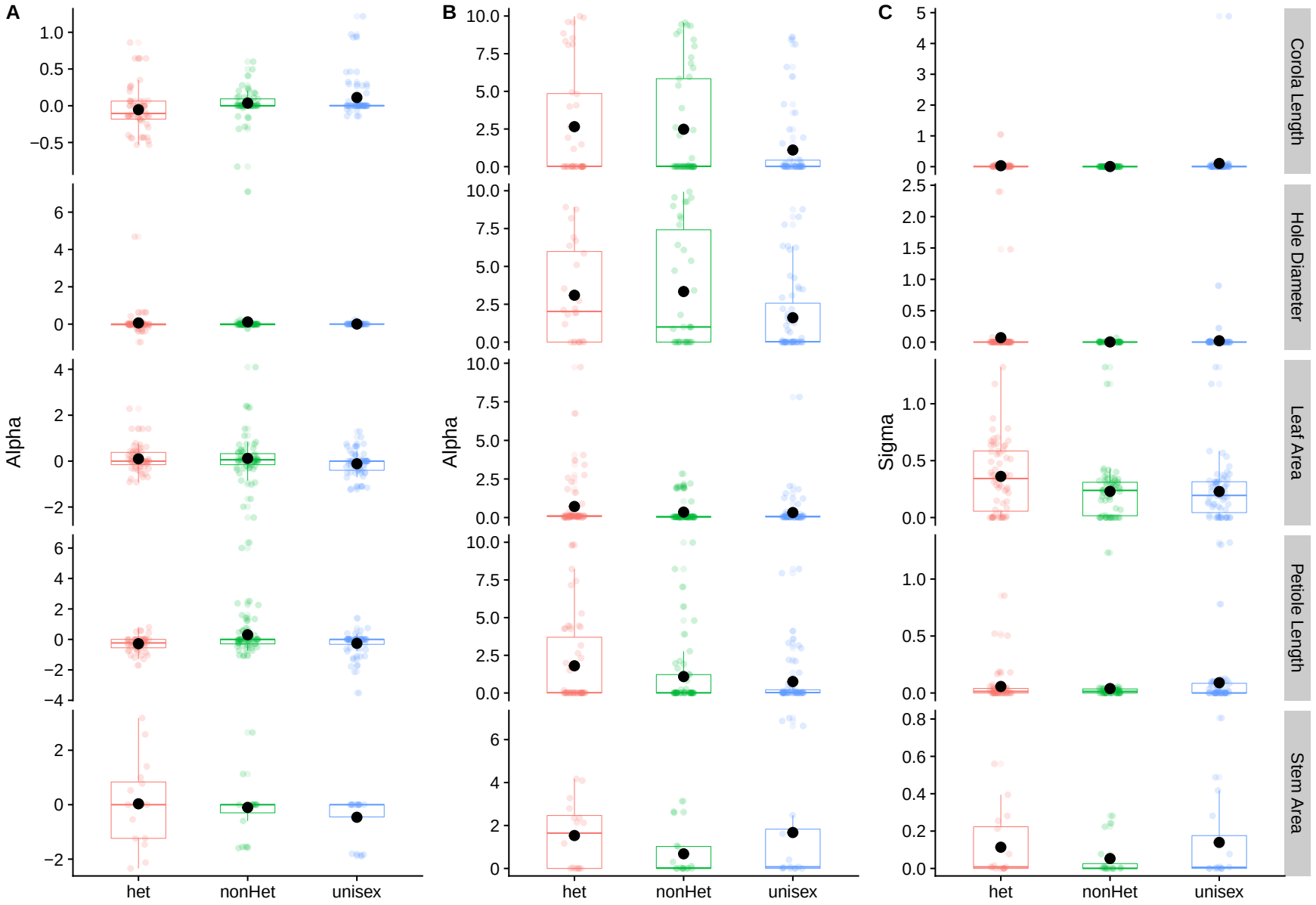

Figure 13: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Matsysendage.

PC1 - Parameter differences

Table 37: Differences in Theta values for PC1 analysis of Mating System. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex
het	0	21	23	0	28	23	0	26	38	0	27	25	0	10	8
nonHet	35	0	26	31	0	14	37	0	35	30	0	32	6	0	6
unisex	33	25	0	36	37	0	25	24	0	32	19	0	8	9	0

Table 38: Differences in Alpha values for PC1 analysis of Mating System. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex
het	0	40	45	0	36	50	0	47	45	0	32	36	0	9	6
nonHet	16	0	25	23	0	48	16	0	24	24	0	24	7	0	5
unisex	11	17	0	9	11	0	18	39	0	20	26	0	10	11	0

Table 39: Differences in Sigma values for PC1 analysis of Mating System. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex
het	0	26	16	0	14	11	0	40	38	0	18	13	0	7	3
nonHet	5	0	4	7	0	8	9	0	28	15	0	8	0	0	2
unisex	14	26	0	10	13	0	11	21	0	20	25	0	4	5	0

PC2 - Parameters

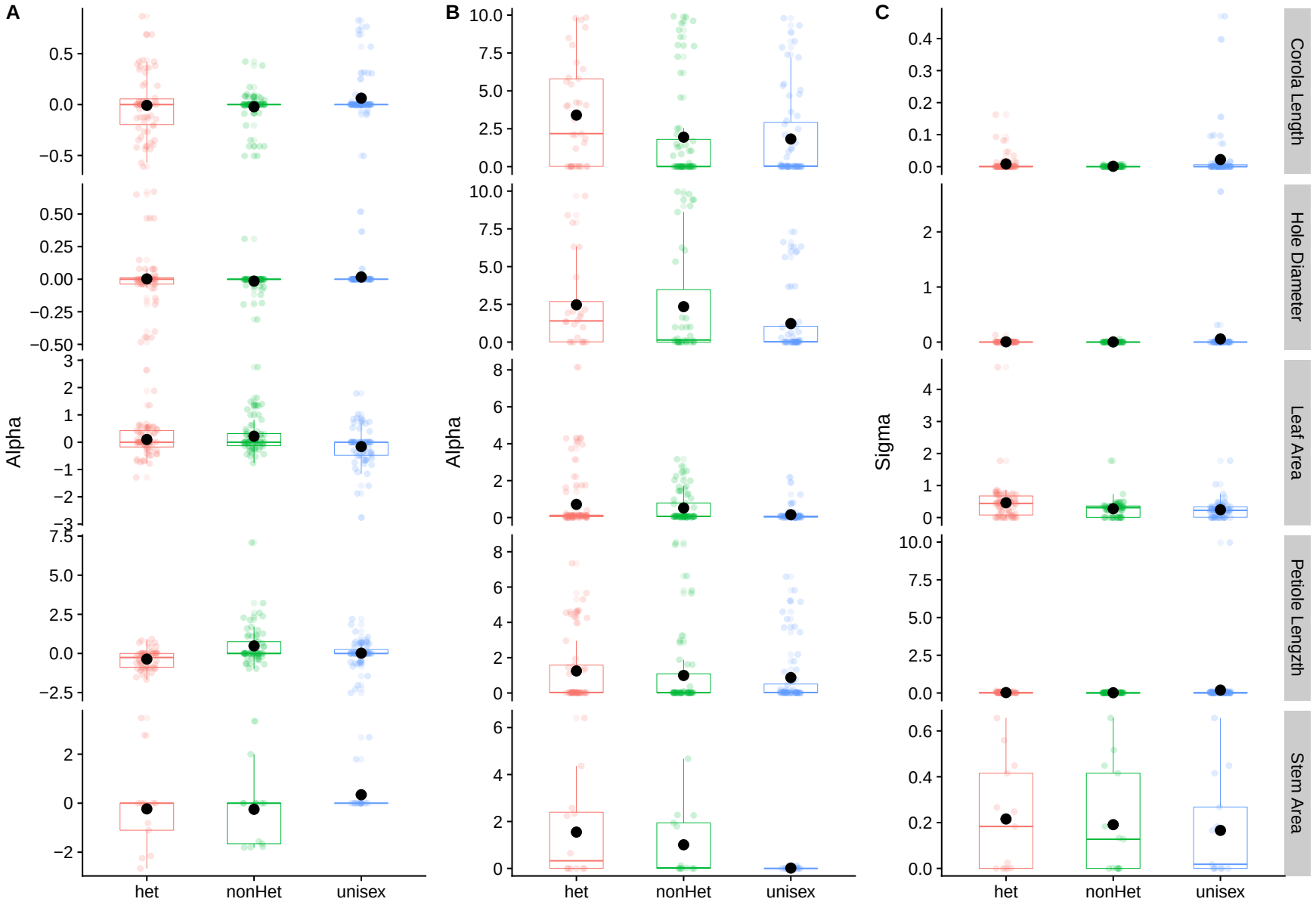

Figure 14: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Matsysendage.

PC2 - Parameter differences

Table 40: Differences in Theta values for PC2 analysis of Mating System. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex
het	0	36	29	0	31	16	0	31	40	0	22	30	0	7	4
nonHet	30	0	21	25	0	14	38	0	42	39	0	38	6	0	3
unisex	37	31	0	40	39	0	29	22	0	31	17	0	9	8	0

Table 41: Differences in Alpha values for PC2 analysis of Mating System. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex
het	0	**54**	**57**	0	35	47	0	45	**52**	0	44	49	0	6	9
nonHet	12	0	28	21	0	39	24	0	34	17	0	26	7	0	8
unisex	9	28	0	9	16	0	17	35	0	12	27	0	4	5	0

Table 42: Differences in Sigma values for PC2 analysis of Mating System. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex
het	0	29	16	0	15	13	0	44	43	0	27	19	0	4	3
nonHet	3	0	5	8	0	11	9	0	42	11	0	6	1	0	3
unisex	16	26	0	9	12	0	10	11	0	20	33	0	2	2	0

PC3 - Parameters

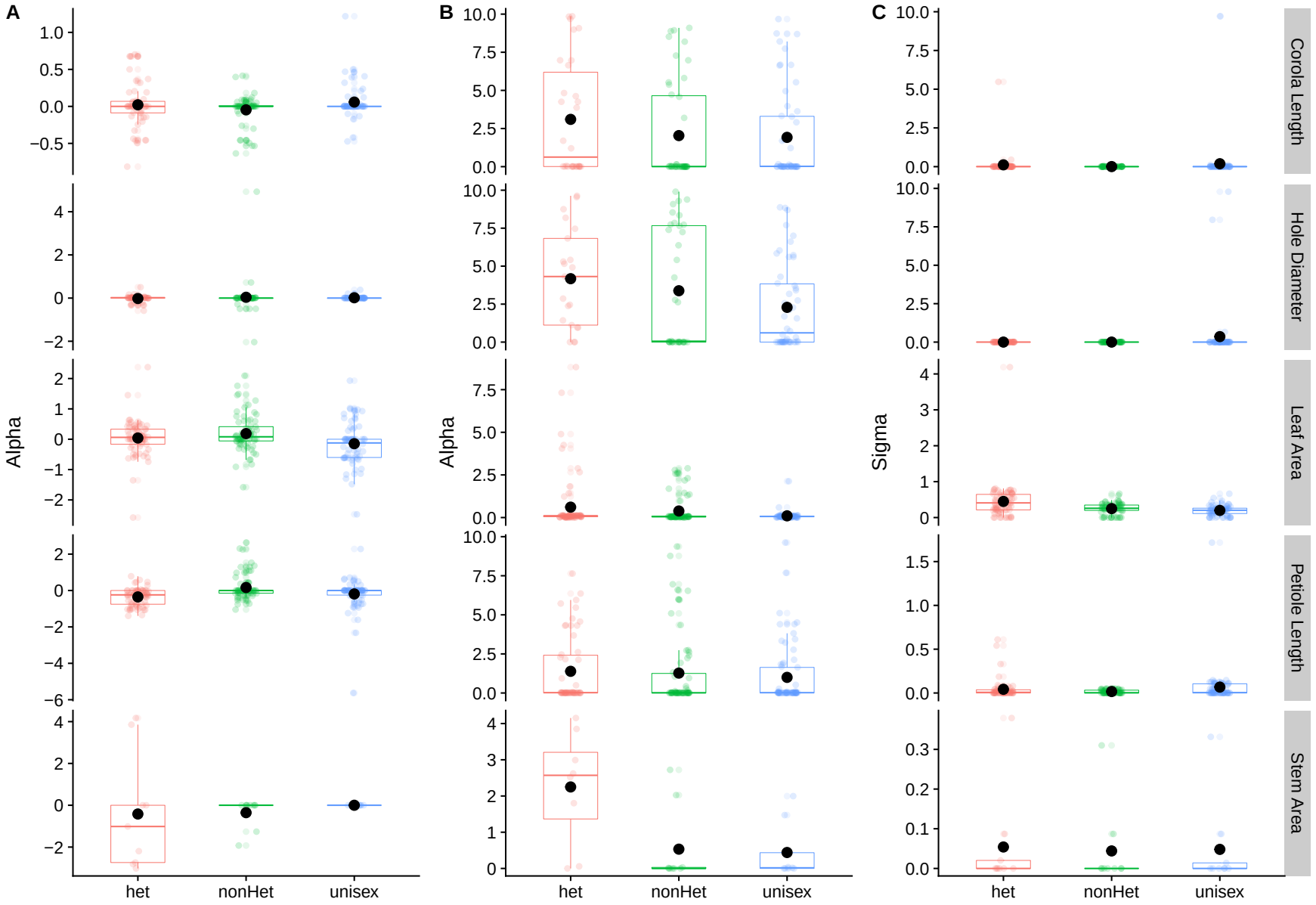

Figure 15: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Matsysendage.

PC3 - Parameter differences

Table 43: Differences in Theta values for PC3 analysis of Mating System. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex
het	0	28	30	0	35	35	0	34	50	0	24	34	0	4	2
nonHet	27	0	20	19	0	29	38	0	**52**	44	0	40	5	0	4
unisex	25	32	0	19	19	0	22	17	0	34	22	0	7	2	0

Table 44: Differences in Alpha values for PC3 analysis of Mating System. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex
het	0	42	50	0	40	47	0	49	44	0	48	48	0	7	8
nonHet	13	0	22	14	0	30	23	0	30	20	0	29	2	0	5
unisex	5	22	0	7	23	0	28	42	0	20	29	0	1	4	0

Table 45: Differences in Sigma values for PC3 analysis of Mating System. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex	het	nonHet	unisex
het	0	21	17	0	10	5	0	46	49	0	25	19	0	1	1
nonHet	7	0	7	4	0	4	14	0	42	18	0	6	2	0	1
unisex	11	21	0	9	10	0	11	16	0	24	37	0	2	2	0

Reward

PC1 - Parameters

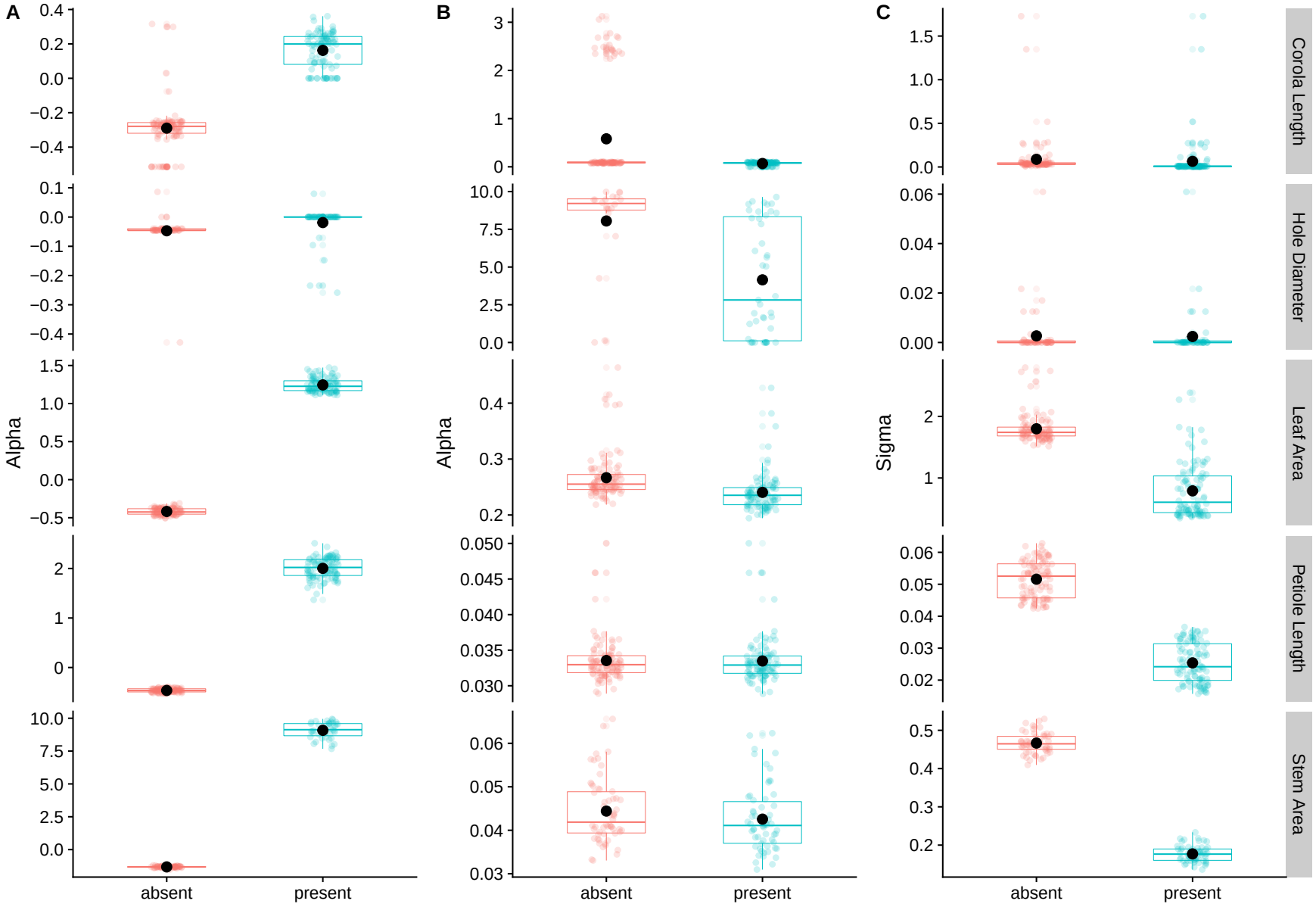

Figure 16: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Rewardendage.

PC1 - Parameter differences

Table 46: Differences in Theta values for PC1 analysis of Reward. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	absent	present	absent	present	absent	present	absent	present	absent	present
absent	0	4	0	6	0	0	0	0	0	0
present	**90**	0	45	0	**100**	0	**100**	0	**58**	0

Table 47: Differences in Alpha values for PC1 analysis of Reward. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	absent	present	absent	present	absent	present	absent	present	absent	present
absent	0	**94**	0	42	0	**88**	0	**100**	0	45
present	0	0	9	0	12	0	0	0	13	0

Table 48: Differences in Sigma values for PC1 analysis of Reward. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	absent	present	absent	present	absent	present	absent	present	absent	present
absent	0	**75**	0	1	0	**100**	0	**100**	0	**58**
present	0	0	0	0	0	0	0	0	0	0

PC2 - Parameter

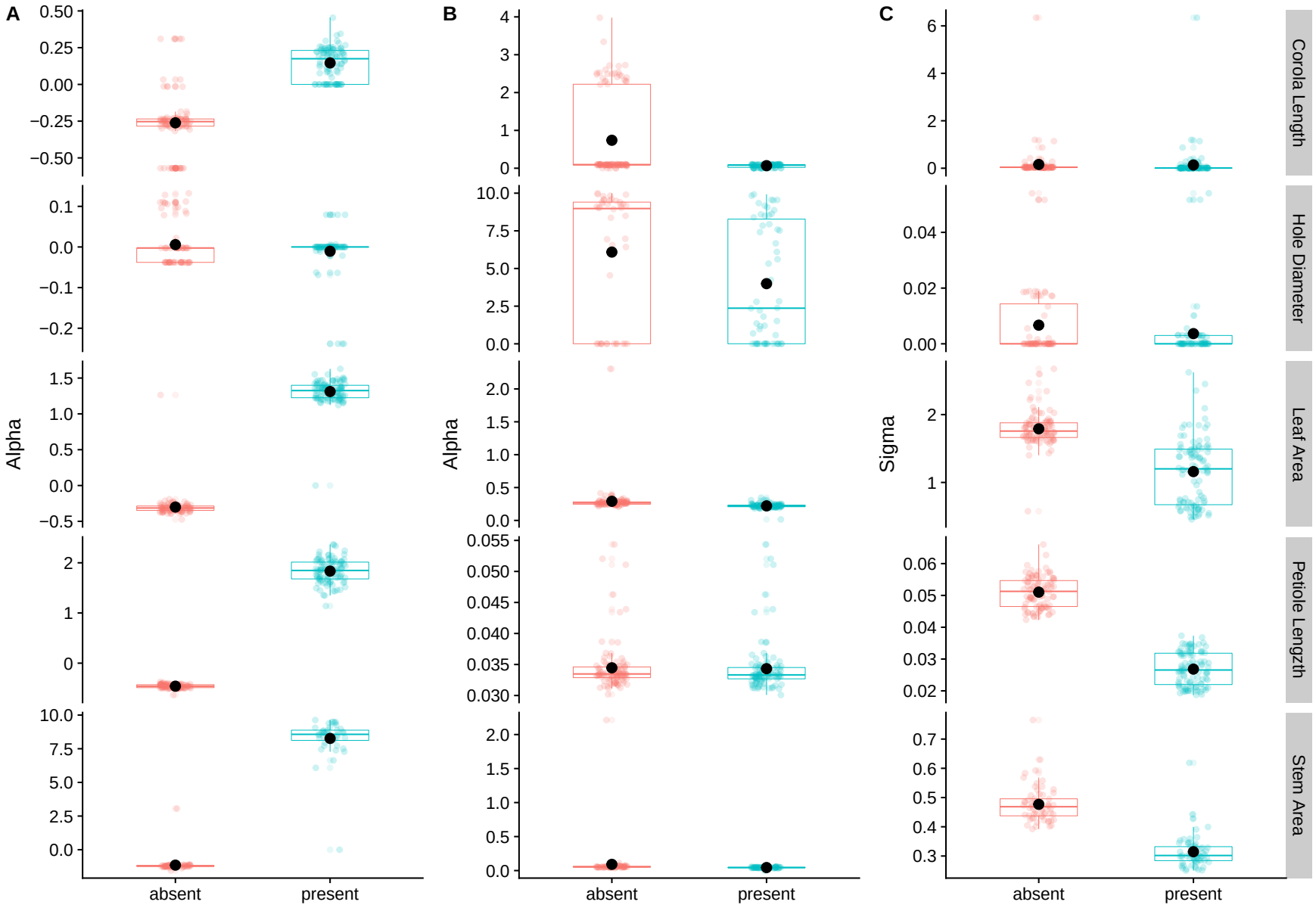

Figure 17: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Rewardendage.

PC2 - Parameter differences

Table 49: Differences in Theta values for PC2 analysis of Reward. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	absent	present	absent	present	absent	present	absent	present	absent	present
absent	0	6	0	18	0	1	0	0	0	1
present	**88**	0	46	0	**99**	0	**100**	0	**62**	0

Table 50: Differences in Alpha values for PC2 analysis of Reward. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	absent	present	absent	present	absent	present	absent	present	absent	present
absent	0	**89**	0	50	0	**100**	0	**100**	0	**63**
present	5	0	14	0	0	0	0	0	0	0

Table 51: Differences in Sigma values for PC2 analysis of Reward. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	absent	present	absent	present	absent	present	absent	present	absent	present
absent	0	**69**	0	13	0	**99**	0	**100**	0	**62**
present	0	0	0	0	0	0	0	0	0	0

PC3 - Parameters

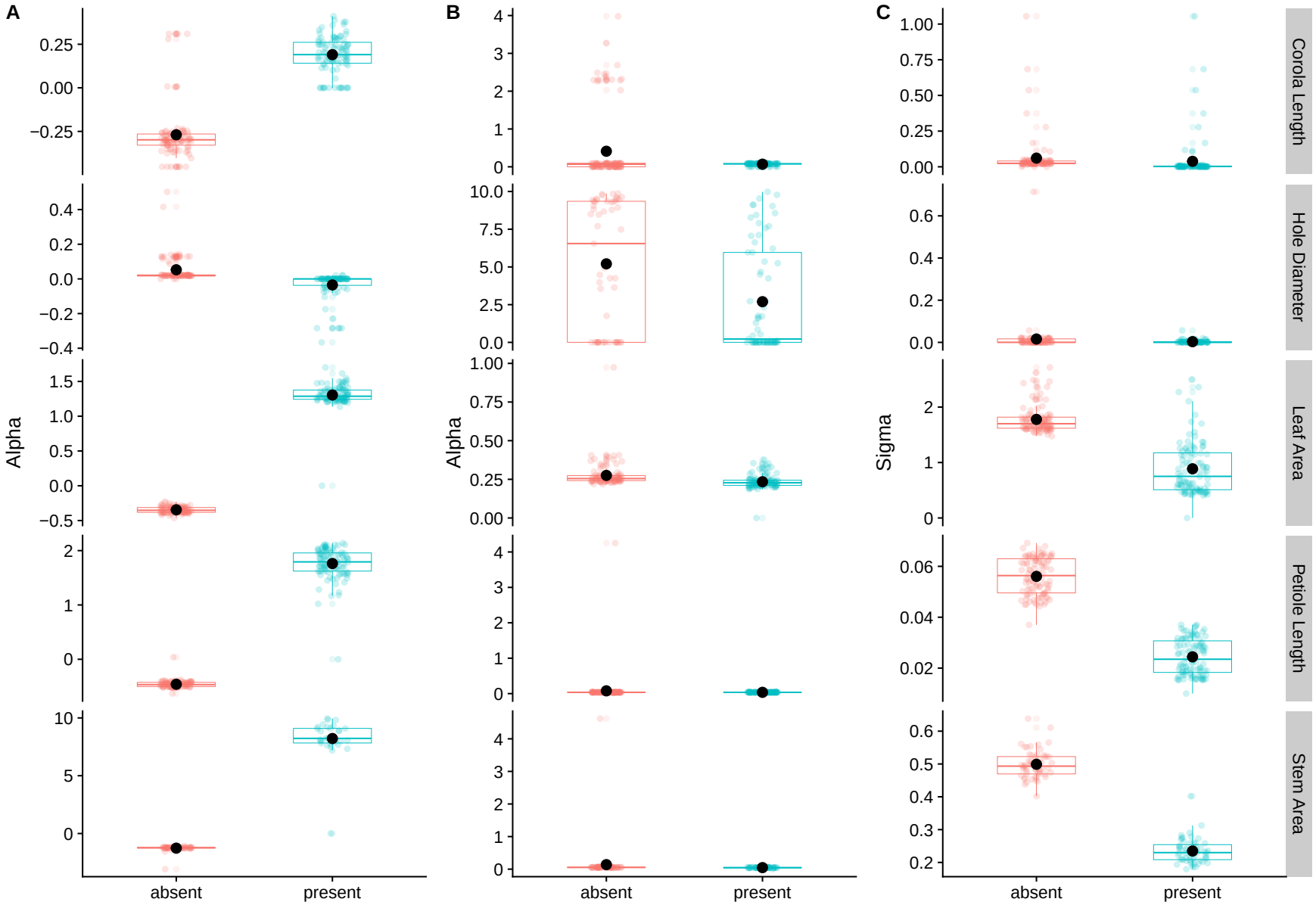

Figure 18: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Rewardendage.

PC3 - Parameter differences

Table 52: Differences in Theta values for PC3 analysis of Reward. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	absent	present	absent	present	absent	present	absent	present	absent	present
absent	0	8	0	**79**	0	0	0	1	0	0
present	**86**	0	1	0	**100**	0	**99**	0	**55**	0

Table 53: Differences in Alpha values for PC3 analysis of Reward. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	absent	present	absent	present	absent	present	absent	present	absent	present
absent	0	**52**	0	**66**	0	**98**	0	**99**	0	**55**
present	42	0	13	0	2	0	1	0	0	0

Table 54: Differences in Sigma values for PC3 analysis of Reward. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length		Hole Diameter		Leaf Area		Petiole Length		Stem Area	
	absent	present	absent	present	absent	present	absent	present	absent	present
absent	0	**80**	0	18	0	**100**	0	**99**	0	**54**
present	0	0	1	0	0	0	0	0	0	0

Strategy

PC1 - Parameters

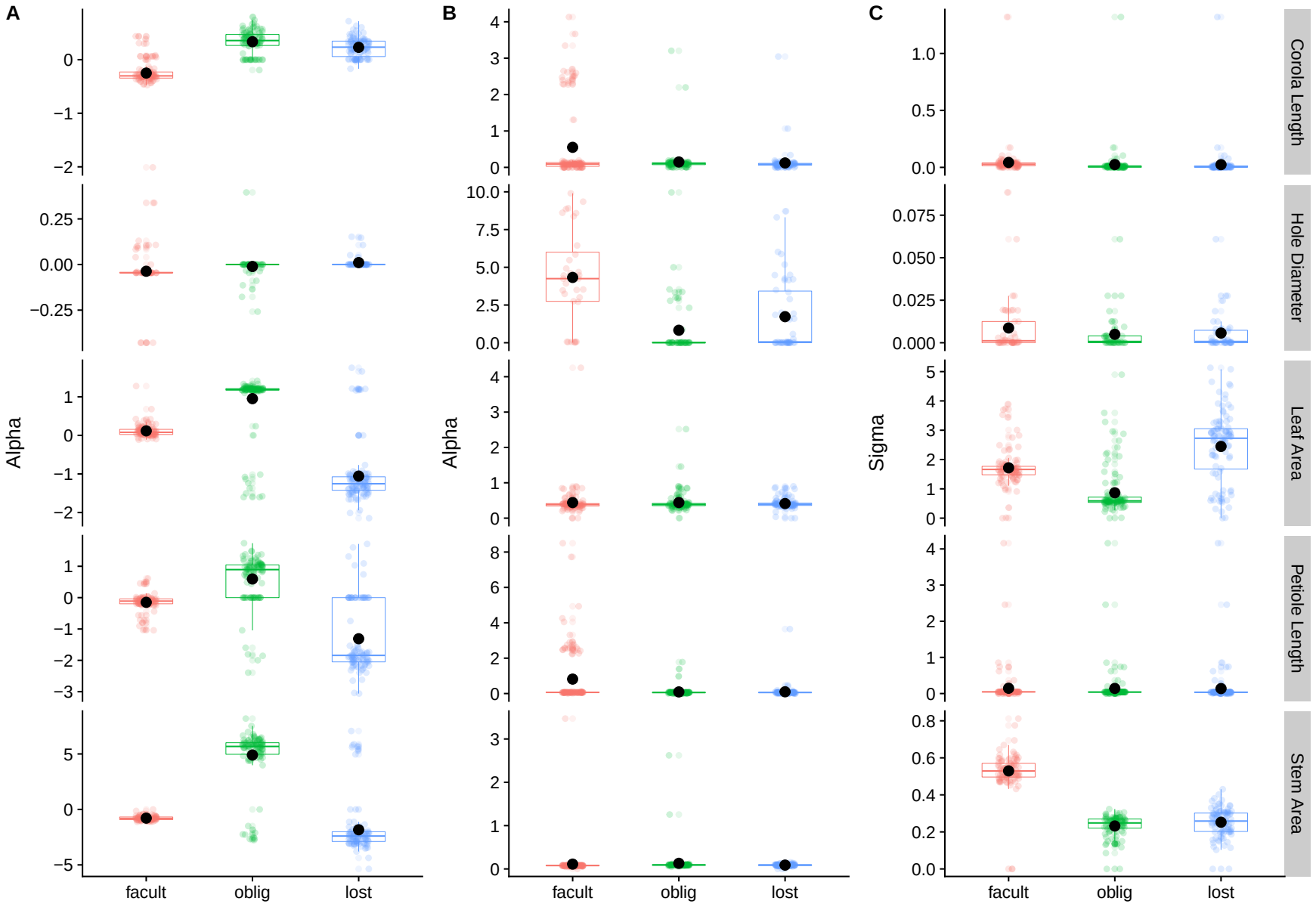

Figure 19: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Strategyendage.

PC1 - Parameter differences

Table 55: Differences in Theta values for PC1 analysis of Strategy. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	facult	oblig	lost	facult	oblig	lost	facult	oblig	lost	facult	oblig	lost	facult	oblig	lost
facult	0	15	17	0	11	8	0	10	**91**	0	13	**75**	0	9	**89**
oblig	**80**	0	**60**	36	0	6	**90**	0	**90**	**83**	0	**71**	**90**	0	**89**
lost	**78**	21	0	39	31	0	9	9	0	21	12	0	10	9	0

Table 56: Differences in Alpha values for PC1 analysis of Strategy. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	facult	oblig	lost	facult	oblig	lost	facult	oblig	lost	facult	oblig	lost	facult	oblig	lost
facult	0	**59**	**59**	0	42	46	0	24	12	0	**94**	**95**	0	3	27
oblig	36	0	42	5	0	11	**76**	0	21	2	0	12	**96**	0	**65**
lost	36	13	0	1	30	0	**88**	**79**	0	1	12	0	**72**	34	0

Table 57: Differences in Sigma values for PC1 analysis of Strategy. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	facult	oblig	lost	facult	oblig	lost	facult	oblig	lost	facult	oblig	lost	facult	oblig	lost
facult	0	**76**	**74**	0	12	9	0	**89**	21	0	**70**	**69**	0	**98**	**98**
oblig	1	0	31	2	0	1	8	0	10	3	0	**63**	0	0	26
lost	3	46	0	5	13	0	**76**	**87**	0	4	10	0	0	**72**	0

PC2 - Parameters

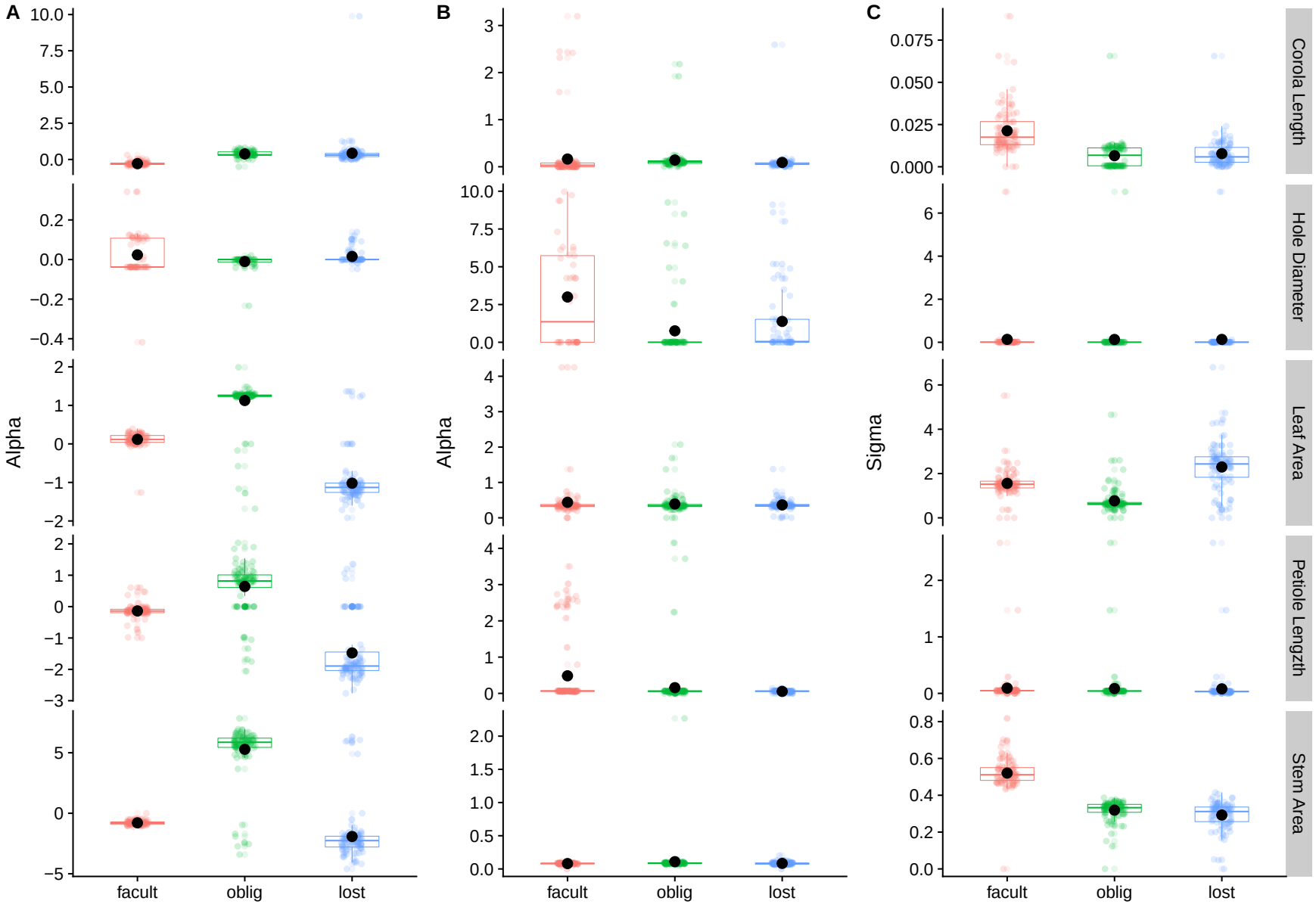

Figure 20: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Strategyendage.

PC2 - Parameter differences

Table 58: Differences in Theta values for PC2 analysis of Strategy. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	facult	oblig	lost	facult	oblig	lost	facult	oblig	lost	facult	oblig	lost	facult	oblig	lost
facult	0	4	4	0	24	22	0	5	**90**	0	13	**82**	0	7	**88**
oblig	**89**	0	**64**	32	0	6	**93**	0	**91**	**82**	0	**77**	**90**	0	**90**
lost	**89**	25	0	34	36	0	8	5	0	13	8	0	9	7	0

Table 59: Differences in Alpha values for PC2 analysis of Strategy. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	facult	oblig	lost	facult	oblig	lost	facult	oblig	lost	facult	oblig	lost	facult	oblig	lost
facult	0	31	31	0	**54**	**53**	0	**61**	13	0	**92**	**95**	0	14	**61**
oblig	**62**	0	**58**	2	0	5	37	0	13	3	0	8	**83**	0	**74**
lost	**62**	9	0	3	32	0	**85**	**85**	0	0	9	0	36	23	0

Table 60: Differences in Sigma values for PC2 analysis of Strategy. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	facult	oblig	lost	facult	oblig	lost	facult	oblig	lost	facult	oblig	lost	facult	oblig	lost
facult	0	**86**	**81**	0	20	16	0	**91**	12	0	**78**	**77**	0	**96**	**96**
oblig	1	0	32	1	0	3	3	0	5	1	0	**73**	0	0	**77**
lost	6	**55**	0	4	18	0	**82**	**89**	0	2	6	0	0	19	0

PC3 - Parameters

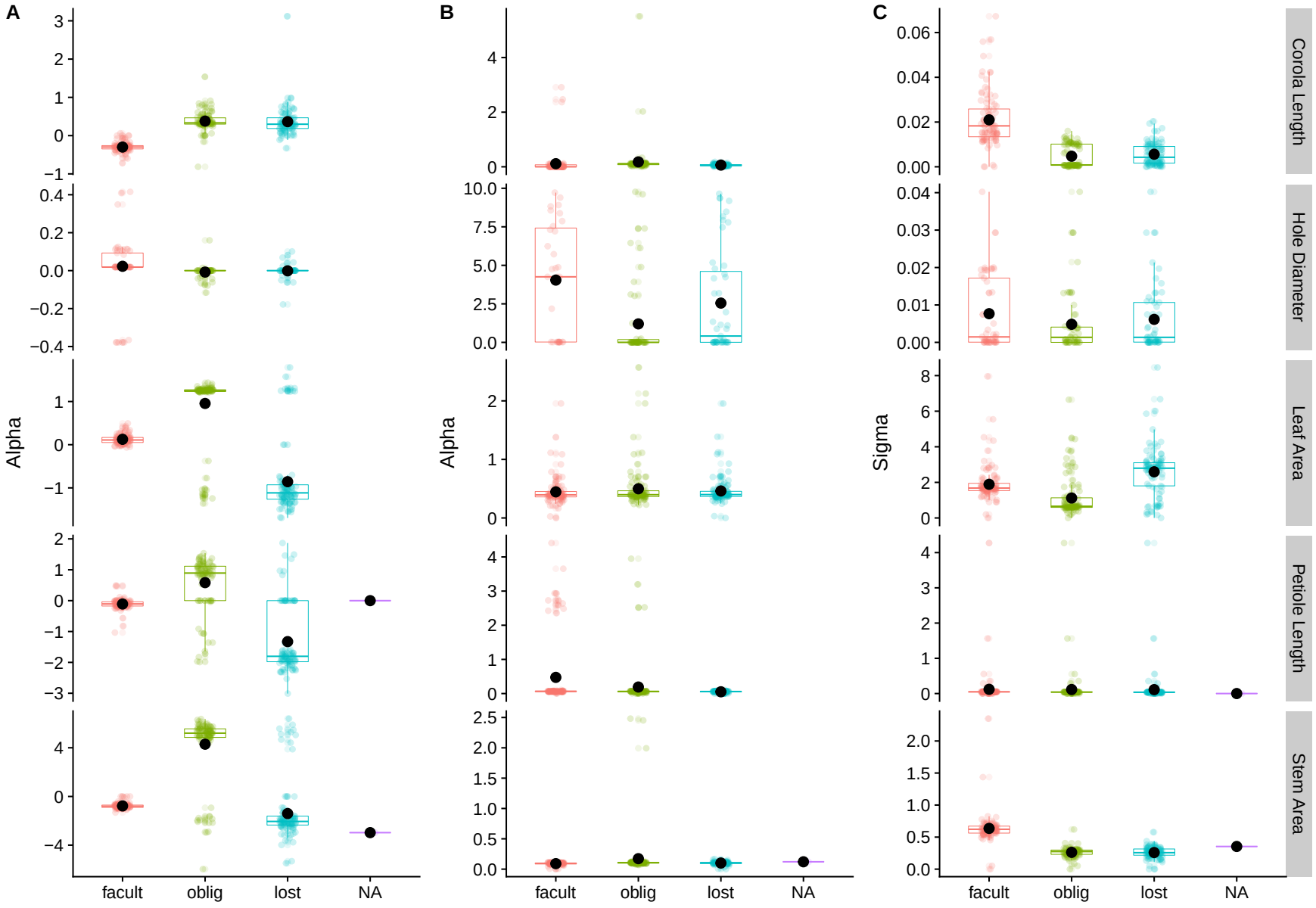

Figure 21: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Strategyendage.

PC3 - Parameter differences

Table 61: Differences in Theta values for PC3 analysis of Strategy. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	facult	oblig	lost	facult	oblig	lost	facult	oblig	lost	facult	oblig	lost	facult	oblig	lost
facult	0	4	5	0	47	47	0	13	**87**	0	17	**72**	0	13	**85**
oblig	**90**	0	**56**	6	0	23	**85**	0	**85**	**73**	0	**68**	**84**	0	**84**
lost	**89**	35	0	6	19	0	11	13	0	18	12	0	12	13	0

Table 62: Differences in Alpha values for PC3 analysis of Strategy. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	facult	oblig	lost	facult	oblig	lost	facult	oblig	lost	facult	oblig	lost	facult	oblig	lost
facult	0	31	32	0	**51**	48	0	35	16	0	**85**	**89**	0	5	35
oblig	**62**	0	**62**	2	0	8	**63**	0	21	4	0	13	**92**	0	**54**
lost	**61**	9	0	5	33	0	**82**	**77**	0	0	3	0	**62**	43	0

Table 63: Differences in Sigma values for PC3 analysis of Strategy. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	facult	oblig	lost	facult	oblig	lost	facult	oblig	lost	facult	oblig	lost	facult	oblig	lost
facult	0	**88**	**84**	0	19	16	0	**87**	18	0	**73**	**74**	0	**95**	**94**
oblig	2	0	33	2	0	6	9	0	12	2	0	**60**	0	0	**52**
lost	6	**57**	0	5	15	0	**78**	**84**	0	1	15	0	1	43	0

Warts

PC1 - Parameters

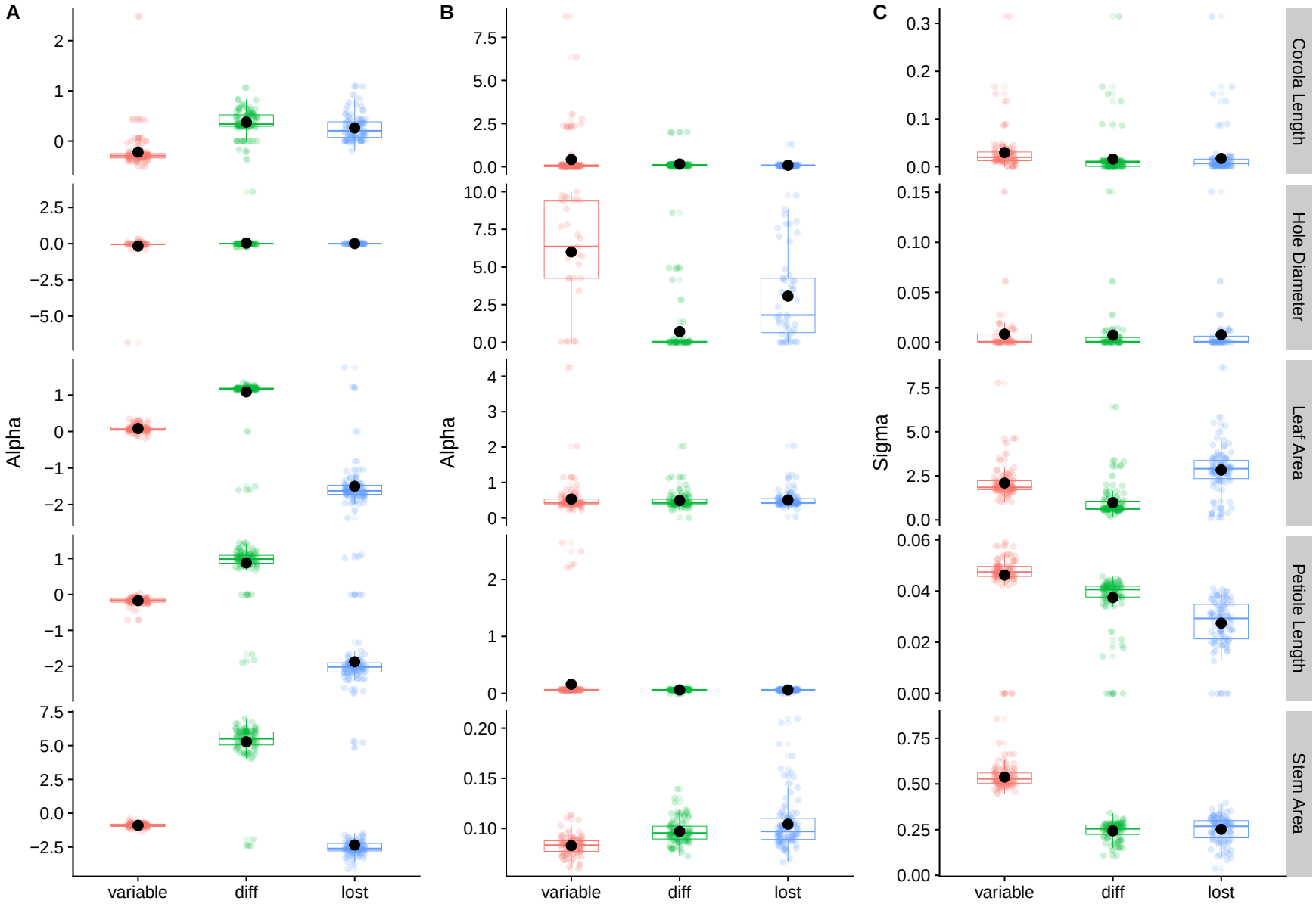

Figure 22: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Wartsendage.

PC1 - Parameter differences

Table 64: Differences in Theta values for PC1 analysis of Warts. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	variable	diff	lost	variable	diff	lost	variable	diff	lost	variable	diff	lost	variable	diff	lost
variable	0	12	9	0	10	6	0	3	**96**	0	4	**89**	0	3	**96**
diff	**84**	0	**72**	41	0	8	**97**	0	**96**	**91**	0	**88**	**96**	0	**96**
lost	**87**	15	0	45	41	0	4	3	0	6	3	0	3	3	0

Table 65: Differences in Alpha values for PC1 analysis of Warts. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	variable	diff	lost	variable	diff	lost	variable	diff	lost	variable	diff	lost	variable	diff	lost
variable	0	42	41	0	45	49	0	32	17	0	**93**	**93**	0	1	8
diff	**54**	0	**54**	6	0	11	**68**	0	21	2	0	3	**98**	0	37
lost	**55**	12	0	2	36	0	**83**	**79**	0	2	3	0	**91**	**62**	0

Table 66: Differences in Sigma values for PC1 analysis of Warts. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	variable	diff	lost	variable	diff	lost	variable	diff	lost	variable	diff	lost	variable	diff	lost
variable	0	**82**	**76**	0	7	4	0	**96**	12	0	**91**	**91**	0	**99**	**99**
diff	2	0	27	7	0	3	3	0	6	0	0	**87**	0	0	33
lost	8	**57**	0	10	12	0	**87**	**93**	0	0	4	0	0	**66**	0

PC2 - Parameters

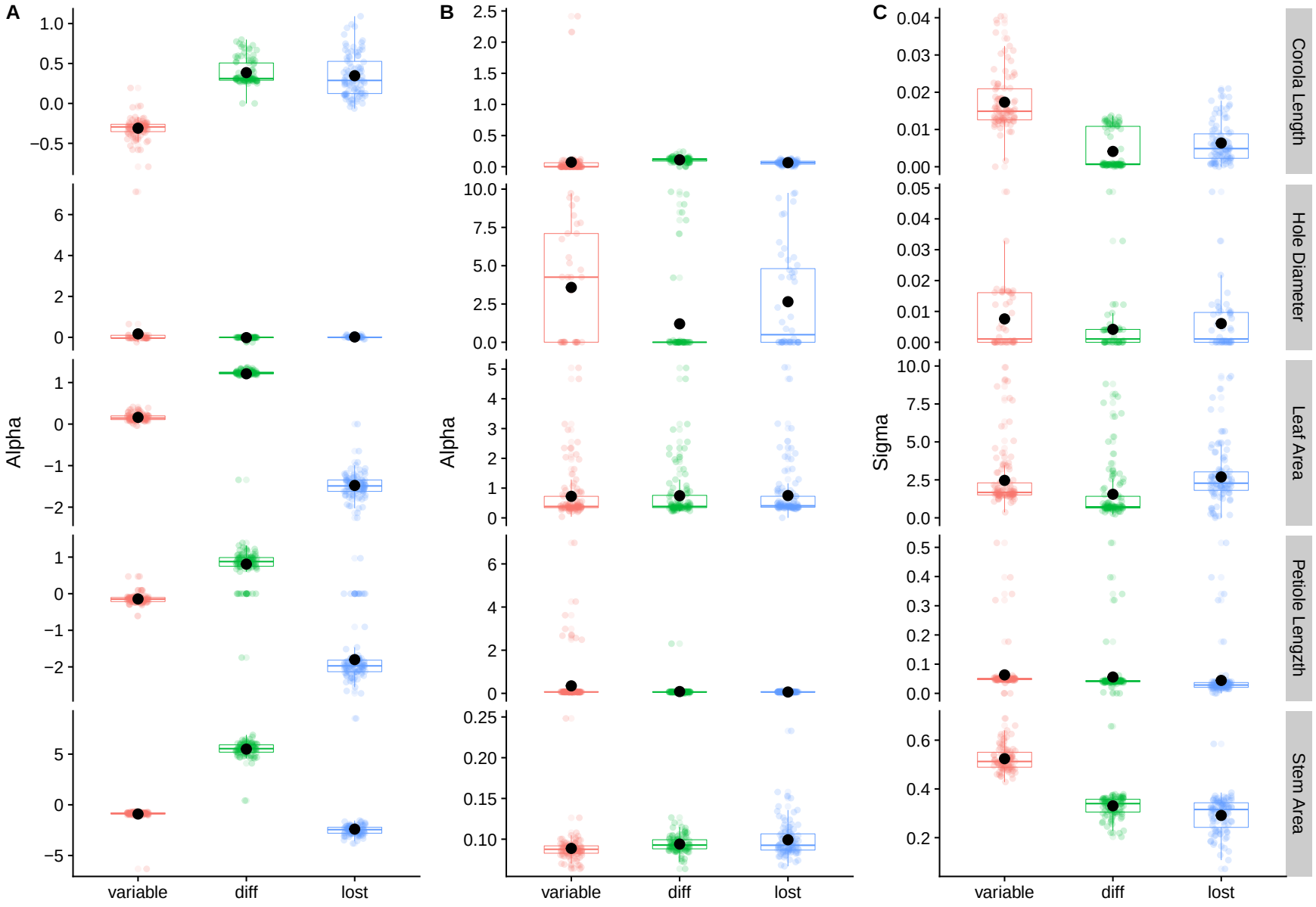

Figure 23: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Wartsendage.

PC2 - Parameter differences

Table 67: Differences in Theta values for PC2 analysis of Warts. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	variable	diff	lost	variable	diff	lost	variable	diff	lost	variable	diff	lost	variable	diff	lost
variable	0	1	1	0	19	14	0	1	**98**	0	7	**95**	0	0	**98**
diff	**94**	0	**66**	29	0	6	**98**	0	**98**	**92**	0	**89**	**99**	0	**98**
lost	**94**	28	0	34	38	0	1	1	0	4	1	0	1	1	0

Table 68: Differences in Alpha values for PC2 analysis of Warts. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	variable	diff	lost	variable	diff	lost	variable	diff	lost	variable	diff	lost	variable	diff	lost
variable	0	19	19	0	46	46	0	**58**	7	0	**98**	**98**	0	6	21
diff	**76**	0	**68**	2	0	6	41	0	2	1	0	6	**93**	0	48
lost	**76**	11	0	2	28	0	**92**	**97**	0	1	4	0	**78**	**51**	0

Table 69: Differences in Sigma values for PC2 analysis of Warts. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	variable	diff	lost	variable	diff	lost	variable	diff	lost	variable	diff	lost	variable	diff	lost
variable	0	**93**	**90**	0	22	16	0	**99**	22	0	**90**	**90**	0	**98**	**98**
diff	0	0	21	1	0	3	0	0	9	1	0	**90**	1	0	**92**
lost	3	**72**	0	7	20	0	**77**	**90**	0	1	1	0	1	7	0

PC3 - Parameters

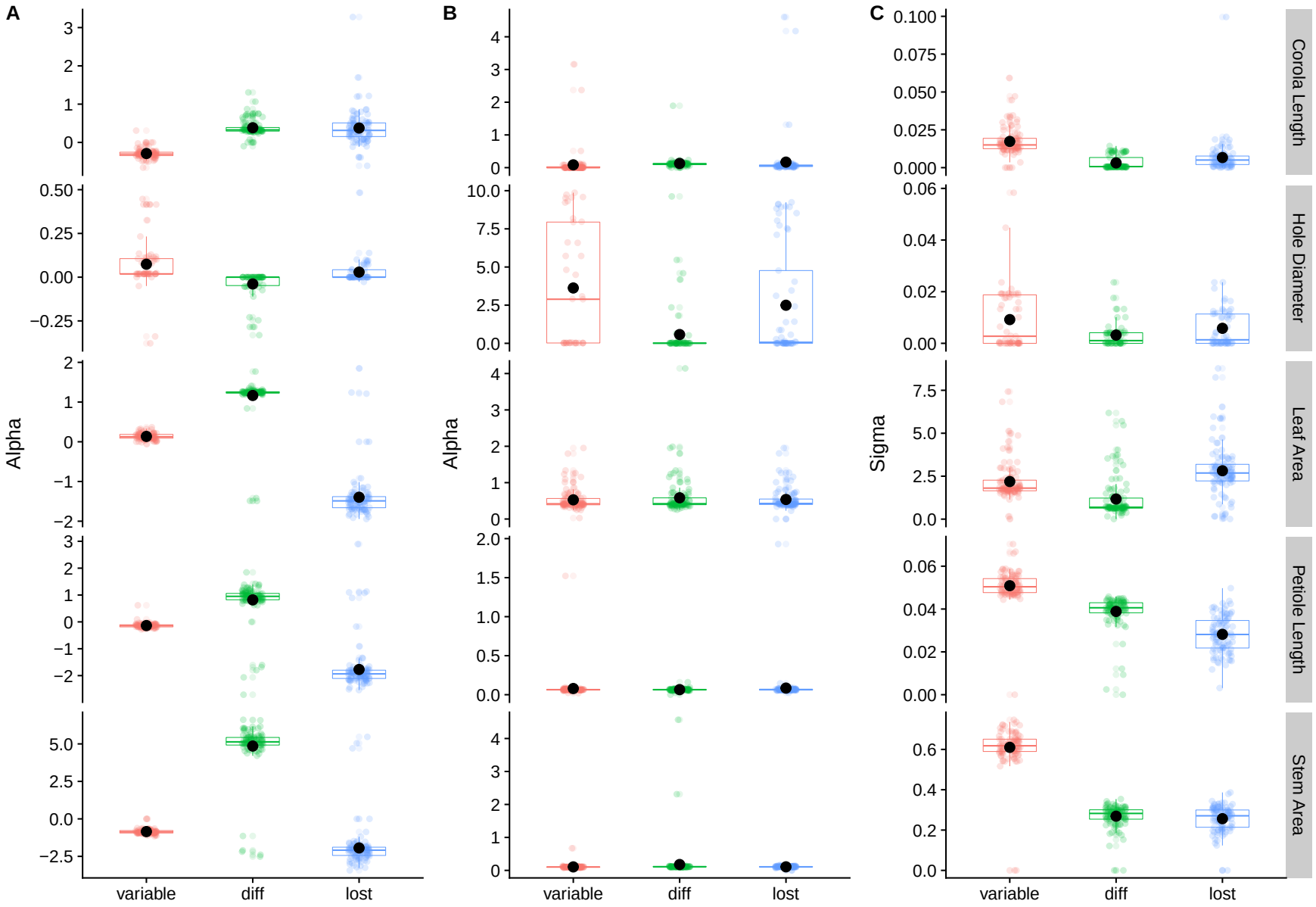

Figure 24: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Wartsendage.

PC3 - Parameter differences

Table 70: Differences in Theta values for PC3 analysis of Warts. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	variable	diff	lost	variable	diff	lost	variable	diff	lost	variable	diff	lost	variable	diff	lost
variable	0	3	4	0	**54**	49	0	3	**97**	0	6	**92**	0	5	**94**
diff	**88**	0	**57**	3	0	27	**97**	0	**97**	**91**	0	**92**	**95**	0	**95**
lost	**87**	34	0	8	27	0	3	3	0	5	5	0	6	5	0

Table 71: Differences in Alpha values for PC3 analysis of Warts. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	variable	diff	lost	variable	diff	lost	variable	diff	lost	variable	diff	lost	variable	diff	lost
variable	0	12	13	0	**51**	**54**	0	49	13	0	**96**	**95**	0	3	26
diff	**79**	0	**70**	6	0	11	**51**	0	14	1	0	1	**97**	0	**63**
lost	**78**	12	0	3	29	0	**87**	**86**	0	2	1	0	**74**	37	0

Table 72: Differences in Sigma values for PC3 analysis of Warts. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	variable	diff	lost	variable	diff	lost	variable	diff	lost	variable	diff	lost	variable	diff	lost
variable	0	**88**	**83**	0	21	22	0	**95**	14	0	**96**	**96**	0	**98**	**98**
diff	1	0	24	13	0	7	3	0	7	1	0	**90**	0	0	**58**
lost	6	**65**	0	12	27	0	**84**	**91**	0	1	7	0	0	40	0

Hole Diameter - Discrete

PC1 - Parameters

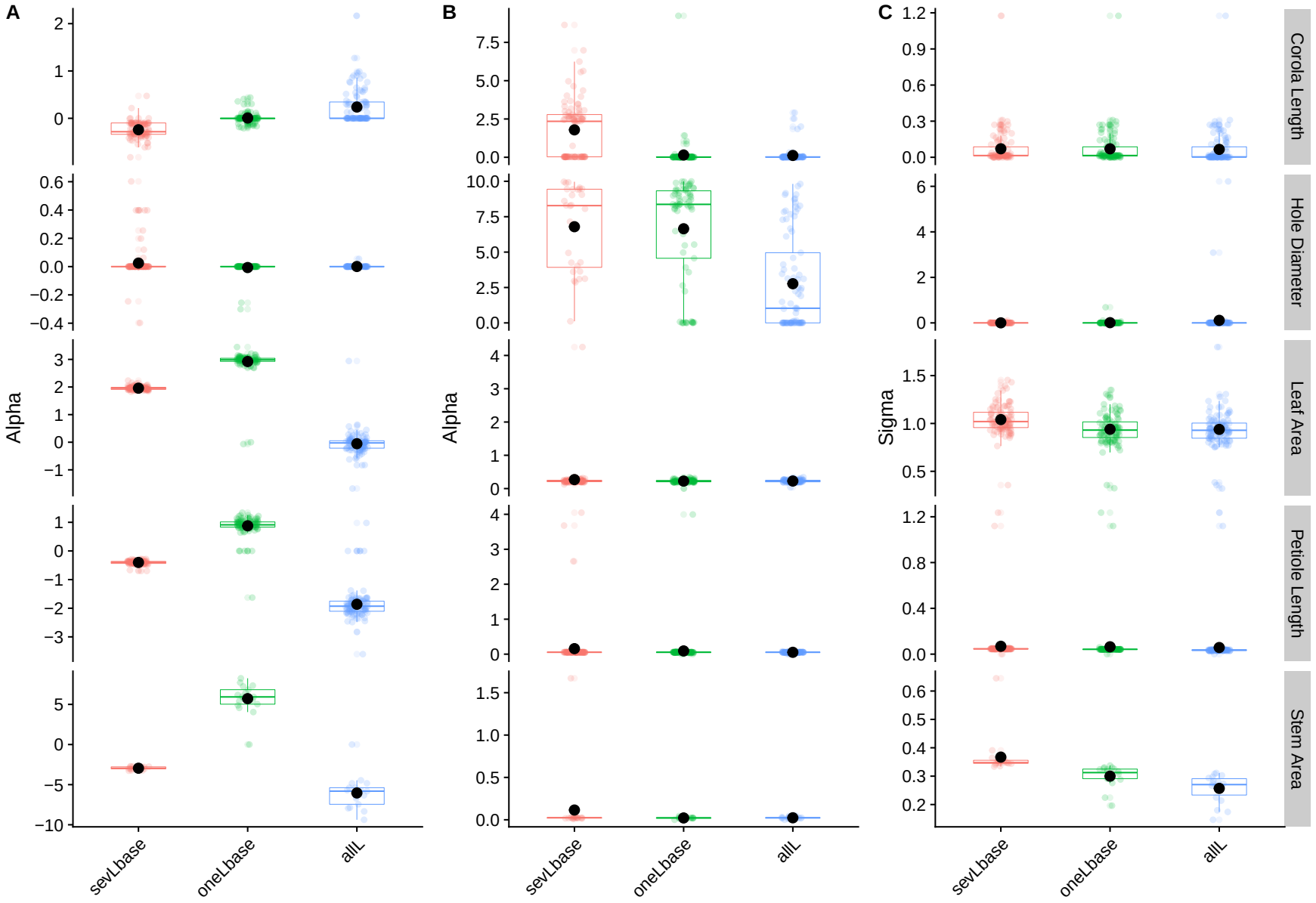

Figure 25: Distribution of Theta (A), Alpha (B) and Sigma (C) values for the OU-based models for each continuous trait in association with different states of Holediam.Discendage.

PC1 - Parameter differences

Table 73: Differences in Theta values for PC1 analysis of Holediam.Disc. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL
sevLbase	0	2	4	0	38	36	0	2	**99**	0	1	**95**	0	0	17
oneLbase	**92**	0	7	50	0	18	**98**	0	**99**	**99**	0	**95**	18	0	17
allL	**90**	43	0	**52**	25	0	1	1	0	5	1	0	1	1	0

Table 74: Differences in Alpha values for PC1 analysis of Holediam.Disc. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL
sevLbase	0	**93**	**90**	0	**74**	**87**	0	**85**	**82**	0	**100**	**100**	0	16	8
oneLbase	1	0	30	14	0	**73**	15	0	41	0	0	3	2	0	5
allL	4	25	0	1	14	0	18	**59**	0	0	1	0	10	13	0

Table 75: Differences in Sigma values for PC1 analysis of Holediam.Disc. Each cell contains the number of replicas for which the row state was higher than the column state. Green cells highlight cases with more than 90 replicas, orange cells highlight cases between 75 and 90 replicas, and yellow cells highlight cases between 50 and 75 replicas.

	Corola Length			Hole Diameter			Leaf Area			Petiole Length			Stem Area		
	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL	sevLbase	oneLbase	allL
sevLbase	0	29	42	0	5	3	0	**99**	**97**	0	**96**	**96**	0	18	18
oneLbase	15	0	40	8	0	1	0	0	**60**	0	0	**93**	0	0	18
allL	3	5	0	11	13	0	2	39	0	0	3	0	0	0	0