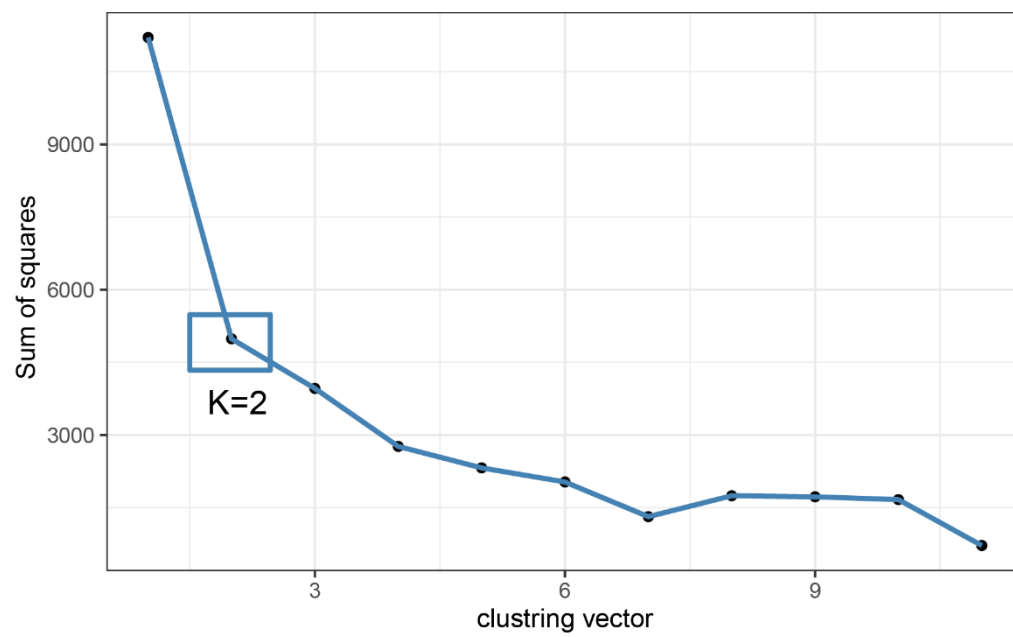


## Supplementary Figures and Tables



**Figure S1.** Best k value for clustering analysis using sum of squares (SSE) optimized by the elbow method.

**Table S1.** Summary of means and standard deviations of the color traits for two color variants (non-red, red) of each body region and each sex.

	Throat (n=127)			Venter (n=127)		
Female (n=70)	Combined (n=70)	Non-red (n=25)	Red (n=45)	Combined (n=70)	Non-red (n=29)	Red (n=41)
Hue	653.41 $\pm$ 5.95	646.16 $\pm$ 3.77	657.44 $\pm$ 1.10	652.90 $\pm$ 7.29	645.24 $\pm$ 4.98	658.32 $\pm$ 1.31
Chroma	2.78 $\pm$ 0.50	7.04 $\pm$ 5.80	4.96 $\pm$ 2.43	1.44 $\pm$ 0.30	18.45 $\pm$ 5.66	15.35 $\pm$ 4.13
Luminance	5.70 $\pm$ 4.06	2.61 $\pm$ 0.59	2.88 $\pm$ 0.43	16.63 $\pm$ 5.03	1.39 $\pm$ 0.31	1.49 $\pm$ 0.28
Male (n=57)	Combined (n=57)	Non-red (n=21)	Red (n=36)	Combined (n=57)	Non-red (n=10)	Red (n=47)
Hue	654.25 $\pm$ 6.86	646.71 $\pm$ 5.77	658.64 $\pm$ 1.55	658 $\pm$ 7.12	645.20 $\pm$ 5.07	660.72 $\pm$ 3.67
Chroma	2.40 $\pm$ 0.47	7.08 $\pm$ 4.37	8.50 $\pm$ 4.59	1.84 $\pm$ 0.41	21.67 $\pm$ 6.88	13.59 $\pm$ 4.83
Luminance	7.98 $\pm$ 4.52	2.29 $\pm$ 0.37	2.47 $\pm$ 0.52	15.01 $\pm$ 6.03	1.54 $\pm$ 0.25	1.90 $\pm$ 0.41

**Table S2.** Summary of a linear mixed models (LMM) examining differences of color conspicuousness in Just Noticeable Differences (JNDs) in relation to a lizard visual system for chromatic and luminance channels against background vegetation between sexes and body regions, and interaction between them. F: female, M: male, T: throat, V: venter. Bold indicates a significant difference ( $P < 0.05$ ).

JNDs	Fixed effect	Estimate	t value	P value	Mean $\pm$ SD		
					Throat	Venter	
Chromatic	F vs M	-14.99	-6.32	<b>&lt;0.001</b>	F	34.76 $\pm$ 18.16	3.18 $\pm$ 1.62
	T vs V	-30.16	-14.40	<b>&lt;0.001</b>	M	18.60 $\pm$ 16.26	4.47 $\pm$ 1.66
	Sex : region	17.46	5.55	<b>&lt;0.001</b>			
Luminance	F vs M	-3.82	-4.51	<b>&lt;0.001</b>	F	10.99 $\pm$ 5.85	4.70 $\pm$ 2.70
	T vs V	-4.94	-6.48	<b>&lt;0.001</b>	M	7.16 $\pm$ 5.95	4.33 $\pm$ 3.41
	Sex : region	3.18	2.78	<b>&lt;0.001</b>			

**Table S3.** Summary of a linear mixed models (LMM) examining differences of color conspicuousness in Just Noticeable Differences (JNDs) in relation to a lizard visual system for chromatic and luminance channels against background vegetation between two color variants. Summary of a linear mixed models (LMM).

JNDs	Female (non-red vs red)			Male (non-red vs red)		
Throat (n=97)	Estimate	t value	P value	Estimate	t value	P value
Chromatic	0.23	1.39	0.17	-0.28	-1.29	0.20
Luminance	0.04	0.22	0.82	-0.44	-1.08	0.29
Venter (n=97)						
Chromatic	-0.11	-0.66	0.51	-0.15	-1.09	0.28
Luminance	<b>-0.57</b>	<b>-2.12</b>	<b>0.04</b>	<b>-1.32</b>	<b>-3.45</b>	<b>0.001</b>

**Table S4.** Summary of a linear mixed models (LMM) examining differences of individual quality related traits between two color variants (red, non-red) by body region and sex. Summary of a linear mixed models (LMM).

	Female (non-red vs red)			Male (non-red vs red)		
	Estimate	t value	<i>P</i> value	Estimate	t value	<i>P</i> value
Throat						
<b>Age</b>	-0.10	-0.98	0.34	<b>0.23</b>	<b>2.60</b>	<b>0.03</b>
<b>SMI</b>	<b>-0.14</b>	<b>-2.95</b>	<b>0.01</b>	0.02	0.53	0.60
Head size (PC1)	0.08	0.08	0.94	-1.88	-2.12	0.05
Tail length	0.08	1.87	0.07	0.004	0.15	0.89
<b>Bite force</b>	<b>0.23</b>	<b>3.09</b>	<b>0.01</b>	-0.12	-1.11	0.28
Venter						
Age	0.05	0.46	0.65	-0.02	-0.20	0.84
SMI	-0.04	-0.86	0.40	-0.02	-0.31	0.76
<b>Head size (PC1)</b>	<b>-2.00</b>	<b>-2.22</b>	<b>0.04</b>	-0.59	-0.59	0.57
Tail length	0.05	1.13	0.27	0.004	0.06	0.95
Bite force	0.13	1.63	0.11	-0.18	-1.87	0.09

**Table S5.** Summary of a linear mixed models (LMM) examining differences of reproductive output traits between two color variants (non-red, red) by body region and sex.

	Female (non-red vs red)			Male (non-red vs red)		
	Estimate	t value	<i>P</i> value	Estimate	t value	<i>P</i> value
Throat						
Litter size	-0.03	-0.26	0.80	0.19	0.69	0.52
Litter mass	0.07	0.49	0.63	-0.17	-1.53	0.19
Total live mass	0.27	0.87	0.40	-0.21	-1.13	0.29
Total live number	0.19	0.67	0.52	-0.04	-0.14	0.90
Venter						
Litter size	0.03	0.22	0.83	-	-	-
Litter mass	0.14	1.00	0.34	-	-	-
Total live mass	0.22	0.66	0.52	-	-	-
Total live number	0.20	0.69	0.50	-	-	-