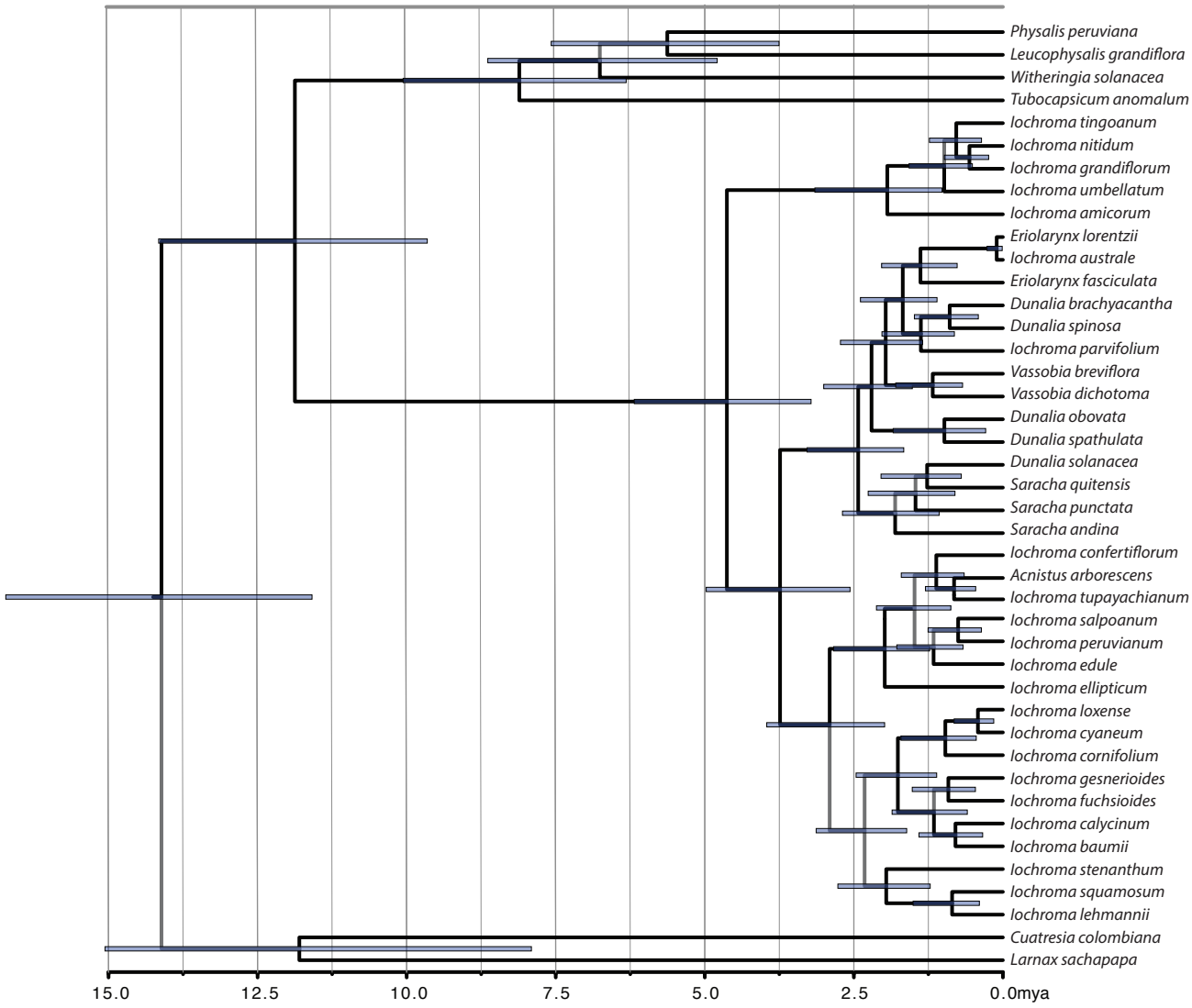

Fig. S1. Timetree of Iochrominae. Maximum clade credibility tree from BEAST analysis. 95% highest posterior densities for each node depth are shown with the light blue bars. Branches with less than 95% posterior probability (PP) are colored in gray and those with greater PP values are in black. Time is indicated in millions of years (mya) along the x-axis.

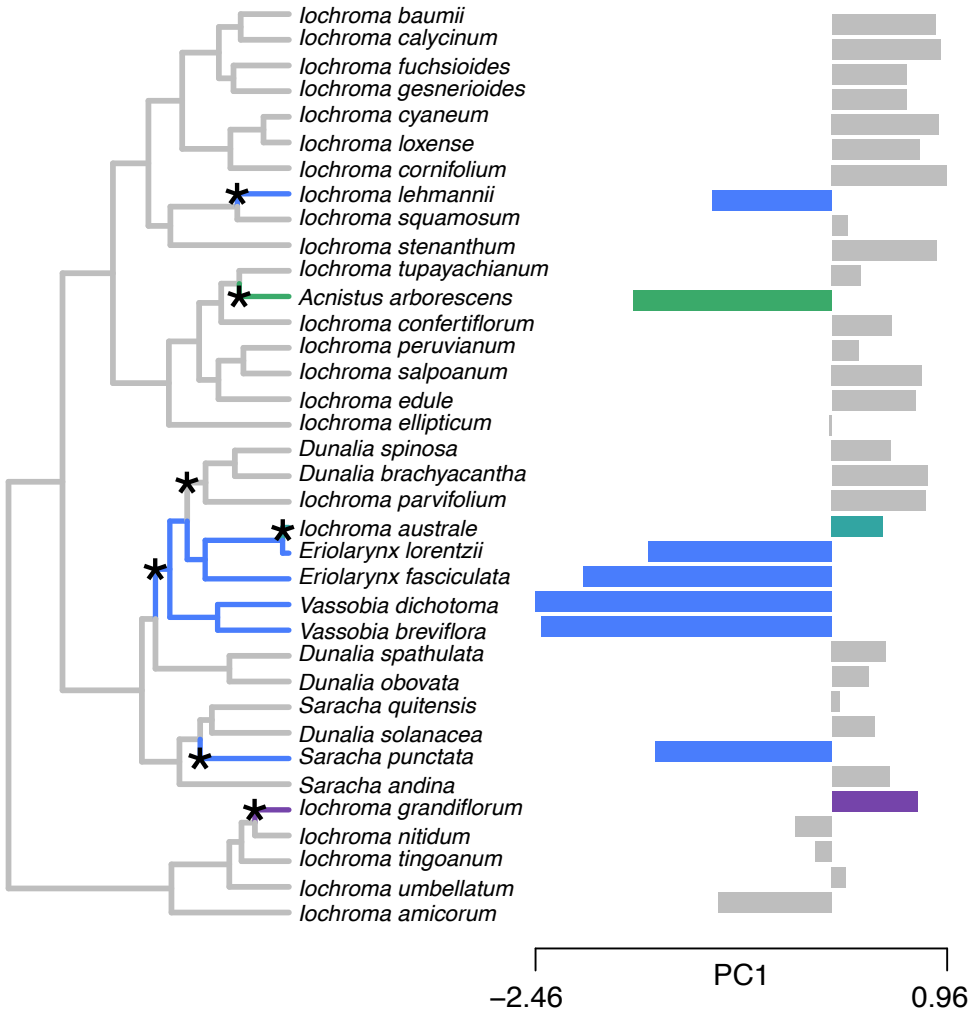

Fig. S2. Estimate of regime shifts on MCC tree. Significant shift are indicated with black asterisks and can be either transitions to new shape regimes or reversals to the ancestral regime. Distinct regimes are indicated with different colors; here there are 5 estimated regimes. Analysis is based on PC1 values, plotted on the right.

Table S1. Pollinator data for Iochrominae taxa. Quantitative measures of relative hummingbird importance are listed where available. For the remaining taxa, principal pollinator was coded from field observations. Voucher specimens are listed for personal observations.

Species	Rel. hummingbird importance	Principal pollinator	Source
Acnistus arborescens	0	insect	1
Dunalia spathulata	NA	insect	pers. obs.: Smith 454 (WIS)
D. spinosa	NA	hummingbird	2, pers. obs.: Smith 512 (WIS)
Eriolarynx lorentzii	NA	insect	pers. obs.: Smith 532 (WIS)
Iochroma australe	NA	mixed	pers. obs.: Smith 390 (WIS)
I. calycinum	0.74	hummingbird	1
I. confertiflorum	0.78	hummingbird	1
I. cornifolium	0.96	hummingbird	1
I. cyaneum	0.84	hummingbird	1
I. edule	0.99	hummingbird	1
I. ellipticum	0	insect	1
I. fuchsioides	0.7	mixed	1
I. gesnerioides	0.9	hummingbird	1
I. lehmannii	0.99	hummingbird	1
I. loxense	0.89	hummingbird	1
I. parvifolium	0.7	mixed	1
I. peruvianum	0.44	mixed	1
I. stenanthum	0.99	hummingbird	1
I. umbellatum	0.32	mixed	1
Saracha andina	NA	hummingbird	3
S. quitensis	NA	hummingbird	4
Vassobia breviflora	0	insect	5

References:

[1]Smith, S. D., S. J. Hall, P. R. S. Izquierdo and D. A. Baum. 2008. Comparative pollination biology of sympatric and allopatric Andean *Iochroma* (Solanaceae). Annals of the Missouri Botanical Garden 95: 600-617.

[2]Reyes, D. 2017. Los picaflores de Chile. www.educarchile.cl/ech/pro/app/detalle?ID=226246

[3]Fernandez-Hilario, R. and S. D. Smith. 2017. A new species of *Saracha* (Solanaceae) from the Central Andes of Peru. Phytokeys 85: 31–43.

[4]Alvarez, A. 1996. Systematics of *Saracha* (Solanaceae). Master's thesis, University of Missouri-St. Louis, St. Louis, Missouri, USA.

[5]Taura, H. M. and S. Laroca. 2004. Biologia da polinização: interações entre as abelhas (Hym., Apoidea) e as flores de *Vassobia breviflora* (Solanaceae). Acta Biológica Paranaense 33:143-162.

Table S2. Parameter estimates from PGLS analyses. "Poll" denotes relative hummingbird importance and the PCs correspond to the shape PCs (Fig. 1). The "No Vb" analysis has the outlier *Vassobia breviflora* removed from the dataset (see text). Values of *P* less than 0.05 are bolded. All analyses were conducted using the MCC tree (Fig. S1) and repeated with three models: the Brownian motion (BM) model, the Ornstein-Uhlenbeck (OU) model, and the TIPS model. The estimated α parameter is provided for OU models.

Dataset	Formula	Model	df	Coefficient	S.E.	t-value	*P*	α	*σ*	AIC
Full	PC1~ Poll	BM	16	0.30	0.08	3.58	**0.003**	-	0.17	-11.86
		OU	16	0.29	0.08	3.44	**0.004**	0.18	0.16	-9.98
		TIPS	16	0.29	0.08	3.52	**0.003**	-	0.12	-10.92
No Vb	PC1~ Poll	BM	15	0.22	0.08	2.84	**0.01**	-	0.15	-14.47
		OU	15	0.20	0.08	2.50	**0.03**	0.38	0.11	-12.92
		TIPS	15	0.20	0.08	2.51	**0.03**	-	0.10	-14.13
Full	PC2 ~ Poll	BM	16	-0.01	0.05	-0.17	0.86	-	0.10	-27.09
		OU	16	-0.01	0.05	-0.17	0.86	0.00	330	-25.09
		TIPS	16	-0.02	0.05	-0.53	0.60	-	0.08	-22.64
No Vb	PC2 ~ Poll	BM	15	-0.06	0.04	-1.36	0.20	-	0.08	-30.71
		OU	15	-0.07	0.04	-1.68	0.12	0.32	0.06	-29.40
		TIPS	15	-0.11	0.04	-2.45	0.03	-	0.05	-29.63

Table S3. Phylogenetic ANOVA with pollinator system as a categorical variable. "Poll" denotes relative hummingbird importance and the PCs correspond to the shape PCs (Fig. 1). The set of 22 taxa used in this analysis along with their coding is given in Table S1. Values of *P* less than 0.05 are bolded. All analyses were conducted using the MCC tree (Fig. S1) and repeated with three models: the Brownian motion (BM) model, the Ornstein-Uhlenbeck (OU) model, and the TIPS model. The estimated α parameter is provided for OU models.

Formula	Model	df	F	*P*	α	*σ*	AIC
PC1~ Poll	BM	2, 19	47.00	**>0.001**	-	0.16	-17.41
	OU	2, 19	22.32	**>0.001**	0.54	0.11	-15.69
	TIPS	2, 19	9.25	**0.002**	-	0.11	-16.97
PC2 ~ Poll	BM	2, 19	0.31	0.73	-	0.10	-39.99
	OU	2, 19	0.33	0.72	0.23	0.08	-35.38
	TIPS	2, 19	0.74	0.49	-	0.07	-34.23

Table S4. Inclusion in a regime shift. Each species is listed along with the frequency with which it was associated with a shift across the 100-tree sample. For example, the two *Vassobia* species were estimated to be part of a different regime from the ancestral (background) regime in all of the 100 trees. Those that were not involved in any shift (have values of zero) are inferred to have retained the ancestral regime across all of the trees.

Vassobia breviflora	100
Vassobia dichotoma	100
Acnistus arborescens	95
Eriolarynx fasciculata	95
Eriolarynx lorentzii	95
Saracha punctata	95
Iochroma australe	94
Dunalia spinosa	92
Iochroma parvifolium	92
Iochroma lehmannii	86
Iochroma grandiflorum	62
Dunalia brachyacantha	31
Iochroma amicorum	1
Dunalia obovata	0
Dunalia solanacea	0
Dunalia spathulata	0
Iochroma baumii	0
Iochroma calycinum	0
Iochroma confertiflorum	0
Iochroma cornifolium	0
Iochroma cyaneum	0
Iochroma edule	0
Iochroma ellipticum	0
Iochroma fuchsioides	0
Iochroma gesnerioides	0
Iochroma loxense	0
Iochroma nitidum	0
Iochroma peruvianum	0
Iochroma salpoanum	0
Iochroma squamosum	0
Iochroma stenanthum	0
Iochroma tingoanum	0
Iochroma tupayachianum	0
Iochroma umbellatum	0
Saracha andina	0
Saracha quitensis	0

Table S5. Distinct convergent regimes estimated by l1ou across the 100-tree sample. These include both cases where independent lineages acquired the same derived regime (e.g., the blue lineages in Fig. S2) and where lineages reverted to the ancestral (background) regime (e.g., the *D. spinosa+D. brachyachantha+I. parvifolium* clade in Fig. S2). Each column in the table represents a distinct regime with gray squares denoting inclusion of the taxon in the regime. The number of taxa in each regime and the number of times the regime was inferred among the 100-tree sample is given at the bottom. The first three regimes, with large numbers of taxa, correspond to cases where taxa converged to the ancestral regime. *I. australe* is not included in the table because it was never inferred to be part of a convergent regime (i.e., it was always inferred to have shifted to its own unique regime).

Regime	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Acnistus arborescens												■	■		■	■	■
Dunalia brachyacantha	■	■	■	■	■												
Dunalia obovata	■	■	■														
Dunalia solanacea	■	■	■														
Dunalia spathulata	■	■	■														
Dunalia spinosa	■	■	■	■	■												
Eriolarynx fasciculata						■	■	■	■			■	■	■			
Eriolarynx lorentzii						■	■	■	■			■	■				
Iochroma amicorum	■	■	■								■						
Iochroma baumii	■	■	■														
Iochroma calycinum	■	■	■														
Iochroma confertiflorum	■	■	■														
Iochroma cornifolium	■	■	■														
Iochroma cyaneum	■	■	■														
Iochroma edule	■	■	■														
Iochroma ellipticum	■	■	■														
Iochroma fuchsioides	■	■	■														
Iochroma gesnerioides	■	■	■														
Iochroma grandiflorum		■	■	■													
Iochroma lehmannii			■			■		■		■	■	■			■		■
Iochroma loxense	■	■	■														
Iochroma nitidum	■	■	■														
Iochroma parvifolium	■	■	■	■	■												
Iochroma peruvianum	■	■	■														
Iochroma salpoanum	■	■	■														
Iochroma squamosum	■	■	■														
Iochroma stenanthum	■	■	■														
Iochroma tingoanum	■	■	■														
Iochroma tupayachianum	■	■	■														
Iochroma umbellatum	■	■	■														
Saracha andina	■	■	■														
Saracha punctata						■	■			■		■	■	■	■	■	
Saracha quitensis	■	■	■														
Vassobia breviflora						■	■	■	■			■	■	■			
Vassobia dichotoma						■	■	■	■			■	■	■			
Number of taxa included	27	28	29	4	3	6	5	5	4	2	2	7	6	4	3	2	2
Number of occurrences	41	15	5	3	28	31	28	9	23	7	1	2	1	1	2	1	19