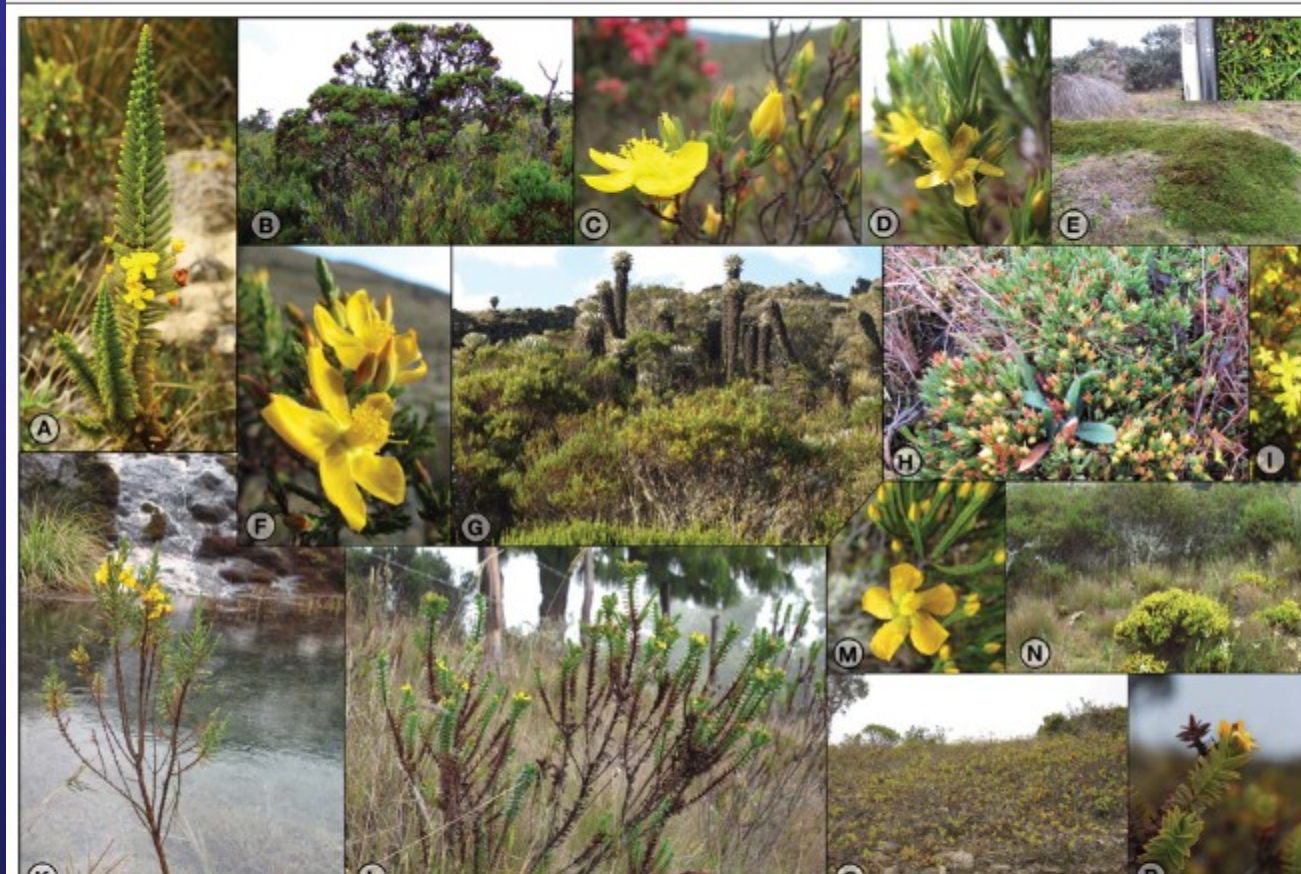
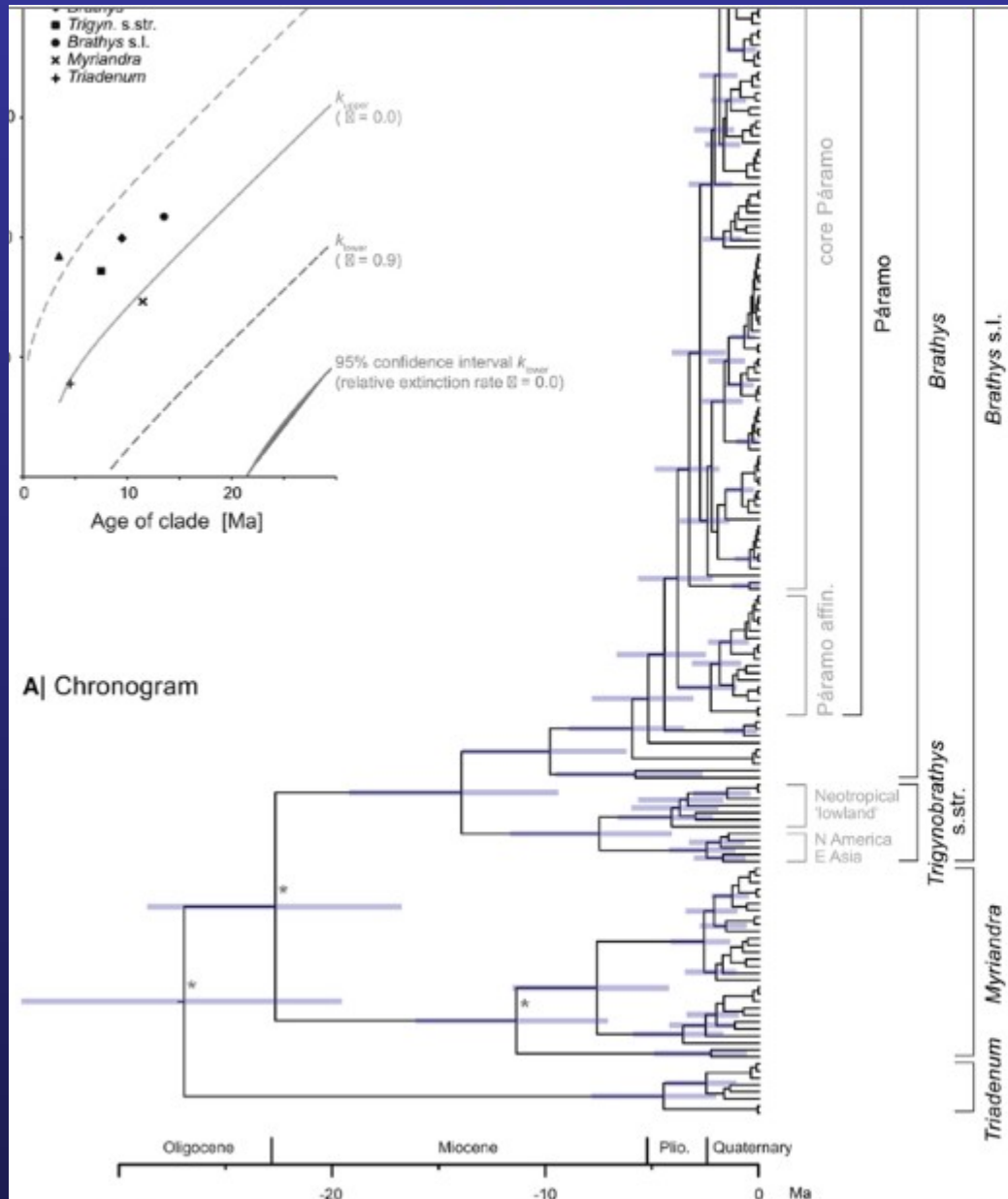


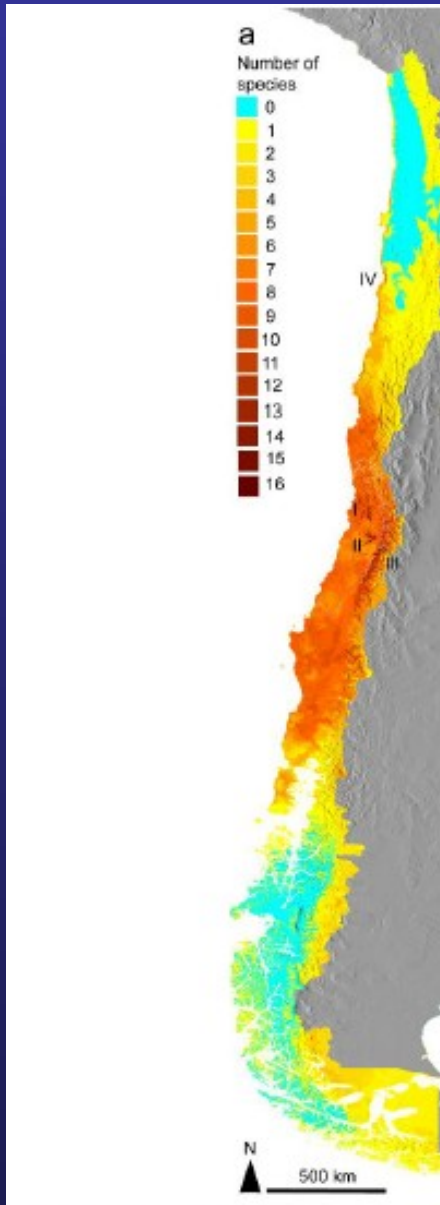
Hypericum



Nurk et al., 2013



Clade	Species number	Bayesian relaxed clock (crown ages)			Net diversification rate [r]		
		Mean	Lower 95% HPD	Upper 95% HPD	Mean	Max.	Min.
<i>Triadenum</i> + <i>Myriandra</i> + <i>Brathys</i> s.l.	184	26.77	19.57	34.41	0.195	0.266	0.152
<i>Triadenum</i>	6	4.48	2.07	7.78	0.400	0.866	0.230
<i>Myriandra</i>	29	11.35	7.15	16.02	0.297	0.471	0.210
<i>Brathys</i> s.l.	149	13.92	9.45	19.09	0.359	0.530	0.262
<i>Trigynobrathys</i> s.str.	52	7.47	4.17	11.59	0.529	0.948	0.341
<i>Brathys</i>	97	9.79	6.28	13.83	0.467	0.728	0.331
Páramo	67	3.83	2.26	5.62	1.098	1.860	0.748



L2: Corniculatae



L4: Roseae



L1: Trifidus



L3: Caesia



L5: Palmatifoliae



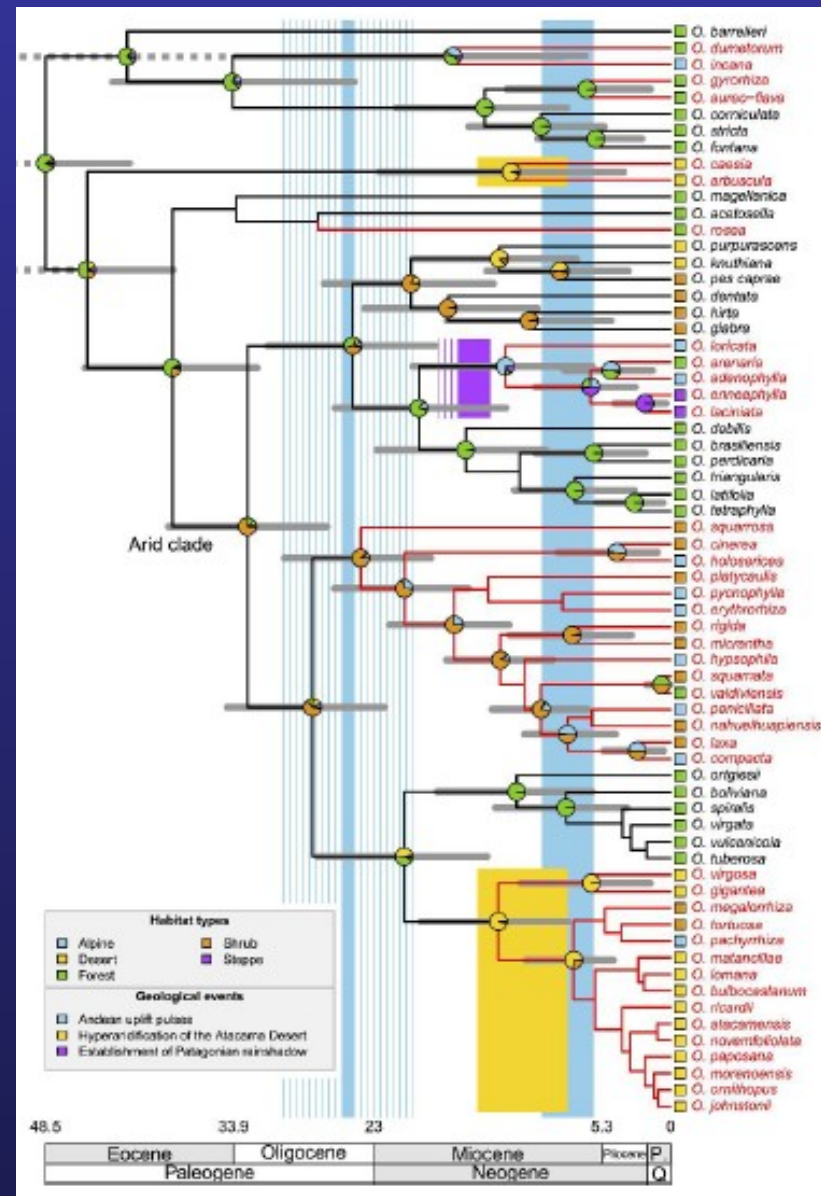
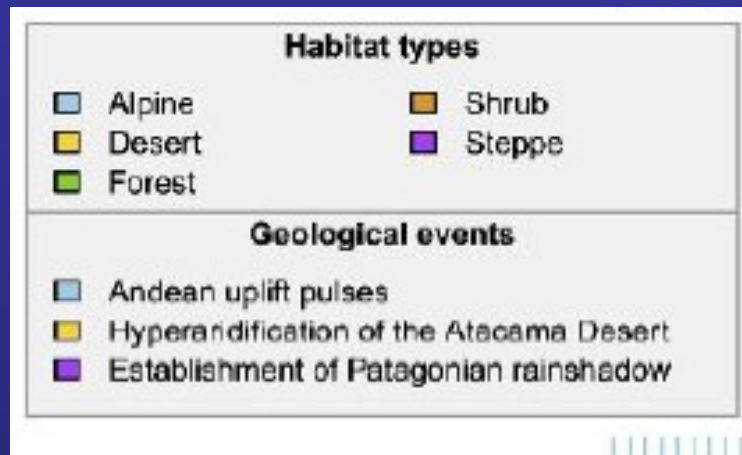
L6: Alpinae



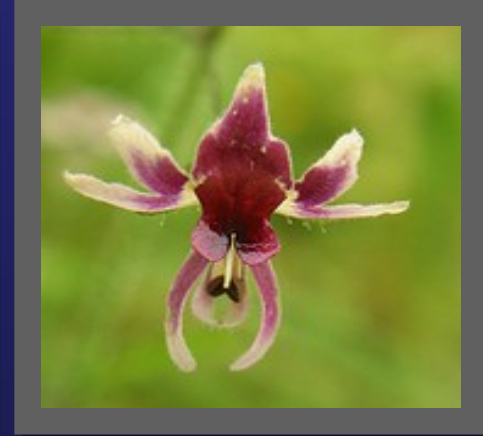
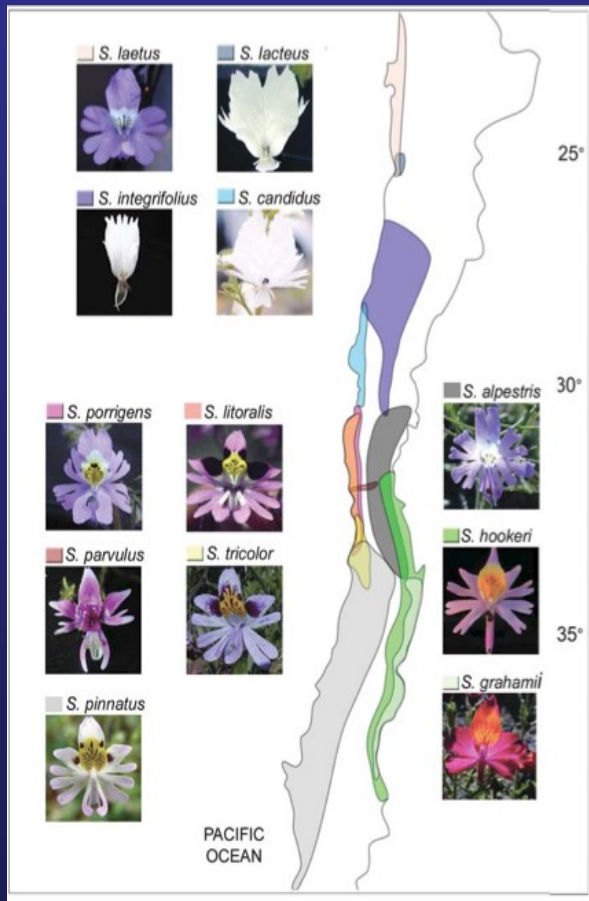
L7: Carnosae ...



... + Giganteae



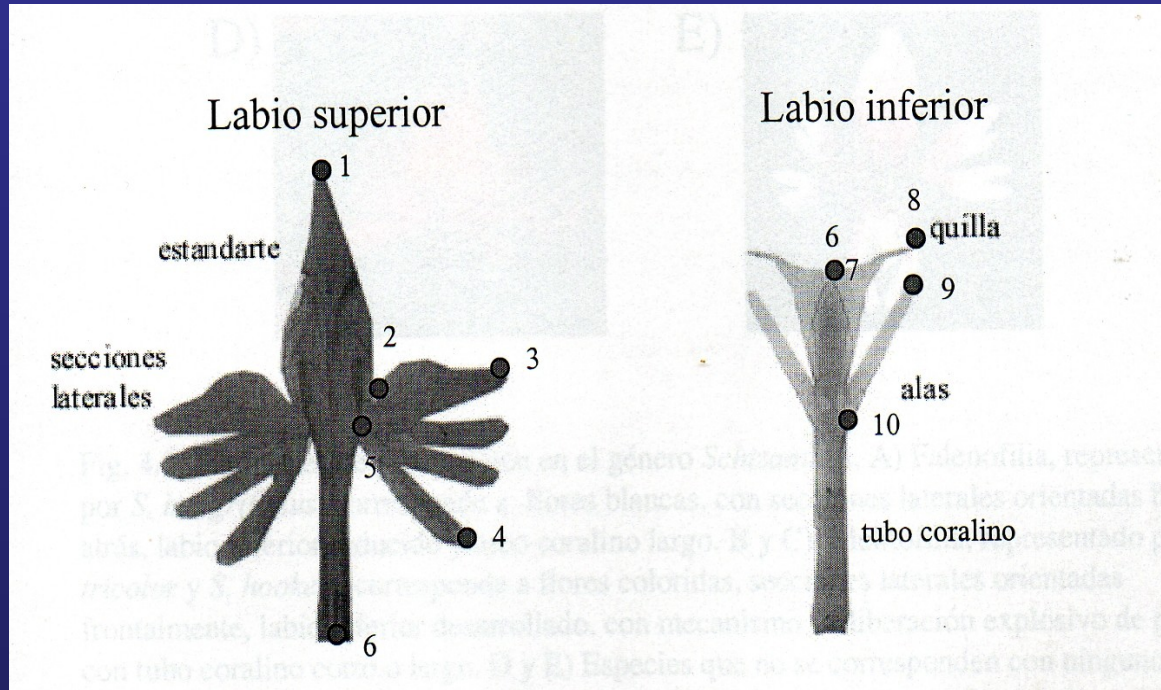
¿Se acelera la tasa de divergencia floral en desiertos y ambientes de alta montaña?



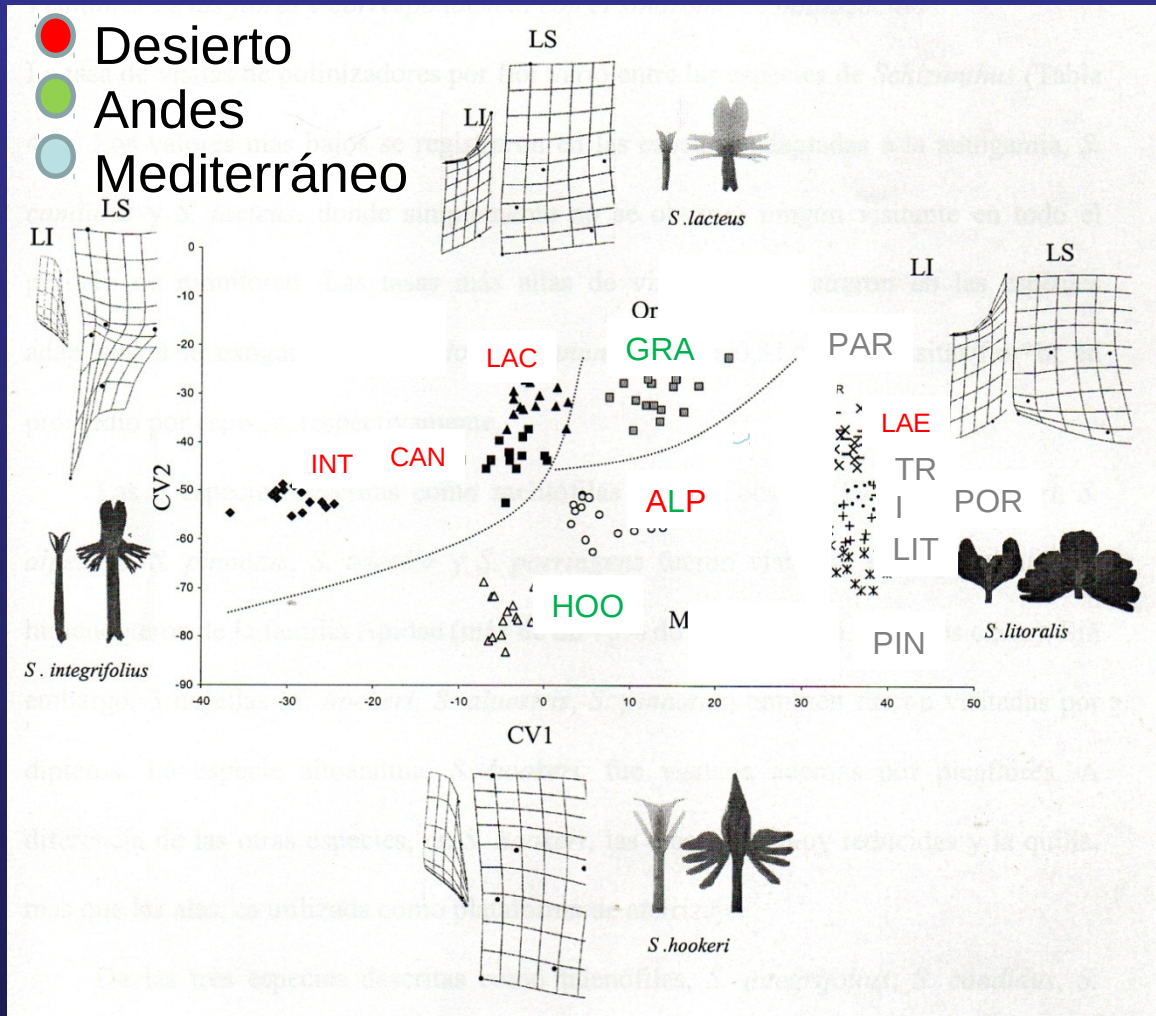
Schizanthus

Pérez et al, 2006, AJB

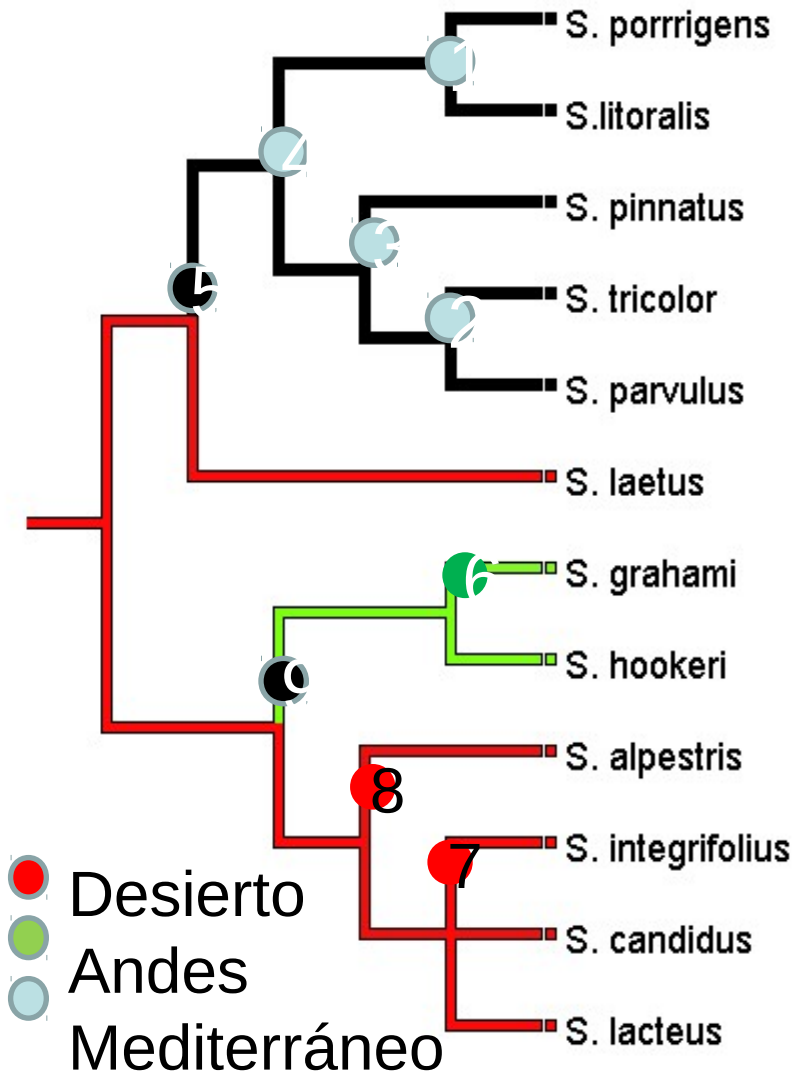
Morfometría geométrica



PCA variables de forma



Contrastes



Árbol obtenido por análisis bayesiano de secuencias de ADN. Pérez et al. 2006 AJB

	DIVERG. MORF.	TASA: Morf/Gen
MED-MED		
POR-LIT	0.51	0.03
TRI-PAR	0.93	0.09
PIN-A2	0.72	0.12
A3-A1	0.48	0.02
AND-AND		
HOO-GRA	4.11	0.23
DES-DES		
INT-CAN	3.10	0.41
CAN-LACT	1.23	0.10
INT-LACT	3.57	0.48
ALP-7	3.48	0.21

Mediterráneo: 0.07
Desierto: 0.30
Andes: 0.23

Prueba t: $p=0.02$

Leucocoryne (Alliaceae)



L. dimorphopetala



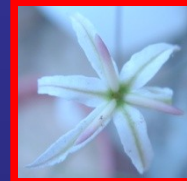
L. appendiculata



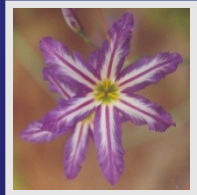
L. macropetala



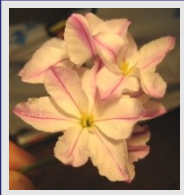
L. narcissoides



L. angustipetala



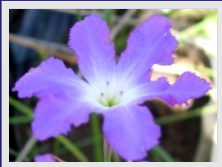
L. vittata



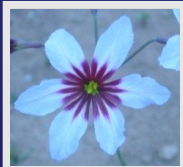
L. pauciflora



L. talinensis



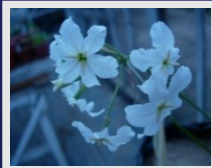
L. violascens



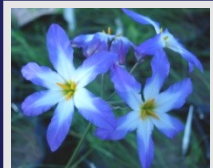
L. purpurea



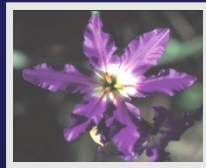
L. ixioides



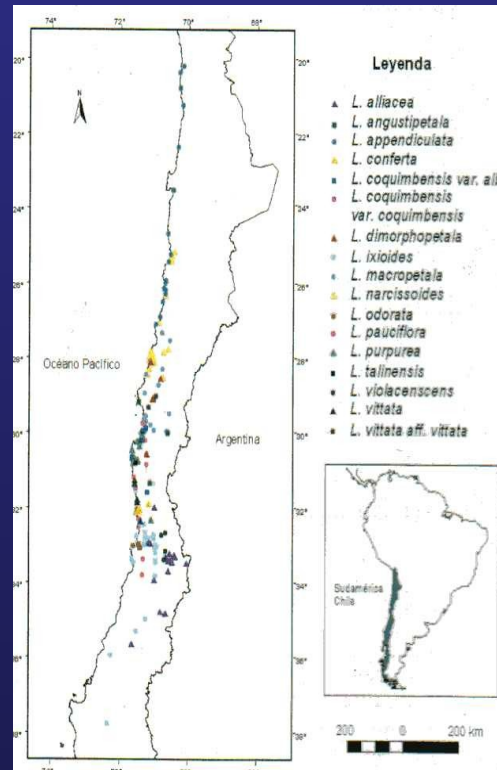
L. odorata



L. coquimbensis



L. aff. vittata



L. alliacea

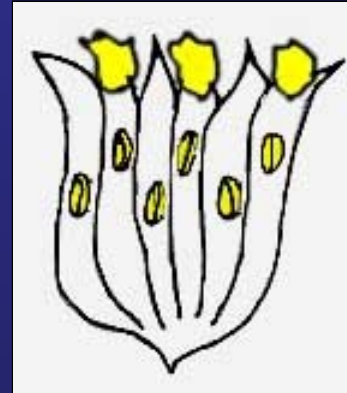


L. conferta

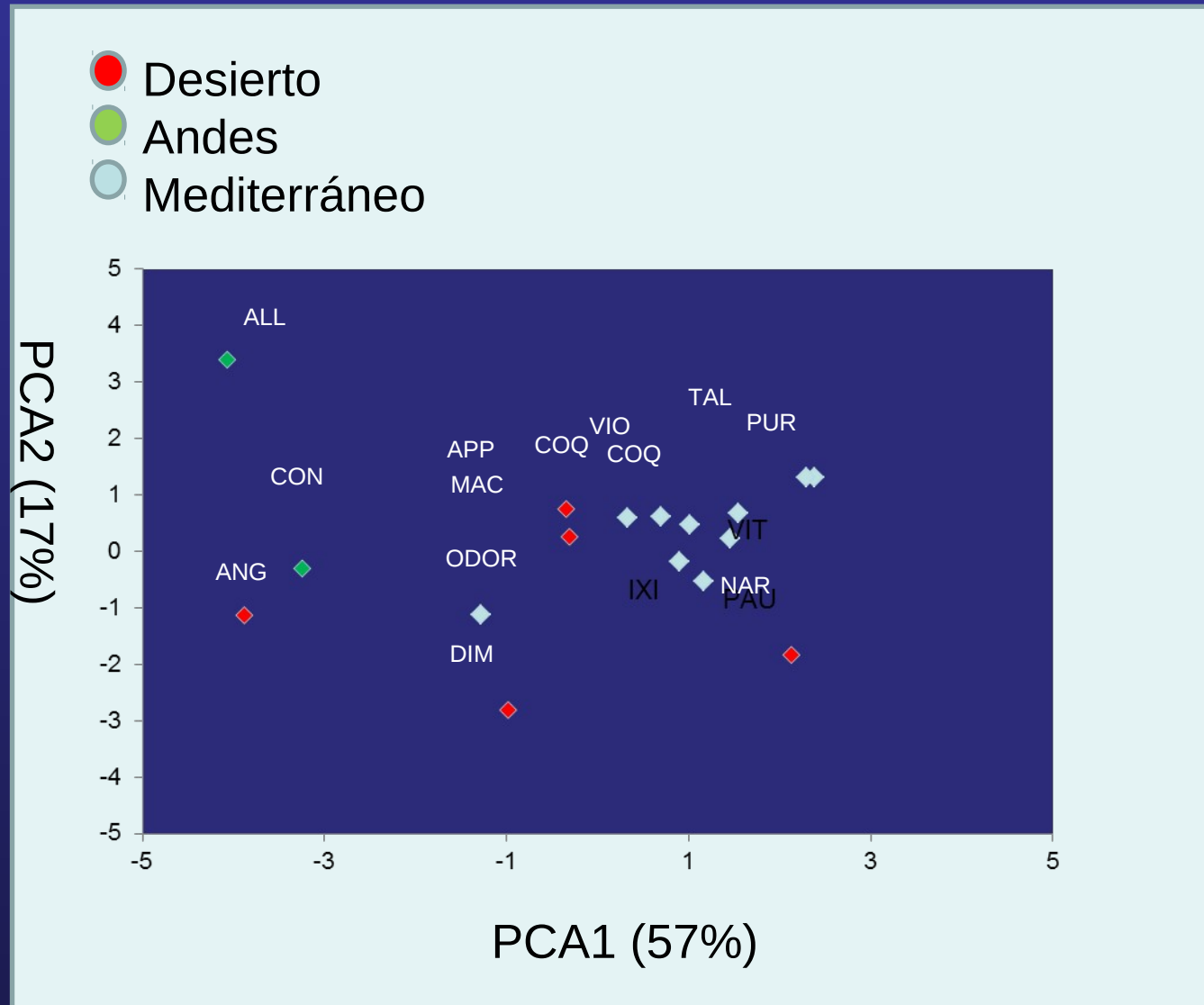
17 taxa
14 especies)

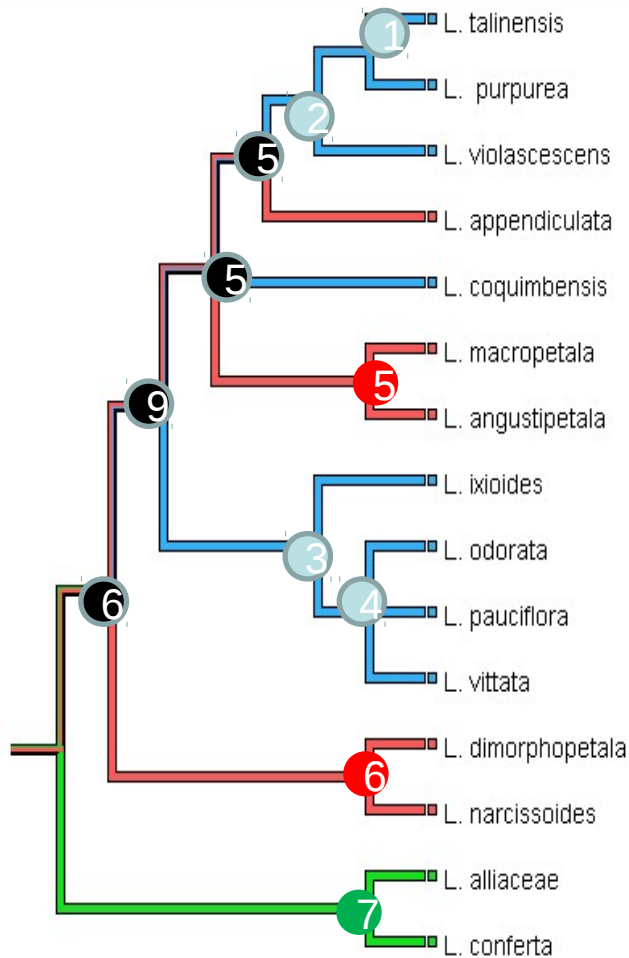
Rasgos Florales

Borde tépalos
Forma tépalos
Ancho relativo tépalos
N° est. Fértiles
N° estaminoides
Largo relativo Estilo
Largo relativo Estambre
Forma Estambre
Largo relativo anteras



PCA rasgos florales en *Leucocoryne*





	TASA: Morf/Gen
MED-MED	
TAL-PUR	0,09
A1-VIOL	1,59
ODO-PAU	2,29
PAU-VIT	0,15
IXI-A4	0,27
AND-AND	
ALL-CONF	1,60
DES-DES	
DIM-NAR	3,11
MACR-ANG	3,57

Mediterráneo: 0,89
 Desierto: 3,34
 Andes: 1,60



Prueba t: $p < 0.01$

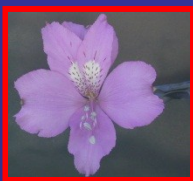
Árbol obtenido por análisis bayesiano de secuencias de cpADN y nADN. Jara, Tesis de Doctorado



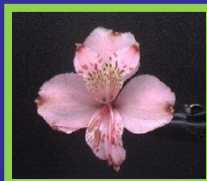
A. graminea



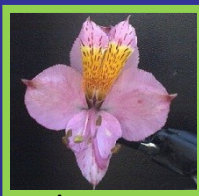
A. werdermannii



A. violaceae



A. umbellata



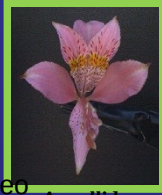
A. exerens



A. polyphylla



A. schizanthoides



A. pallida



Desierto
Andes
Mediterráneo



A. hookeri



A. zoellneri



A. ligu



A. diluta



A. angustifolia



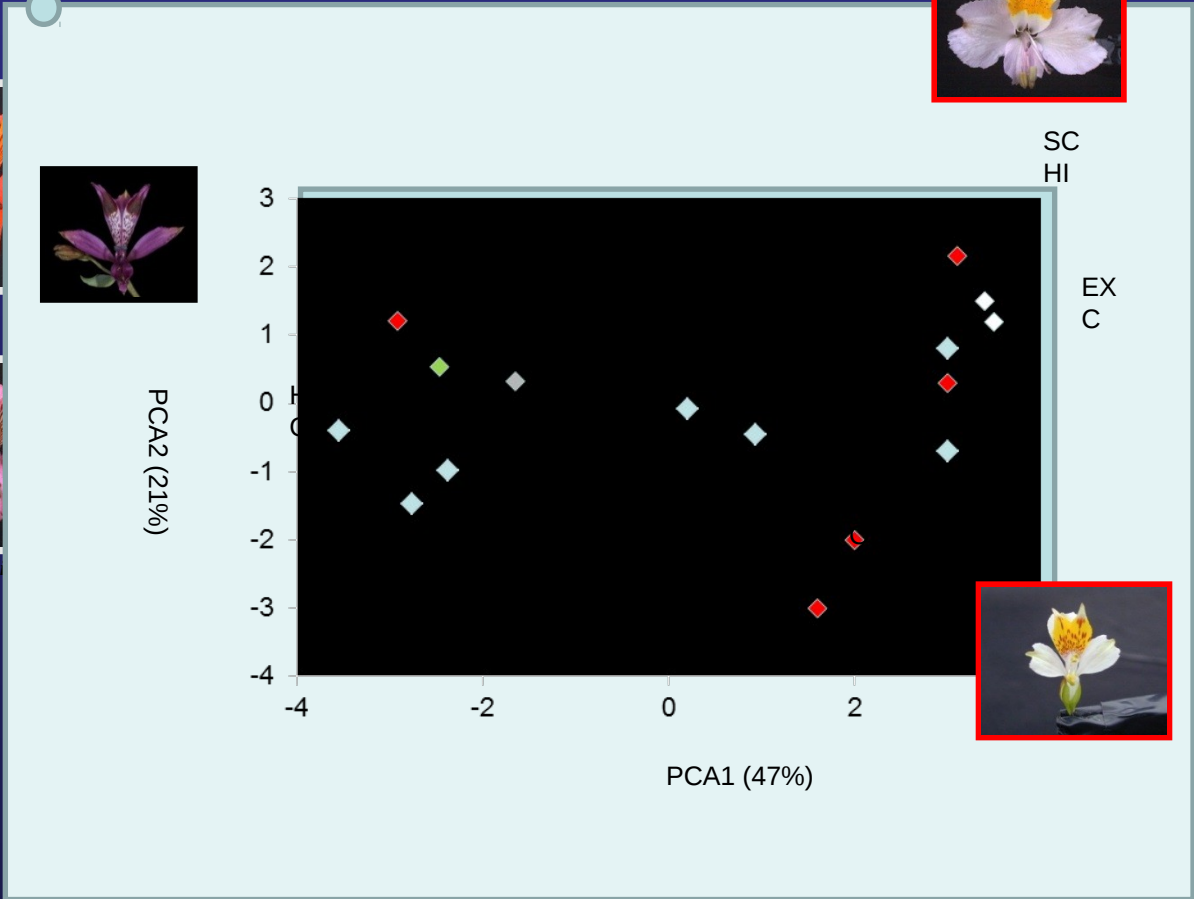
A. presl



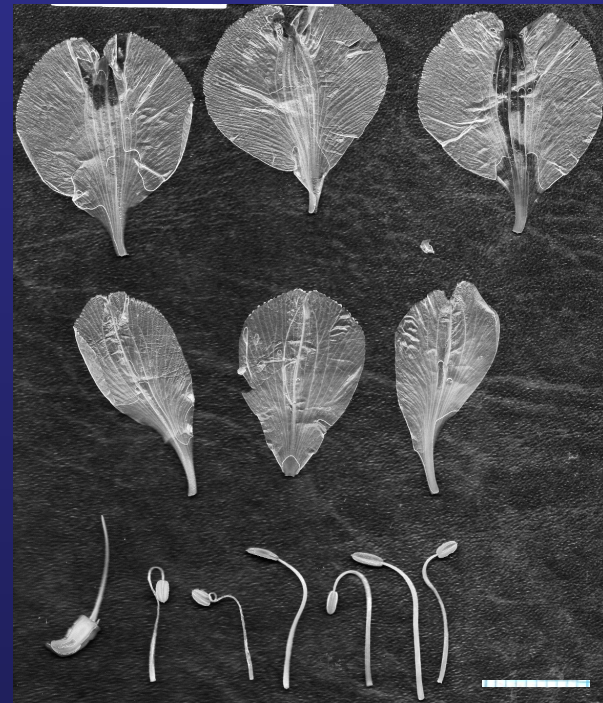
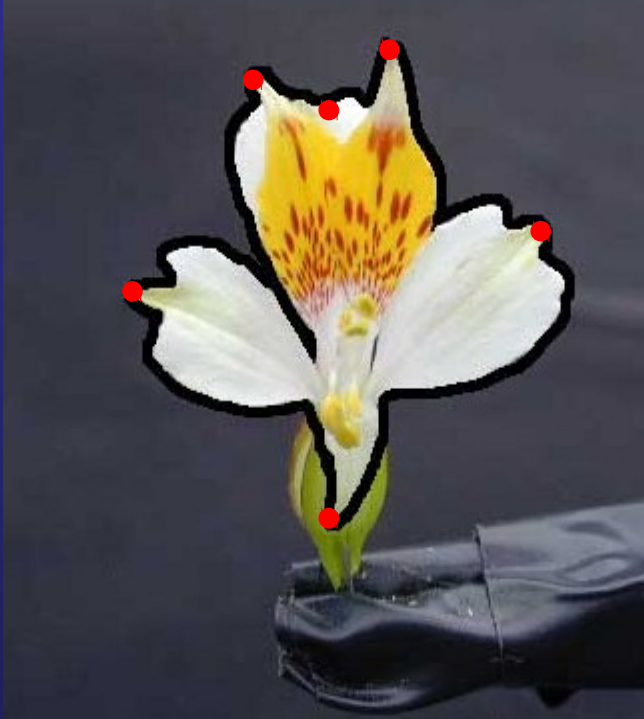
A. versicolor



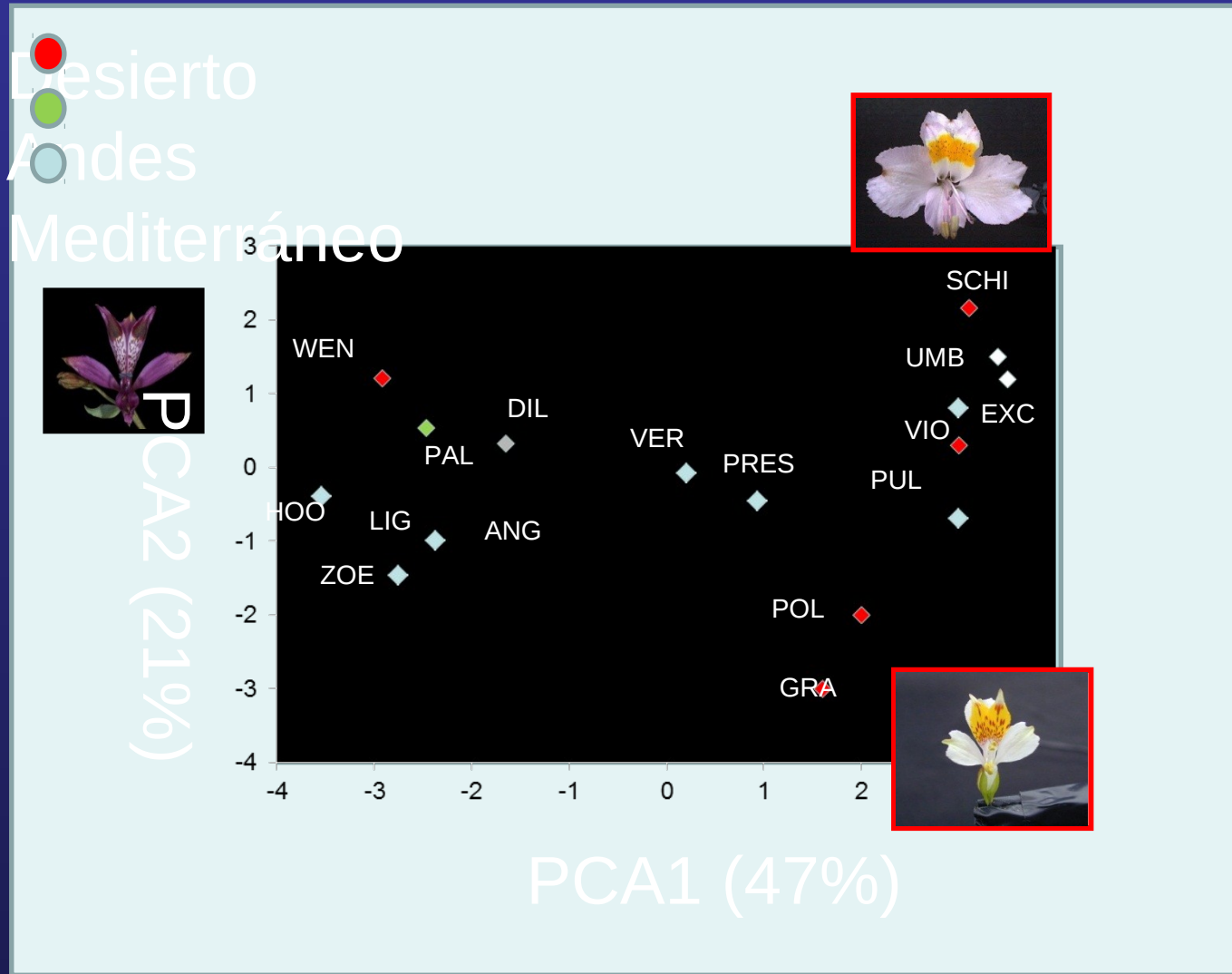
A. pulchra

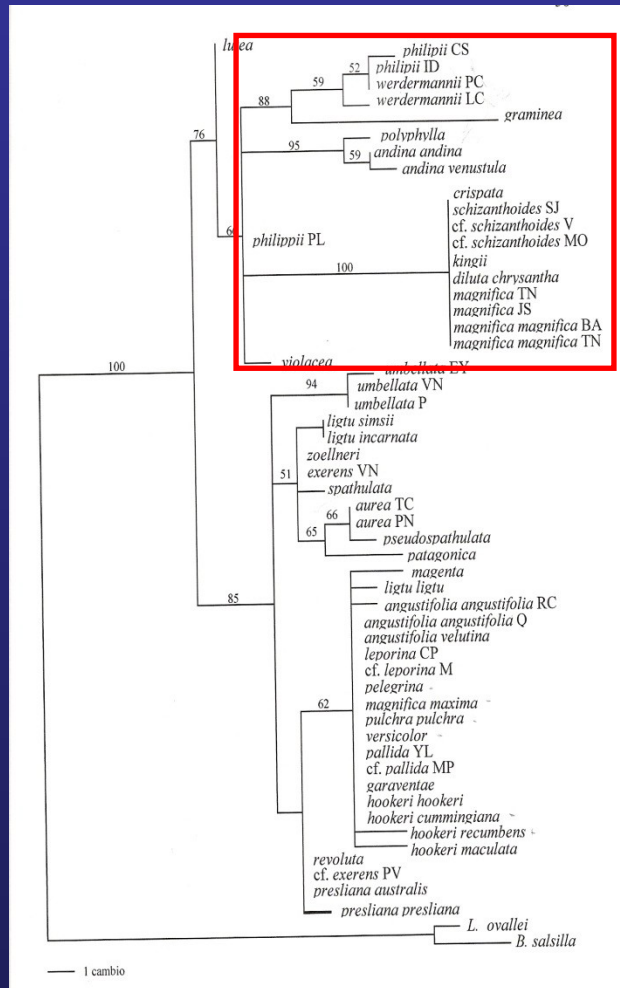


Rasgos Florales

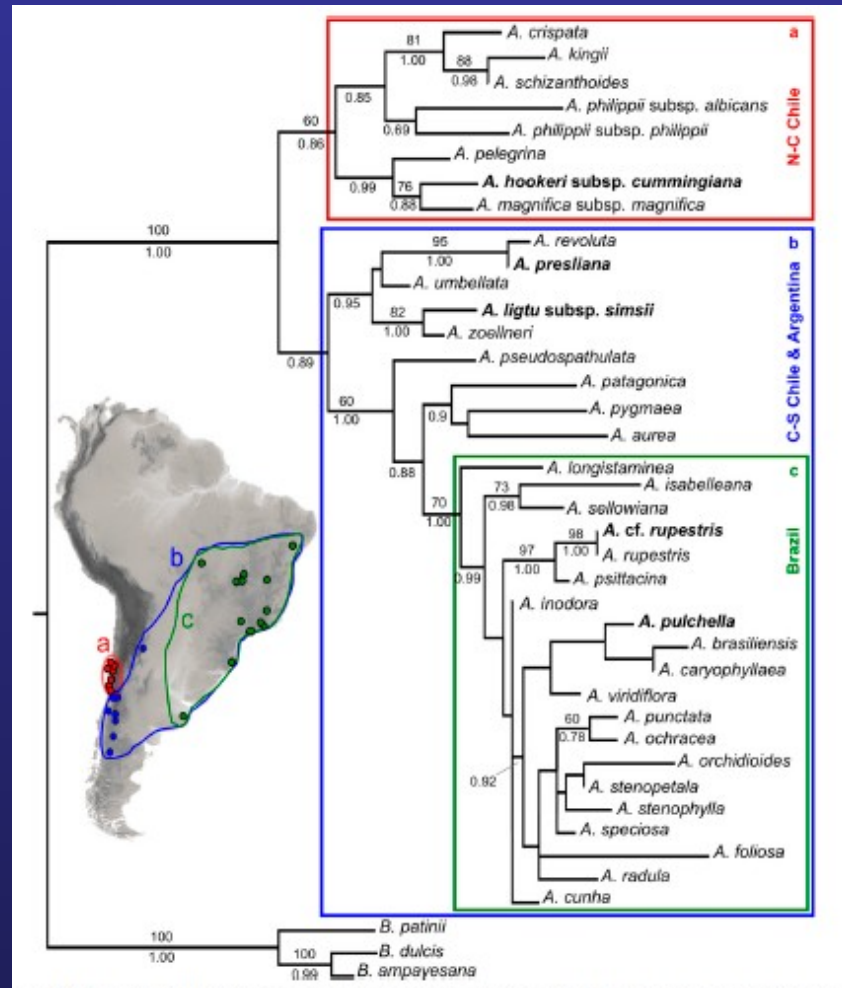


PCA morfología floral de *Alstroemeria*

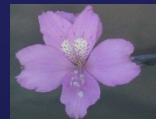
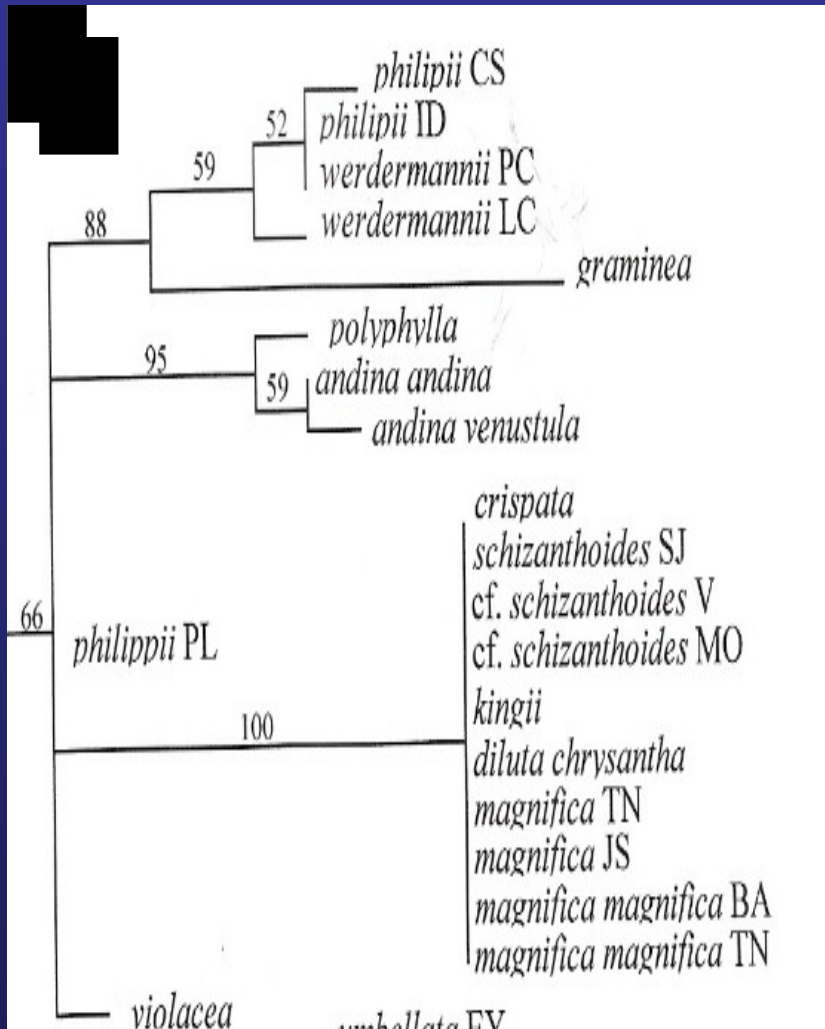




Rougier, 2005. Filograma de uno de los 480 árboles de MP, basado en secuencias de trnF-ndhJ

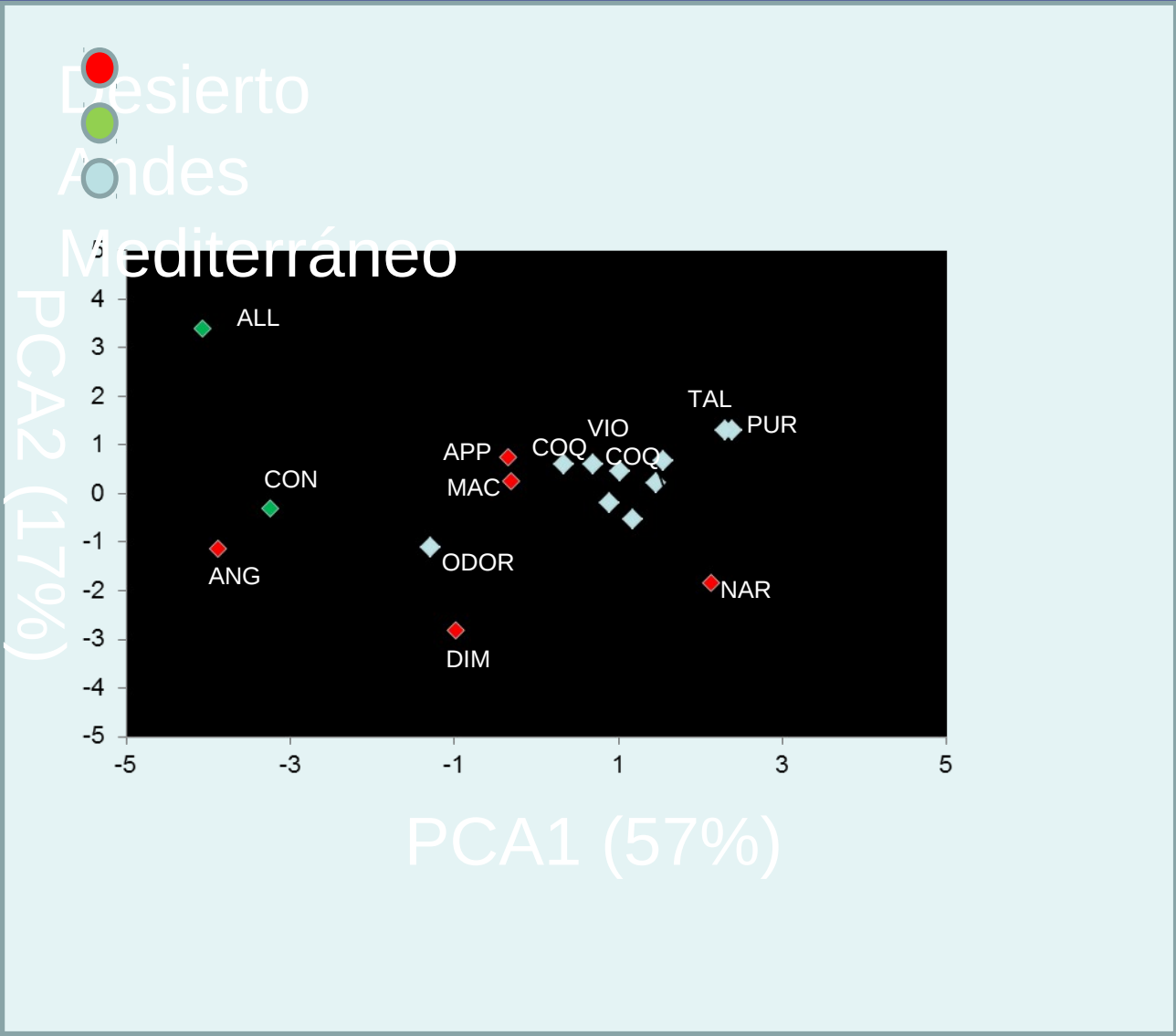


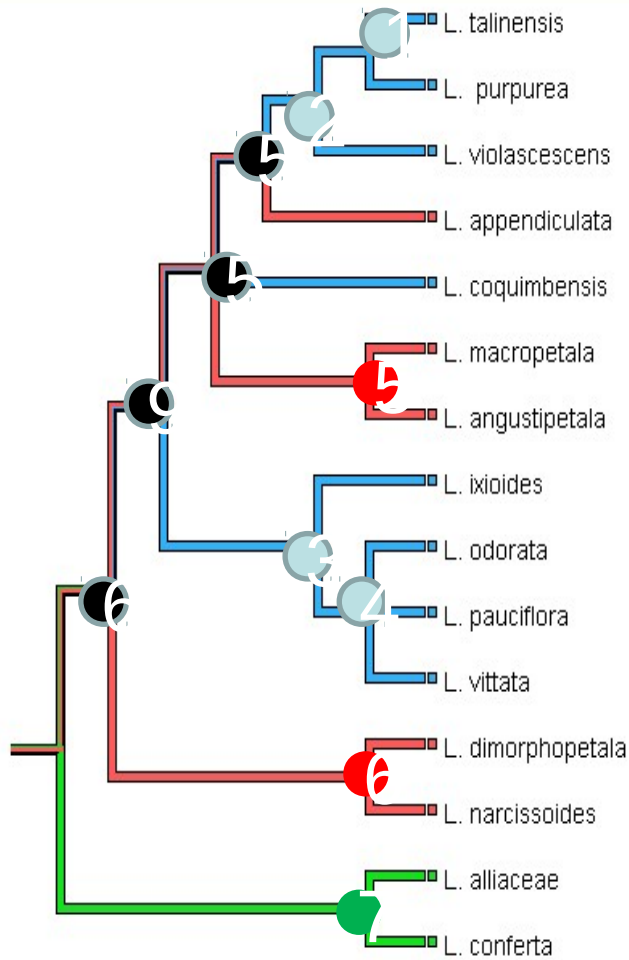
Chacón et al. , 2012. Filograma obtenido por ML, basado en ITS y 4 regiones cloroplastidiales



Rougier, 2005. Sección de filograma mostrando clado

PCA rasgos florales en *Leucocoryne*





	TASA: Morf/Gen
MED-MED	
TAL-PUR	0,09
A1-VIOL	1,59
ODO-PAU	2,29
PAU-VIT	0,15
IXI-A4	0,27
AND-AND	
ALL-CONF	1,60
DES-DES	
DIM-NAR	3,11
MACR-ANG	3,57

Mediterráneo: 0,39 $t: p < 0.01$

Desierto: 3,34

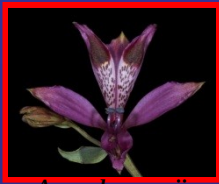
Andes: 1,60

Árbol obtenido por
análisis bayesiano de

... ADN



A. graminea



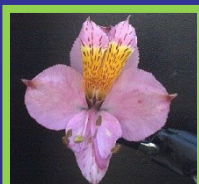
A. werdermannii



A. violacea



A. umbellata



A. exerens



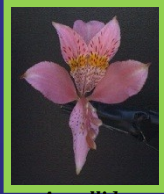
Denise Rougier
U. Andrés Bello



A. polyphylla



A. schizanthoides



A. pallida



A. hookeri



A. zoellneri



A. ligtu simii



A. diluta



A. angustifolia



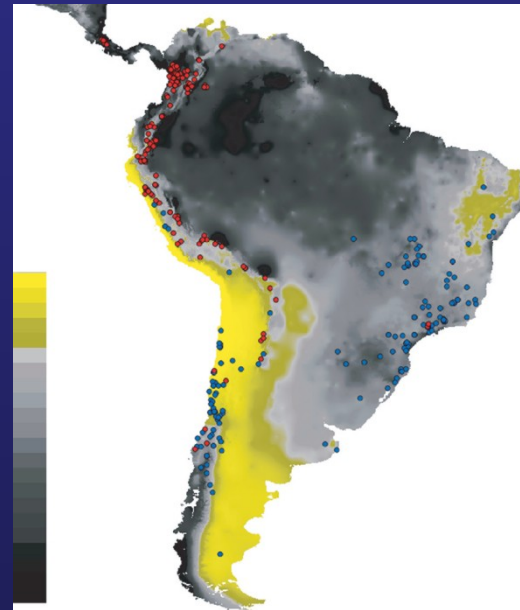
A. presliana



A. versicolor

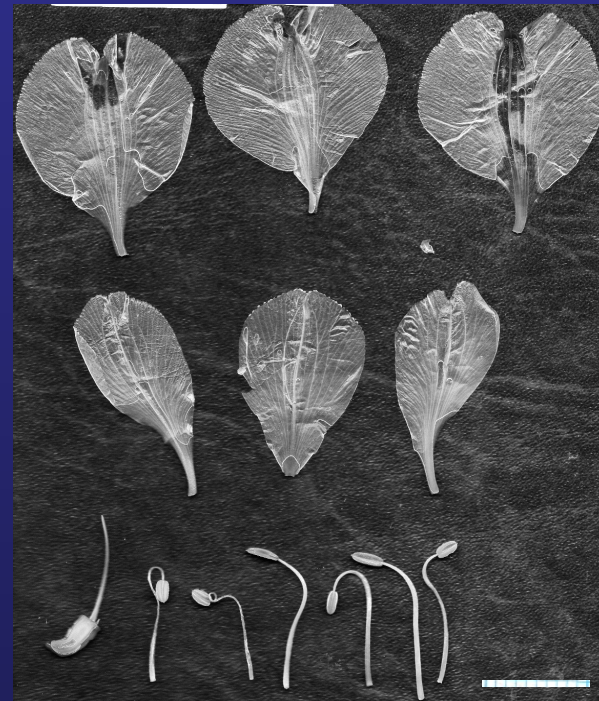
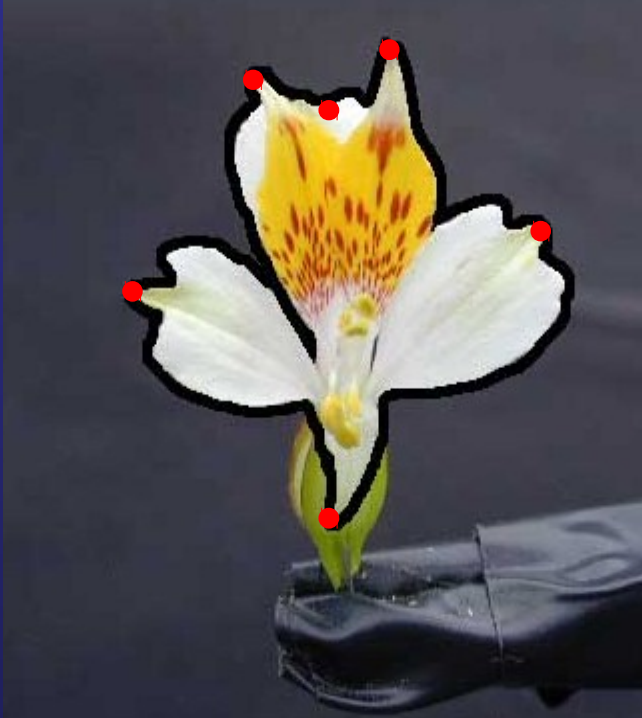


A. pulchra

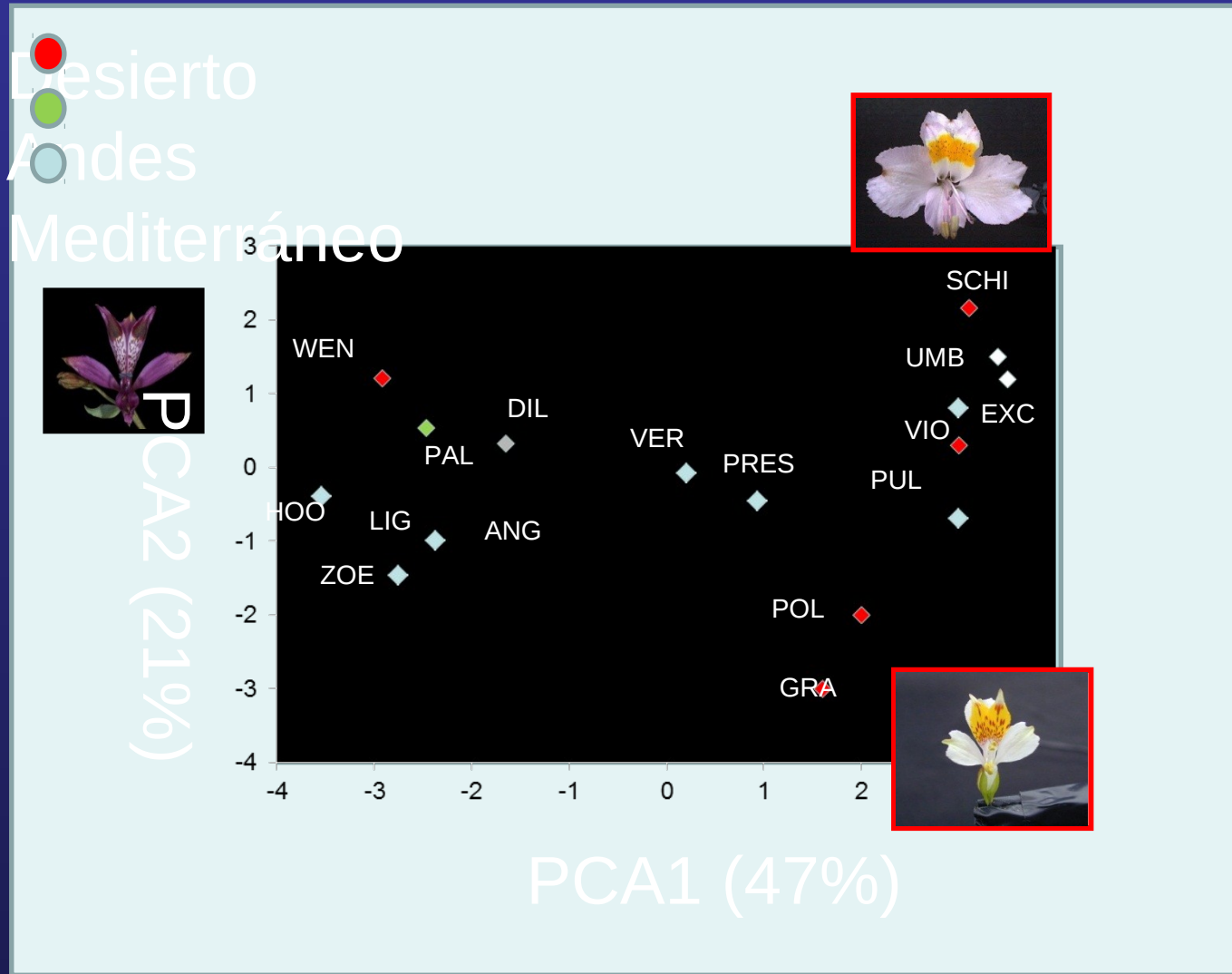


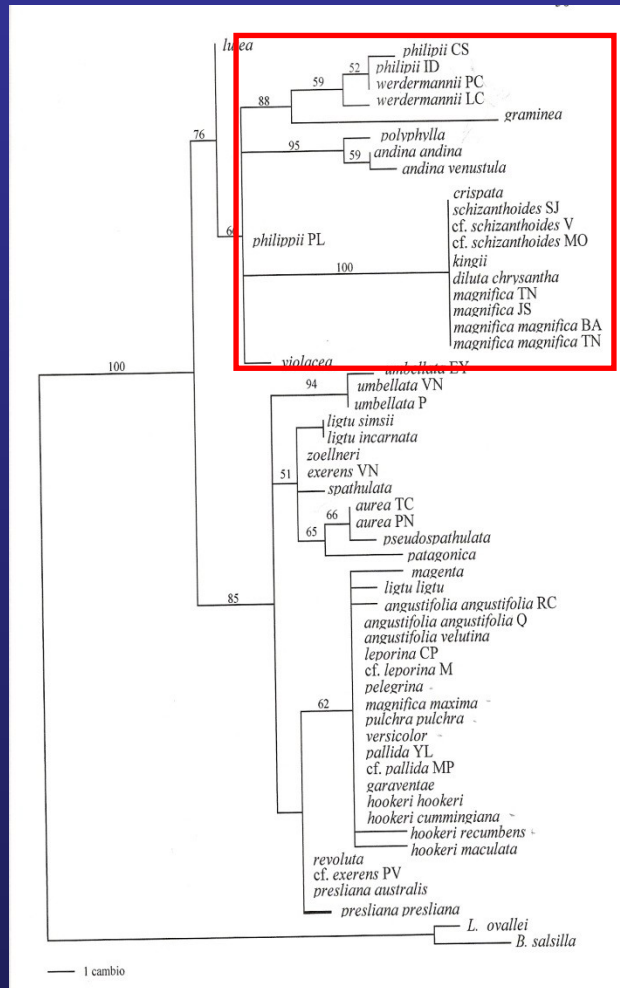
Distribución de *Alstroemeria* (ptos
Chacón et al, 2012)

Rasgos Florales

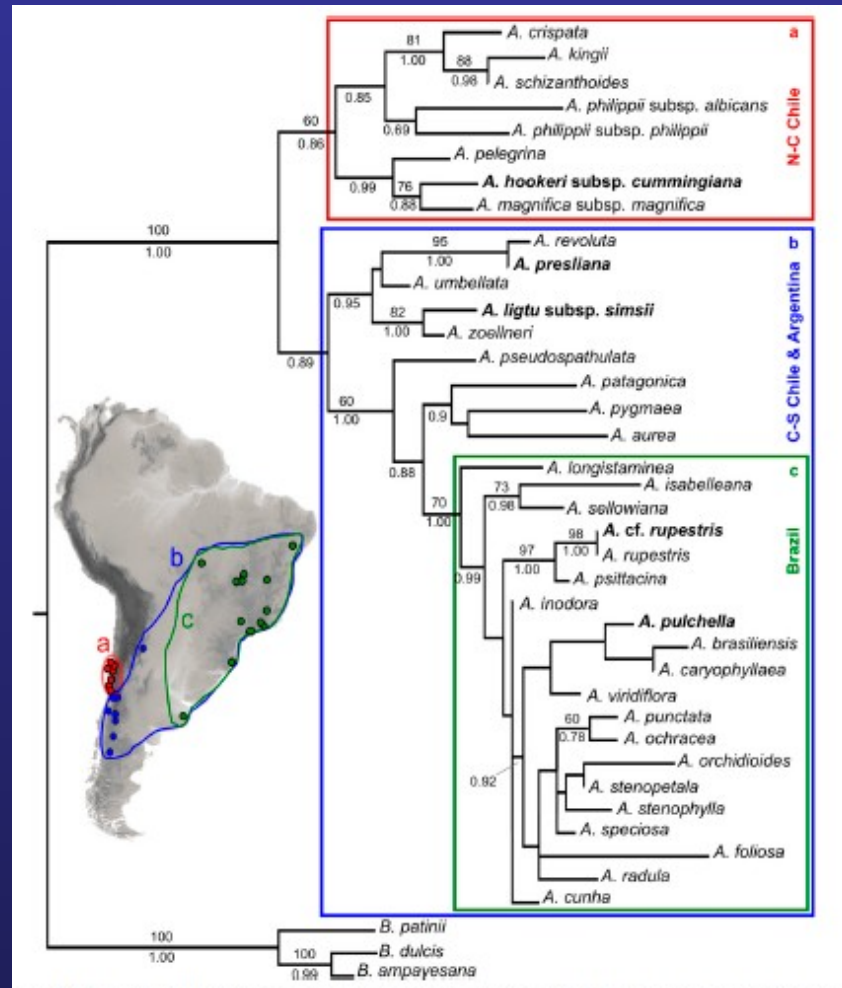


PCA morfología floral de *Alstroemeria*

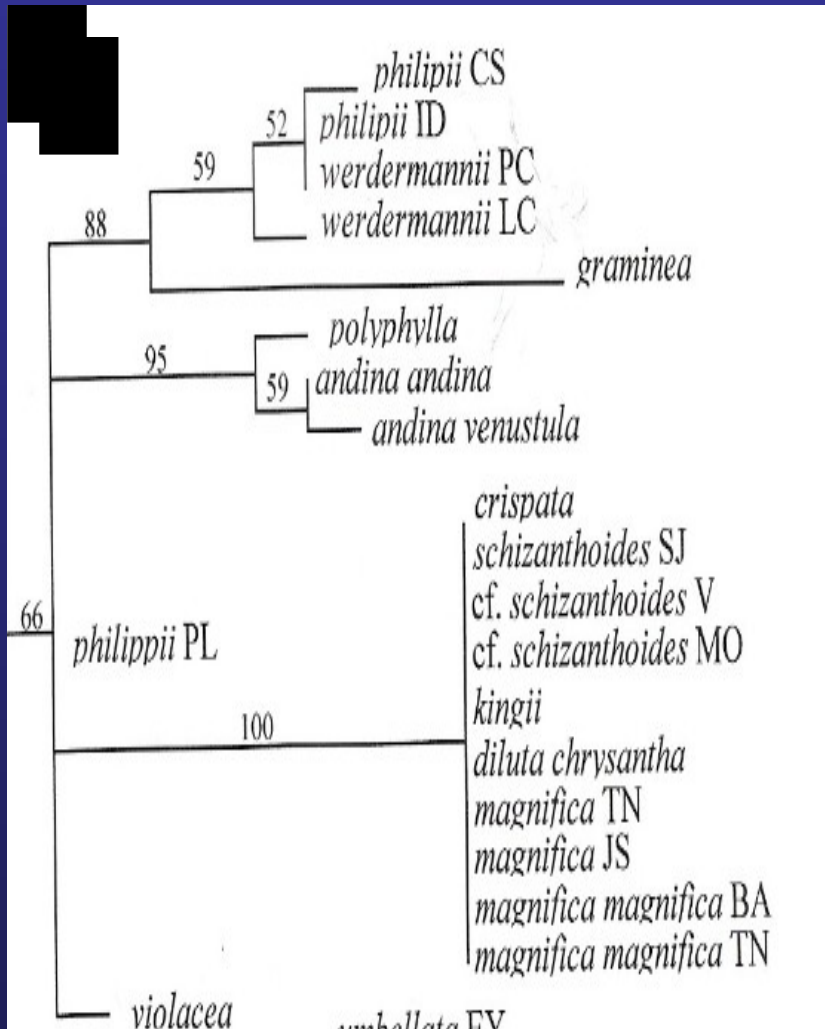




Rougier, 2005. Filograma de uno de los 480 árboles de MP, basado en secuencias de trnF-ndhJ



Chacón et al. , 2012. Filograma obtenido por ML, basado en ITS y 4 regiones cloroplastidiales

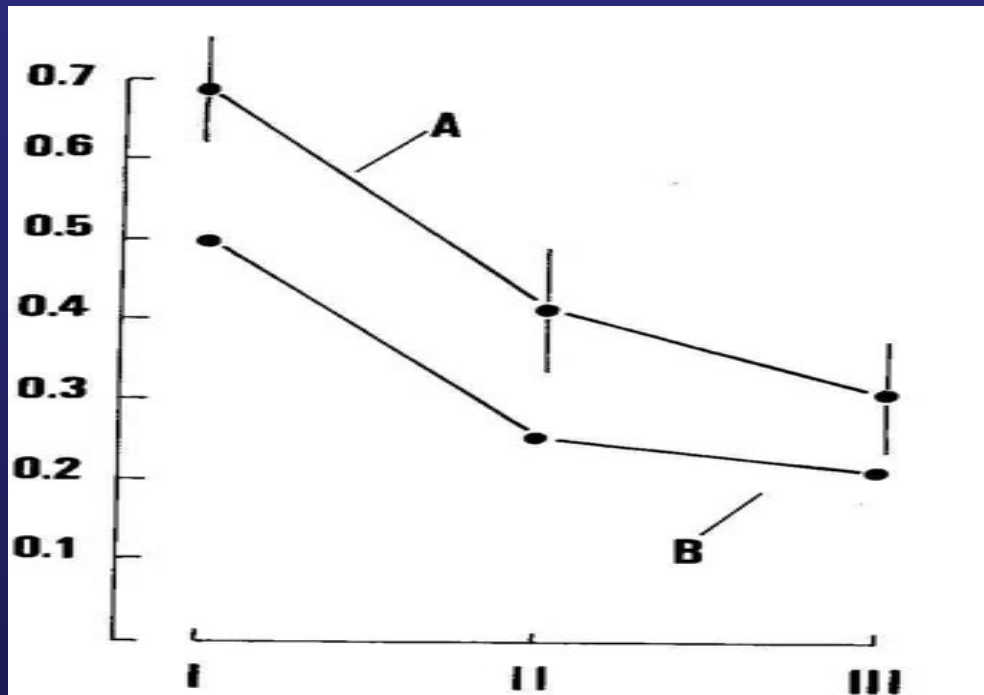


Rougier, 2005. Sección de filograma mostrando clado



Tasa de Visitas
Polinizadores

Baja tasa de visita de
polinizadores en ambientes
andinos



Nivel de Altitud

DIGITALIZACIÓN DE DATOS DE POLINIZADORES DE CHILE, INTERACCIÓN INSECTO-PLANTA Y DISTRIBUCIÓN

Cecilia Smith-Ramírez, Karen Yáñez Ramírez, Instituto Ecología y Biodiversidad, Universidad de Chile, 5 de Mayo de 2011

munitarios:

, F. 2009: Punta Teatinos-Juan Soldado, IV región; semi-

1982: Farellones, RM; alta montaña

rez et al., 2005. Islas de Chiloé Bosques templados

específicos

mente 250 especies de plantas

Polinizadores especies de *Schizanthus*

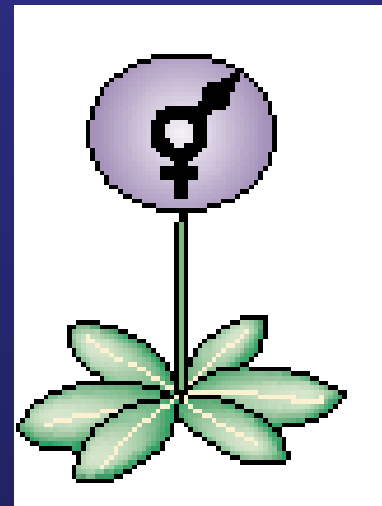
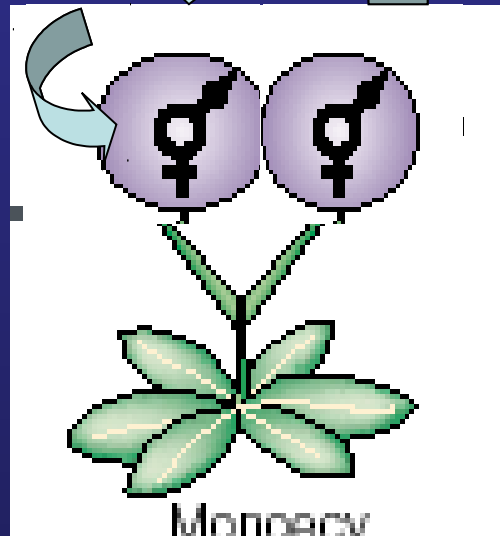
Species	PS	Hymenoptera	Diptera	Lepidoptera	Hummingbirds	N	FO
● <i>S. alpestris</i>	B	100	0	0	0	342	340
● <i>S. candidus</i>	M	—	—	—	—	0	617
○ <i>S. grahamii</i> ²	H	0	0	0	100	81	447
○ <i>S. grahamii</i> ³	H	—	—	—	—	0	354
○ <i>S. hookeri</i> ¹	B	95.2	0	0	4.8	1580	350
○ <i>S. hookeri</i> ²	B	87.4	0	0	12.6	1416	562
○ <i>S. hookeri</i> ³	B	79.5	5.9	0	14.6	390	207
● <i>S. integrifolius</i>	M	81.2	0	18.8	0	32	523
● <i>S. lacteus</i>	M	—	—	—	—	0	312
● <i>S. pinnatus</i>	B	82.9	17.1	0	0	1751	314
● <i>S. porrigens</i>	B	100	0	0	0	503	339
● <i>S. tricolor</i>	B	100	0	0	0	1759	424

Notes: Locations for multiple specimens are *Schizanthus grahamii*², La Parva; *S. grahamii*³, Valle Nevado; *S. hookeri*¹, Valle Nevado; *S. hookeri*², Portillo; *S. hookeri*³, Termas de Chillán.

Polinización cruzada

Geitonogamia

Autopolinización
automática



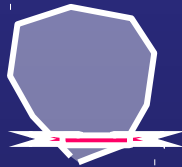
Limitación de Polen y Aseguramiento Reproductivo en el Desierto de Atacama



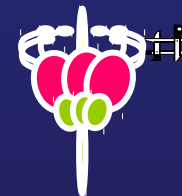
PN Llanos del Challe



Polinización manual



Exclusión de polinizadores naturales



Polinización natural



Polinización natural

Autofertilización

EP vs PM

Aseguramiento

Reproductivo

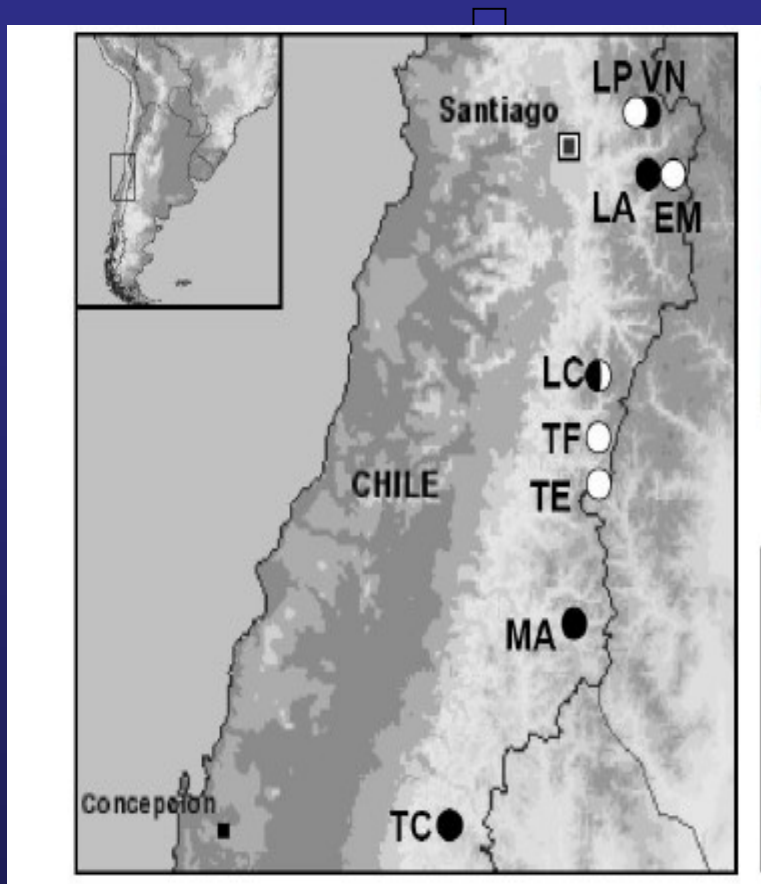
vo

PN vs

EP

	% Frutos producidos			Tasas	
	Excl. Poliniz	Pol. Manual	PN Emas	Autofer Excl/Man	Falla Polin. PN-E/Man
Anuales					
<i>Cistanthe grandiflora</i>	86	100	65	0.86	0.35
<i>Cistanthe longiscapa</i>	81	92	42	0.88	0.54
<i>Oenothera coquimbensis</i>	100	100	11	1.00	0.89
<i>Shizanthus candidus</i>	100	95	56	1.05	0.41
Herbáceas perennes					
<i>Alstroemeria werdermannii</i>	11	86	79	0.13	0.08
<i>Alstroemeria philipii</i>	0	68	14	0.00	0.59
<i>Quinchamalium chilense</i>	54	94	47	0.57	0.49
<i>Rhodophiala bagnoldii</i>	60	92	72	0.65	0.21
<i>Zephyra elegans</i>	33	70	48	0.48	0.31
Arbustos					
<i>Solanum heternatherum</i>	0	74	50*	0.00	0.32
<i>Solanum remyanum</i>	12	80	5	0.15	0.74
<i>Adesmia agryophylla</i>	8	90	16	0.09	0.82
<i>Balbisia peduncularis</i>	0	86	86*	0.00	0.42
<i>Nicotiana solanifolia</i>	15	85	47	0.18	0.45
<i>Nolana divaricata</i>	16	64	20	0.25	0.68
<i>Nolana rupicola</i>	10	96	44	0.10	0.40

Limitación de polen en ambientes altoandinos



Pérez, Arroyo y Medel, 2009 *A*

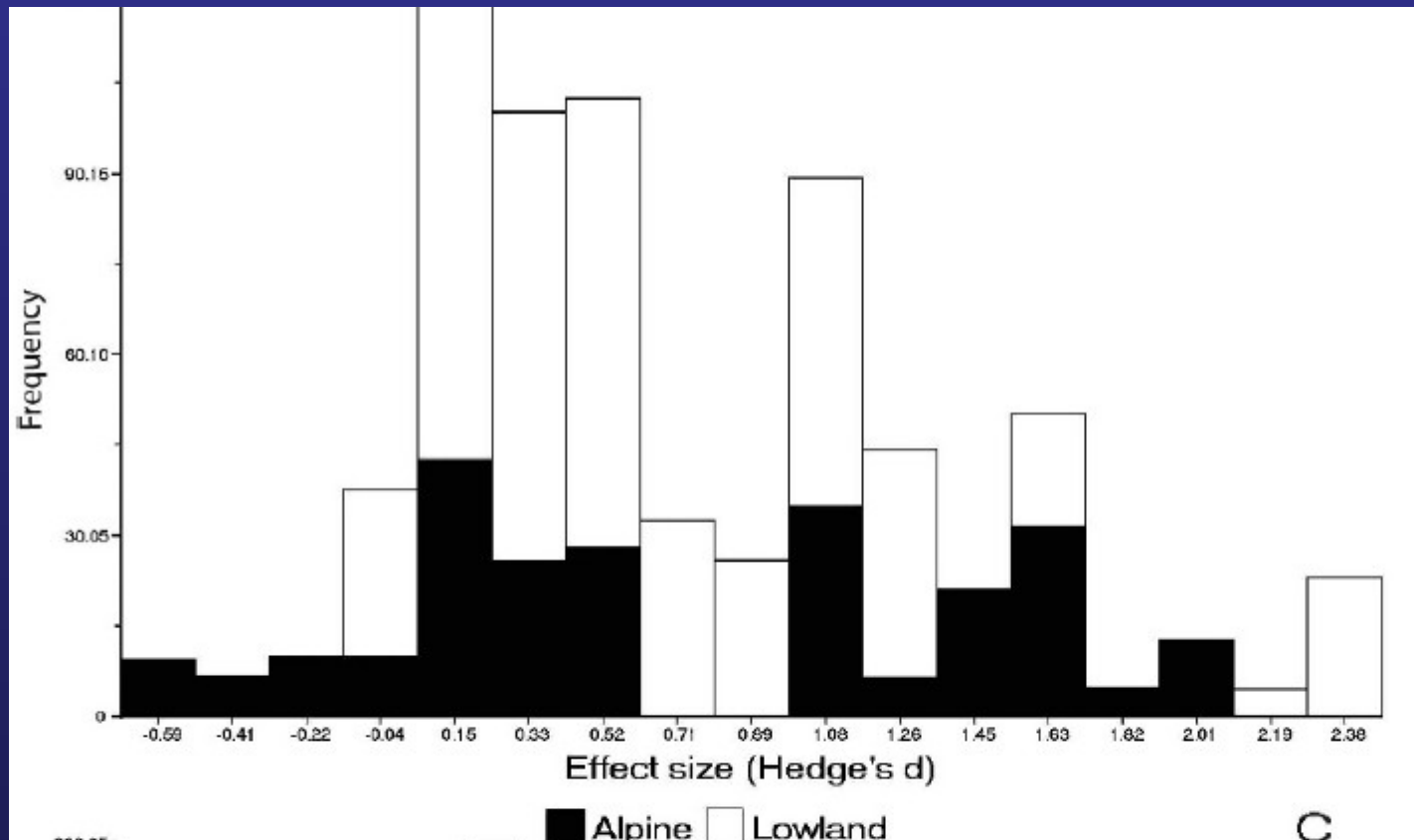
Consecuencias especialización: Mayor vulnerabilidad a fluctuaciones de polinizadores

Location	Year	% Fruit			PF	RAS
		H	E	N	1 - E/H	1 - E/N
<i>S. grahamii</i>						
PAR	2004	90	66	81	0.26	0.18
PAR	2006	99	94	90	0.05	-0.04
PAR	2007	86	11	46	0.87	0.76
EMB	2007	76	26	49	0.66	0.46
TER	2007	85	34	89	0.60	0.62
<i>S. hookeri</i>						
NEV	2004	81	51	60	0.37	0.15
NEV	2006	96	73	77	0.25	0.06
LAG	2007	90	60	59	0.33	-0.02
POR	2007	84	60	64	0.28	0.06
MAU	2007	94	76	71	0.18	-0.07

tasa de falla de polinizadores

Pérez et al. 2009

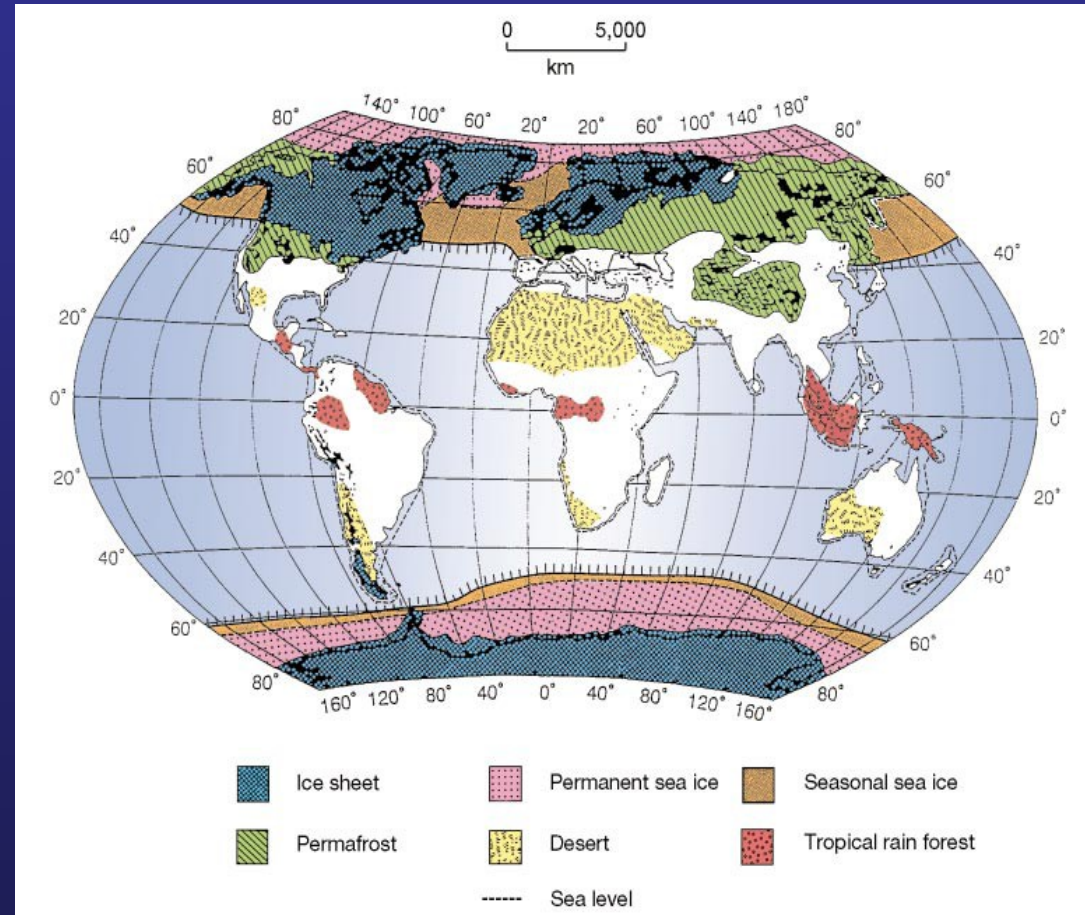
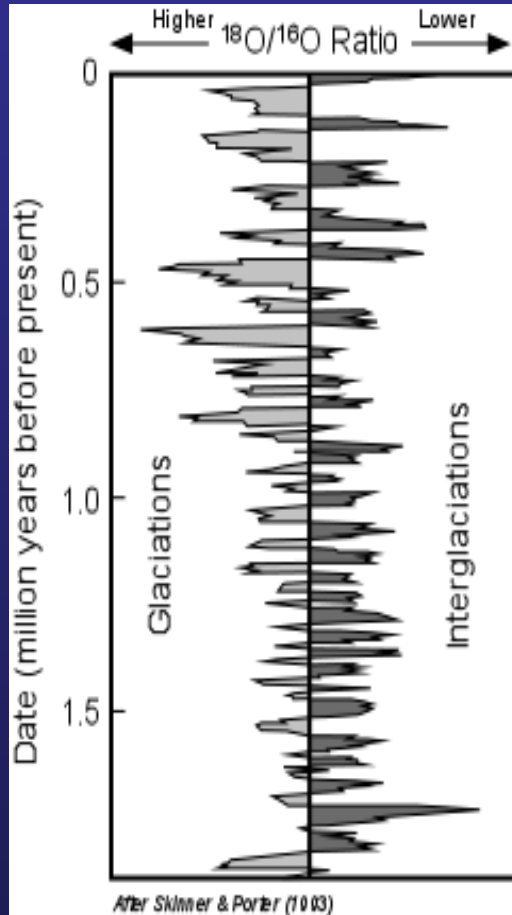
Resultados de un meta-análisis sobre limitación de polen en ambientes alpinos



García-Camacho et al., 2009

¿Por qué hay tanta
diversificación floral en
ambientes donde hay pocos
polinizadores?

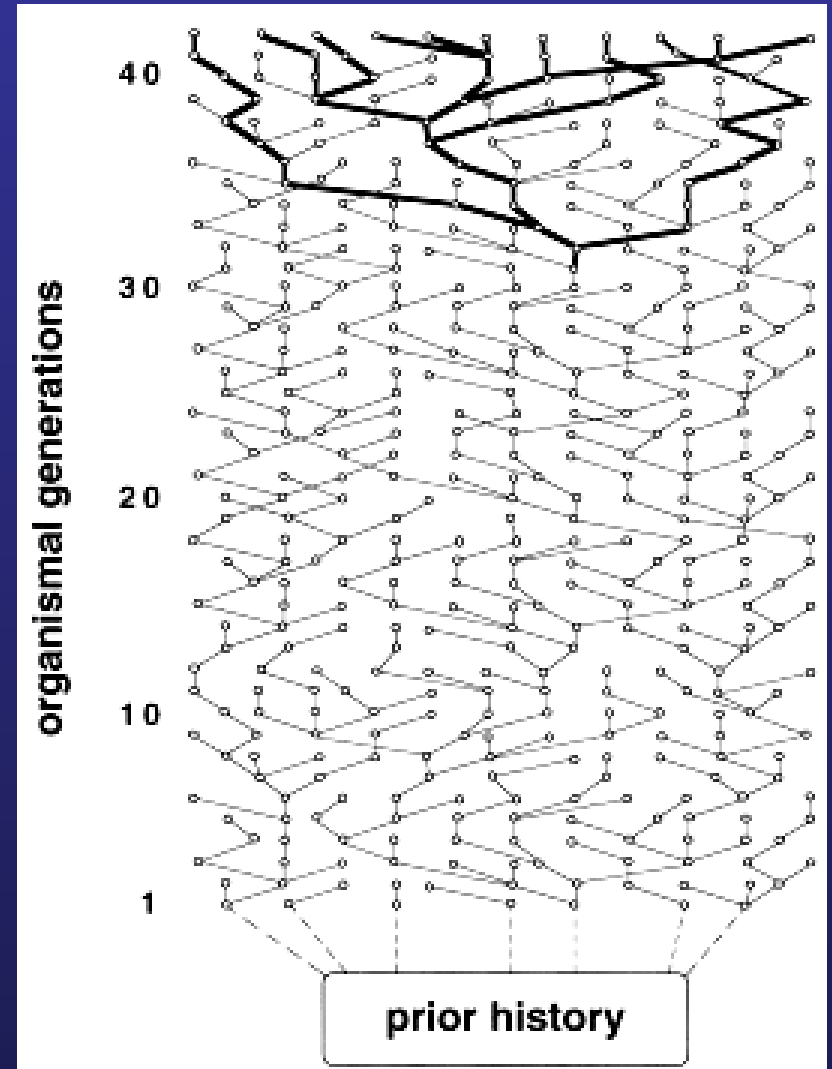
Respuesta de la vegetación a cambios climáticos: ciclos glaciales del Cuaternario



Filogeografía

Distribución geográfica de los linajes, especialmente aquellos dentro y entre especies cercanamente emparentadas

Avise et al., 1987.

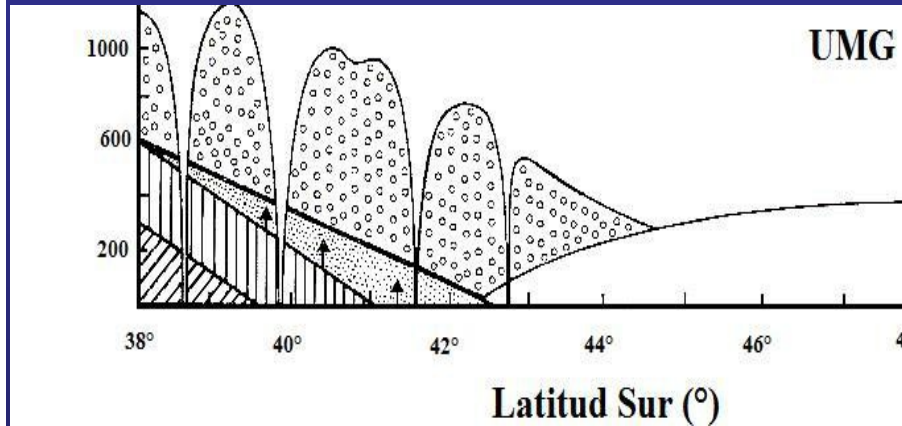
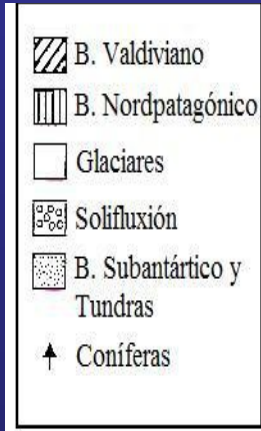


Avance de masas de hielos durante el último máximo glacial

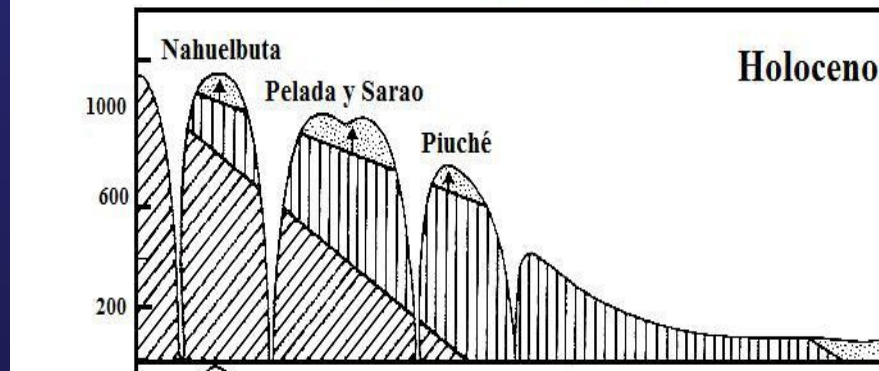


UMG: 29.400 y
14.450 años ¹⁴C

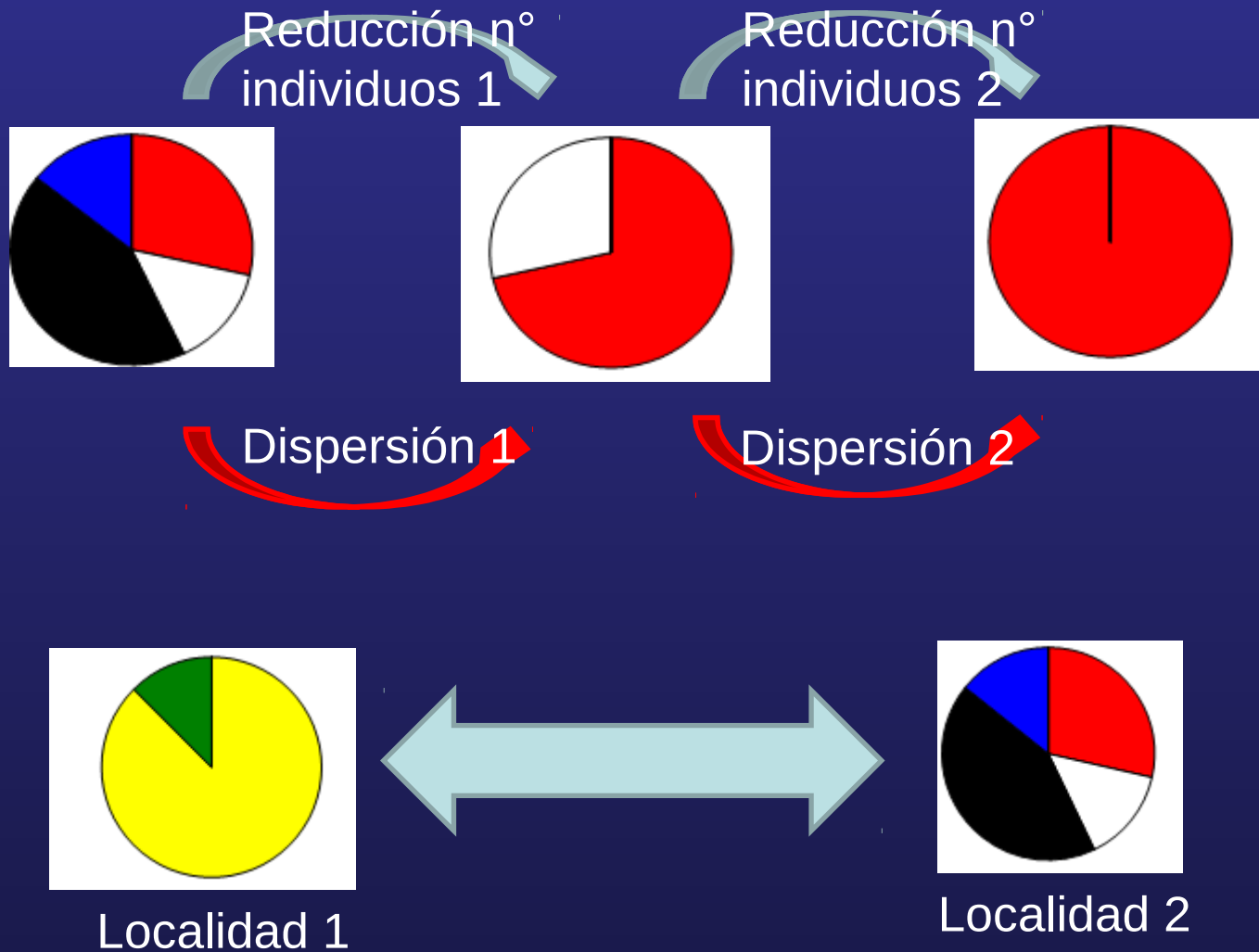
Contracción de los rangos de distribución durante el UMG y posterior expansión durante holoceno

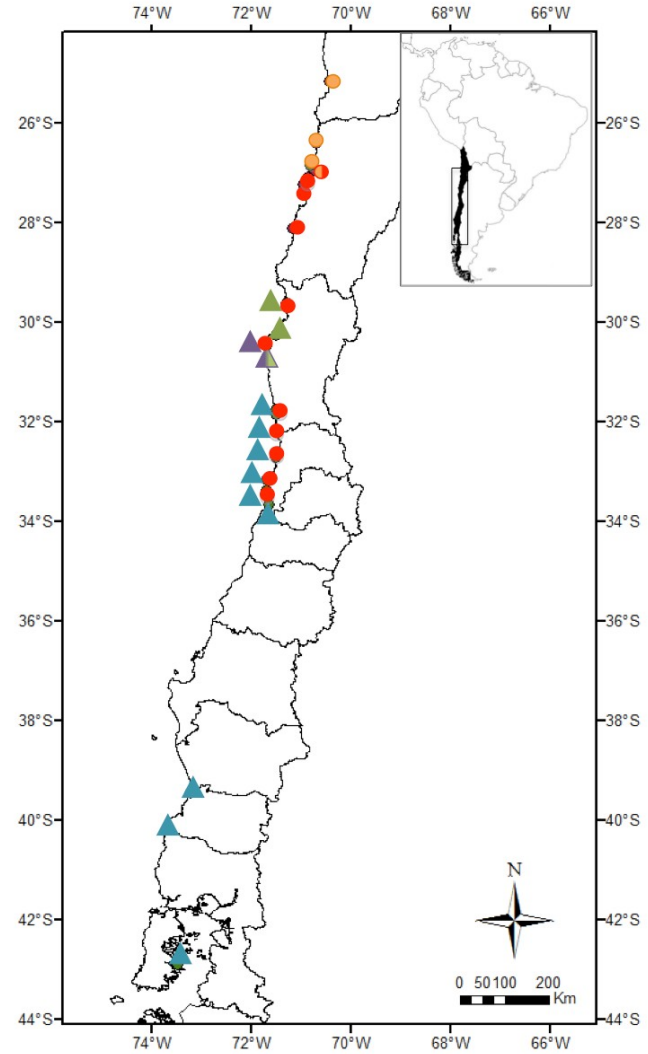


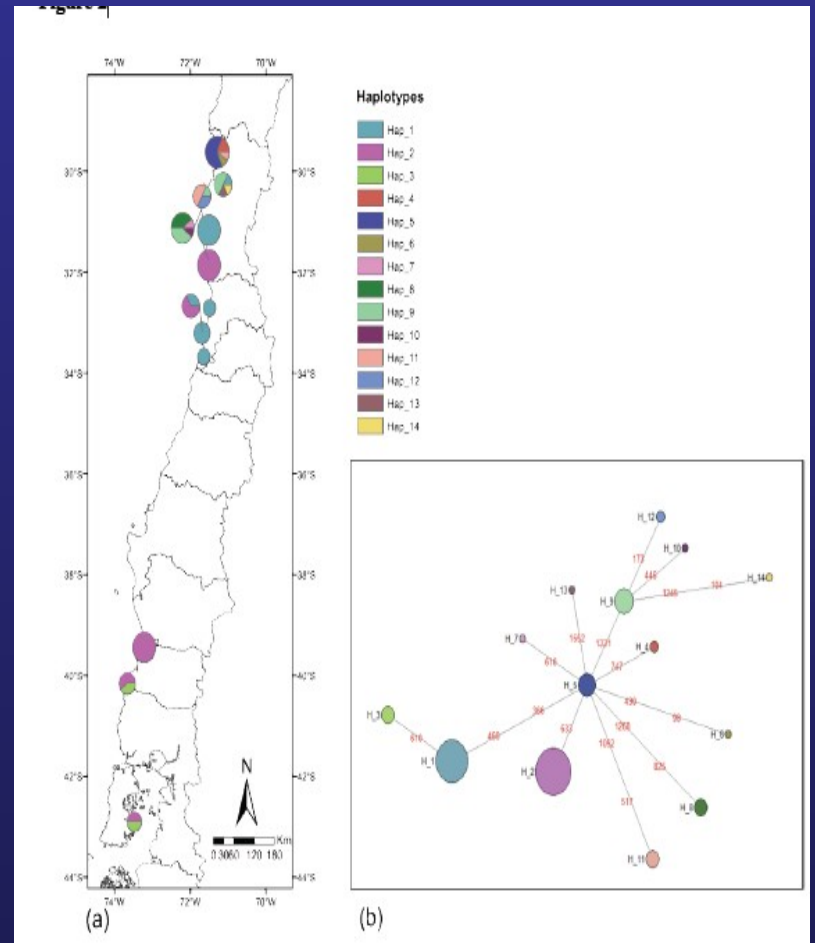
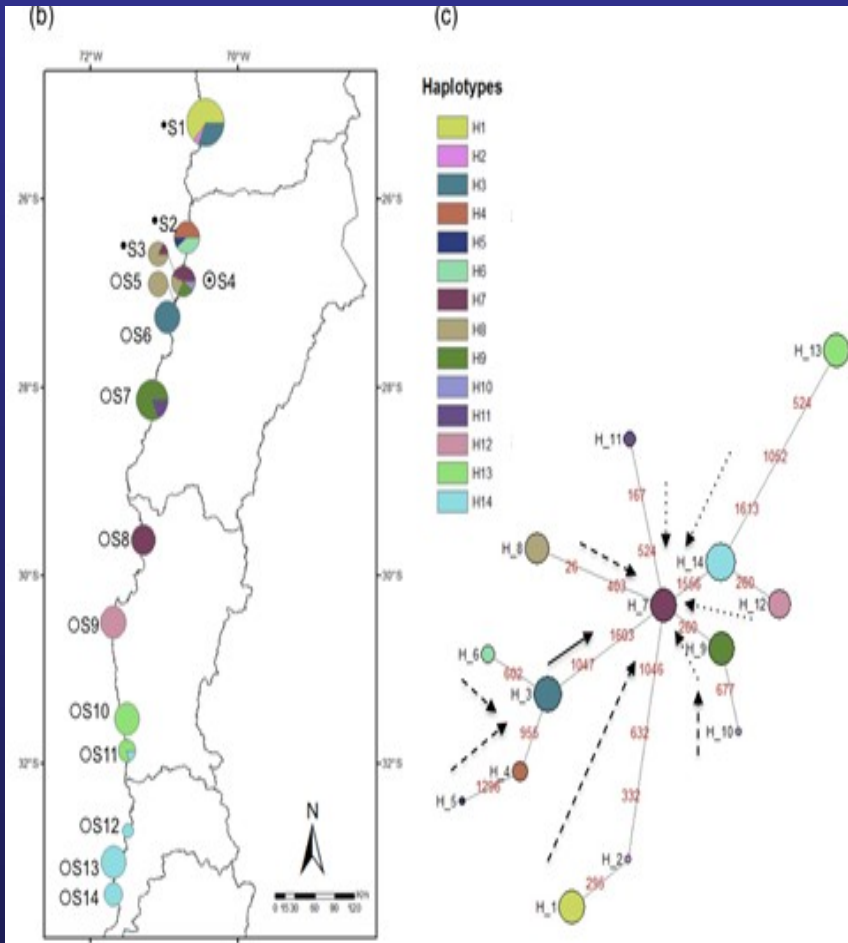
Cordillera de la Costa, Chile (38°-48°S)



Patrones de Variabilidad genética: ADN del cloroplasto

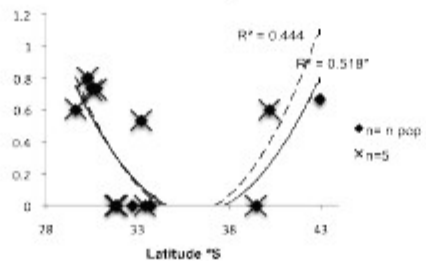




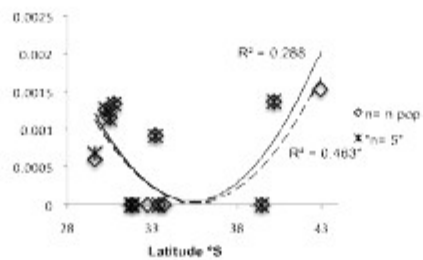


Herbaceous complex

(a) Latitudinal variation in haplotype diversity

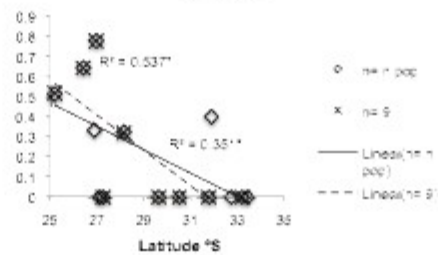


(b) Latitudinal variation in nucleotide diversity

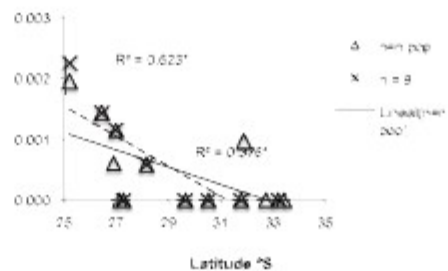


Shrubby complex

(c) Latitudinal variation in Haplotype diversity



(d) Latitudinal variation in nucleotide diversity



	Shrubby lineage	Herbaceous lineage
N	130	89
n° pops	14	13
bp	1649	1749
K	14	14
S	18	17
Hd	0.904	0.808
π	0.0021	0.0013
Π	3.442	2.231
Gst	0.76	0.561
Nst	0.81	0.532
<i>P</i> (Nst>Gst)	0.04*	n.s.
D	0.111	0.176
FS	-0.267	-3.336
SSD	0.004 (n.s)	0.05 (*)

Sistemática molecular

Relaciones de
parentesco

Tiempos de
divergencia

Patrón de distribución
actual de taxa

Biogeografía

Origen grupos
taxonómicos

Disyunciones:
vicarianza vs dispersión

Mecanismos de
especiación

Respuesta a cambios
climáticos