

Online Supplemental Material

Appendix S.1. Sample ID; Taxon (Accepted Name); Voucher (Herbarium); Provenance; [Latitude, Longitude].

Otoba_acuminata_MM2720; **Otoba acuminata** (Standl.) A.H. Gentry; Mary Merello, Allison Miller & Beatriz Wong 2720 (MO); Panama; [09°13'10"N, 079°21'38"W].

Otoba_cyclobasis_MT281; **Otoba cyclobasis** T.S.Jaram. & Balslev; Milton Tirado, E. Albuja & M. Chapiro 281 (MO); Ecuador; [00°43'N, 078°53'W]. Otoba_glycycarpa_LV25198; **Otoba glycycarpa** (Ducke) W.A.Rodrigues & T.S.Jaram.; Luis Valenzuela G., Jaime Flores, Gerry Shareva M., et al. 25198 (MO); Peru; [11°21'39"S 074°02'31"W]. Otoba_gordoniiifolia_RZ196; **Otoba gordoniiifolia** (A. DC.) A.H. Gentry; R.A. Zahawi 196 (MO); Ecuador; [00°05'N, 079°40'W]. Otoba_gracilipes_DC884; **Otoba gracilipes** (A.C. Sm.) A.H. Gentry; D. Cárdenas L. 884 (MO); Colombia; [7°26'20.0"N, 77°07'15.8"W]. Otoba_latialata_RC4751; **Otoba latialata** (Pittier) A.H. Gentry; R. Callejas et al. 4751 (MO); Colombia; [7°0'59.36"N, 76°18'31.52"W]. Otoba_novogranatensis_AG476; **Otoba novogranatensis** Moldenke; A. Grijalva, C. Aulestia & J. Taicúz 476 (MO); Ecuador; [01°02'N, 078°15'W]. Otoba_novogranatensis_CK681; **Otoba novogranatensis** Moldenke; C. Kernan & P. Phillips 681 (MO); Costa Rica; [08°27'N, 083°33'W]. Otoba_novogranatensis_EB500; **Otoba novogranatensis** Moldenke; E. Bello C. 500 (MO); Costa Rica; [10°18'36"N, 084°42'00"W]. Otoba_novogranatensis_GP2325; **Otoba novogranatensis** Moldenke; G. A. Tipaz, P. Méndez, H. Vargas & M. Chapiro 2325 (MO); Ecuador; [00°45'N, 078°47'W]. Otoba_novogranatensis_LG20482; **Otoba novogranatensis** Moldenke; L. D. Gómez P., R. L. Liesner & E. J. Judziewicz 20482 (MO); Costa Rica; [09°38'24"N, 082°48'30"W]. Otoba_novogranatensis_WP16081; **Otoba novogranatensis** Moldenke; W. A. Palacios & M. Tirado 16081 (MO); Ecuador; [00°45'N, 078°56'W]. Otoba_novogranatensis_WS36336; **Otoba novogranatensis** Moldenke; W. D. Stevens & O. M. Montiel J. 36336 (MO); Nicaragua; [12°17'36"N, 085°05'58"W]. Otoba_parvifolia_DN9151; **Otoba parvifolia** (Markgr.) A.H. Gentry; D. A. Neill, F. Hurtado & A. A. Alvarado 9151 (MO); Ecuador, Napo; [00°36'S, 077°23'W]. Otoba_parvifolia_MN37243; **Otoba parvifolia** (Markgr.) A.H. Gentry; M. H. Nee 37243 (MO); Bolivia; [17°39'S, 063°43'W]. Otoba_parvifolia_MS1182; **Otoba parvifolia** (Markgr.) A.H. Gentry; M.S. Silveira 1182 (MO); Brazil, Acre; [08°17'48"S, 071°08'36"W]. Otoba_parvifolia_RV19070; **Otoba parvifolia** (Markgr.) A.H. Gentry; R. Vásquez & R. Apanú 19070 (MO); 08 September 1994; Peru, Amazonas, Condorcanqui; 320 m; [04°51'S, 078°18'W]. Otoba_sp_nov_JP16902; **n/a**; J. J. Pipoly, III, Á. Cogollo P. et al. 16902 (MO); Colombia; [06°29'N, 076°14'W]. Otoba_sp_nov_RC5752; **n/a**; R. Callejas, R. Fonnegra G., F. J. Roldán & A. L. Arbeláez 5752 (MO); Colombia; [07°20'N, 076°30'W]. Otoba_vespertilio_GM12543; **Otoba vespertilio** D. Santam. & J.E. Jiménez; Gordon McPherson 12543 (MO); Panama; [08°47'03"N, 082°10'52"W].

Figure Legends for Appendix S2-S37

Appendix S.2. Heatmap showing the percent reference protein length recovered for all samples across all 353 loci.

Appendix S.3. AMAS summary statistics for each locus.

Appendix S.4. Maximum likelihood results for combined nuclear data excluding *O. vespertilio*. Topology with branchlengths shown above with relationships clarified and support values shown on the cladogram below.

Appendix S.5. Maximum likelihood results for chloroplast data. Topology with branchlengths shown above with relationships clarified and support values shown on the cladogram below.

Appendix S.6. Maximum likelihood results for combined chloroplast and nuclear data including *O. vespertilio*. Topology with branchlengths shown above with relationships clarified and support values shown on the cladogram below.

Appendix S.7. Penalized likelihood divergence time estimations calibrated from minimum (top), median (middle), and maximum (bottom) UCLN dates in Magallón et al. (2015).

Appendix S.8. Penalized likelihood divergence time estimations calibrated from minimum (top), mean (middle), and maximum (bottom) UCLN dates in Massoni et al. (2015).

Appendix S.9. Discrete ancestral character estimation for anther shape.

Appendix S.10. Discrete ancestral character estimation for aril color.

Appendix S.11. Discrete ancestral character estimation for the presence, absence of extrastaminal discs.

Appendix S.12. Discrete ancestral character estimation for filament shape.

Appendix S.13. Discrete ancestral character estimation for the presence, absence of gynoeceium pubescence.

Appendix S.14. Discrete ancestral character estimation for color of leaf abaxial pubescence.

Appendix S.15. Discrete ancestral character estimation for leaf abaxial pubescence.

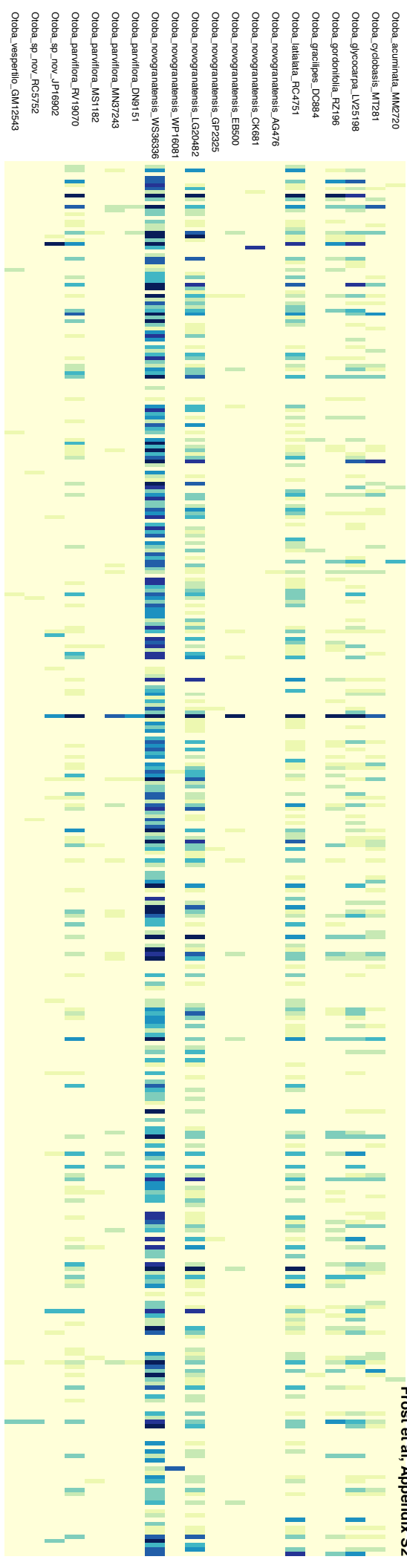
Appendix S.16. Discrete ancestral character estimation for petiole wingedness.

Appendix S.17. Discrete ancestral character estimation for the presence, absence of intramarginal veins.

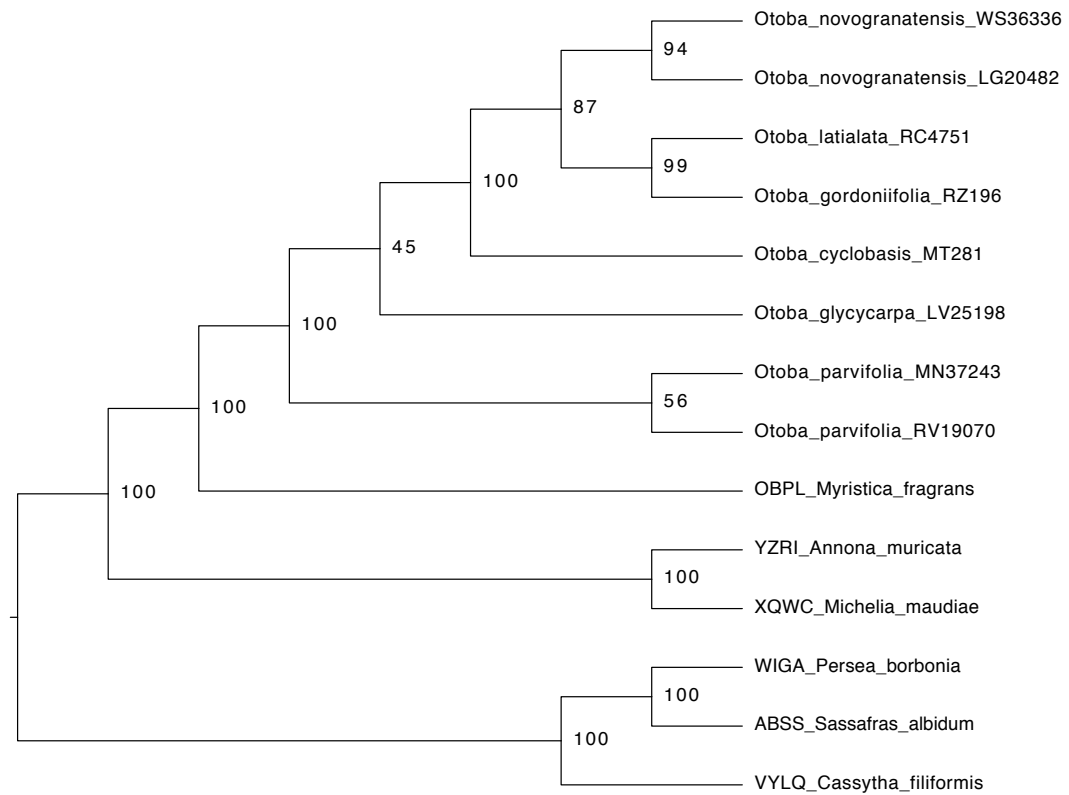
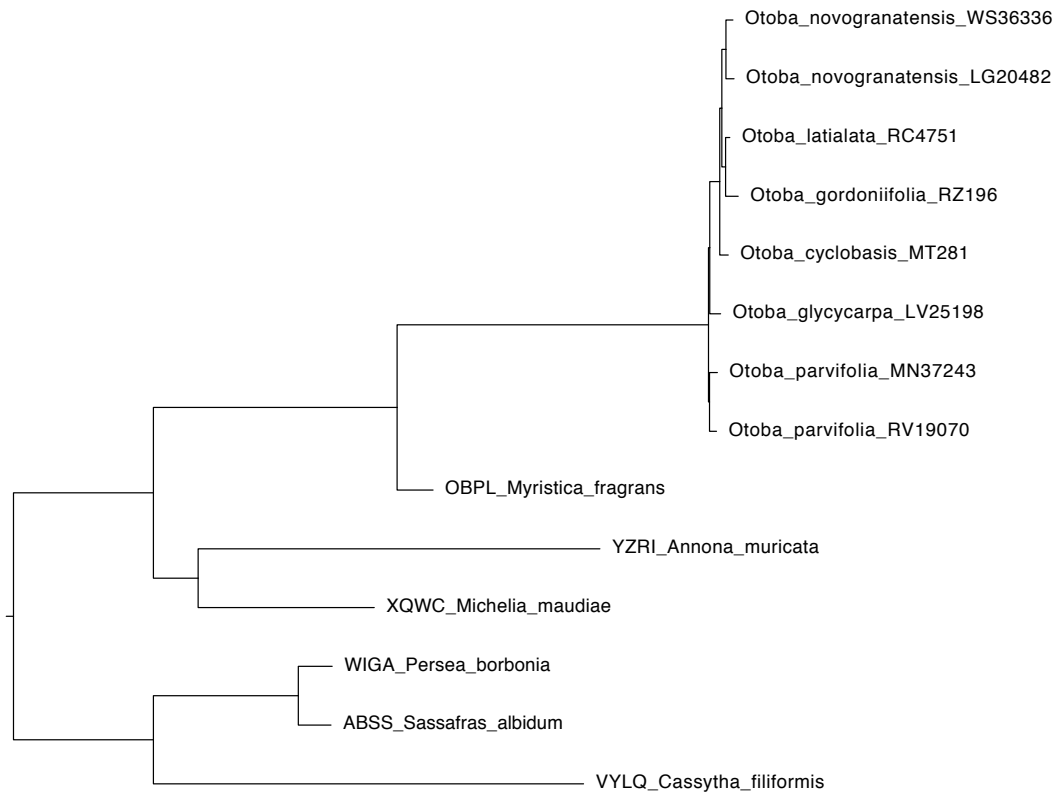
Appendix S.18. Discrete ancestral character estimation for the presence, absence of seed prickles.

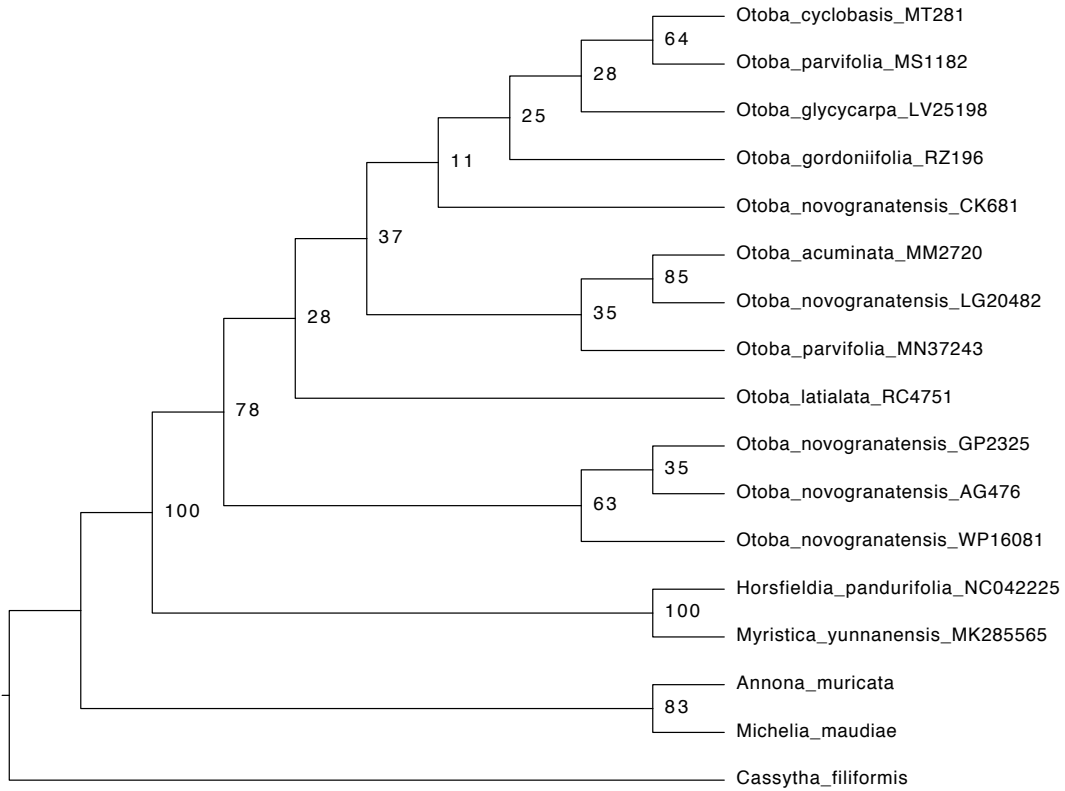
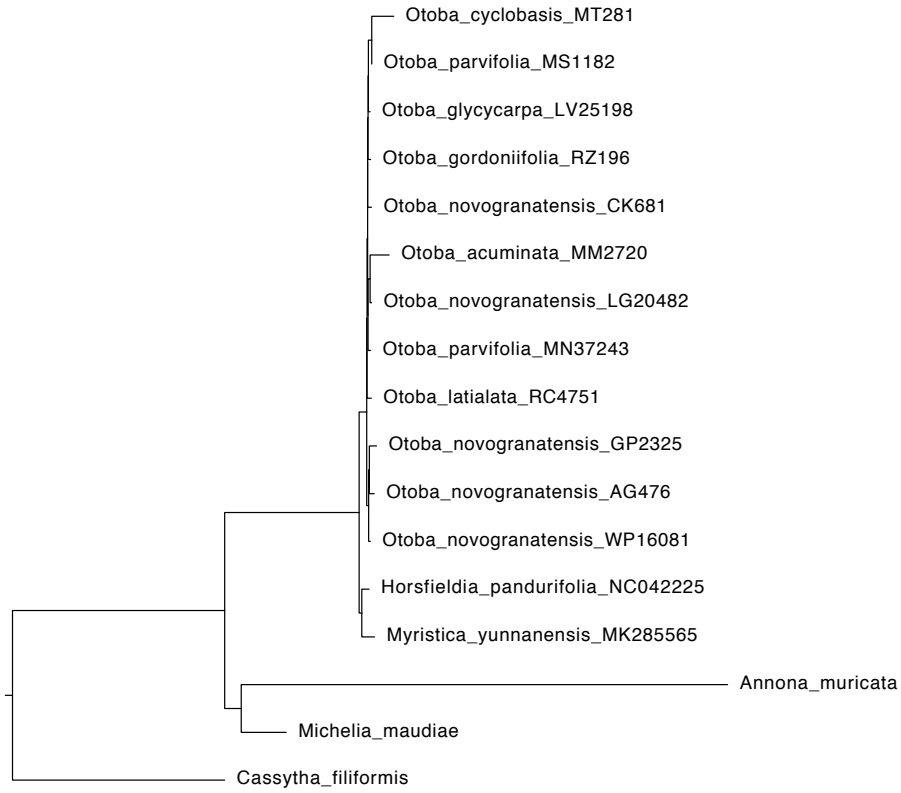
Appendix S.20. Continuous ancestral character estimation for androecium length.

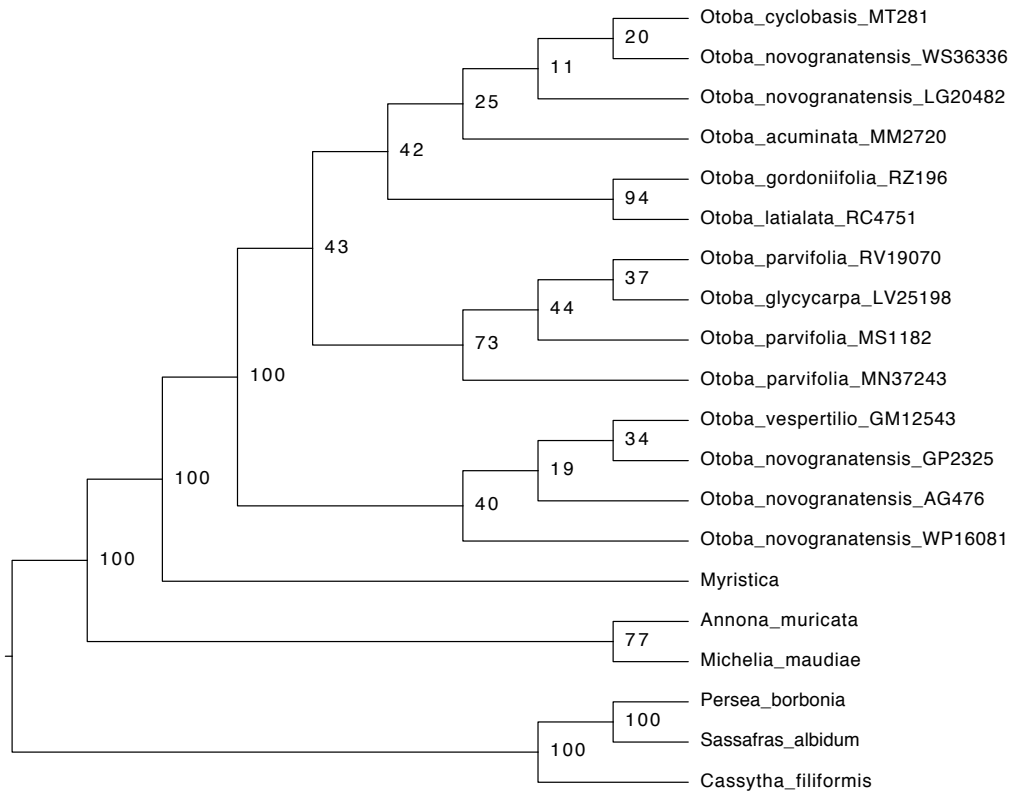
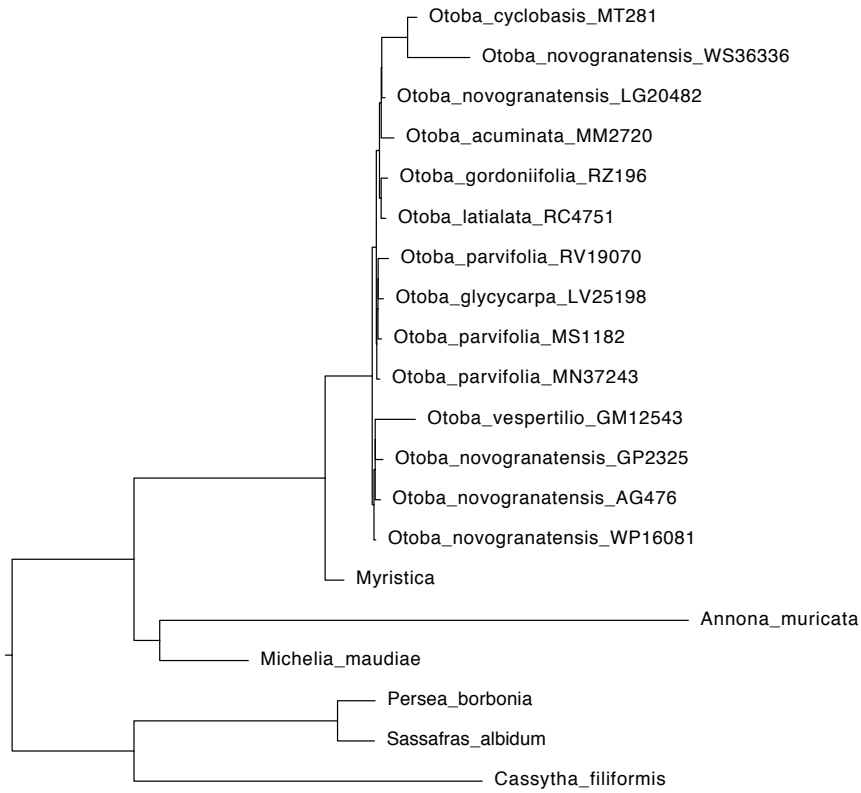
- Appendix S.21.** Continuous ancestral character estimation for anther length.
- Appendix S.22.** Continuous ancestral character estimation for fruit length.
- Appendix S.23.** Continuous ancestral character estimation for fruit width.
- Appendix S.24.** Continuous ancestral character estimation for gynoecium length.
- Appendix S.25.** Continuous ancestral character estimation for lamina length.
- Appendix S.26.** Continuous ancestral character estimation for lamina width.
- Appendix S.27.** Continuous ancestral character estimation for ovary length.
- Appendix S.28.** Continuous ancestral character estimation for ovary width.
- Appendix S.29.** Continuous ancestral character estimation for pericarp thickness.
- Appendix S.30.** Continuous ancestral character estimation for petiole length.
- Appendix S.31.** Continuous ancestral character estimation for petiole width.
- Appendix S.32.** Continuous ancestral character estimation for pistillate perianth length.
- Appendix S.33.** Continuous ancestral character estimation for number of secondary veins.
- Appendix S.34.** Continuous ancestral character estimation for seed length.
- Appendix S.35.** Continuous ancestral character estimation for seed width.
- Appendix S.36.** Continuous ancestral character estimation for staminate pedicel length.
- Appendix S.37.** Continuous ancestral character estimation for staminate perianth length.



Alignment name	No of taxa	Alignment Length	Total matrix cells	Undetermined Characters	Missing Percent	No. variable sites	Proportion variable sites	Parsimony Informative sites	Proportion parsimony informative	AT content	GC content	A	C	G	T	K	M	R	Y	S	W	B	V	H	D	X	N	O	?	
4471. supersonlig. cleanmatrix	4	1778	7112		4498	63.249%	0	0.0000	0	0.0000	0	1	734	456	484	940	0	0	0	0	0	0	0	0	0	0	0	0	4498	0
4527. supersonlig. cleanmatrix	5	1534	7770		4881	62.519%	3	0.00193	0	0.0000	0	1	776	478	780	855	0	0	0	0	0	0	0	0	0	0	0	0	4881	0
4724. supersonlig. cleanmatrix	7	1588	10976		6677	60.933%	15	0.0057	4	0.0255	0	1	1259	877	996	1257	0	0	0	0	0	0	0	0	0	0	0	0	6677	0
4726. supersonlig. cleanmatrix	6	1238	7548		5441	72.089%	2	0.00159	0	0.0079	0	1	545	343	481	738	0	0	0	0	0	0	0	0	0	0	0	0	5441	0
4802. supersonlig. cleanmatrix	6	1735	10410		6148	59.059%	15	0.00865	0	0.0000	0	1	1140	667	997	1458	0	0	0	0	0	0	0	0	0	0	0	0	6148	0
4806. supersonlig. cleanmatrix	6	834	4844		2857	57.787%	1	0.00121	0	0.00121	0	1	552	340	503	692	0	0	0	0	0	0	0	0	0	0	0	0	2857	0
4808. supersonlig. cleanmatrix	6	1733	10398		5856	56.319%	10	0.0057	1	0.0058	0	1	1169	882	1190	1201	0	0	0	0	0	0	0	0	0	0	0	0	5856	0
4893. supersonlig. cleanmatrix	4	1808	6432		3902	60.659%	1	0.0082	0	0.0000	0	1	686	407	513	924	0	0	0	0	0	0	0	0	0	0	0	0	3902	0
4842. supersonlig. cleanmatrix	4	1007	4028		1978	49.108%	5	0.0000	0	0.0000	0	1	476	377	443	734	0	0	0	0	0	0	0	0	0	0	0	0	1978	0
4854. supersonlig. cleanmatrix	7	1171	8197		4820	56.382%	2	0.0017	0	0.0000	0	1	906	551	1078	1042	0	0	0	0	0	0	0	0	0	0	0	0	4820	0
4898. supersonlig. cleanmatrix	5	1098	5940		2488	48.356%	4	0.00597	0	0.0000	0	1	752	478	625	697	0	0	0	0	0	0	0	0	0	0	0	0	2488	0
4928. supersonlig. cleanmatrix	8	3573	28534		19303	68.481%	13	0.00624	1	0.00268	0	1	2750	1584	2015	3222	0	0	0	0	0	0	0	0	0	0	0	0	19303	0
5032. supersonlig. cleanmatrix	3	895	2415		889	28.530%	5	0.00821	0	0.0000	0	1	603	302	415	406	0	0	0	0	0	0	0	0	0	0	0	0	889	0
5116. supersonlig. cleanmatrix	5	982	4810		2567	53.386%	12	0.01547	1	0.00104	0	1	562	381	501	789	0	0	0	0	0	0	0	0	0	0	0	0	2567	0
5123. supersonlig. cleanmatrix	6	947	5832		3588	62.739%	2	0.00211	1	0.00108	0	1	587	416	452	679	0	0	0	0	0	0	0	0	0	0	0	0	3588	0
5131. supersonlig. cleanmatrix	4	784	3136		1553	49.841%	0	0.00128	0	0.0000	0	1	443	274	392	484	0	0	0	0	0	0	0	0	0	0	0	0	1553	0
5182. supersonlig. cleanmatrix	7	1324	8288		6124	66.077%	6	0.00453	0	0.0000	0	1	878	548	818	900	0	0	0	0	0	0	0	0	0	0	0	0	6124	0
5183. supersonlig. cleanmatrix	7	1383	9471		5628	59.402%	25	0.01848	0	0.0000	0	1	1145	631	837	1232	0	0	0	0	0	0	0	0	0	0	0	0	5628	0
5184. supersonlig. cleanmatrix	5	1070	5350		2878	50.056%	5	0.00467	0	0.0000	0	1	724	415	625	908	0	0	0	0	0	0	0	0	0	0	0	0	2878	0
5206. supersonlig. cleanmatrix	5	740	3700		2094	56.324%	0	0.0000	0	0.0000	0	1	511	283	372	470	0	0	0	0	0	0	0	0	0	0	0	0	2094	0
5257. supersonlig. cleanmatrix	6	507	3042		1112	36.559%	2	0.00594	0	0.0000	0	1	604	378	371	577	0	0	0	0	0	0	0	0	0	0	0	0	1112	0
5273. supersonlig. cleanmatrix	5	1112	5580		3528	63.453%	4	0.00580	1	0.00390	0	1	587	386	489	580	0	0	0	0	0	0	0	0	0	0	0	0	3528	0
5280. supersonlig. cleanmatrix	6	1180	6980		3820	54.883%	7	0.00603	0	0.0000	0	1	846	580	704	1010	0	0	0	0	0	0	0	0	0	0	0	0	3820	0
5299. supersonlig. cleanmatrix	7	1387	8709		5970	61.489%	14	0.01009	12	0.0885	0	1	876	678	740	1445	0	0	0	0	0	0	0	0	0	0	0	0	5970	0
5326. supersonlig. cleanmatrix	4	1593	8012		2954	48.301%	4	0.00266	0	0.0000	0	1	787	583	832	886	0	0	0	0	0	0	0	0	0	0	0	0	2954	0
5333. supersonlig. cleanmatrix	6	1971	11826		7564	63.961%	8	0.00406	0	0.0000	0	1	1170	735	1119	1218	0	0	0	0	0	0	0	0	0	0	0	0	7564	0
5335. supersonlig. cleanmatrix	5	1819	9095		6323	68.822%	4	0.00200	0	0.0000	0	1	781	532	581	878	0	0	0	0	0	0	0	0	0	0	0	0	6323	0
5398. supersonlig. cleanmatrix	5	1316	6580		3859	58.647%	6	0.00456	0	0.0000	0	1	707	529	519	966	0	0	0	0	0	0	0	0	0	0	0	0	3859	0
5404. supersonlig. cleanmatrix	5	1736	8780		5832	66.424%	7	0.00589	0	0.0000	0	1	782	637	608	921	0	0	0	0	0	0	0	0	0	0	0	0	5832	0
5406. supersonlig. cleanmatrix	7	2486	17282		12704	73.595%	12	0.00487	0	0.0000	0	1	1158	790	983	1617	0	0	0	0	0	0	0	0	0	0	0	0	12704	0
5421. supersonlig. cleanmatrix	5	1125	5625		3441	61.173%	5	0.00444	0	0.0000	0	1	578	327	525	754	0	0	0	0	0	0	0	0	0	0	0	0	3441	0
5426. supersonlig. cleanmatrix	6	2303	13818		7588	54.014%	24	0.01042	0	0.0000	0	1	1682	124	1458	1886	0	0	0	0	0	0	0	0	0	0	0	0	7588	0
5430. supersonlig. cleanmatrix	4	827	3308		1691	51.118%	2	0.00242	0	0.0000	0	1	426	182	347	632	0	0	0	0	0	0	0	0	0	0	0	0	1691	0
5434. supersonlig. cleanmatrix	4	444	1776		517	23.110%	0	0.0000	0	0.0000	0	1	287	280	352	340	0	0	0	0	0	0	0	0	0	0	0	0	517	0
5448. supersonlig. cleanmatrix	8	2012	10696		11046	68.820%	88	0.00199	4	0.00199	0	1	1313	889	1235	1804	0	0	0	0	0	0	0	0	0	0	0	0	11046	0
5454. supersonlig. cleanmatrix	4	1557	6238		3098	48.743%	12	0.00771	0	0.0000	0	1	807	524	684	1115	0	0	0	0	0	0	0	0	0	0	0	0	3098	0
5463. supersonlig. cleanmatrix	6	846	5076		2623	51.675%	4	0.00473	0	0.0000	0	1	701	395	533	824	0	0	0	0	0	0	0	0	0	0	0	0	2623	0
5469. supersonlig. cleanmatrix	3	400	1200		420	35.000%	4	0.01000	0	0.0000	0	1	164	149	178	289	0	0	0	0	0	0	0	0	0	0	0	0	420	0
5502. supersonlig. cleanmatrix	6	1900	11400		7114	62.404%	8	0.00421	0	0.0000	0	1	1138	756	827	1475	0	0	0	0	0	0	0	0	0	0	0	0	7114	0
5528. supersonlig. cleanmatrix	5	2014	10070		6872	68.242%	0	0.0000	0	0.0000	0	1	828	573	670	1127	0	0	0	0	0	0	0	0	0	0	0	0	6872	0
5554. supersonlig. cleanmatrix	4	1638	6532		3794	57.906%	1	0.00661	0	0.0000	0	1	837	432	655	834	0	0	0	0	0	0	0	0	0	0	0	0	3794	0
5578. supersonlig. cleanmatrix	4	580	2240		946	42.232%	4	0.00714	0	0.0000	0	1	341	235	316	402	0	0	0	0	0	0	0	0	0	0	0	0	946	0
5594. supersonlig. cleanmatrix	6	792	4732		1738	38.995%	11	0.01589	1	0.00126	0	1	848	541	843	782	0	0	0	0	0	0	0	0	0	0	0	0	1738	0
5599. supersonlig. cleanmatrix	6	730	3850		1895	51.918%	2	0.00274	0	0.0000	0	1	419	306	315	715	0	0	0	0	0	0	0	0	0	0	0	0	1895	0
5614. supersonlig. cleanmatrix	5	3819	18090		10069	58.419%	11	0.00694	0	0.0000	0	1	2042	1349	1751	2380	0	0	0	0	0	0	0	0	0	0	0	0	10069	0
5639. supersonlig. cleanmatrix	4	740	2980		1472	48.330%	4	0.00541	0	0.0000	0	1	411	285	344	488	0	0	0	0	0	0	0	0	0	0	0	0	1472	0
5644. supersonlig. cleanmatrix	3	890	2870		1278	47.865%	2	0.00225	0	0.0000	0	1	356	236	285	485	0	0	0	0	0	0	0	0	0	0	0	0	1278	0
5648. supersonlig. cleanmatrix	6	1679	10074		6212	61.564%	11	0.00525	2	0.01119	0	1	1024	590	848	1440	0	0	0	0	0	0	0	0	0	0	0	0	6212	0
5699. supersonlig. cleanmatrix	6	1387	8332		5438	64.553%	6	0.00429	0	0.00143	0	1	724	543	597	1072	0	0	0	0	0	0	0	0	0	0	0	0	5438	0
5702. supersonlig. cleanmatrix	7	832	3824		3032	52.404%	7	0.00641	1	0.00120	0	1	722	535	575	940	0	0	0	0	0	0	0	0	0	0	0	0	3032	0
5716. supersonlig. cleanmatrix	4	1194	4776		2887	60.448%	7	0.00887	0	0.0000	0	1	568	319	413	589	0	0	0	0	0	0	0	0	0	0	0	0	2887	0
5721. supersonlig. cleanmatrix	6	1011																												

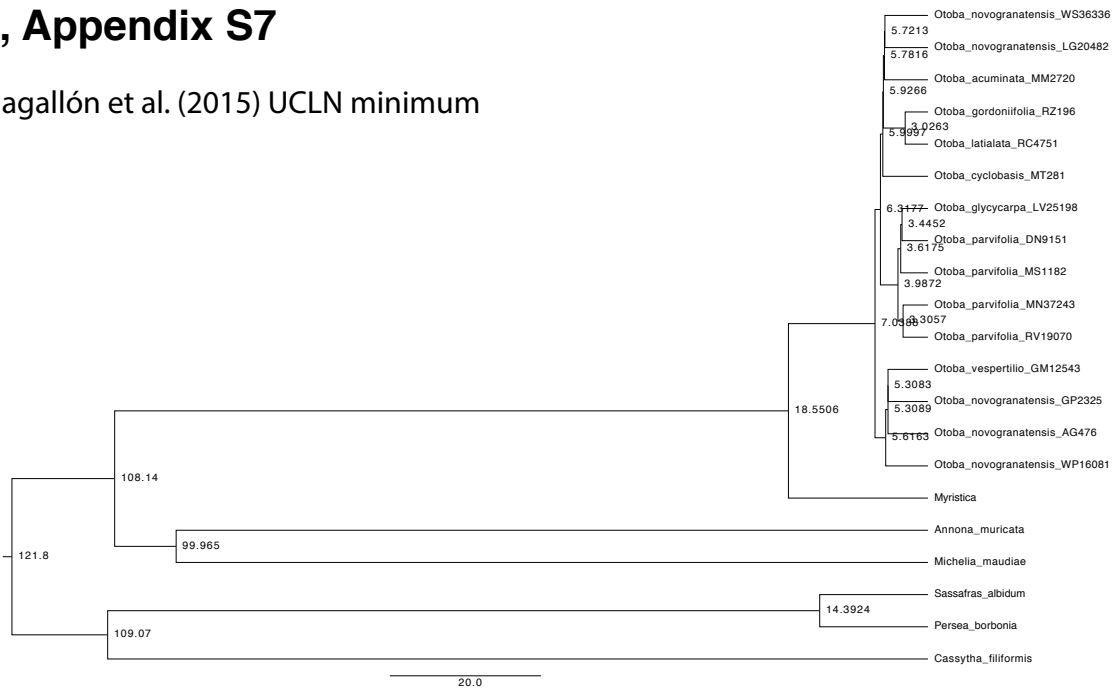




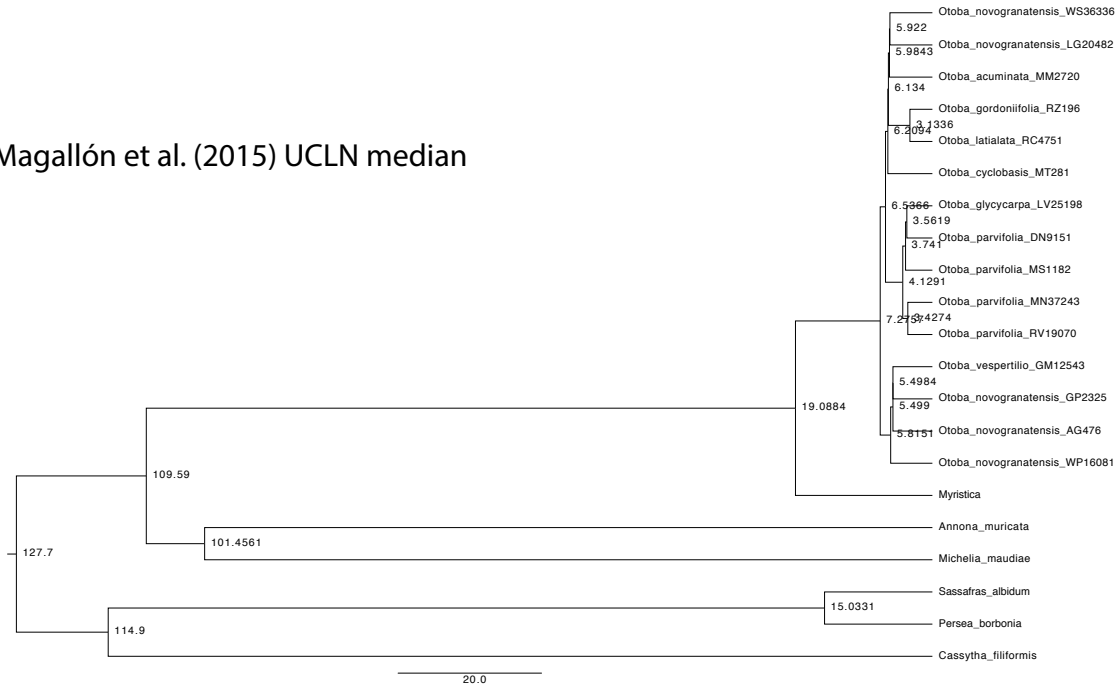


Frost et al, Appendix S7

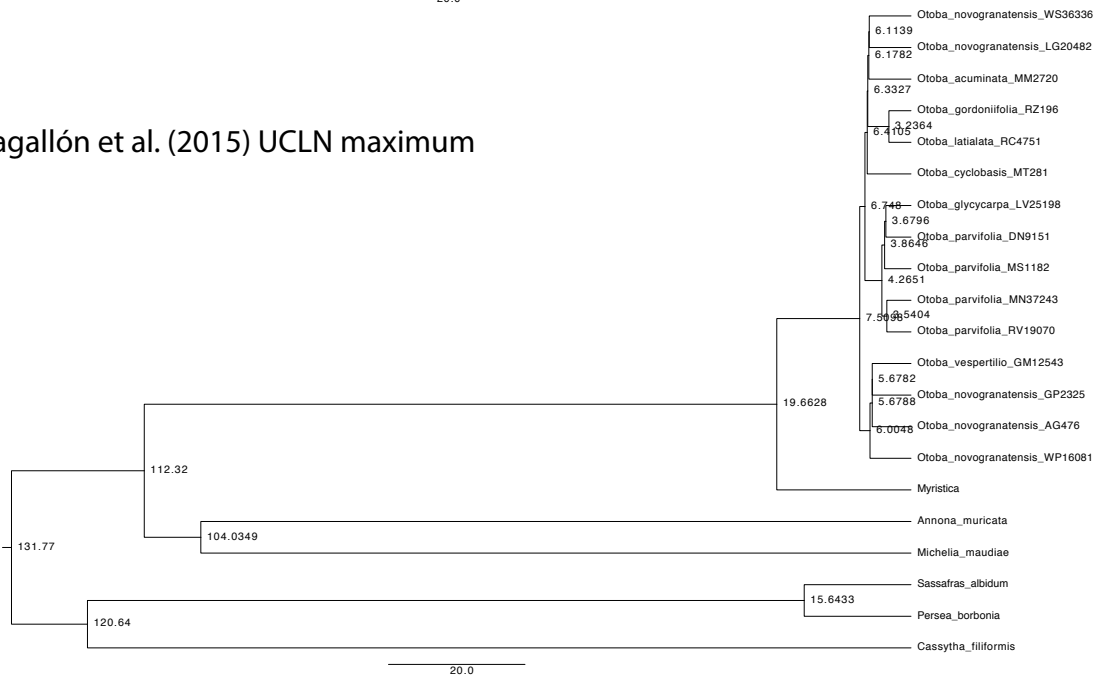
Magallón et al. (2015) UCLN minimum



Magallón et al. (2015) UCLN median

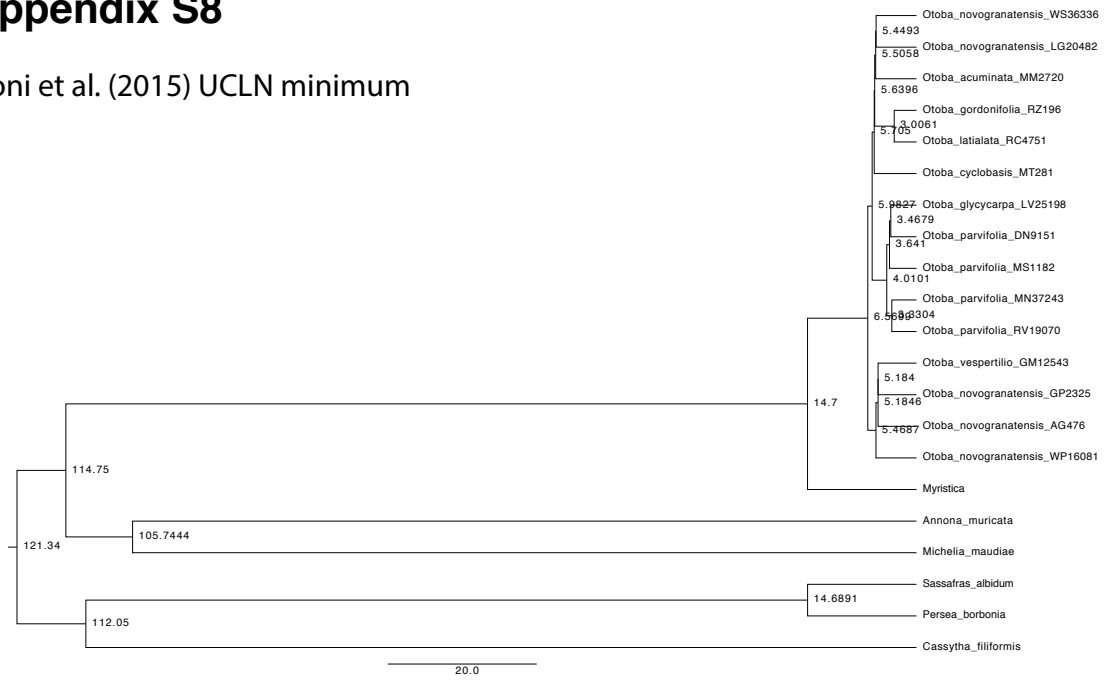


Magallón et al. (2015) UCLN maximum

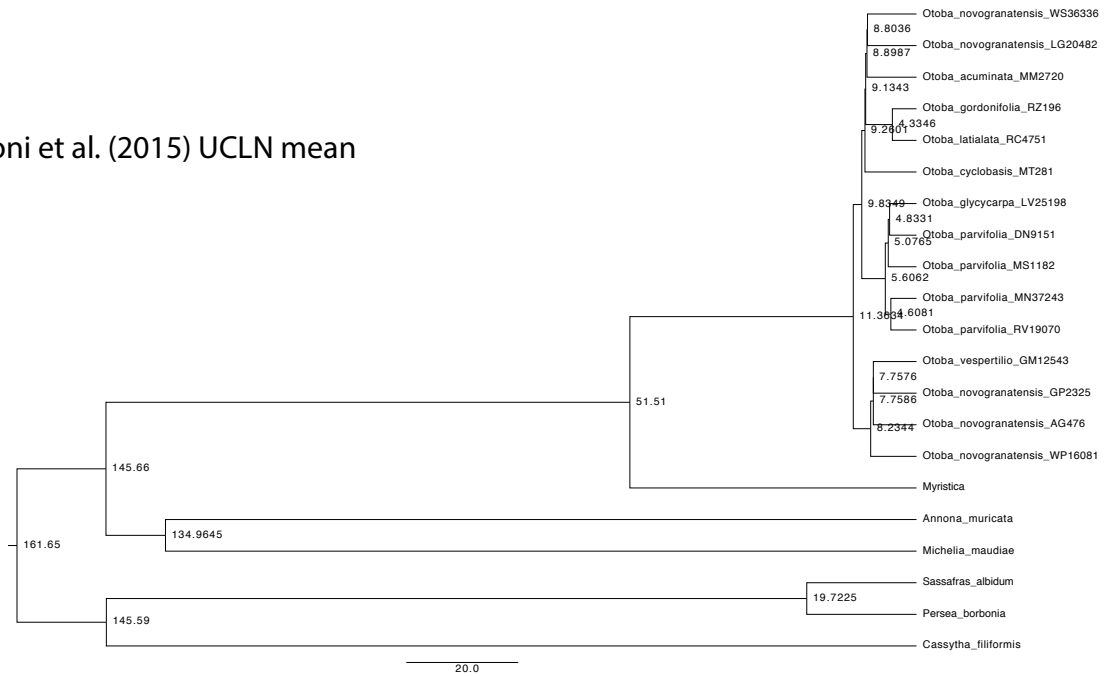


Frost et al, Appendix S8

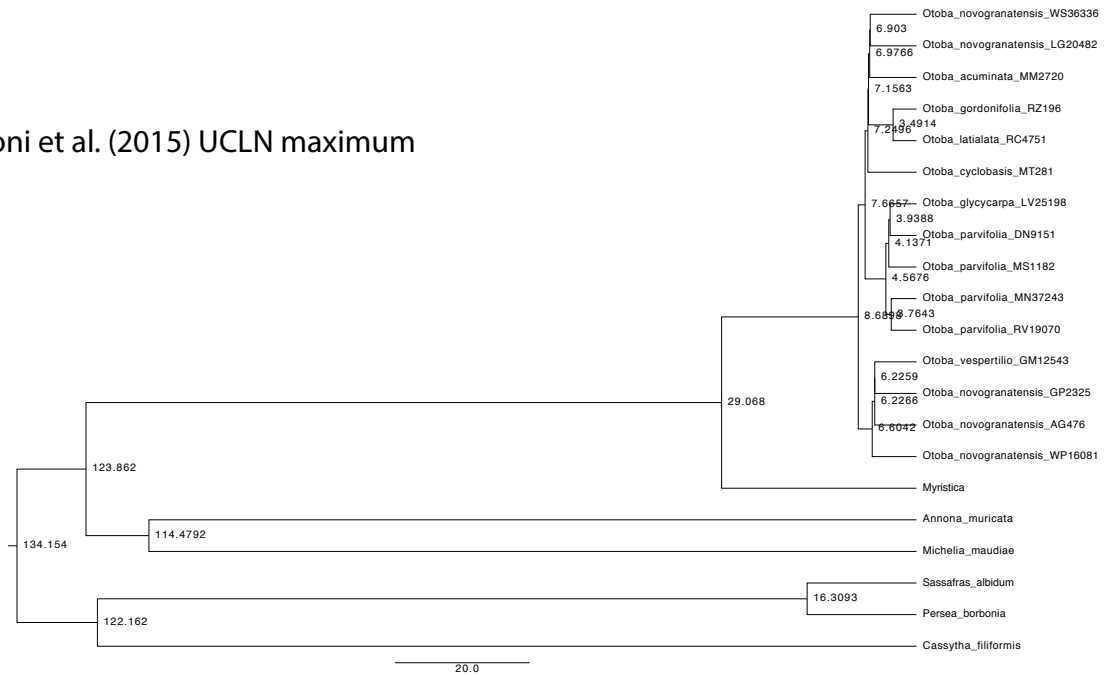
Massoni et al. (2015) UCLN minimum



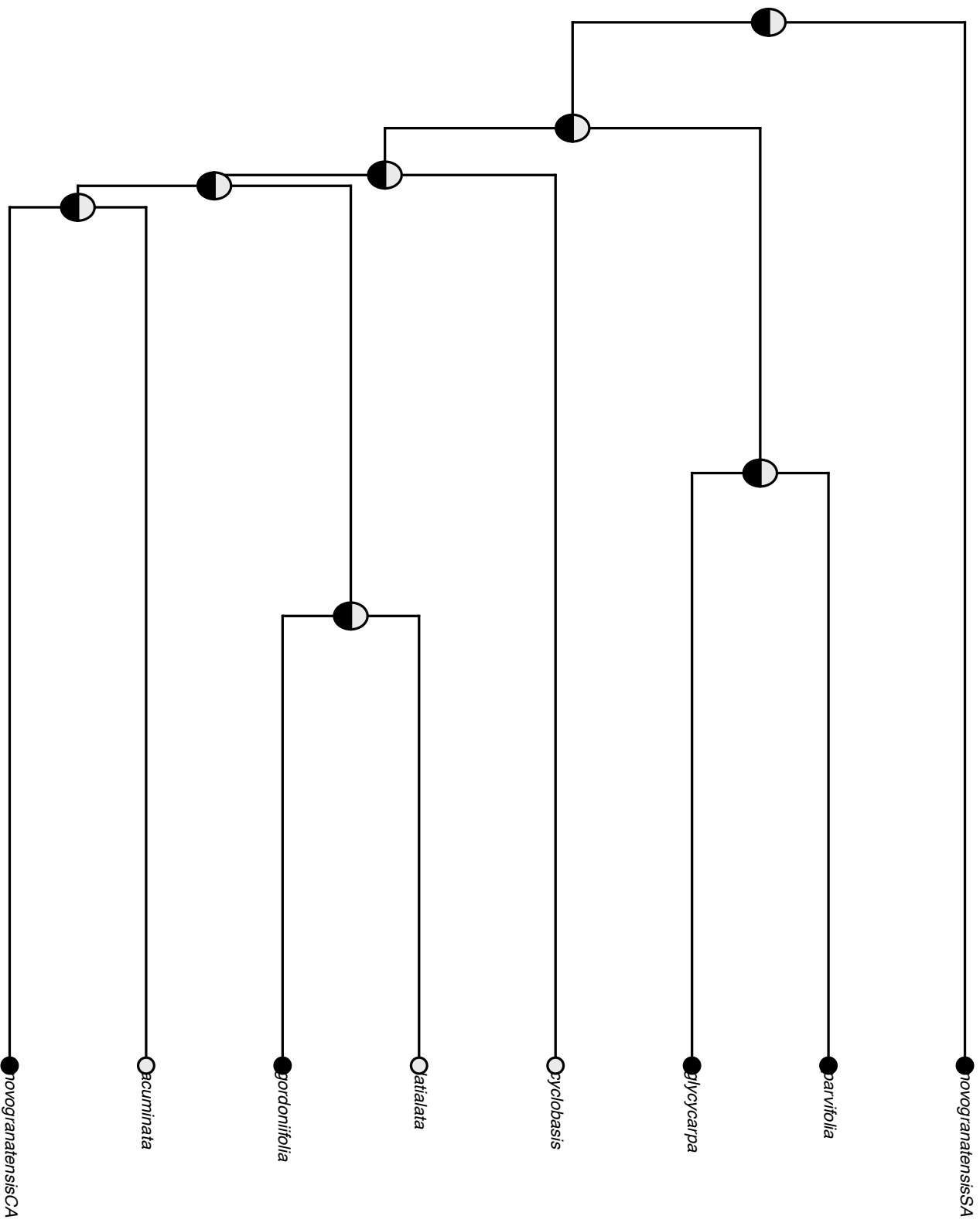
Massoni et al. (2015) UCLN mean



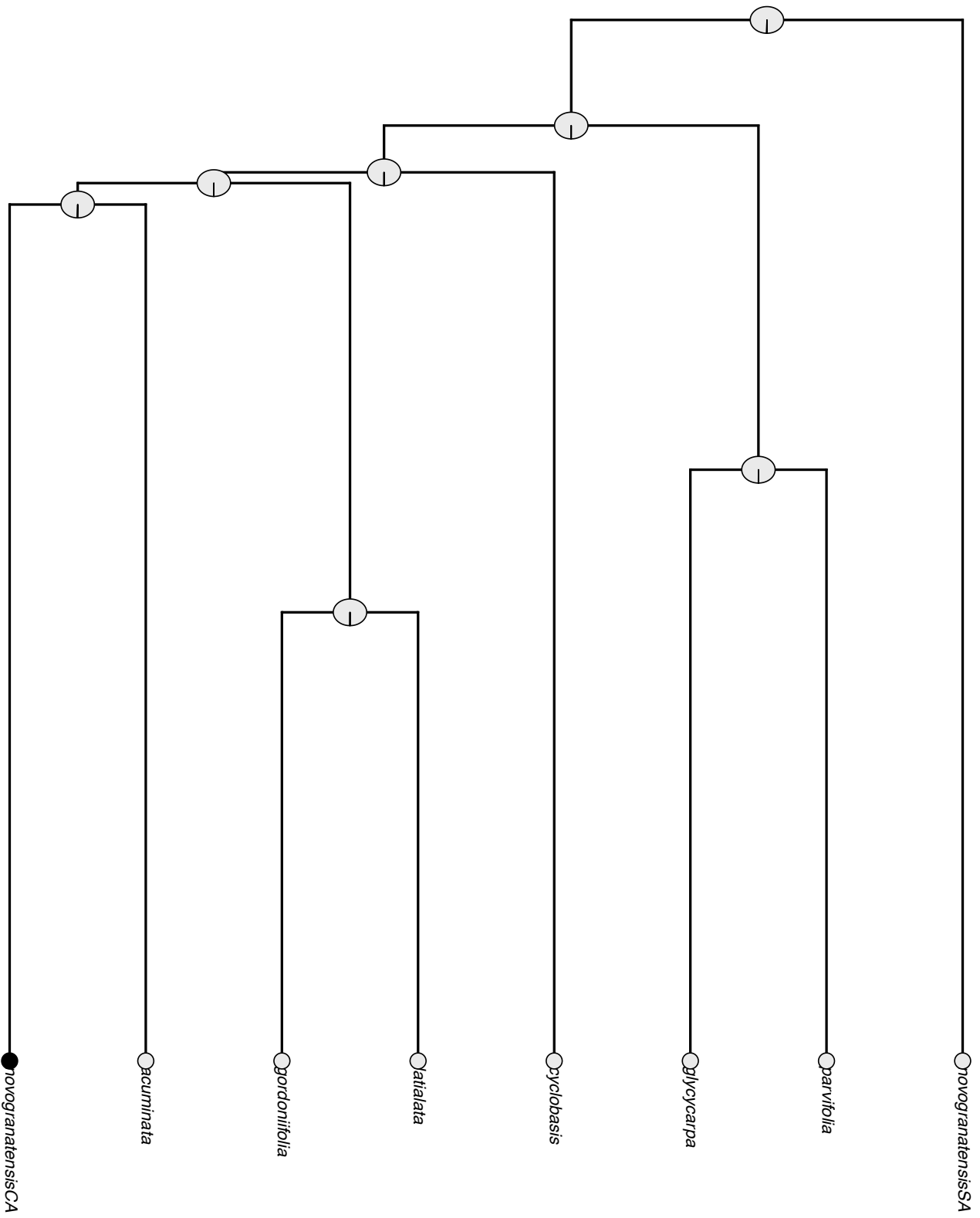
Massoni et al. (2015) UCLN maximum



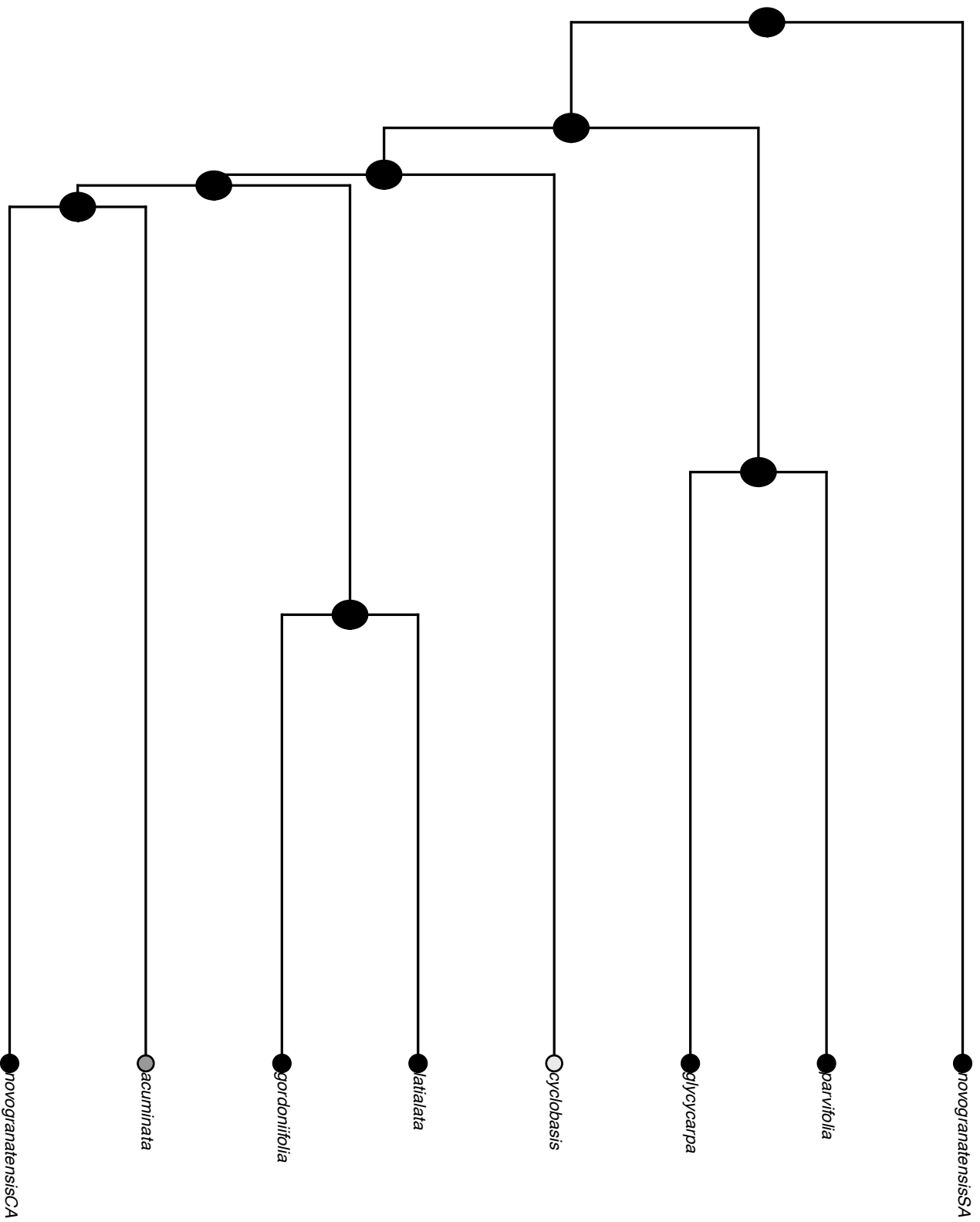
Frost et al, Appendix S9



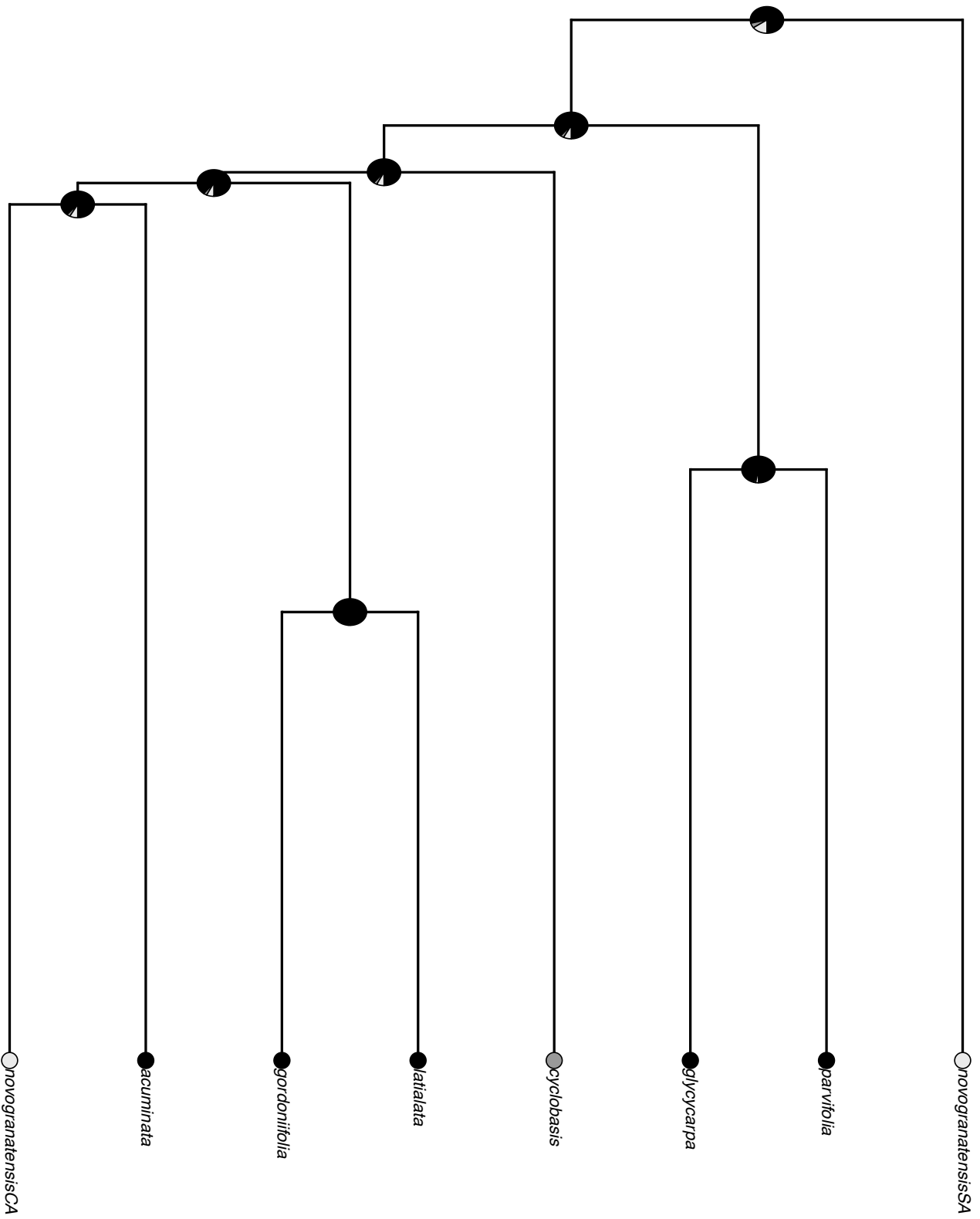
anther shape, attachment:
globose, dorsally
reniform, basally



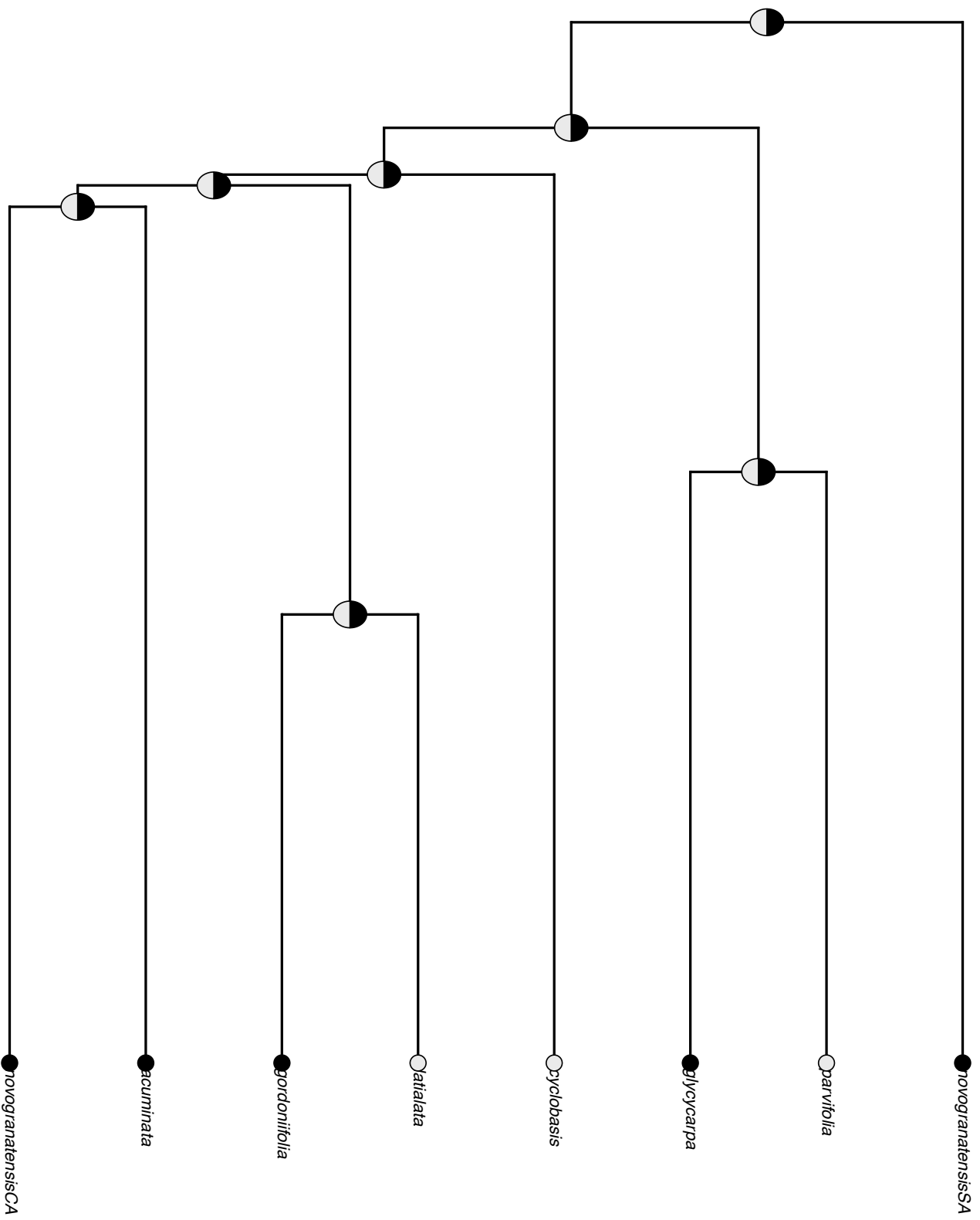
ari color:
white to yellow
orange to red



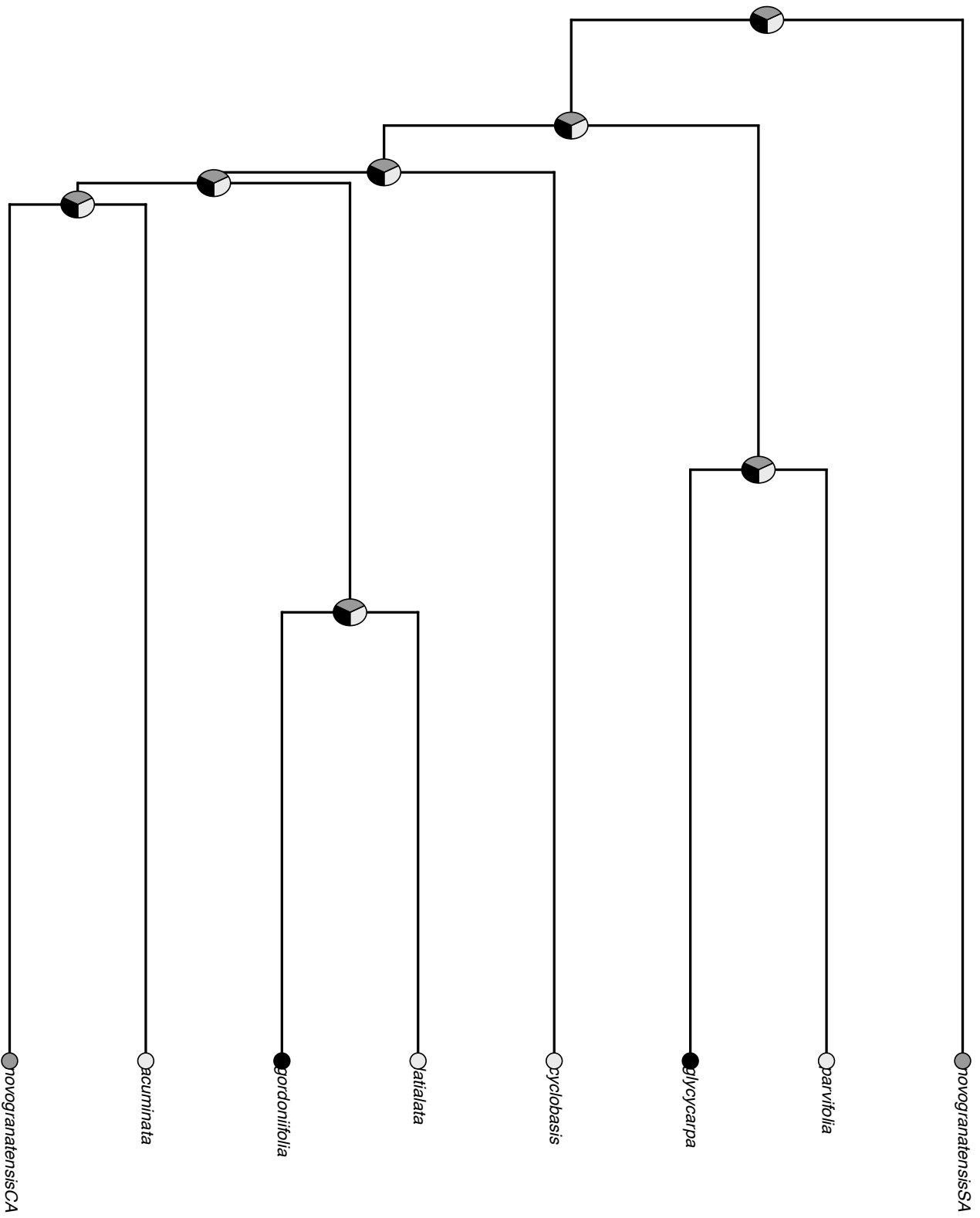
extrastaminal disc:
absent
rarely present
present



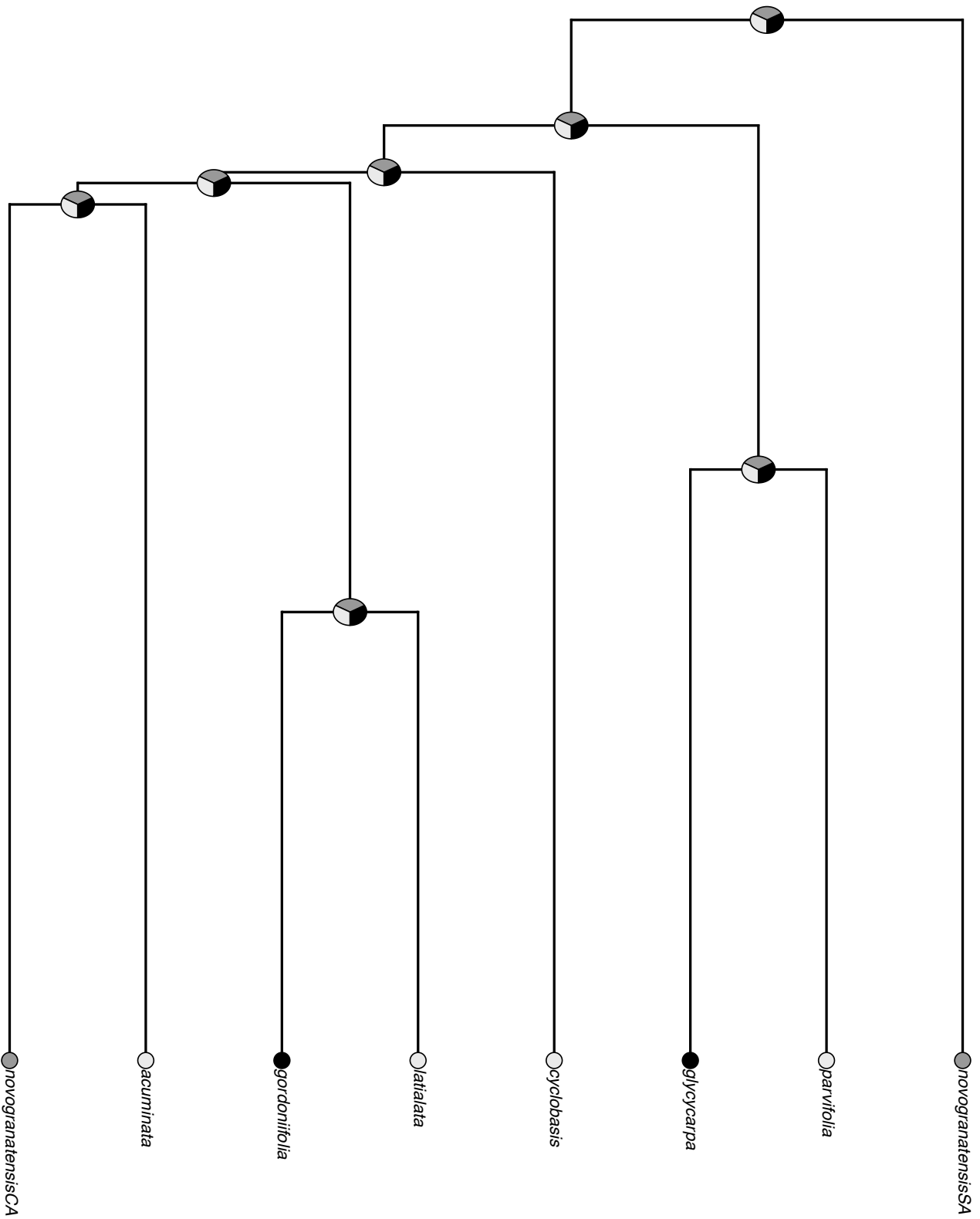
filament column shape:
□ not applicable
▒ with parallel sides
■ bottle-shaped



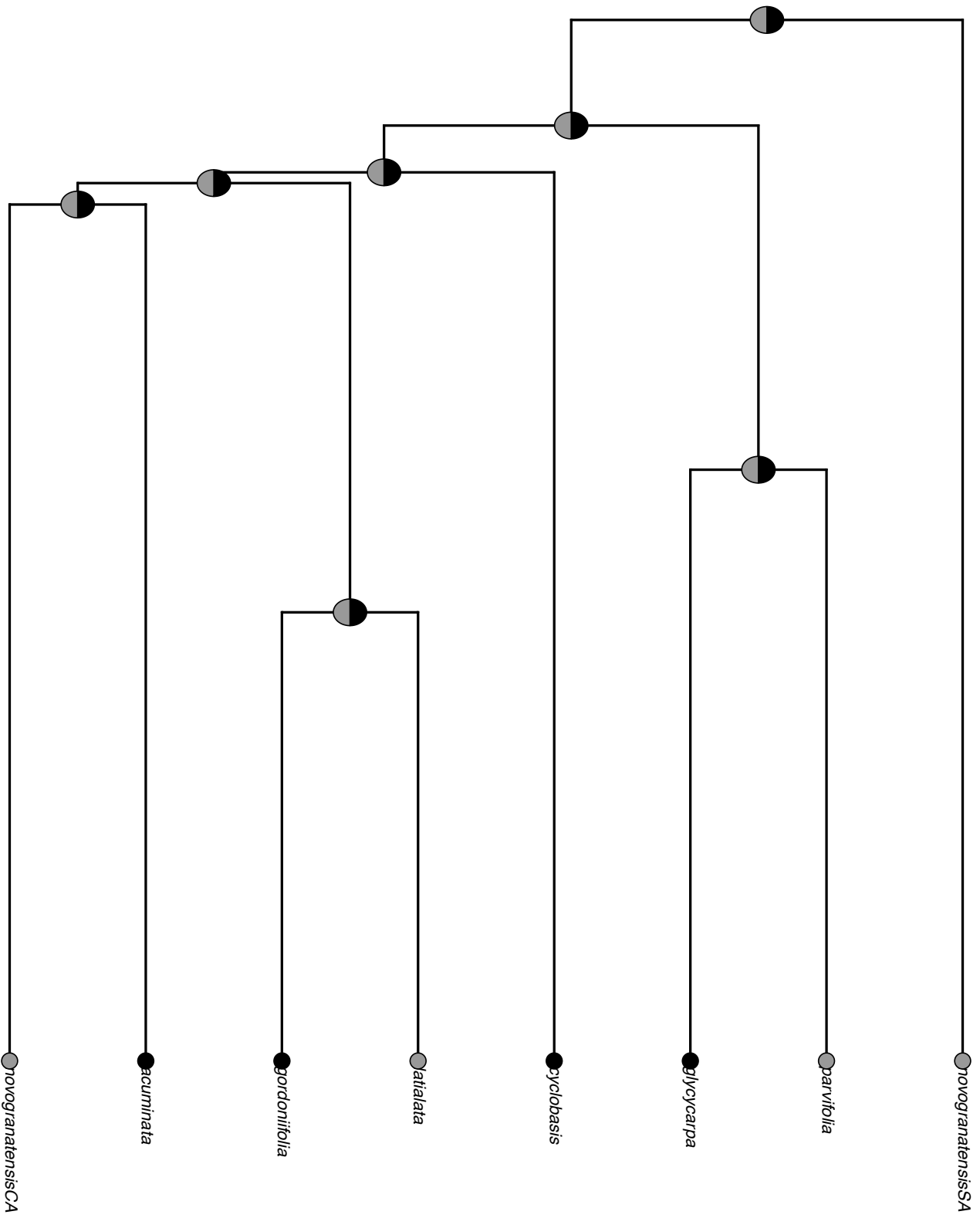
gynoecium :
glabrous
pubescent



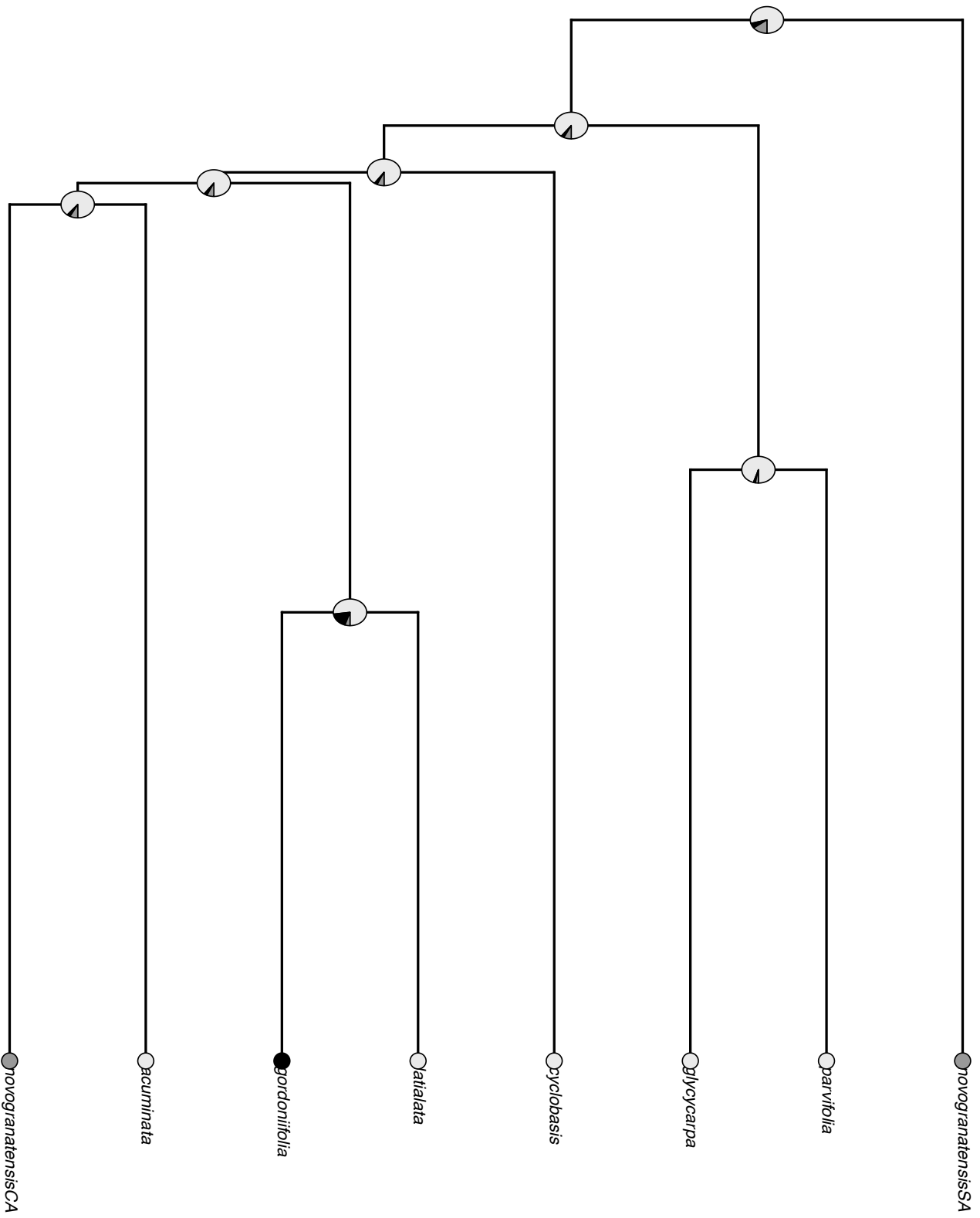
leaf abaxial pubescence color:
whitish
whitish-ferruginous
ferruginous



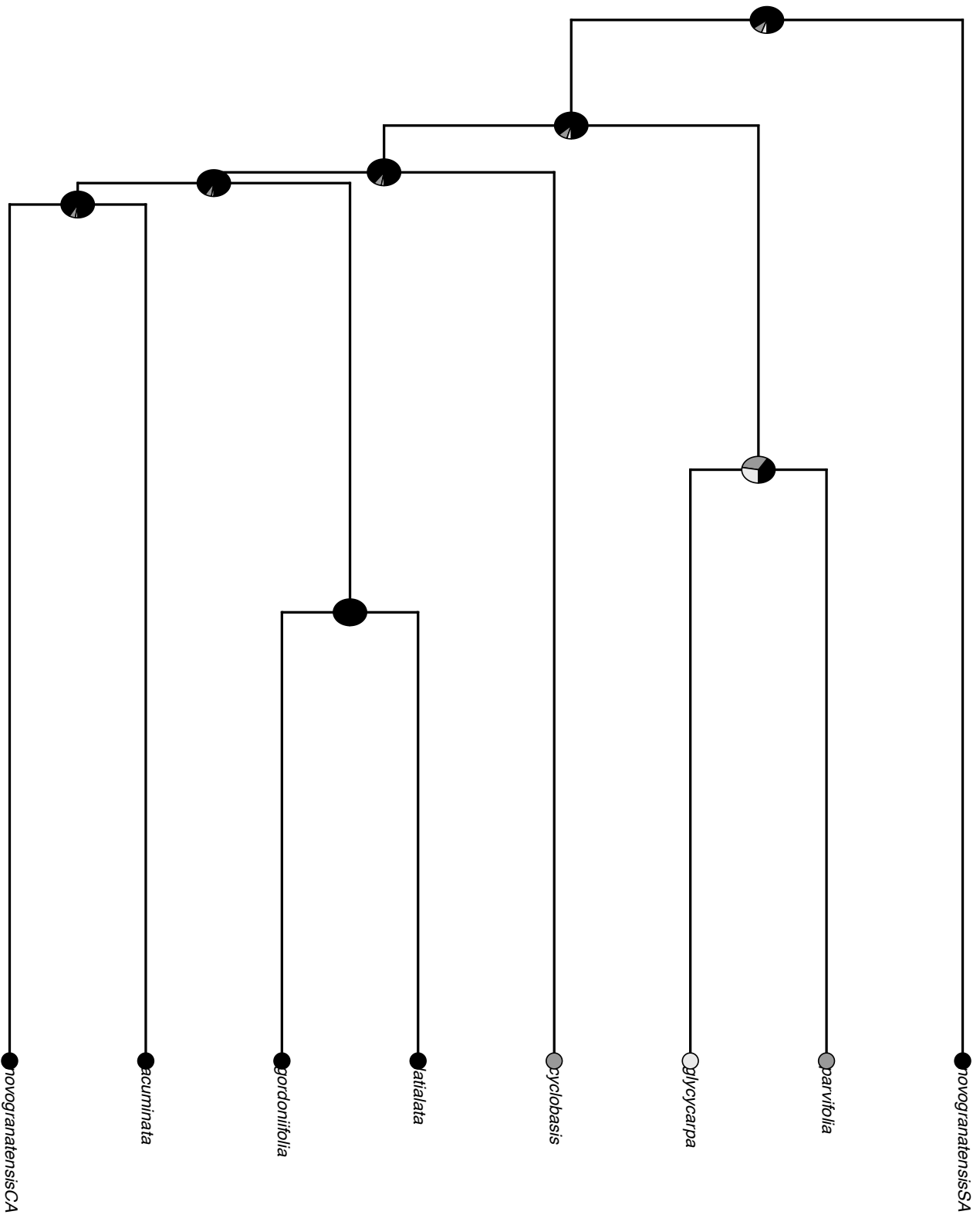
leaf abaxial pubescence:
glabrescent - somewhat pubescent
glabrescent to densely pubescent
densely pubescent



petiole :
■ somewhat/obscurely winged
■ winged

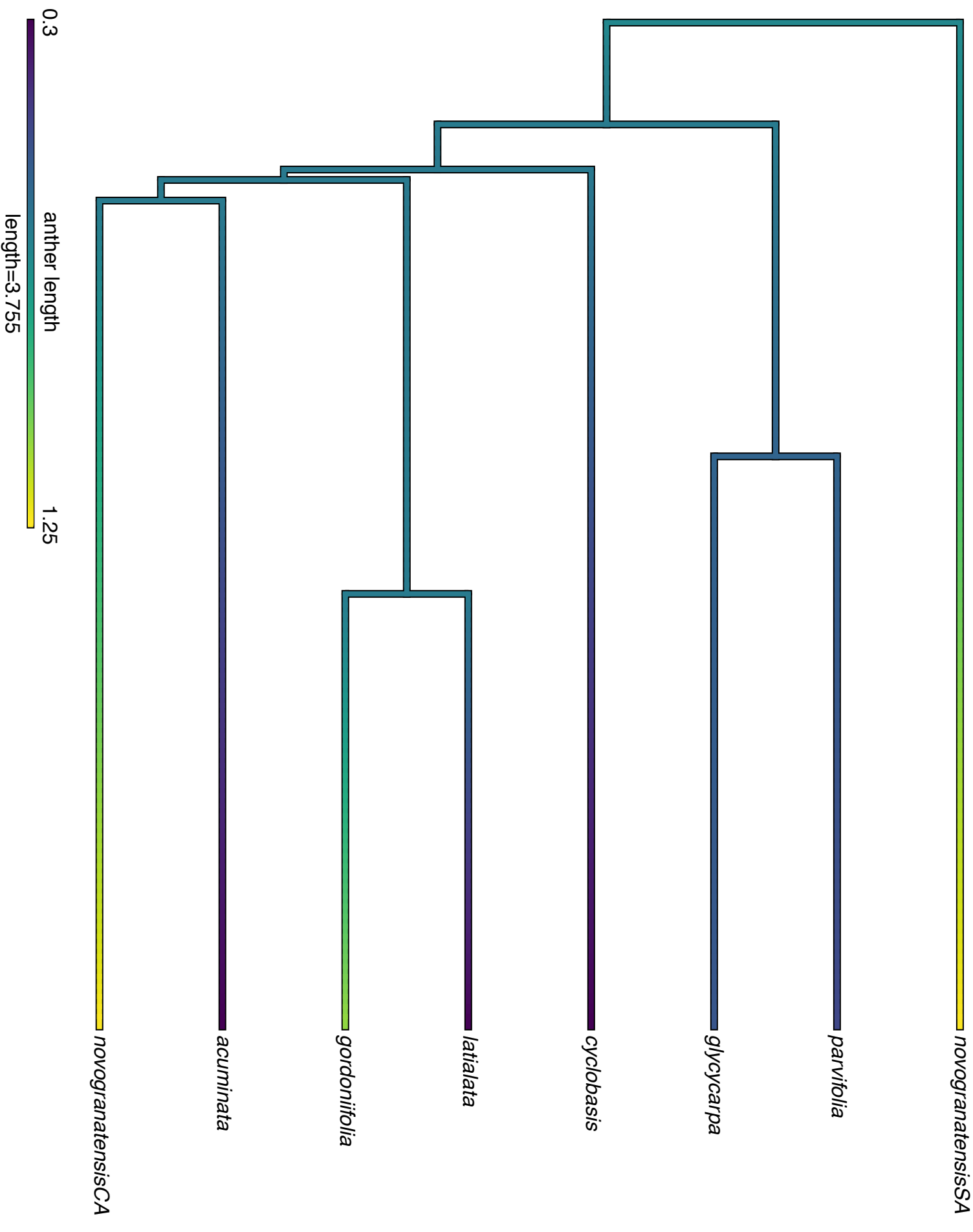


intramarginal veins:
absent
rarely, not raised
present

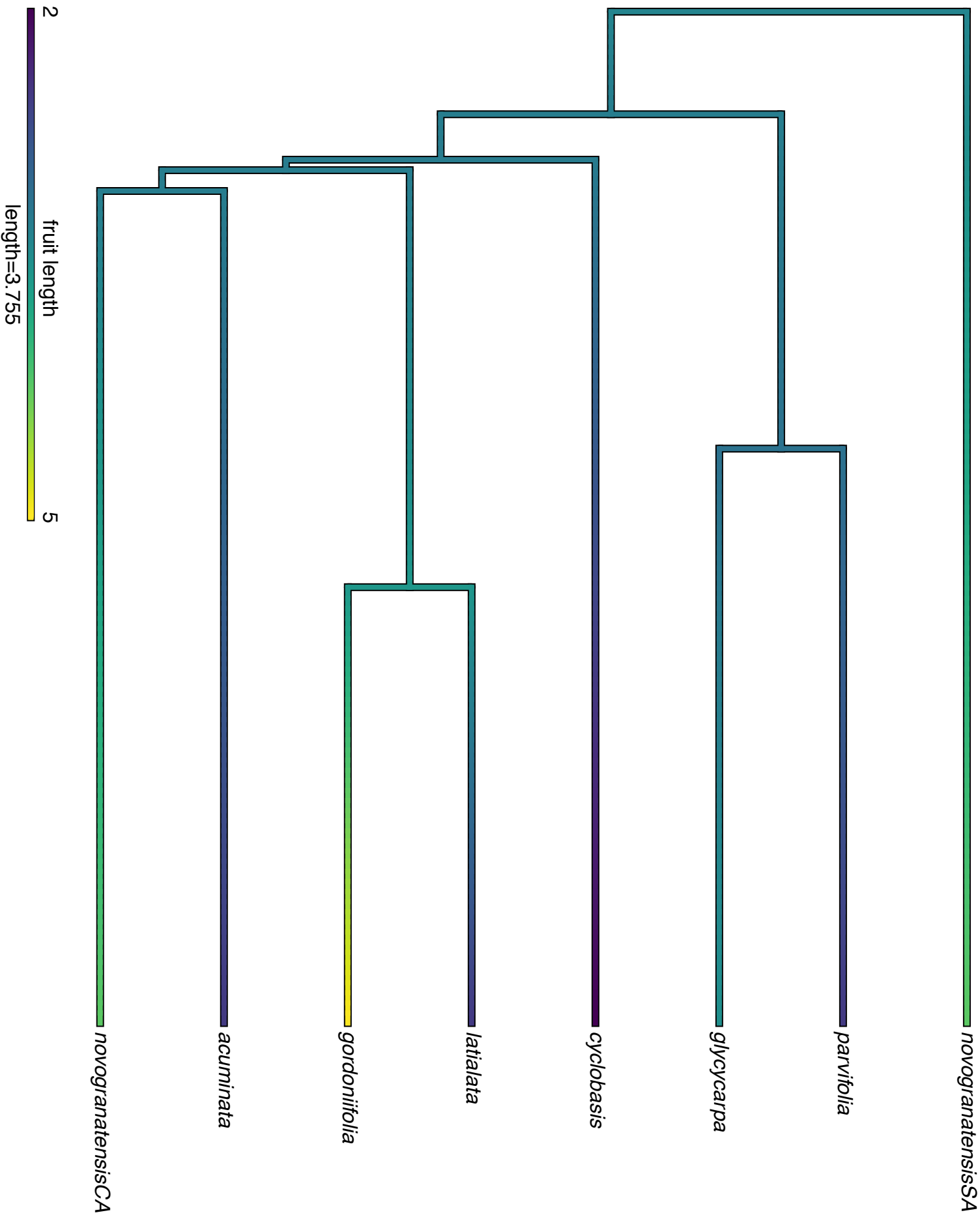


seed:
not prickled
occasionally prickled
prickled

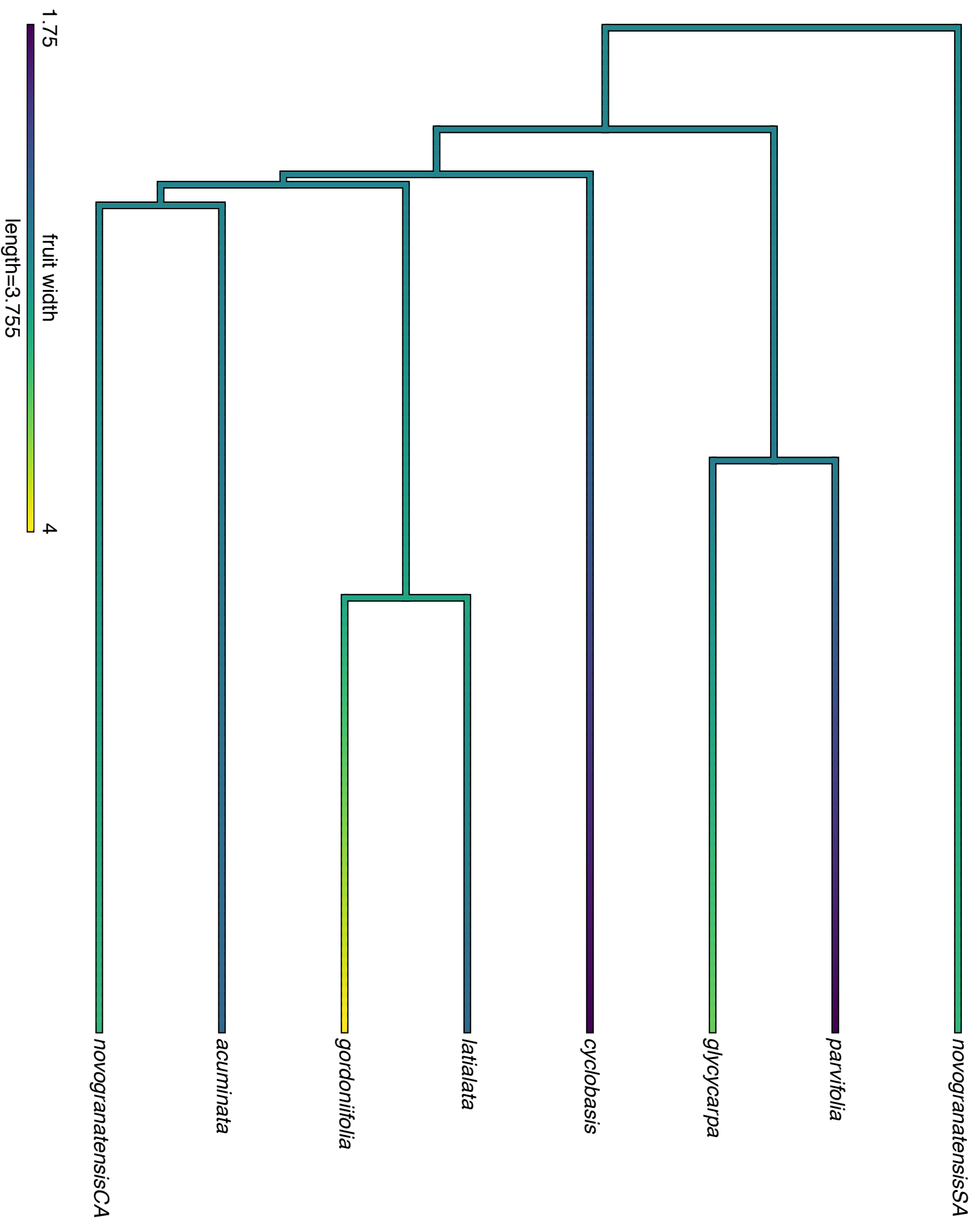
Frost et al, Appendix S20



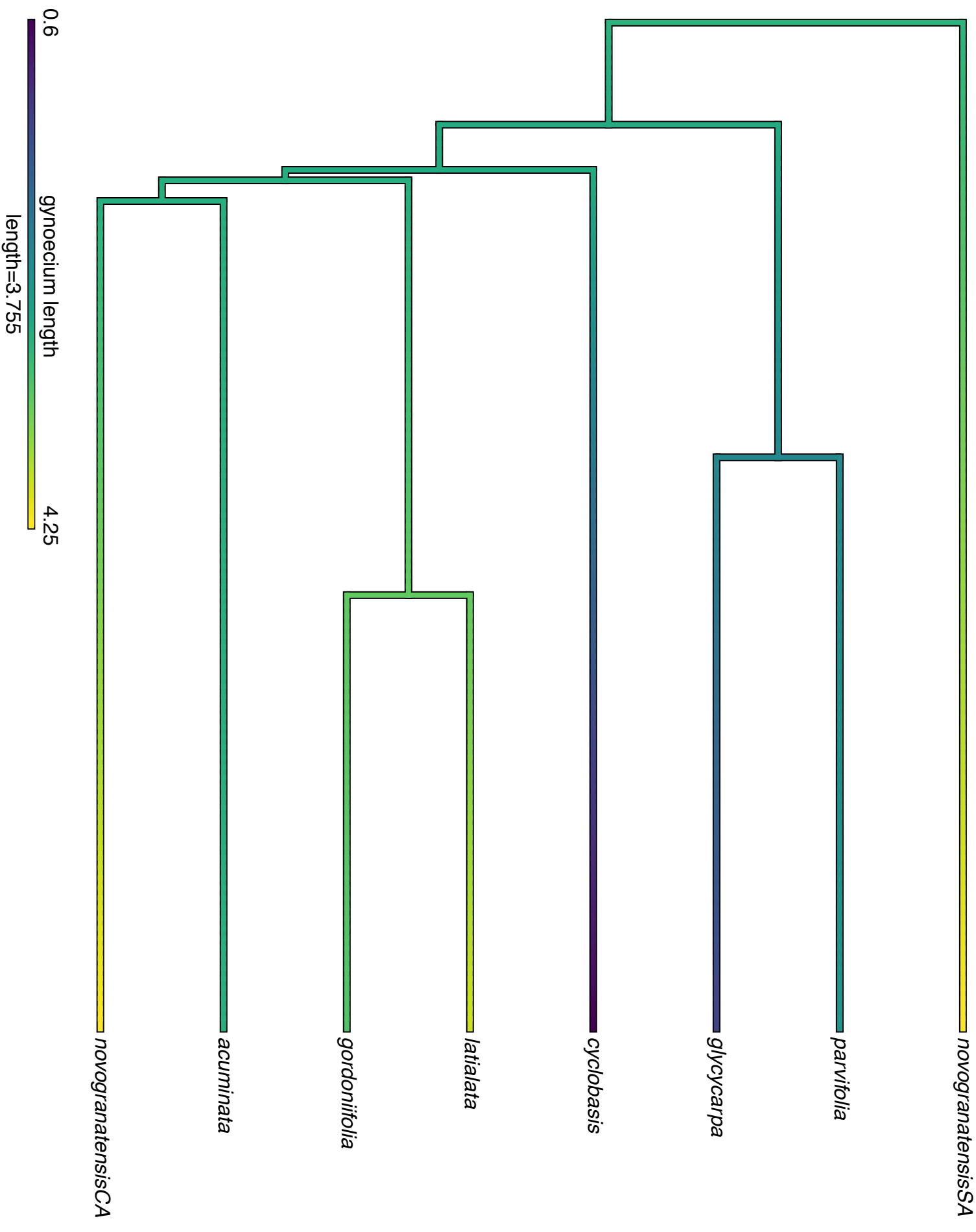
Frost et al, Appendix S21



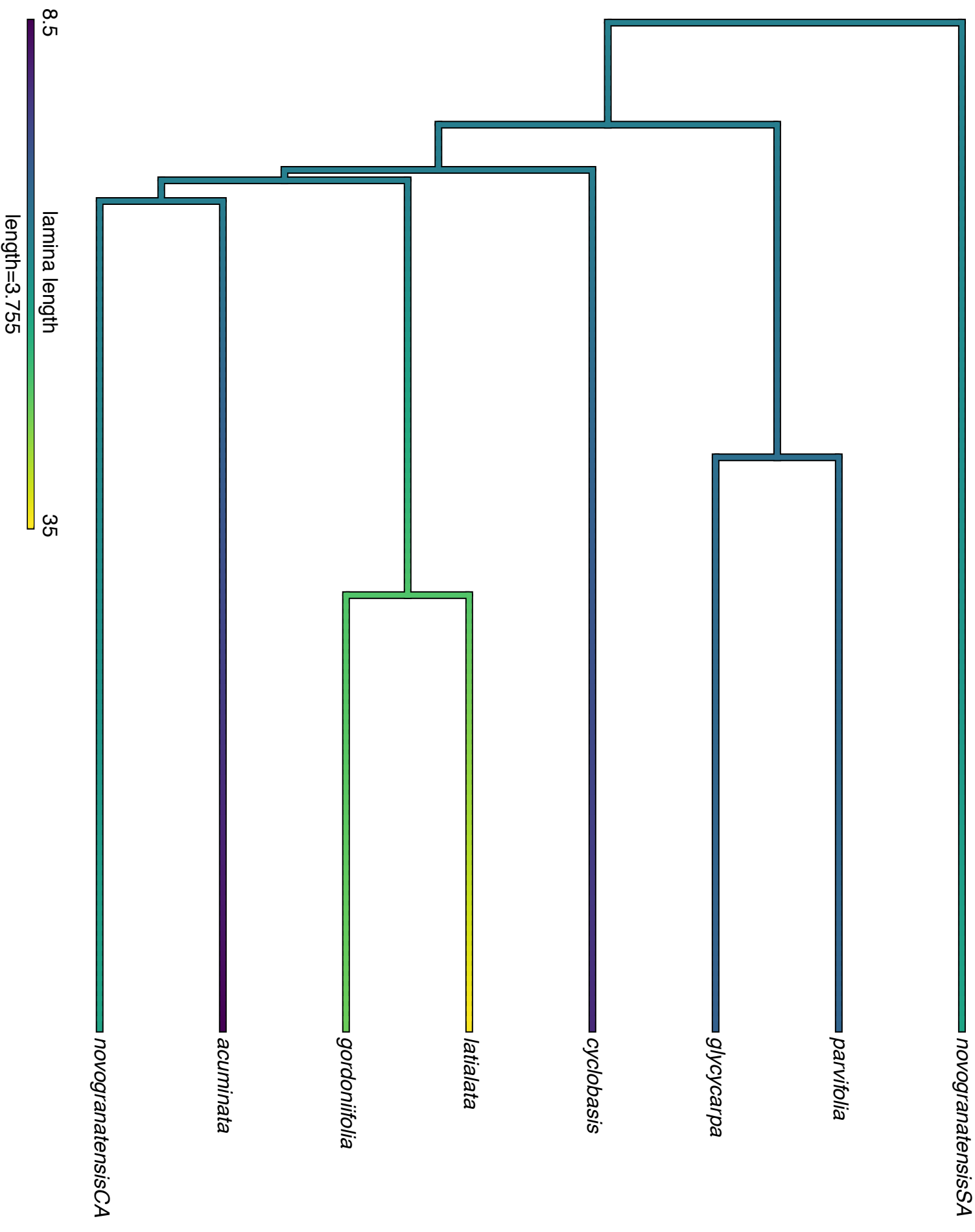
Frost et al, Appendix S22



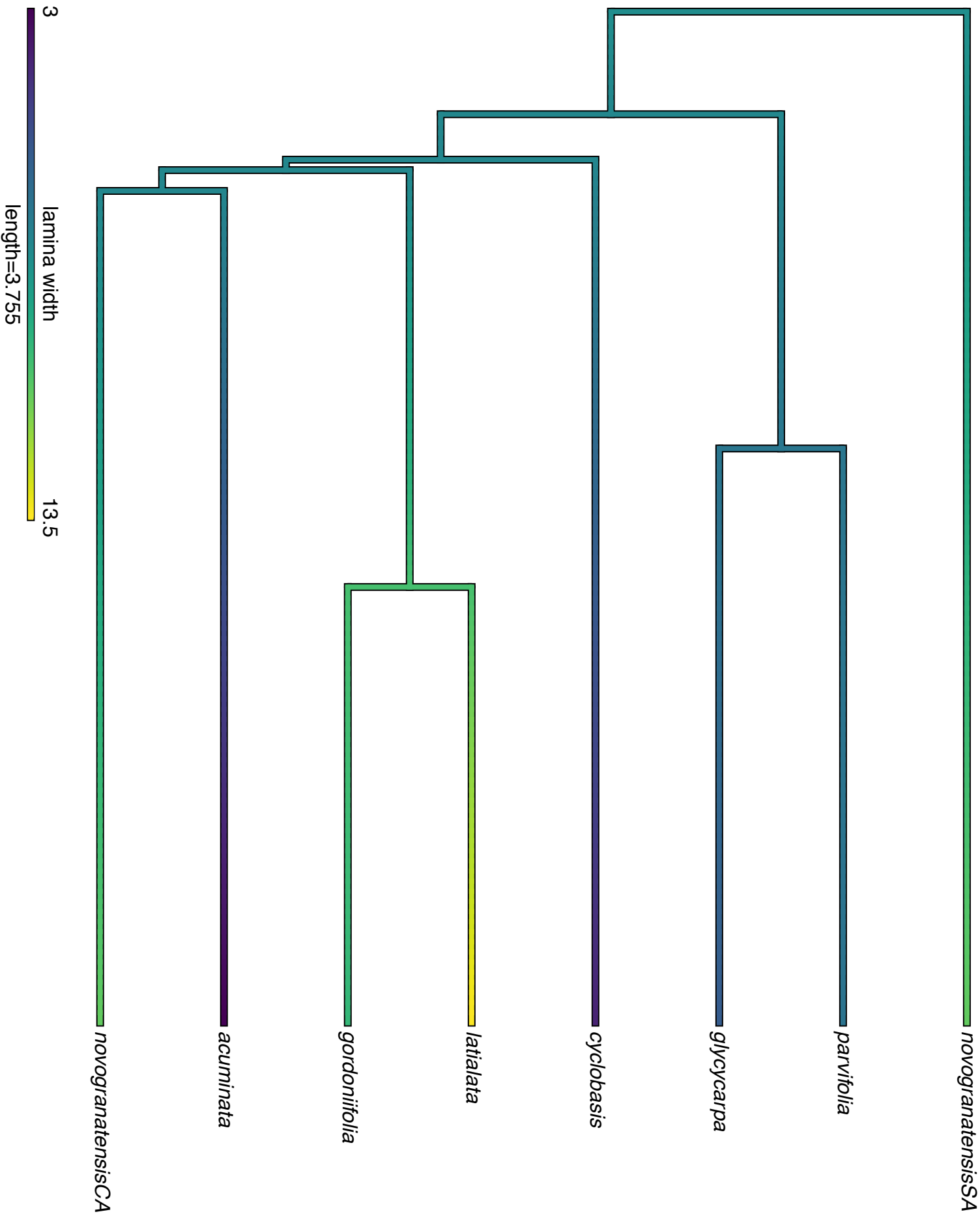
Frost et al, Appendix S23



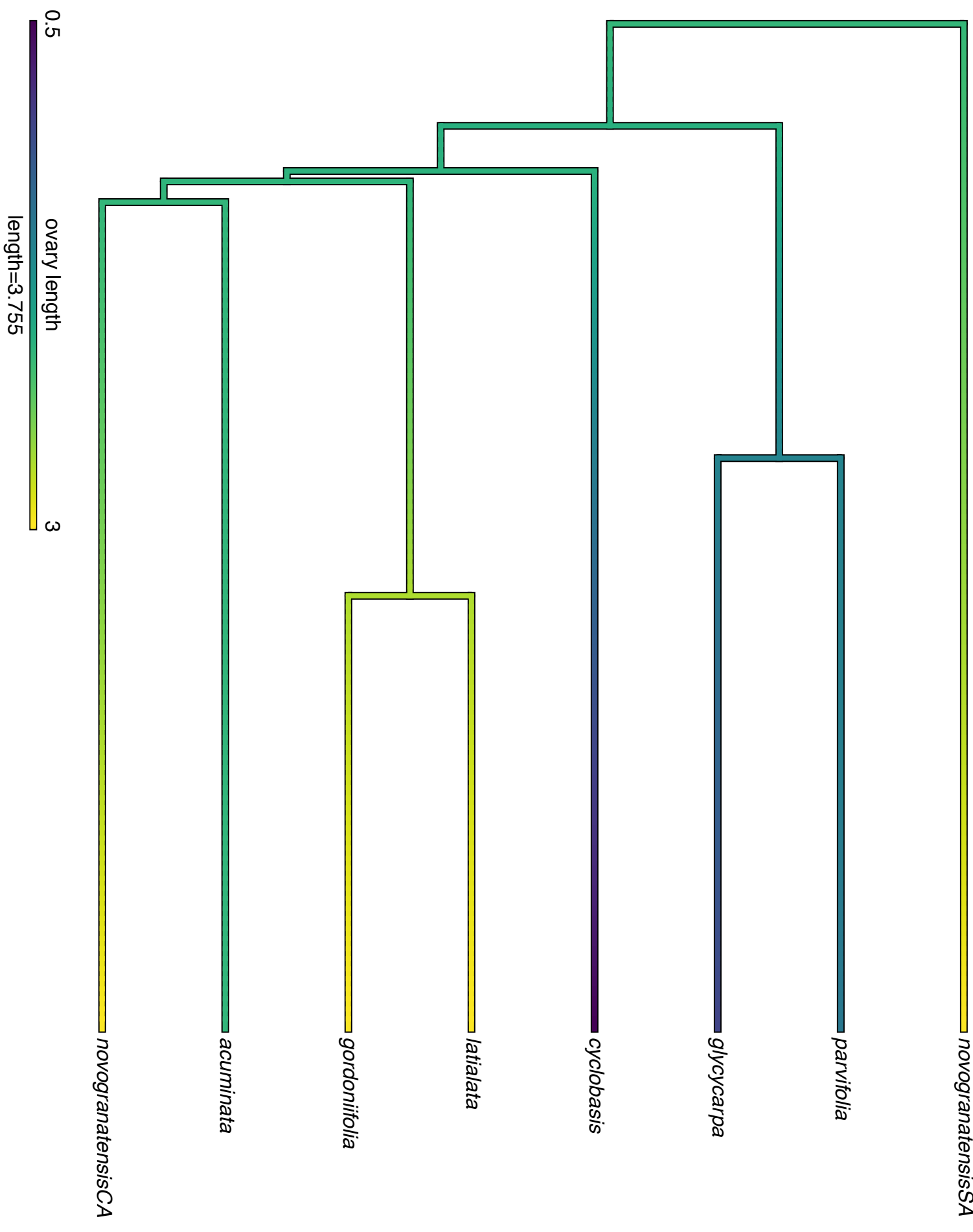
Frost et al, Appendix S24

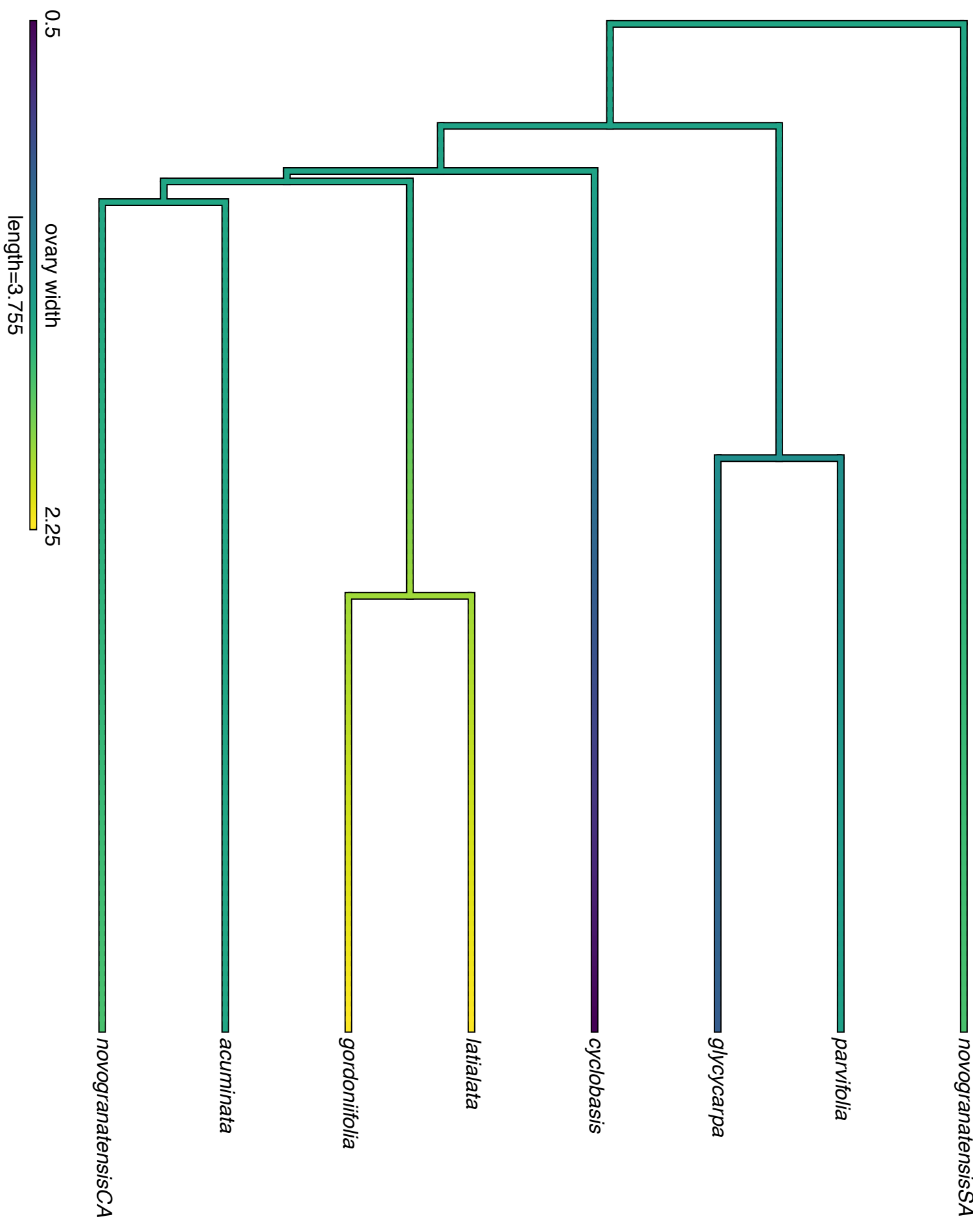


Frost et al, Appendix S25

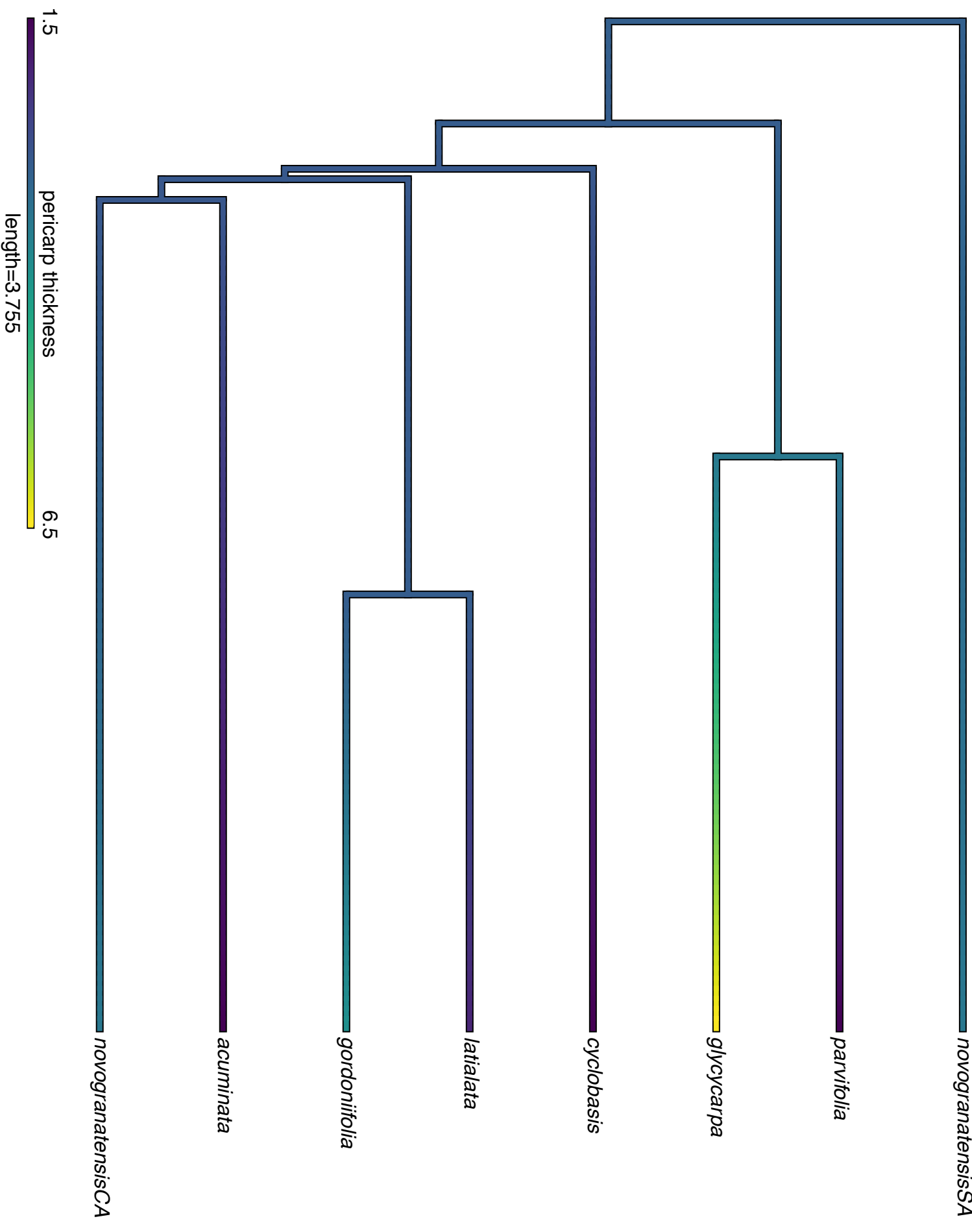


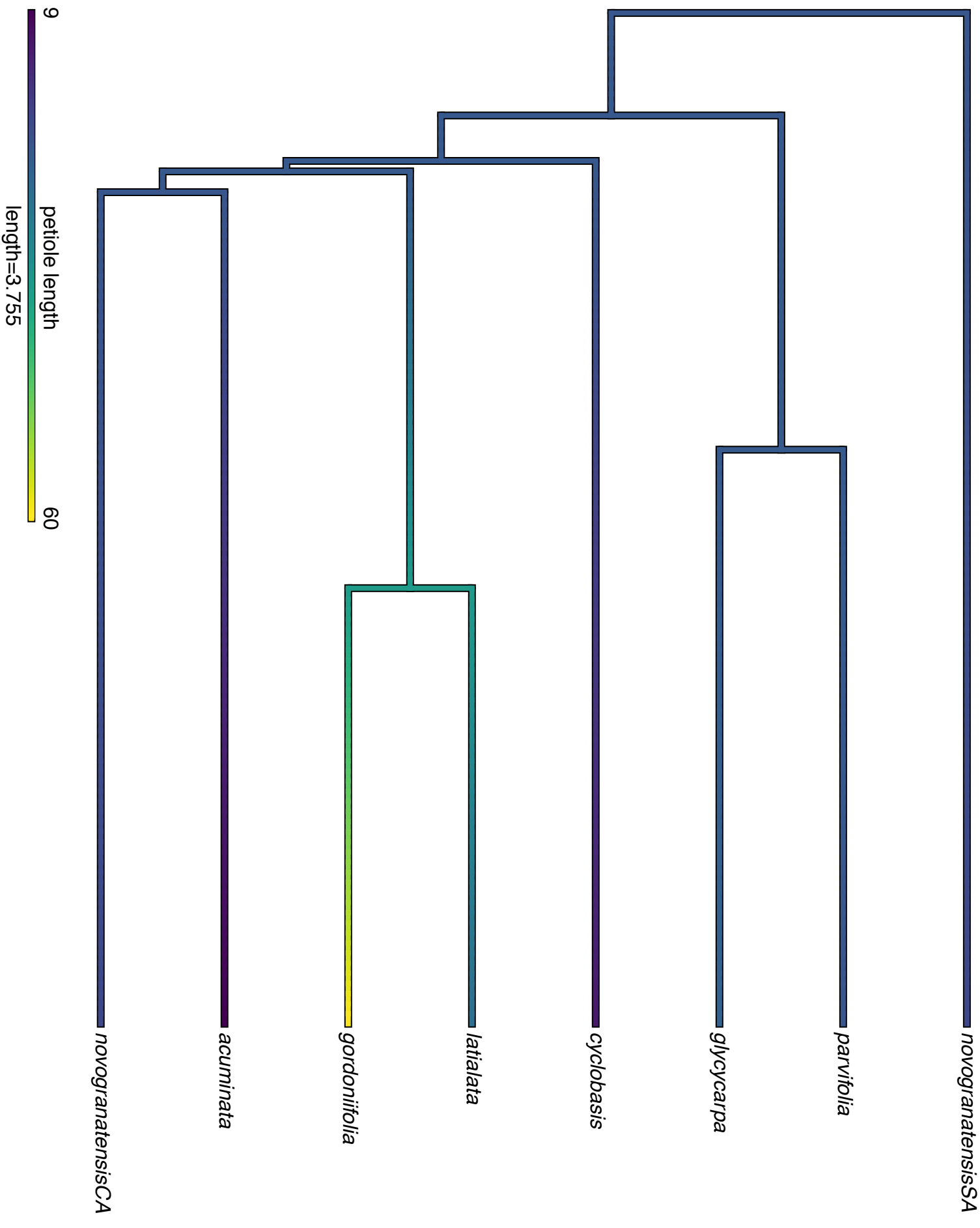
Frost et al, Appendix S26



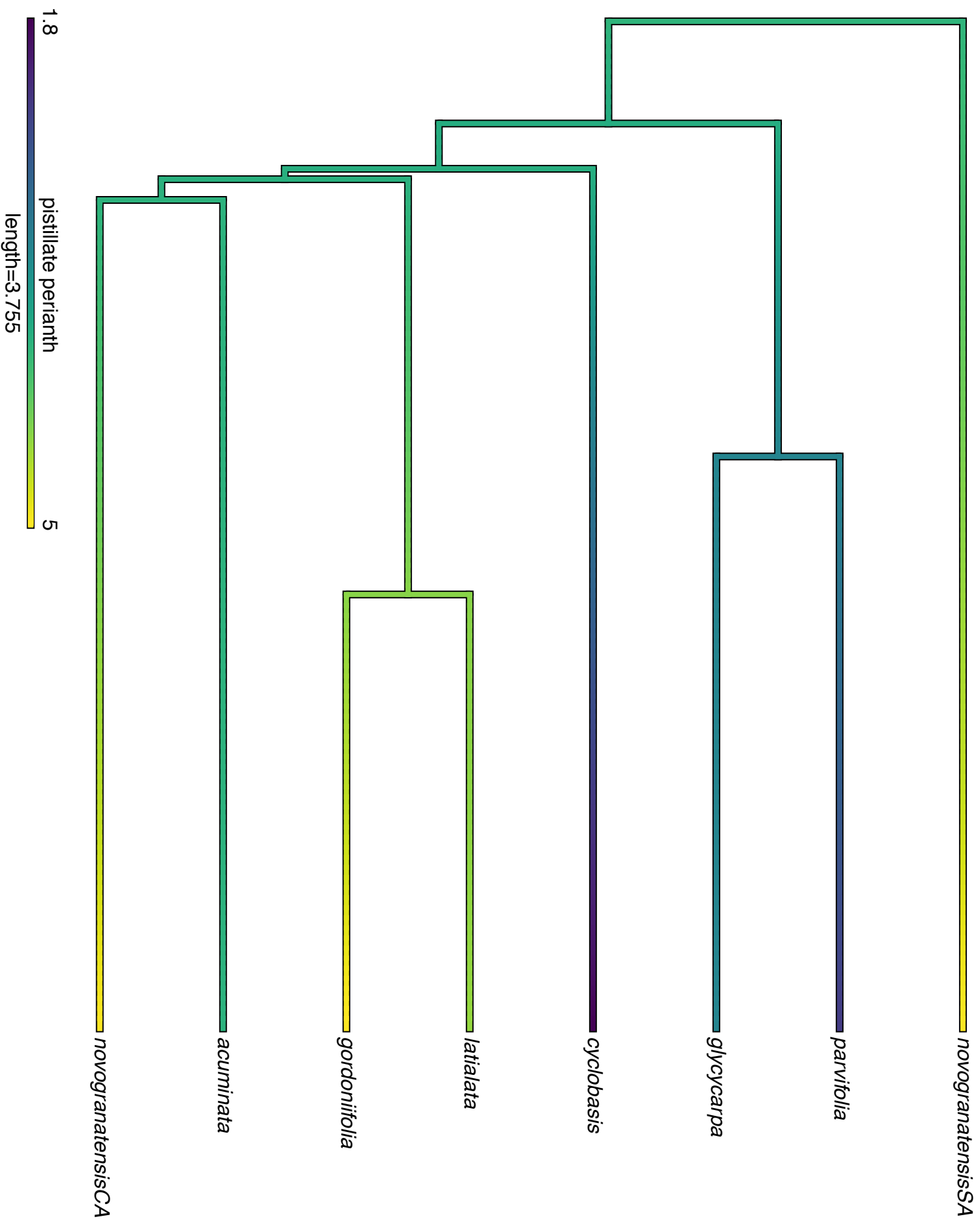


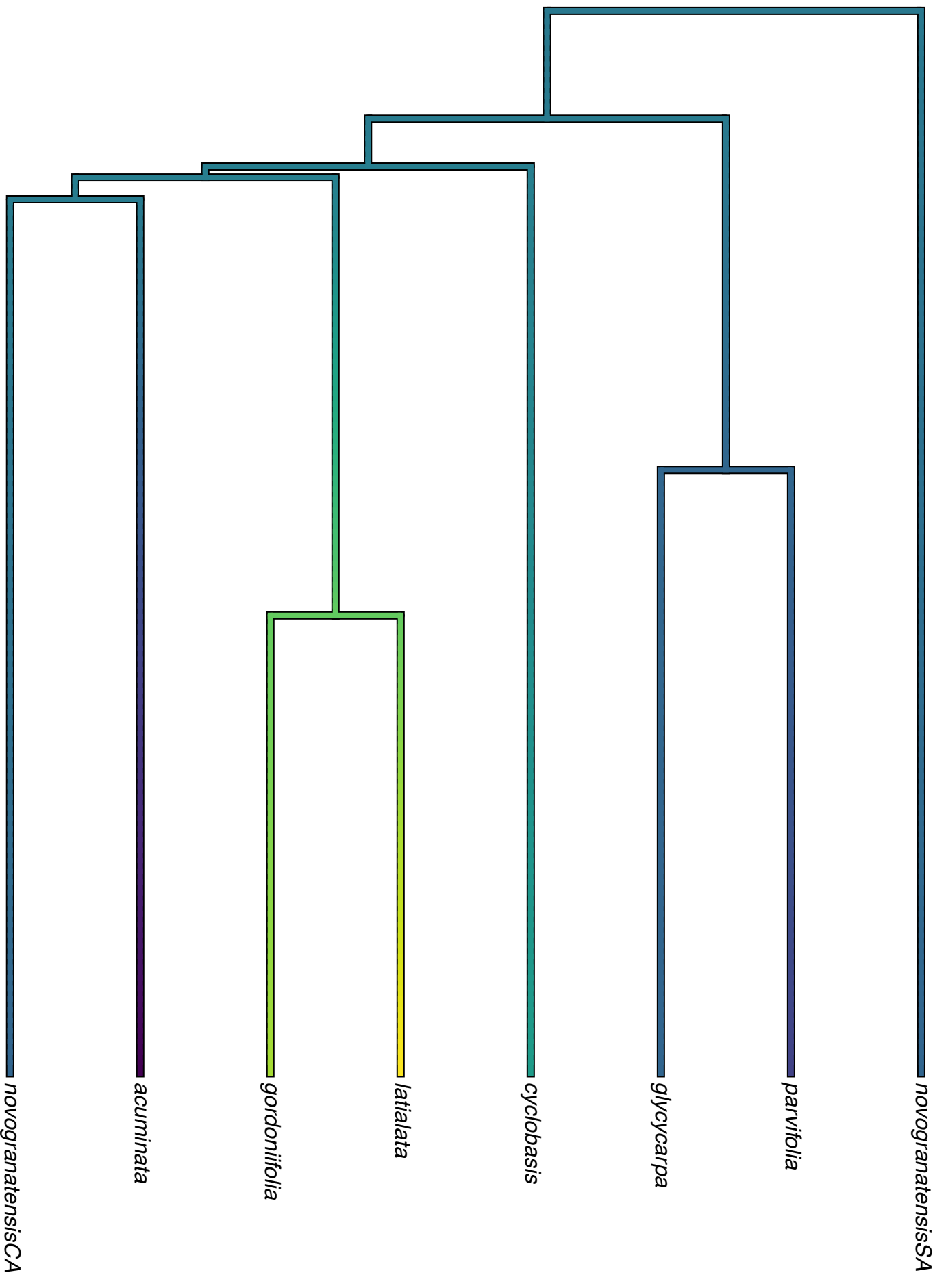
Frost et al, Appendix S28





Frost et al, Appendix S30





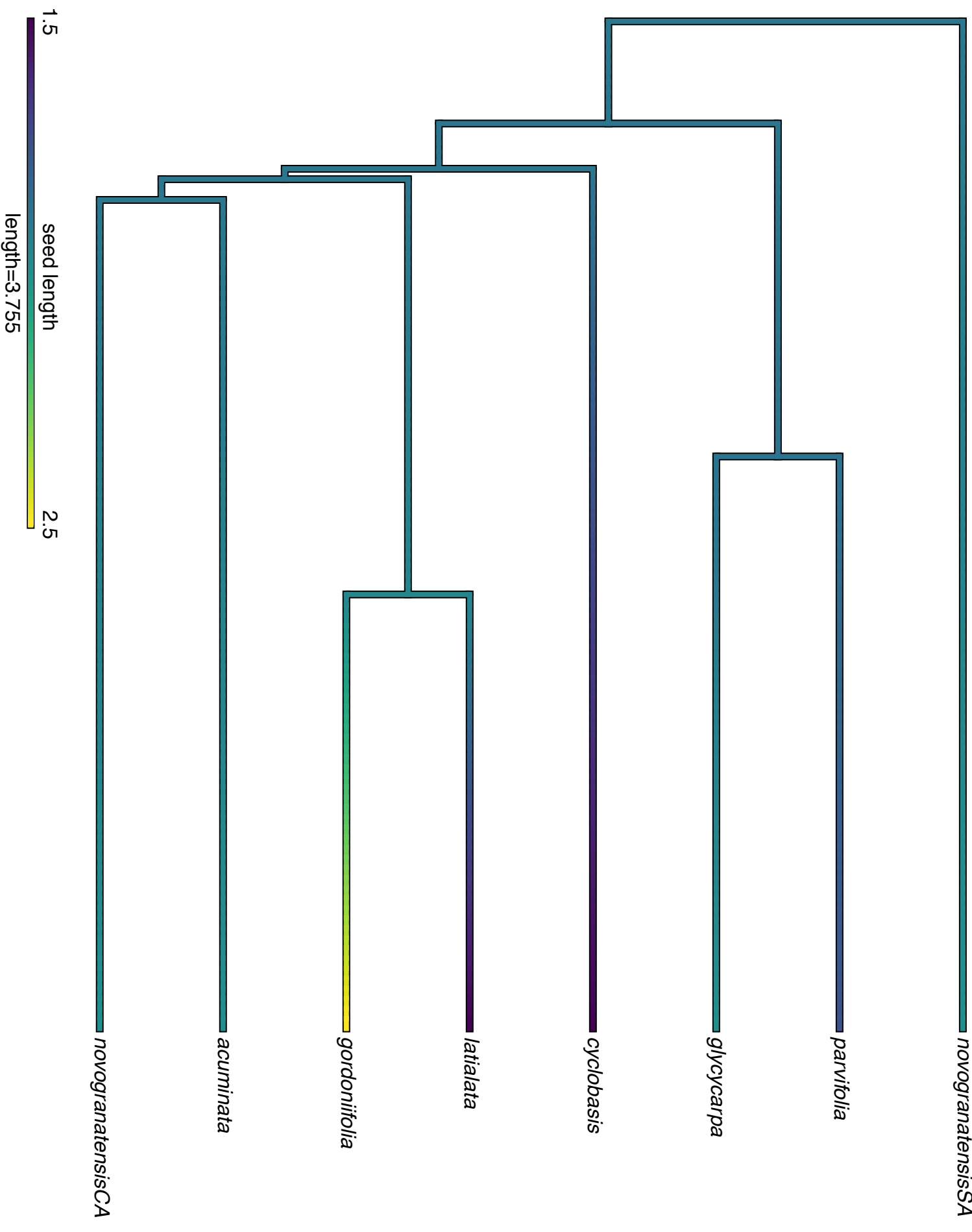
7

number of secondary veins

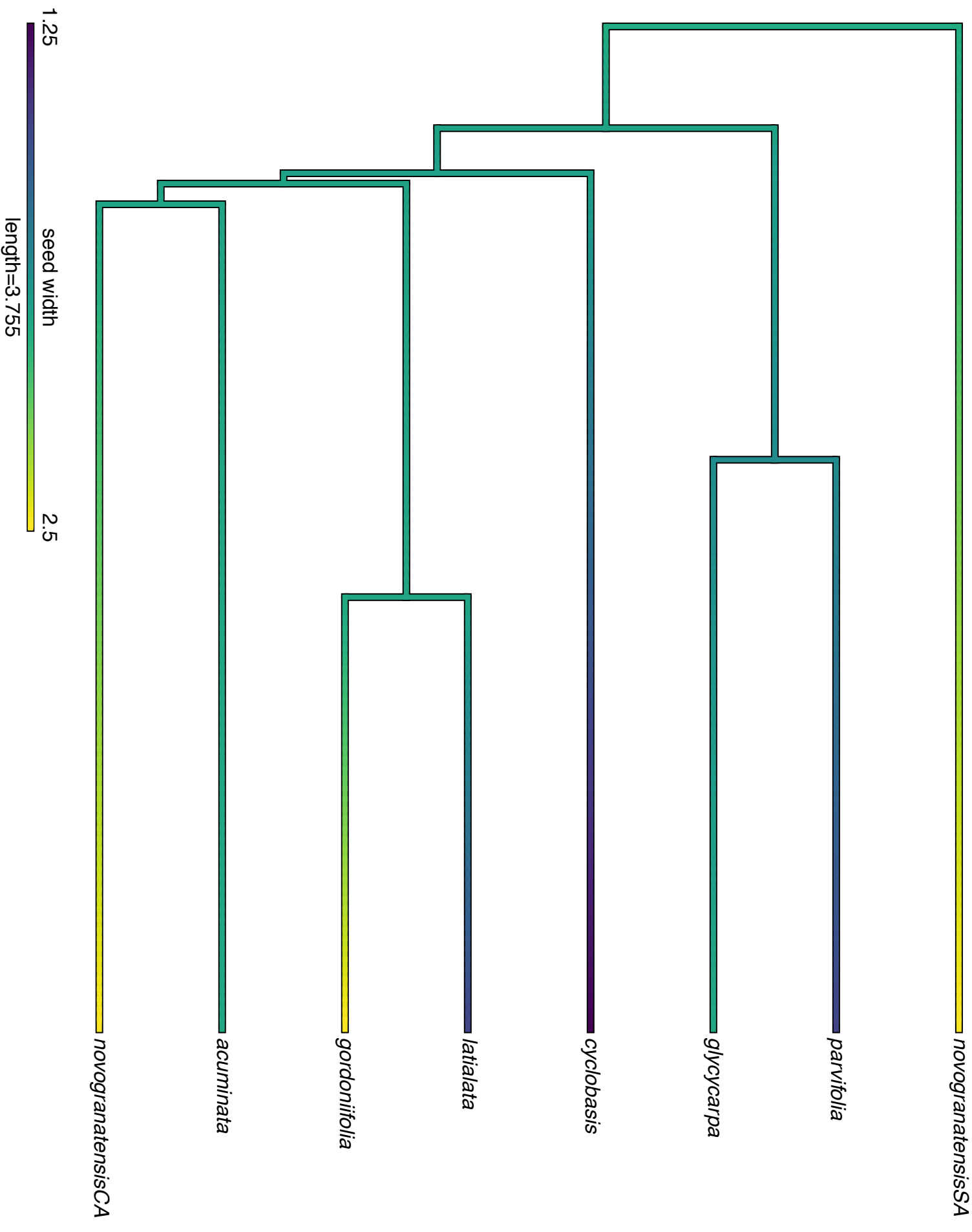
22.5

length=3.755

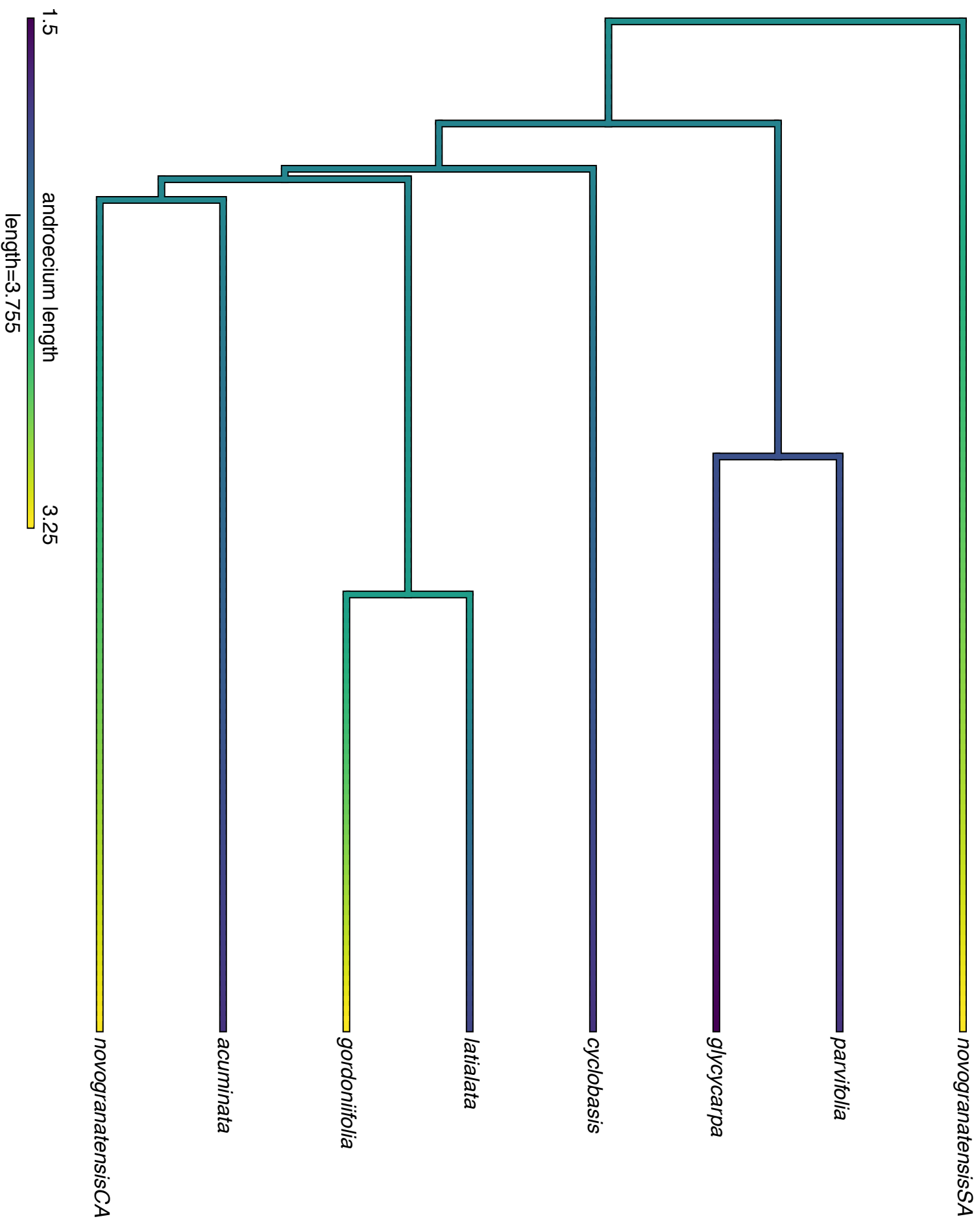
Frost et al, Appendix S32



Frost et al, Appendix S33



Frost et al, Appendix S34



Frost et al, Appendix S35

