

New Phytologist Supporting Information

Article title: **A macro-ecological perspective on crassulacean acid metabolism (CAM) photosynthesis evolution in Afro-Madagascan drylands: Eulophiinae orchids as a case study**

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The following Supporting Information is available for this article:

Fig. S1 BioClim climatic descriptors and their corresponding coordinates on eigenaxes produced using principal components analysis.

Fig. S2 BEAST Maximum Clade Credibility tree.

Table S1 Details of herbarium specimens sampled for carbon stable isotopic composition ($\delta^{13}\text{C}$) measurements.

Fig. S1 BioClim climatic descriptors and their corresponding coordinates on eigenaxes produced using principal components analysis. Note that the first eigenaxis accounted for 44% of the variance and discriminated habitats by temperature and seasonality (BioClim variables 2, 4 and 7 versus all the others; also summarized in Fig. 2(a)). The second eigenaxis accounted for 22% of the variance and generally discriminated dry and/or hot from cold and/or humid habitats.

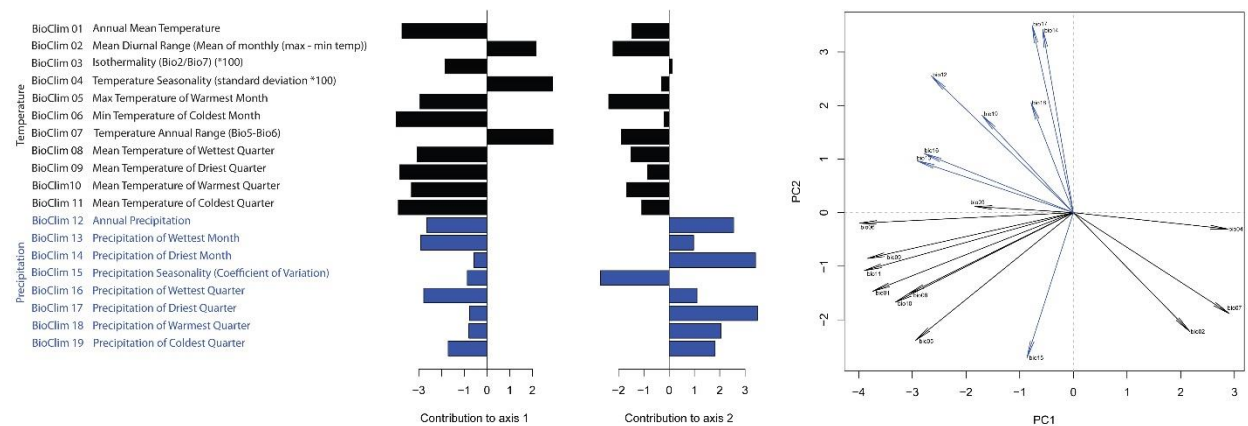


Fig. S2 BEAST Maximum Clade Credibility tree. Numbers below branches are support values (Bayesian posterior probabilities; values < 0.5 not shown). Grey horizontal bars indicate 95% highest posterior density (HPD) intervals on nodes that correspond to the crown age of each Eulophiinae genus, and nodes that are discussed in the text. Vertical lines show geological intervals mentioned in the text.

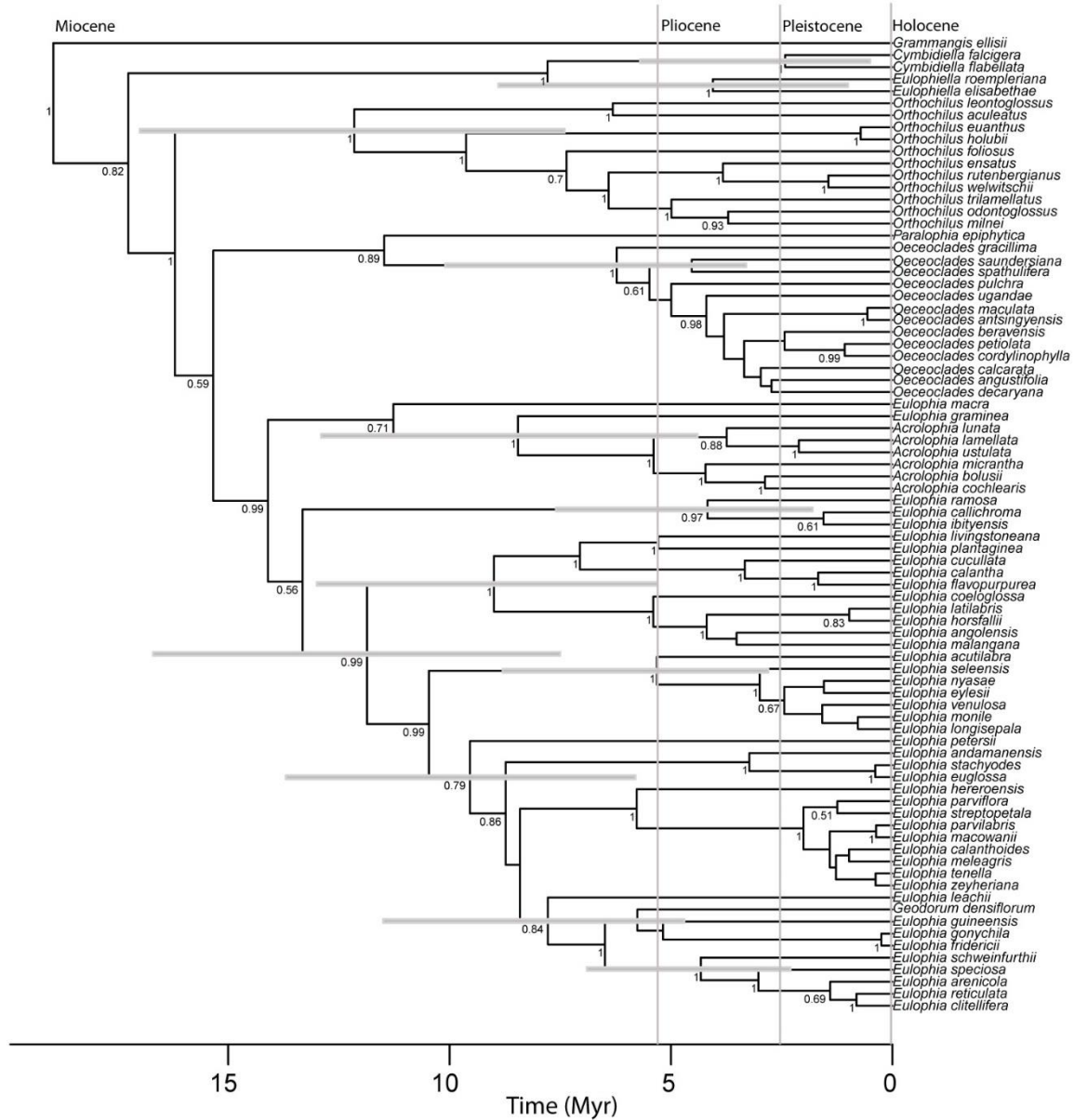


Table S1 Details of herbarium specimens sampled for carbon stable isotopic composition ($\delta^{13}\text{C}$) measurements. All specimens are from the Herbarium of the Royal Botanic Gardens, Kew.

Taxon name	Specimen collector, number		$\delta^{13}\text{C}$ (‰)
<i>Acrolophia bolusii</i>	B. Bytebier	2120	-25.83
<i>Acrolophia cochlearis</i>	ex Herb. Burchell	6201	-22.93
<i>Acrolophia lamellata</i>	B. Bytebier	2125	-25.42
<i>Acrolophia lunata</i>	J.P. Rourke	1758	-25.88
<i>Acrolophia micrantha</i>	s. c.	M099	-21.65
<i>Acrolophia ustulata</i>	Bolus	4848	-23.95
<i>Cymbidiella falcigera</i>	R. E. Bone, J. Andriatiana, <i>et al.</i>	304	-27.00
<i>Cymbidiella flabellata</i>	Razakamalala <i>et al.</i>	2915	-29.42
<i>Eulophia acutilabra</i>	M. Richards	2336	-19.47
<i>Eulophia andamanensis</i>	A. F. G. Kerr	376	-23.48
<i>Eulophia angolensis</i>	H. M. Richards	14446	-27.05
<i>Eulophia arenicola</i>	E. A. Robinson	5778	-11.54
<i>Eulophia calantha</i>	R. E. Bone & L. Merrett	381	-28.97
<i>Eulophia calanthoides</i>	D. J. B. Killick	1327	-27.00
<i>Eulophia callichroma</i>	L. A. Grandvaux Barbosa & M. Carvalho	4067	-25.09
<i>Eulophia clitellifera</i>	N. C. Chase	7359	-13.60
<i>Eulophia coeloglossa</i>	R. E. Bone & L. Merrett	357	-25.21
<i>Eulophia cucullata</i>	R. E. Bone & M. Bingham	322	-28.24
<i>Eulophia euglossa</i>	L. Ake Assi	8909	-28.51
<i>Eulophia eylesii</i>	I. la Croix	368	-27.81
<i>Eulophia flavopurpurea</i>	Brummit & Polhill	13685	-25.69
<i>Eulophia fridericii</i>	Williamson	220	-23.98
<i>Eulophia gonychila</i>	R. E. Bone & M. Bingham	311	-26.99
<i>Eulophia graminea</i>	C. E. Carr	50	-26.72
<i>Eulophia guineensis</i>	H. Smeds	1240	-27.08
<i>Eulophia hereroensis</i>	N. C. Chase	7223	-22.95
<i>Eulophia horsfallii</i>	R. E. Bone & M. Bingham	328	-28.26
<i>Eulophia ibityensis</i>	R. E. Bone, J. Andriatiana & R. Letsara	293	-28.31
<i>Eulophia latilabris</i>	R. E. Bone & M. Bingham	327	-26.32
<i>Eulophia leachii</i>	R. E. Bone & E. Roe	318	-12.93
<i>Eulophia livingstoneana</i>	R. E. Bone, J. Andriatiana & R. Letsara	295	-28.13
<i>Eulophia longisepala</i>	Parmentier & Kila	4657	-28.98
<i>Eulophia macowanii</i>	Mrs Hutton Reed	Mar-68	-25.23
<i>Eulophia macra</i>	R. E. Bone, J. Andriatiana & R. Letsara	298	-26.76
<i>Eulophia malangana</i>	R. E. Bone	350	-28.16
<i>Eulophia meleagris</i>	Ex Herb. Bolus	5916	-26.24
<i>Eulophia monile</i>	J. Lovett, K. Sidwell & C. J. Kayombo		-25.85

<i>Eulophia nyasae</i>	Herb. Cal. Berkeley (?Jean Pawek, <i>illeg.</i>)	10794	-21.48
<i>Eulophia parviflora</i>	H. B. Silliband	915	-25.87
<i>Eulophia parvilabris</i>	J. C. Scheepers	872	-27.06
<i>Eulophia petersii</i>	R. E. Bone & M. Bingham	309	-14.57
<i>Eulophia plantaginea</i>	R. E. Bone, J. Andriatiana & R. Letsara	292	-29.63
<i>Eulophia ramosa</i>	R. E. Bone, J. Andriatiana, <i>et al.</i>	262	-30.77
<i>Eulophia reticulata</i>	R. J. L.	516 B	-10.75
<i>Eulophia schweinfurthii</i>	J. Kornes	2887	-14.14
<i>Eulophia seleensis</i>	R. E. Bone & M. Bingham	339	-26.51
<i>Eulophia speciosa</i>	Fanshawe	7150	-12.65
<i>Eulophia spectabilis</i>	J. H. Vaughan	3164	-29.77
<i>Eulophia stachyodes</i>	E. W. Carrall	4.31	-24.25
<i>Eulophia streptopetala</i>	Greenway	6335	-24.90
<i>Eulophia tenella</i>	Mrs Crook	425	-27.29
<i>Eulophia venulosa</i>	R. E. Bone & L. Merrett	388	-26.62
<i>Eulophia zeyheriana</i>	J. Medley Wood	4264	-25.21
<i>Eulophiella elisabethae</i>	(Dec 1900, Madagascar)	s. n.	-30.53
<i>Eulophiella roempleriana</i>	Kotozafy & Randriananantena	362	-28.12
<i>Geodorum densiflorum</i>	D. L. Jones	1721	-29.17
<i>Grammangis ellisii</i>	C. Rakotovao <i>et al.</i>	3336	-28.39
<i>Oeceoclades angustifolia</i>	RT	536	-16.19
<i>Oeceoclades antsingyensis</i>	Du Puy <i>et al.</i>	M882	-17.96
<i>Oeceoclades beravensis</i>	R. E. Bone, J. Andriatiana, <i>et al.</i>	276	-15.64
<i>Oeceoclades calcarata</i>	R. E. Bone, J. Andriatiana, <i>et al.</i>	271	-14.44
<i>Oeceoclades cordylinophylla</i>	R. E. Bone, J. Andriatiana, <i>et al.</i>	282	-14.73
<i>Oeceoclades decaryana</i>	R. E. Bone, J. Andriatiana, <i>et al.</i>	259	-12.89
<i>Oeceoclades gracillima</i>	R. E. Bone, J. Andriatiana, <i>et al.</i>	251	-13.79
<i>Oeceoclades maculata</i>	R. E. Bone, J. Andriatiana, <i>et al.</i>	254	-12.99
<i>Oeceoclades petiolata</i>	R. E. Bone, J. Andriatiana, <i>et al.</i>	253	-13.94
<i>Oeceoclades pulchra</i>	D. Ravelonarivo	279	-32.21
<i>Oeceoclades saundersiana</i>	Thomas	4314	-17.13
<i>Oeceoclades spathulifera</i>	R. E. Bone, J. Andriatiana, <i>et al.</i>	272	-16.27
<i>Oeceoclades ugandae</i>	s. c.	P2336	-14.01
<i>Orthochilus aculeatus</i>	Bolus	3900	-19.29
<i>Orthochilus ensatus</i>	Gomes Sansa	139	-24.74
<i>Orthochilus euanthus</i>	R. E. Bone & M. Bingham	321	-30.52
<i>Orthochilus foliosus</i>	A. O. Crook	435	-24.22
<i>Orthochilus holubii</i>	R. E. Bone & M. Bingham	340	-25.65
<i>Orthochilus leontoglossus</i>	Fl. Transvaal (Coll. F. G. Rogers)	30257	-23.80
<i>Orthochilus milnei</i>	R. E. Bone & M. Bingham	324	-30.27
<i>Orthochilus odontoglossus</i>	Miss E. Bruce	353	-22.16

<i>Orthochilus rutenbergianus</i>	RNF	2105	-26.96
<i>Orthochilus trilamellatus</i>	R. E. Bone & L. Merrett	380	-27.65
<i>Orthochilus welwitschii</i>	G. Troupin	2110	-26.29
<i>Paralophia epiphytica</i>	Rakotondrajaona et al.	273	-32.16