

TABLE S2. Factor loading in PCA, the results are shown for the characters with $r \geq 0.50$ with PCA factors. For taxon codes see Table 1.

Factor	ROS		ARR		HET	
	Character	r	Character	r	Character	r
Factor 1	LTF	-0.54	LTF	-0.54	LTF	-0.52
Factor 1	LHMF	-0.54	LHIF	-0.54	LTV	-0.54
Factor 1	AHMF	-0.52	LHMF	-0.68	LHMF	-0.65
Factor 1	AHB	0.60	LHSF	-0.53	LHSF	-0.59
Factor 1	LBE	-0.62	AHIF	-0.57	NLCV	-0.50
Factor 1	LBM	-0.75	AHMF	-0.63	LBE	-0.56
Factor 1	LB1I	-0.71	AHSF	-0.54	LB1I	-0.50
Factor 1	LB2I	-0.73	LBE	-0.69	ABE	-0.53
Factor 1	ABE	-0.50	LBM	-0.70	ABM	-0.75
Factor 1	ABM	-0.63	LB1I	-0.81	AB1I	-0.69
Factor 1	AAB2I	-0.57	LB2I	-0.74	LABM	-0.58
Factor 1			LBP	-0.50	LAB1I	-0.59
Factor 1			ABM	-0.58	AABM	-0.62
Factor 1			AB1I	-0.52	AAB1I	-0.72
Factor 1			AB2I	-0.52	AAB2I	-0.61
Factor 1			LABE	-0.50		
Factor 1			LABM	-0.51		
Factor 1			AABE	-0.64		
Factor 1			AABM	-0.57		
Factor 1			AAB1I	-0.51		
Factor 2	LCP	-0.60	ALFC	0.62	AHIF	0.67
Factor 2	ALFC	-0.52	ATFC	-0.53	AHMF	0.63
Factor 2	LANTP	-0.69	LTECC	0.70	LLHIF	0.51
Factor 2	LTECP	-0.50	LESTC	0.57	AHIV	0.55
Factor 2	LESTP	-0.51	LPC	0.75	AHMV	0.52
Factor 2	LPP	-0.61	LLHSF	0.50	LLHVI	0.60
Factor 2	LPC	-0.61	LHCV	-0.50		
Factor 2			LHB	-0.50		
Factor 3	AHCV	0.60	LHIV	0.50	LCP	-0.62
Factor 3	NLHMF	-0.52	AHIV	0.50	LCC	-0.57
Factor 3	LLHMF	-0.56	AHMV	0.50	LANTP	-0.50
Factor 3	AHIV	-0.63			LANTC	-0.67
Factor 3	AHMV	-0.53			LTECP	-0.53
Factor 3					LESTP	-0.51
Factor 3					LPP	-0.60
Factor 3					LPC	-0.50

Factor	CAN		SEM		MEL	
	Character	r	Character	r	Character	R
Factor 1	AHMF	0.57	CD	-0.52	LBE	-0.62
Factor 1	AHSF	0.59	CA	-0.53	LBM	-0.54
Factor 1	NLHMF	0.51	LBE	-0.66	LB1I	-0.57
Factor 1	LBM	0.66	LBM	-0.56	LB2I	-0.63
Factor 1	LB1I	0.73	LB1I	-0.58	ABE	-0.50
Factor 1	AB1I	0.56	LB2I	-0.55	AABM	-0.64
Factor 1	LAB1I	0.50	AABM	-0.55		
Factor 1	AABE	0.63	AAB1I	-0.57		
Factor 1	AABM	0.67	AAB2I	-0.58		
Factor 1	AAB1I	0.69				
Factor 1	ALBM	0.50				
Factor 2	LCP	-0.62	NLCV	0.51	LTF	0.52
Factor 2	LTFC	0.63	NLHB	0.77	LPT	0.60
Factor 2	ALFP	-0.58	LHIV	0.67	LHMF	0.60
Factor 2	LANTP	-0.66	NLHIV	0.59	NLCV	-0.50
Factor 2	LTECC	0.63	NLHMV	0.52	LLHVI	-0.54
Factor 2	LESTP	-0.53			LCP	-0.63
Factor 2	LESTC	0.59			LCC	-0.54
Factor 2	LPP	-0.59			LTFP	-0.56
Factor 2	LCC	0.65			LTFC	-0.50
Factor 2					LANTP	-0.61
Factor 2					LANTC	-0.55
Factor 2					LTECP	-0.71
Factor 2					LESTP	-0.54
Factor 2					LESTC	-0.62
Factor 2					LPP	-0.52
Factor 3			LCP	0.50		
Factor 3			LTFP	0.50		
Factor 3			ATFP	0.51		
Factor 3			LTECP	0.52		

Factor	IMP		AGE		PEC-18	
	Character	r	Character	r	Character	r
Factor 1	LHMF	0.63	LCC	0.68	LCP	-0.62
Factor 1	AHMF	0.64	LTFP	0.53	LCC	-0.77
Factor 1	AHSF	0.51	LTFC	0.59	LTFP	-0.59
Factor 1	LHCV	0.62	ALFP	0.68	LTFC	-0.68
Factor 1	AHCV	0.50	ALFC	0.50	LANTP	-0.71
Factor 1	NLCV	0.61	ATFP	0.51	LANTC	-0.76
Factor 1	LHB	0.62	LANTP	0.67	LTECP	-0.62
Factor 1	AHB	0.50	LANTC	0.51	LTECC	-0.73
Factor 1	NLHB	0.61	LTECP	0.68	LESTC	-0.55
Factor 1	LHMV	0.59	LTECC	0.58	LPP	-0.60
Factor 1	AHMV	0.56	LESTP	0.71	LPC	-0.69
Factor 1	NLHMV	0.64	LESTC	0.64		
Factor 1	CD	0.62	LPP	0.64		
Factor 1	CA	0.51	LCP	0.75		
Factor 1	LBE	0.60				
Factor 1	LBM	0.68				
Factor 1	LB1I	0.64				
Factor 1	LB2I	0.63				
Factor 1	LBP	0.58				
Factor 1	ABM	0.51				
Factor 1	ABP	0.50				
Factor 2	LCC	0.52	LHMF	0.54	AHMF	0.53
Factor 2	LTFC	0.53	LHSF	0.50	AHSF	0.53
Factor 2	ALFP	0.64	AHMF	0.67	AHIV	0.50
Factor 2	ALFC	0.71	AHSF	0.60	AHMV	0.50
Factor 2	ATFC	0.54	LHMV, AHMV	0.58	LB1I	0.54
Factor 2	LANTP	-0.85	AHB	0.52	LB2I	0.60
Factor 2	LTECP	-0.69	NLHB	-0.52	LAB1I	0.52
Factor 2	LTECC	0.63	CD	-0.58	AABE	0.50
Factor 2	LPC	0.87	LBM	0.52	AAB1I	0.58
Factor 2			LB1I	0.57	ALBE	0.55
Factor 2			ABM	0.50	ALBM	0.57
Factor 2			LABM	0.59		
Factor 2			LABI2	0.51		
Factor 2			AAB1I	0.58		
Factor 3			ALB2I	-0.50		

Factor	PEC-36		OBL		ROB	
	Character	r	Character	r	Character	R
Factor 1	LCP	0.87	LTF	0.57	AHIF	0.62
Factor 1	LCC	0.88	LHIF	0.64	AHMF	0.70
Factor 1	LTFP	0.66	LHMF	0.63	LLHMF	0.51
Factor 1	LTFC	0.77	LHSF	0.55	AHCV	0.71
Factor 1	ATFC	0.56	LHCV	0.75	NLCV	-0.53
Factor 1	LANTP	0.65	LHIV	0.59	AHB	0.67
Factor 1	LANTC	0.77	LHMV	0.55	NLHB	-0.60
Factor 1	LTECP	0.67	CD	0.65	AHIV	0.68
Factor 1	LTECC	0.67	LBE	0.51	AHMV	0.74
Factor 1	LESTP	0.63	LBM	0.55	LLHVI	0.59
Factor 1	LESTC	0.55	LB1I	0.50	LLHVM	0.67
Factor 1	LPC	0.57	LB2I	0.83	LLHIF	0.55
Factor 1			ABM	0.51		
Factor 1			AB2I	0.71		
Factor 1			LAB2I	0.78		
Factor 1			AAB2I	0.78		
Factor 2	LHSF	-0.53	DTF	0.63	LTF	0.57
Factor 2	LHCV	-0.63	AHMF	0.53	LHIF	0.50
Factor 2	LHB	-0.63			LHMF	0.54
Factor 2	LABI2	-0.60			LBE	0.63
Factor 2	LAB2I	-0.52			LBM	0.67
Factor 2	AABM	0.50			LB1I	0.69
Factor 2	AAB1I	-0.67			LB2I	0.64
Factor 2	AAB2I	-0.62			ABE	0.51
Factor 3			NLHMF	0.53	LABE	0.51
Factor 3			AHMV	-0.55	LABM	0.50
Factor 3					AABE	0.50
Factor 3					AABM	0.58
Factor 3					AAB1I	0.50
Factor 3					LABE	0.51

TABLE S3. Eigenvalue and percent of variance of PCA factors. For taxon codes see Table 1.

Taxa	Factor	Eigenvalue	Percent of variance	Cumulative Eigenvalue	Cumulative variance
ROS	1	7.60	9.62	7.60	9.62
	2	4.77	6.04	12.37	15.66
	3	3.44	4.35	15.81	20.02
ARR	1	9.42	11.49	9.43	11.49
	2	6.42	7.83	15.84	19.32
	3	5.82	7.10	21.66	26.42
HET	1	8.74	10.41	8.74	10.41
	2	5.35	6.37	14.1	16.78
	3	4.18	4.98	18.28	21.77
CAN	1	7.19	8.46	7.19	8.46
	2	4.61	5.42	11.8	13.88
SEM	1	5.85	7.32	5.85	7.32
	2	4.44	5.55	10.29	12.87
	3	3.57	4.46	13.86	17.33
MEL	1	9.24	11.84	9.24	11.84
	2	7.50	9.62	16.74	21.46
IMP	1	16.17	11.97	16.17	11.97
	2	7.56	5.59	23.74	17.57
AGE	1	7.66	9.23	7.66	9.23
	2	6.18	7.45	13.85	16.68
	3	5.45	6.56	19.29	23.25
PEC-18	1	7.95	9.35	7.95	9.35
	2	7.26	8.55	15.21	17.90
	3	3.90	4.59	19.12	22.49
PEC-36	1	7.08	8.43	7.08	8.43
	2	6.03	7.17	13.11	15.61
	3	3.96	4.71	17.07	20.32
OBL	1	10.07	13.43	10.07	13.43
	2	4.28	5.71	14.35	19.13
	3	3.77	5.03	18.12	24.16
ROB	1	7.92	10.57	7.92	10.57
	2	4.98	6.65	12.91	17.22
	3	3.40	4.53	16.31	21.75

TABLE S4. Chi-square tests with successive roots removed, $p < 0.0001$. BTX, between taxa; BGR, between groups; WGI, between taxa of Group I; WGII, between taxa of Group II; df, degrees of freedom.

Source of variation	Roots	Eigenvalue	Canonical R	Wilk's λ	χ^2	df
BTX	0	13.65	0.96	0.00001	26,580.25	847
	1	6.99	0.93	0.0001	20,622.70	760
	2	4.75	0.91	0.001	15,498.97	585
BGR	0	8.04	0.94	0.02	8,705.08	118
	1	4.01	0.89	0.19	3,676.93	58
WGI	0	10.60	0.94	0.0002	15,155.43	568
	1	9.68	0.92	0.001	11,314.78	490
WGII	0	8.26	0.94	0.02	1,710.94	72
	1	3.81	0.89	0.21	708.21	35