

**TABLE S1** The control file parameters values defined for the branch models in EasyCodeML

<b>Parameter</b>	<b>Branch model</b>		
	<b>M0</b>	<b>Two-ratio</b>	<b>Free ratio</b>
seqfile	User	User	User
treefile	User	User	User
outfile	M0_mlc	BM_mlc	FM_mlc
noisy	9	9	9
verbose	0	0	1
runmode	0	0	0
seqtype	1	1	1
CodonFreq	2	2	2
clock	0	0	0
aaDist	0	0	0
model	0	2	1
Nssites	0	0	0
icode	0	0	0
Mgene	0	0	0
fix_kappa	0	0	0
kappa	2	2	2
fix_omega	0	0	0
omega	2	2	1
fix_alpha	1	1	1
alpha	0	0	0
Malpha	0	0	0
ncatG	3	3	4
getSE	0	0	0
RateAncestor	0	0	0
fix_blength	0	0	0
method	0	0	0
Small_Diff	.45e-6	.45e-6	.45e-6
cleandata	1	1	1

**TABLE S2** The control file parameters values defined for the branch-site models in EasyCodeML

Parameter	Branch-site model	
	Model A	Model A <sub>null</sub>
seqfile	User	User
treefile	User	User
outfile	A_mlc	Anull_mlc
noisy	9	9
verbose	0	0
runmode	0	0
seqtype	1	1
CodonFreq	2	2
clock	0	0
aaDist	0	0
model	2	2
Nssites	2	2
icode	0	0
Mgene	0	0
fix_kappa	0	0
kappa	2	2
fix_omega	0	1
omega	2	1
fix_alpha	1	1
alpha	0	0
Malpha	0	0
ncatG	3	3
getSE	3	0
RateAncestor	0	0
fix_blength	0	0
method	0	0
Small_Diff	.45e-6	.45e-6
cleandata	1	1

**TABLE S3** The control file parameters values defined for the site models in EasyCodeML

Parameter	Site model						
	M0	M1a	M2a	M3	M7	M8	M8a
seqfile	User	User	User	User	User	User	User
treefile	User	User	User	User	User	User	User
outfile	M0_mlc	M1a_mlc	M2a_mlc	M3_mlc	M7_mlc	M8_mlc	M8a_mlc
noisy	9	9	9	9	9	9	9
verbose	0	0	0	0	0	0	0
runmode	0	0	0	0	0	0	0
seqtype	1	1	1	1	1	1	1
CodonFreq	2	2	2	2	2	2	2
clock	0	0	0	0	0	0	0
aaDist	0	0	0	0	0	0	0
model	0	0	0	0	0	0	0
Nssites	0	1	2	3	7	8	8
icode	0	0	0	0	0	0	0
Mgene	0	0	0	0	0	0	0
fix_kappa	0	0	0	0	0	0	0
kappa	2	2	2	2	2	2	2
fix_omega	0	0	0	0	0	0	1
omega	2	2	2	2	2	2	1
fix_alpha	1	1	1	1	1	1	1
alpha	0	0	0	0	0	0	0
Malpha	0	0	0	0	0	0	0
ncatG	3	3	3	3	3	3	3
getSE	0	0	0	0	0	0	0
RateAncestor	0	0	0	0	0	0	0
fix_blength	0	0	0	0	0	0	0
method	0	0	0	0	0	0	0
Small_Diff	.45e-6	.45e-6	.45e-6	.45e-6	.45e-6	.45e-6	.45e-6
cleandata	1	1	1	1	1	1	1

**TABLE S4** The control file parameters values defined for the clade models in EasyCodeML

Parameter	Clade model	
	CmC	M2a_rel
seqfile	User	User
treefile	User	User
outfile	CmC_mlc	M22_mlc
noisy	9	9
verbose	1	1
runmode	0	0
seqtype	1	1
CodonFreq	2	2
clock	0	0
aaDist	0	0
model	3	0
Nssites	2	22
icode	0	0
Mgene	0	0
fix_kappa	0	0
kappa	3	3
fix_omega	0	0
omega	1	1
fix_alpha	1	1
alpha	0	0
Malpha	0	0
ncatG	10	10
getSE	1	1
RateAncestor	1	1
fix_blength	-1	-1
method	0	0
Small_Diff	.5e-6	.5e-6
cleandata	1	1