

Table 1: Summary statistics for effect of masking.

Selective Profile	Number of Taxa	Inference Method	True Positive Rates (% diff from ref aln, for algs)			
			True	Unfiltered	Guidance	GuidanceP
HA	26	FUBAR	0.252	0.227	0.229 (0.84%)	0.226 (-0.38%)
		PAML	0.209	0.176	0.178 (1.34%)**	0.283 (4.03%)**
	60	FUBAR	0.551	0.474	0.479 (0.99%)	0.464 (-2.15%)*
		PAML	0.422	0.347	0.342 (-1.69%)	0.337 (-2.92%)
	158	FUBAR	0.515	0.458	0.467 (1.89%)*	0.468 (2.12%)*
GP41	26	FUBAR	0.216	0.196	0.20 (1.89%)*	0.197 (0.383%)
		PAML	0.237	0.216	0.220 (1.54%)	0.217 (0.244%)
	60	FUBAR	0.360	0.307	0.313 (1.78%)*	0.304 (-1.12%)
		PAML	0.341	0.304	0.302 (-0.762%)	0.296 (-2.72%)**
	158	FUBAR	0.344	0.320	0.325 (1.78%)**	0.326 (2.03%)**

NOTE.—

Table S1. Full version of Table 1 in main body of MS.

TABLE S2 Table S2. Average percent residues masked (average absolute number residues masked) for algorithms, using masking threshold of 0.5.

Profile	Num	Inf Method	True	Unfiltered	True Positive Rates (% diff from ref aln, for algs)					
					Guidance	BMweights	PDweights	GuidanceP	BMweightsP	
HA	11	FUBAR	0.093	0.084	0.085 (1.33%)	0.086 (1.57%)	0.085 (0.62%)	0.085 (0.74%)	0.086 (1.57%)	(
		PAML	0.086	0.082	0.081 (-0.48%)	0.081 (-0.48%)	0.082 (0.62%)	0.081 (-0.6%)	0.081 (-0.97%)	(
	26	FUBAR	0.252	0.227	0.229 (0.84%)	0.228 (0.48%)	0.228 (0.31%)	0.226 (-0.4%)	0.226 (-0.4%)	(
		PAML	0.209	0.176	0.178 (1.36%)	0.178 (1.36%)	0.178 (1.47%)	0.183 (4.04%)***	0.183 (4.04%)***	(
	60	FUBAR	0.551	0.474	0.479 (0.99%)	0.476 (0.48%)	0.478 (0.90%)	0.464 (-2.16%)**	0.464 (-2.13%)**	(
		PAML	0.422	0.347	0.342 (-1.68%)	0.345 (-0.62%)	0.341 (-1.94%)	0.337 (-2.92%)	0.333 (-4.22%)	(
	158	FUBAR	0.515	0.458	0.4667 (1.88%)**	0.4667 (1.88%)**	0.4671 (1.97%)**	0.468 (2.12%)**	0.467 (2.03%)**	(
		FUBAR	0.062	0.058	0.057 (-1.55%)	0.057 (-1.55%)	0.058 (-0.69%)	0.057 (-1.21%)	0.057 (-1.03%)	(
GP41	11	PAML	0.0959	0.0982	0.0948 (-3.49%)***	0.095 (-3.39%)***	0.095 (-3.49%)***	0.095 (-3.80%)***	0.094 (-3.90%)***	(
	26	FUBAR	0.216	0.196	0.200 (1.89%)**	0.200 (2.04%)**	0.199 (1.48%)*	0.197 (0.36%)	0.197 (0.36%)	(
		PAML	0.237	0.216	0.220 (1.53%)	0.220 (1.77%)*	0.219 (1.44%)	0.217 (0.24%)	0.217 (0.15%)	(
	60	FUBAR	0.359	0.308	0.313 (1.77%)**	0.313 (1.83%)**	0.312 (1.44%)*	0.304 (-1.16%)	0.304 (-1.13%)	(
	158	PAML	0.341	0.304	0.3015 (-0.77%)	0.303 (-0.14%)	0.300 (-1.13%)	0.296 (-2.71%)***	0.296 (-2.61%)**	(
		FUBAR	0.348	0.320	0.325 (1.77%)***	0.324 (1.37%)***	0.326 (1.93%)***	0.326 (2.02%)***	0.326 (1.93%)***	(

NOTE.—

Table 2: Table S2. Absolute Number and Percent residues masked for each alignment.

Profile	Num	Inf Method	Percent Residues Masked (absolute nummasked)					
			Guidance	GuidanceP	BMweights	BMweightsP	PDweights	PDweightsP
HA	11	FUBAR	0.01% (43.25)	0.01% (42.49)	0.01% (44.35)	0.02% (89.32)	0.02% (87.69)	0.026% (113.67)
		PAML	0.01% (43.25)	0.01% (42.49)	0.01% (44.35)	0.02% (89.32)	0.02% (87.69)	0.026% (113.67)
	26	FUBAR	0.01% (107.75)	0.01% (106.73)	0.01% (108.67)	0.025% (256.84)	0.024% (251.01)	0.026% (264.28)
		PAML	0.01% (107.75)	0.01% (106.73)	0.01% (108.67)	0.025% (256.84)	0.024% (251.01)	0.026% (264.28)
	60	FUBAR	0.027% (653.38)	0.026% (634.76)	0.032% (762.93)	0.094% (2280.15)	0.096% (2326.67)	0.104% (2522.89)
		PAML	0.027% (653.38)	0.026% (634.76)	0.032% (762.93)	0.094% (2280.15)	0.096% (2326.67)	0.104% (2522.89)
GP41	11	FUBAR	0.006% (382.88)	0.006% (366.12)	0.006% (413.73)	0.018% (1126.08)	0.019% (1198.67)	0.019% (1245.29)
		PAML	0.009% (40.56)	0.009% (40.01)	0.009% (41.82)	0.021% (93.1)	0.021% (91.96)	0.027% (117.72)
	26	PAML	0.009% (40.56)	0.009% (40.01)	0.009% (41.82)	0.021% (93.1)	0.021% (91.96)	0.027% (117.72)
		FUBAR	0.014% (143.81)	0.014% (141.86)	0.014% (148.7)	0.042% (435.8)	0.044% (461.09)	0.049% (512.64)
	60	FUBAR	0.014% (143.81)	0.014% (141.86)	0.014% (148.7)	0.042% (435.8)	0.044% (461.09)	0.049% (512.64)
		PAML	0.027% (655.49)	0.027% (639.34)	0.032% (777.8)	0.091% (2169.87)	0.094% (2253.62)	0.102% (2447.19)
	158	FUBAR	0.027% (655.49)	0.027% (639.34)	0.032% (777.8)	0.091% (2169.87)	0.094% (2253.62)	0.102% (2447.19)
		PAML	0.006% (363.15)	0.006% (350.34)	0.006% (396.34)	0.017% (1060.16)	0.016% (1036.91)	0.017% (1103.85)

NOTE.—