

Supplementary Information

Supplementary Table 1. Log likelihoods calculated by BIO++ and PAML codeml for each of the different models.

File	Method	M1	M2	M7	M8
APOBEC3F	BPP	-2507,37	-2491,43	-2511,01	-2491,47
	PAML	-3945,63	-3930,68	-3945,88	-3930,68
FOXP2	BPP	-3997,30	-3995,85	-3999,96	-3995,98
	PAML	-5860,15	-5858,43	-5861,65	-5858,44
GADD45A	BPP	-1239,99	-1239,99	-1241,28	-1238,69
	PAML	-1291,75	-1291,75	-1292,06	-1289,64
GBP5	BPP	-6138,60	-6131,37	-6139,83	-6131,78
	PAML	-6516,42	-6504,84	-6518,34	-6505,90
GMPR	BPP	-3027,30	-3027,30	-3027,12	-3025,84
	PAML	-3425,82	-3425,82	-3423,78	-3423,53
HERC5	BPP	-10433,56	-10430,06	-10434,33	-10430,37
	PAML	-11950,25	-11945,50	-11951,66	-11946,35
IFI16	BPP	-11099,74	-11075,12	-11103,87	-11075,78
	PAML	-18264,89	-18223,86	-18270,40	-18225,35
ISG20	BPP	-1837,14	-1837,14	-1836,69	-1836,69
	PAML	-3048,57	-3048,57	-3047,88	-3047,42
MX1	BPP	-8537,86	-8532,47	-8543,10	-8531,57
	PAML	-11329,45	-11316,93	-11335,61	-11317,74
NT5C3A	BPP	-2324,85	-2324,85	-2324,19	-2323,64
	PAML	-4483,43	-4483,43	-4482,88	-4482,16
RB1	BPP	-6873,89	-6873,89	-6874,36	-6872,91
	PAML	-7244,38	-7244,38	-7242,93	-7242,93
RHO	BPP	-2910,93	-2910,93	-2913,24	-2908,65
	PAML	-2967,07	-2967,07	-2953,69	-2953,12
RSAD2	BPP	-4248,12	-4248,12	-4248,75	-4243,00
	PAML	-4875,51	-4868,59	-4874,28	-4865,51
SAMHD1	BPP	-7522,22	-7495,71	-7534,66	-7497,30
	PAML	-8219,63	-8186,06	-8225,38	-8187,80
SERINC3	BPP	-4751,87	-4749,23	-4755,82	-4749,69
	PAML	-5373,70	-5370,57	-5376,40	-5371,08
SHH	BPP	-3576,79	-3576,79	-3580,07	-3575,89
	PAML	-4855,15	-4841,25	-4853,34	-4837,51
SMC6	BPP	-8971,83	-8971,83	-8974,05	-8970,65
	PAML	-12342,77	-12342,77	-12341,63	-12336,91
TREX1	BPP	-3421,42	-3421,42	-3421,35	-3421,15
	PAML	-5080,28	-5080,27	-5080,76	-5080,15
ZC3HAV1	BIO++	-12413,91	-12384,63	-12418,39	-12392,87
	PAML	-17617,28	-17585,61	-17619,80	-17585,77

Supplementary Table 2. Overview of the running times of each of the positive selection methods in Step 8.

	BUSTED	PAML M1 vs M2	PAML M7 vs M8	Bio++ M1 vs M2	Bio++ M7 vs M8	MEME
APOBEC3F	00:02:06	00:09:09	00:55:26	01:37:42	00:59:40	00:18:18
FOXP2	00:10:41	22:26:10	3 days, 2:56:09	00:22:23	02:49:05	00:14:29
GADD45A	00:01:00	00:17:43	01:03:46	00:16:32	00:16:42	00:09:15
GBP5	00:07:57	00:41:13	02:17:19	00:24:26	00:54:38	01:12:38
GMPR	00:06:22	01:19:12	04:13:22	00:23:07	00:28:42	00:46:10
HERC5	00:07:03	01:43:54	06:02:21	01:42:03	01:39:28	02:24:10
IFI16	01:09:12	18:32:28	4 days, 1:14:47	01:28:31	01:22:09	03:19:20
ISG20	00:04:04	01:23:59	04:51:58	00:20:49	00:18:46	00:29:56
MX1	00:12:33	09:14:12	1 day, 0:17:30	01:14:08	03:18:13	01:56:16
NT5C3A	00:17:33	13:42:28	1 day, 15:07:57	00:42:06	2 days, 0:47:25	10:08:30
RB1	00:20:44	01:59:13	07:46:37	00:27:46	01:40:49	01:25:10
RHO	00:02:46	00:12:45	00:34:20	00:15:19	00:24:46	00:24:53
RSAD2	00:09:17	03:40:53	10:40:19	00:29:09	01:13:49	01:09:52
SAMHD1	00:10:46	19:30:38	2 days, 6:50:22	01:23:20	02:07:07	02:32:58
SERINC3	00:05:58	01:37:51	05:24:02	00:56:57	02:17:20	00:59:16
SHH	00:04:46	00:56:20	03:15:44	00:13:25	00:54:23	00:34:22
SMC6	00:16:53	14:16:56	1 day, 21:28:49	00:40:12	03:00:34	02:08:19
TREX1	00:04:11	01:18:01	04:00:57	00:22:24	01:46:02	00:04:34
ZC3HAV1	00:16:12	11:03:56	1 day, 10:43:01	01:36:41	04:24:26	01:54:47