

## Supplementary information for 'Mechanisms of genetic robustness in RNA viruses' by Elena *et al.*

**Table S1** | Survey of mutational fitness effects for different RNA viruses. Data are expressed in a common per generation scale.

<b>Virus</b>	<b>Experimental strategy</b>	<b>Fitness measure</b>	<b>s (<math>\pm</math> SEM)</b>	<b>Sample size<sup>1</sup></b>	<b>Reference</b>
Phage $\phi$ 6	MA ?	Plaque size Total fitness	0.033 $\pm$ 0.008 0.103	? 11 (11)	Burch & Chao (2004)
Poliovirus 1	Chemical mutagenesis	Viability	0.230	?	Burch & Chao (2004); Crotty <i>et al</i> (2001)
Foot-and-mouth disease	MA Chemical mutagenesis	Total fitness Productivity	0.108 $\pm$ 0.025 0.576 $\pm$ 0.096	13 (56) 6 (?)	Escarmis <i>et al</i> (1996) Sierra <i>et al</i> (2000)
Vesicular stomatitis	MA Site-directed mutagenesis <sup>2</sup>	Total fitness Growth rate	0.003 $\pm$ 0.001 0.458 $\pm$ 0.064	49 (?) 22 (22)	Elena & Moya (1999) Sanjuán <i>et al</i> (2004)
Dengue	MA <sup>3</sup>	Plaque size	0.147 $\pm$ 0.027	16 (6)	Butrapet <i>et al</i> (2000)
Tick-borne encephalitis	PCR mutagenesis	Plaque size	0.023 $\pm$ 0.012	4 (5)	Gritsun <i>et al</i> (2001)
Venezuelan equine encephalitis	MA <sup>3</sup>	Plaque size	0.069 $\pm$ 0.008	13 (10)	Kinney <i>et al</i> (1993)
Human immunodeficiency type 1	MA	Total fitness	0.146 $\pm$ 0.109	4 (49)	Yuste <i>et al</i> (1999, 2000, 2005)

<sup>1</sup> Number of mutant genotypes tested. The number in parentheses corresponds to the total number of different mutations used.

<sup>2</sup> 40% of mutations were lethal, but they have been excluded from the calculation to allow comparison with the other studies.

<sup>3</sup> In vaccine candidates.

MA, mutation accumulation; PCR, polymerase chain reaction; SEM, standard error of the mean.

**Table S2** | Survey of mutational fitness effects for organisms with DNA genomes. Data are expressed in a common per generation scale.

Organism	Experimental strategy	Fitness measure	$s$ ( $\pm$ SEM)	Sample size <sup>1</sup>	Reference
<i>Escherichia coli</i>	MA	Growth rate	0.019	250 lines	Kibota & Lynch (1996)
	Transposon mutagenesis	Total fitness	0.035 $\pm$ 0.010	138 (138)	Elena <i>et al</i> (1998)
<i>Saccharomyces cerevisiae</i> (haploid)	Chemical mutagenesis	Growth rate	0.149 $\pm$ 0.019	104 (104)	Szafrañiec <i>et al</i> (2003)
	MA	Growth rate	0.261 $\pm$ 0.019	204 (204)	Wloch <i>et al</i> (2001)
	Transposon mutagenesis	Total fitness	0.032 $\pm$ 0.011	25 (25)	Hatcher <i>et al</i> (1998)
<i>S. cerevisiae</i> (diploid)	Chemical mutagenesis	Growth rate	0.009 $\pm$ 0.002	109 (109)	Szafrañiec <i>et al</i> (2003)
	MA	Growth rate	0.041	151 lines	Joseph & Hall (2004)
<i>Aspergillus nidulans</i>	MA	Total fitness	0.010	50 lines	Zeyl & de Visser (2001)
	MA	Growth rate	0.019 $\pm$ 0.009	80 lines	Bruggeman <i>et al</i> (2003)
<i>Daphnia pulex</i>	MA	Life-history traits	0.004 $\pm$ 0.001	100 lines	Lynch <i>et al</i> (1998)
<i>Caenorhabditis elegans</i>	MA	Productivity	0.028 $\pm$ 0.010	100 lines	Vassilieva <i>et al</i> (2000)
	MA	Growth rate	0.378		
	MA	Productivity	0.001	60 lines	Davies <i>et al</i> (1999)
<i>Drosophila melanogaster</i>	MA	Productivity	0.007	50 lines	Keightley & Caballero (1997) <sup>1</sup>
	MA	Viability	0.003	72 lines	Mukai <i>et al</i> (1972) <sup>2</sup>
	Chemical mutagenesis	Viability	0.005	136 (?)	Ohnishi (1977) <sup>2</sup>
	MA	Viability	0.023	72 lines	Fry <i>et al</i> (1999) <sup>2</sup>
	MA	Viability	0.015	176 lines	Fernández & López-Fanjul (1996) <sup>2</sup>
<i>Arabidopsis thaliana</i>	MA	Total fitness	0.035	1000 lines	Schultz <i>et al</i> (1999)
	MA	Various	0.071 $\pm$ 0.018	40 lines	Shaw <i>et al</i> (2000)

<sup>1</sup> Number of mutant genotypes tested. The number in parentheses corresponds to the total number of different mutations used.

<sup>2</sup> Reviewed in García-Dorado *et al* (1999)

MA, mutation accumulation; SEM, standard error of the mean.

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