Supplementary Tables

Table S1: General linear mixed models to analyse copepod behaviour in response to infection by parasites selected for or against host manipulation. This table shows the outcome of two separate linear mixed models for predation suppression (i.e. host manipulation by not yet infective parasites) and predation enhancement (i.e. host manipulation by infective parasites). A model investigating both in combination is presented in Table 1 and discussed in the main manuscript. Initial model: response ~1+ (1|population). Test statistics and p-values were obtained using likelihood ratio tests and are always for the comparison with the preceding (i.e. less complicated) model. N: 1231 copepods in 4 populations; Significant p values are highlighted in bold.

| Predation suppression (df: 3)			
Factor	df	χ^2	p
+ Generation	4,1	19.11	**<0.0001**
+ Infection	5,1	209.84	**<0.0001**
+ Selection line	7,2	13.59	**0.0011**
+ Infection: Generation	8,1	2.95	0.0859
+ Selection line: Generation	10,2	1.07	0.5867
Predation enhancement (df: 3)			
Factor	df	χ^2	p
+ Generation	4,1	2.45	0.1172
+ Infection	5,1	25.88	**<0.0001**
+ Selection line	7,2	19.80	**<0.0001**
+ Infection: Generation	8,1	8.43	**0.0037**
+ Selection line: Generation	10,2	2.40	0.3007

Table S2: Summary of the model containing all fixed effects and significant interactions (see table S1). Infection was removed from these models since the information is also contained in selection line. Comparisons are with parasites from the control line.

	Predation suppression		Predation enhancement	
Random effects				
Factor	Variance ± SD		Variance ± SD	
Replicate (intercept)	0.0008 ± 0.0281		0.0009 ± 0.0293	
Residual	0.0191 ± 0.1383		0.0366 ± 0.1914	
Fixed effects				
Factor	Estimate ± SE	t- value	Estimate ± SE	t- value
intercept	0.2917 ± 0.0180	16.162	0.5224 ± 0.0217	24.024
Selection line (High)	-0.0019 ± 0.0114	-0.168	0.0134 ± 0.0158	0.848
Selection line (Low)	0.0305 ± 0.0115	2.657	-0.0430 ± 0.0159	-2.707
Selection line (Uninfected)	0.1953 ± 0.0147	13.276	0.0021 ± 0.0324	0.064
Generation	0.0193 ± 0.0040	4.789	0.0300 ± 0.0143	2.101
Infection: Generation			-0.0448 ± 0.0155	-2.891

Table S3: Post hoc tests for selection on parasites for or against host manipulation. Significant p values are highlighted in bold.

| comparison		F0			F1			F2			F3		
		coefficient	t	p	coefficient	t	p	coefficient	t	p	coefficient	t	p
Host manipulation													
Uninfected	Control	-0.256	-5.28	**<0.001**	-0.145	-3.59	**0.002**	-0.117	-2.42	0.069	-0.002	-0.05	1
	High	-0.223	-4.55	**<0.001**	-0.185	-5.40	**<0.001**	-0.137	-3.24	**0.006**	-0.063	-1.70	0.319
	Low	-0.180	-3.60	**0.002**	-0.114	-3.29	**0.005**	-0.017	-0.41	0.975	0.036	0.99	0.754
Low	Control	-0.076	-1.77	0.289	-0.030	-0.96	0.764	-0.100	-2.92	**0.017**	-0.038	-1.17	0.645
	High	-0.043	-0.98	0.761	-0.071	-3.01	**0.013**	-0.119	-4.88	**<0.001**	-0.099	-3.34	**0.004**
High	Control	-0.034	-0.80	0.853	0.041	1.30	0.555	0.020	0.58	0.934	0.061	1.84	0.253
Predation suppression (day 6-8 post infection, not yet infective parasites)													
Uninfected	Control	0.206	5.96	**<0.001**	0.232	9.17	**<0.001**	0.196	6.15	**<0.001**	0.151	5.49	**<0.001**
	High	0.195	5.60	**<0.001**	0.225	10.41	**<0.001**	0.219	7.91	**<0.001**	0.172	6.66	**<0.001**
	Low	0.197	5.52	**<0.001**	0.189	8.65	**<0.001**	0.165	5.93	**<0.001**	0.158	6.25	**<0.001**
Low	Control	0.009	0.30	0.991	0.044	2.20	0.118	0.030	1.35	0.516	-0.008	-0.34	0.986
	High	-0.002	-0.05	1	0.036	2.42	0.070	0.054	3.36	**0.004**	0.013	0.63	0.920
High	Control	0.011	0.36	0.983	0.008	0.39	0.979	-0.023	-1.05	0.708	-0.021	-0.90	0.802
Predation enhancement (day 13-15 post infection, infective parasites)													
Uninfected	Control	-0.050	-1.22	0.614	0.088	2.19	0.123	0.082	1.90	0.220	0.150	4.26	**0.001**
	High	-0.027	-0.66	0.912	0.039	1.15	0.649	0.080	2.14	0.133	0.109	3.29	**0.005**
	Low	0.017	0.41	0.977	0.075	2.16	0.130	0.146	3.87	**0.001**	0.195	6.02	**<0.001**
Low	Control	-0.067	-1.84	0.254	0.013	0.42	0.975	-0.064	-2.11	0.142	-0.046	-1.58	0.386
	High	-0.044	-1.20	0.624	-0.035	-1.49	0.434	-0.066	-3.02	**0.013**	-0.087	-3.28	**0.005**
High	Control	-0.023	-0.64	0.918	0.048	1.55	0.401	0.001	0.04	1	0.041	1.38	0.507

Supplementary Figures
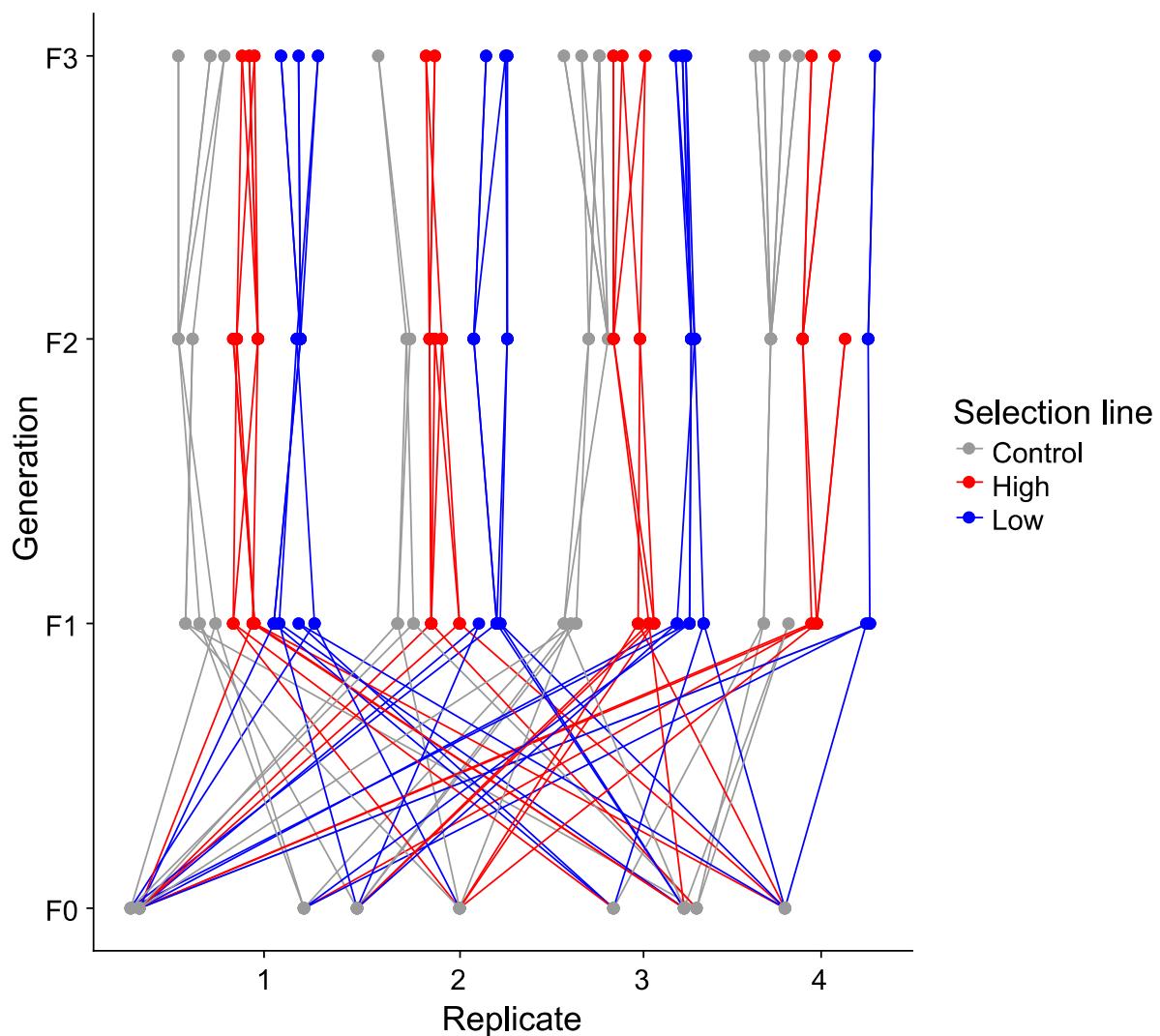
Figure S1: Pedigree for parasite families in different selection lines. Red: High, Blue: Low, Grey: Control (no selection). Each point represents a parasite family.
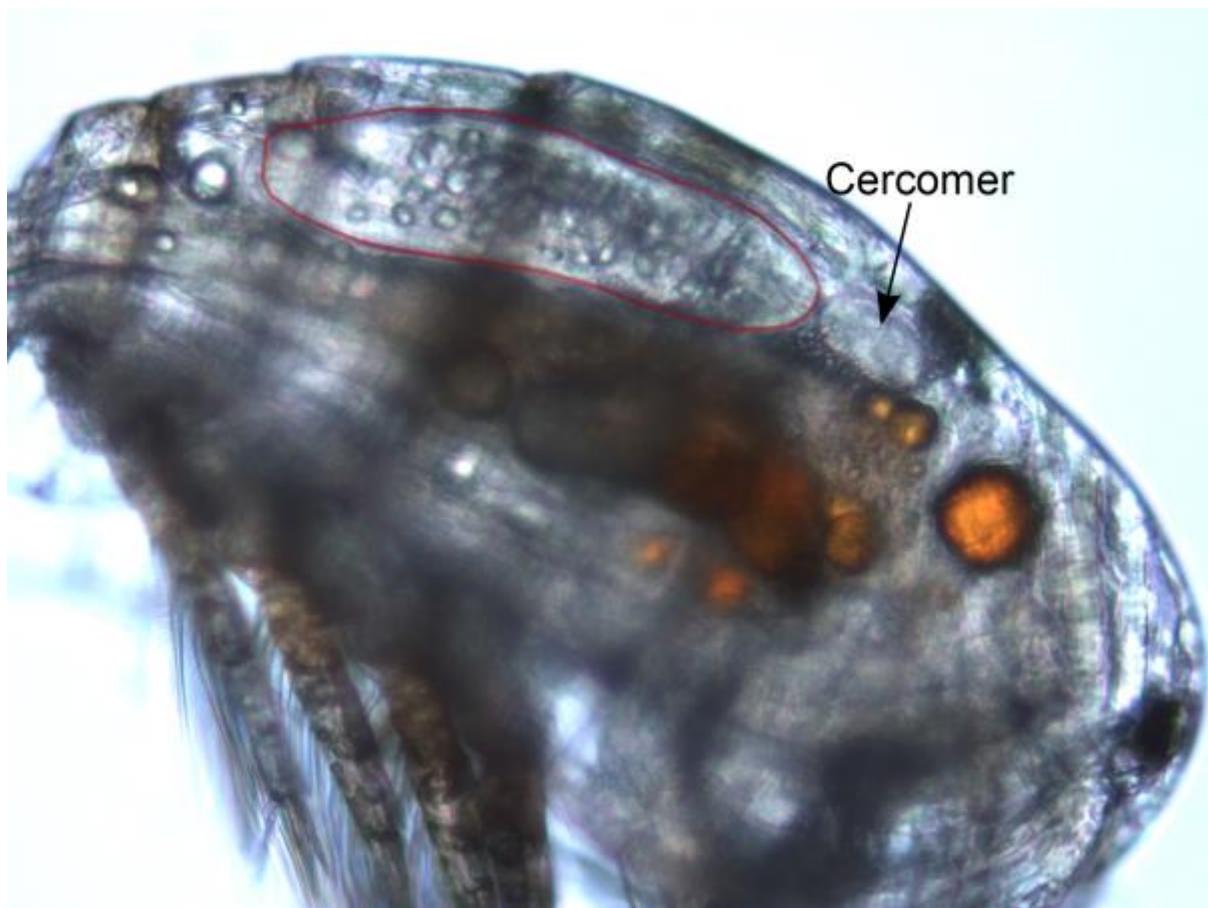
Figure S2: *Macrocyclops albidus* **infected with** *Schistocephalus solidus***.** Red outline indicates area used to measure parasite size.

Potential trade-offs with host manipulation

Selection line did not directly influence infection success in copepods (p=0.3634, Table S4-5), but its effect on infection success changed between generations (p=0.0476, Table S4-5). During the third generation, low selection line parasites were significantly better at infecting copepods than those from the control lines (p=0.043, Fig. S3A, Table S6), but not those from high selection lines (p=0.481, Fig. S3A, Table S6). Development was significantly affected by selection line (p=0.0369, Table S4-5), but a post hoc test revealed no clear differences between individual selection lines (p>0.1, Fig. S3B, Table S6). Neither size in copepods nor infection success, size, or fecundity in fish were affected by selection line or its interaction with generation (p>0.09, Table S4-5, Fig S3C-F).
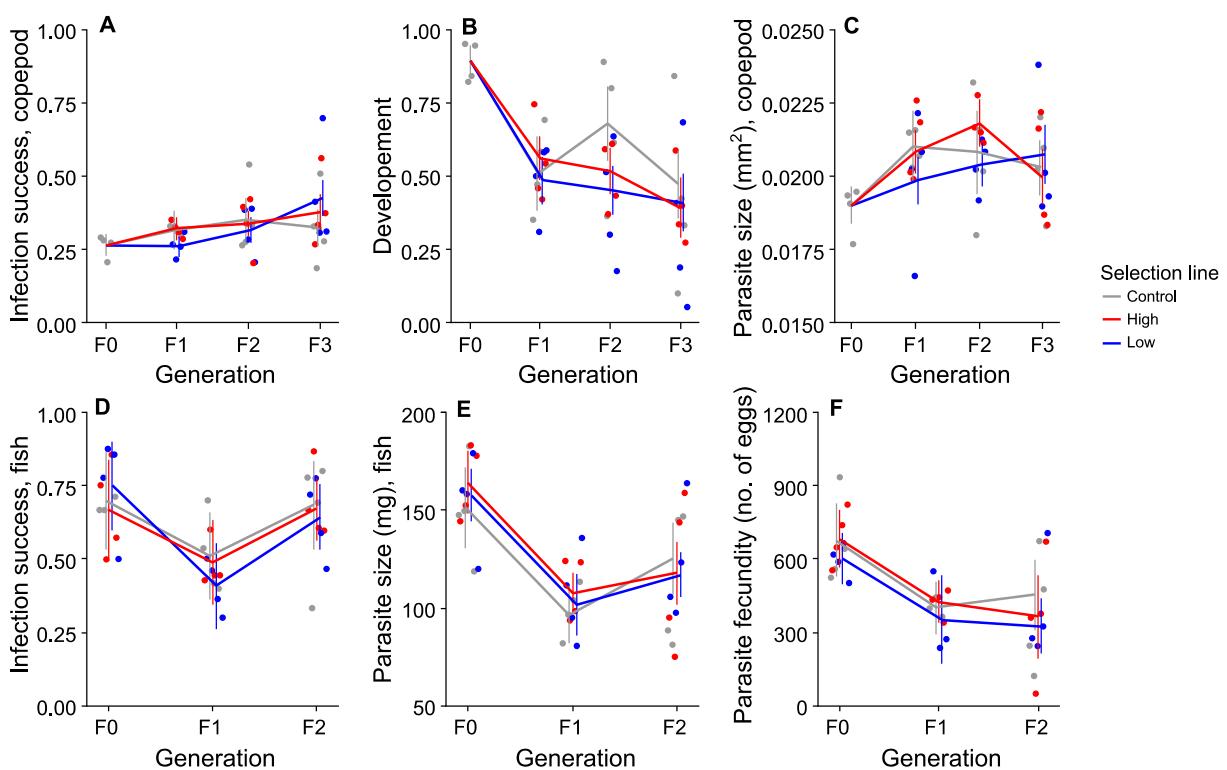
Figure S3: Potential trade-offs with host manipulation. A: Infection success in copepods, B: Development in copepods, C: Parasite size in copepods, D: Infection success in fish, E: Parasite size in fish, F: Parasite fecundity. Error bars represent 95% confidence intervals. N: Infection success, copepods: F0: 563, F1: Control: 199, High: 548, Low: 616, F2: Control: 154, High: 449, Low: 458, F3: Control: 217, High: 246, Low: 249; Development: F0: 142, F1: Control: 59, High: 169, Low: 147, F2: Control: 53, High: 151, Low: 142, F3: Control: 70, High: 88, Low: 100; Parasite size, copepods: F0: 126, F1: Control: 59 , High: 151, Low: 138, F2: Control: 43, High: 131, Low: 120, F3: Control: 62, High: 87, Low: 94; Infection success, fish: F0: Control: 30, High: 30, Low: 32, F1: Control: 45, High: 47, Low: 44, F2: Control: 38, High: 76, Low: 73; Parasite size, fish: F0: Control: 21, High: 20, Low: 24, F1: Control: 19, High: 23, Low: 16, F2: Control: 26, High: 50, Low: 46; Parasite fertility, fish: F0: Control: 10, High: 10, Low: 12, F1: Control: 6, High: 10, Low: 6, F2: Control: 12, High: 10, Low: 10. Points indicate replicate populations.

Table S4: General and generalized linear mixed models to analyse parasite traits which could reveal trade-offs with host manipulation. Original model: response ~1+(1|population). Significant p values are highlighted in bold.

Infection success, copepod (df: 2)			
Factor	df	χ^2	p
+ Generation	3,1	24.79	**<0.0001**
+ Selection line	5,2	2.02	0.3634
+ Generation: Selection line	7,2	6.09	**0.0476**
Development (df: 2)			
Factor	df	χ^2	p
+ Generation	3,1	70.93	**<0.0001**
+ Selection line	5,2	6.60	**0.0369**
+ Generation: Selection line	7,2	1.15	0.5635
Parasite size, copepod (df: 3)			
Factor	Df	χ^2	p
+ Generation	4,1	4.70	**0.0302**
+ Selection line	6,2	4.72	0.0946
+ Generation: Selection line	8,2	1.06	0.5900
Infection success, fish (df: 2)			
Factor	Df	χ^2	p
+ Generation	3,1	0.02	0.8885
+ Selection line	5,2	0.17	0.9206
+ Generation: Selection line	7,2	0.42	0.8111
Parasite size, fish (df: 3)			
Factor	Df	χ^2	p
+ Time in fish	4,1	72.30	**<0.0001**
+ Generation	5,1	1.04	0.3079
+ Selection line	7,2	1.09	0.5804
+ Generation: Selection line	9,2	0.60	0.7423
Parasite fecundity (df: 3)			
Factor	Df	χ^2	p
+ Time in fish	4,1	34.64	**<0.0001**
+ Generation	5,1	4.53	**0.0333**
+ Selection line	7,2	1.87	0.3916
+ Generation: Selection line	9,2	0.34	0.8454

Table S5: Summary of the model containing all fixed effects and significant interactions (see table S4). Comparisons are with parasites from the control line.

Traits in copepods						
	Infection success		**Development**		**Parasite size**	
Random effects						
Factor	Variance ± SD		Variance ± SD		Variance ± SD	
Replicate (intercept)	0.0288 ± 0.1697		0.1708 ± 0.4133		0.1952 ± 0.4418	
Residual					23.5268 ± 4.8504	
Fixed effects						
Factor	Estimate ± SE	z	Estimate ± SE	z	Estimate ± SE	t
Intercept	-0.8944 ± 0.1578	-5.670	1.3442 ± 0.2783	4.830	21.131 ± 0.4700	44.963
Selection line (High)	-0.0736 ± 0.1739	-0.423	-0.2366 ± 0.1732	-1.366	0.5736 ± 0.4120	1.392
Selection line (Low)	-0.4092 ± 0.1758	-2.327	-0.4389 ± 0.1741	-2.521	-0.1499 ± 0.4149	-0.361
Generation	0.0737 ± 0.0685	1.076	-0.5577 ± 0.0689	-8.090	0.3361 ± 0.1574	2.135
Generation: Selection line (High)	0.0838 ± 0.0920	0.911				
Generation: Selection line (Low)	0.2238 ± 0.0927	2.414				

Traits in fish						
	Infection success		**Fecundity**		**Parasite size**	
Random effects						
Factor	Variance ± SD		Variance ± SD		Variance ± SD	
Replicate (intercept)	0.0408 ± 0.2019		126.8 ± 11.3		2739 ± 52	
Residual			1514.5 ± 38.9		35915 ± 190	
Fixed effects						
Factor	Estimate ± SE	z	Estimate ± SE	t	Estimate ± SE	t
Intercept	0.4644 ± 0.2384	1.948	-95.260 ± 34.610	-2.752	-373.01 ± 319.16	-1.169
Selection line (High)	-0.0271 ± 0.2573	-0.105	5.6064 ± 6.3404	0.884	-17.992 ± 50.087	-0.359
Selection line (Low)	-0.0982 ± 0.2578	-0.381	6.5451 ± 6.4431	1.016	-64.677 ± 51.147	-1.265
Generation	0.0219 ± 0.1291	0.170	-4.2804 ± 3.5232	-1.215	-69.463 ± 29.947	-2.320
Time in fish			2.2727 ± 0.3216	7.067	10.355 ± 2.745	3.772

Table S6: Post hoc tests for potential trade-offs with host manipulation. Significant p values are highlighted in bold.

Comparison		coefficient	t	p	coefficient	t	p	coefficient	t	p	coefficient	t	p
Infection success, copepod													
		F0			F1			F2			F3		
High	Control	-0.089	-0.38	0.923	0.019	0.11	0.994	-0.060	-0.30	0.950	0.261	1.30	0.398
Low		-0.145	-0.62	0.811	-0.271	-1.52	0.278	-0.168	-0.84	0.673	0.479	2.40	**0.043**
	High	-0.056	-0.24	0.970	-0.291	-2.23	0.065	-0.108	-0.75	0.729	0.218	1.15	0.481
Development													
		F0			F1			F2			F3		
High	Control	0.870	1.29	0.397	0.218	0.71	0.752	-0.758	-2.16	0.076	-0.224	-0.65	0.790
Low		1.106	1.54	0.273	-0.098	-0.32	0.946	-1.071	-3.02	**0.007**	-0.284	-0.86	0.663
	High	0.236	0.30	0.952	-0.317	-1.38	0.346	-0.313	-1.29	0.395	-0.060	-0.19	0.980