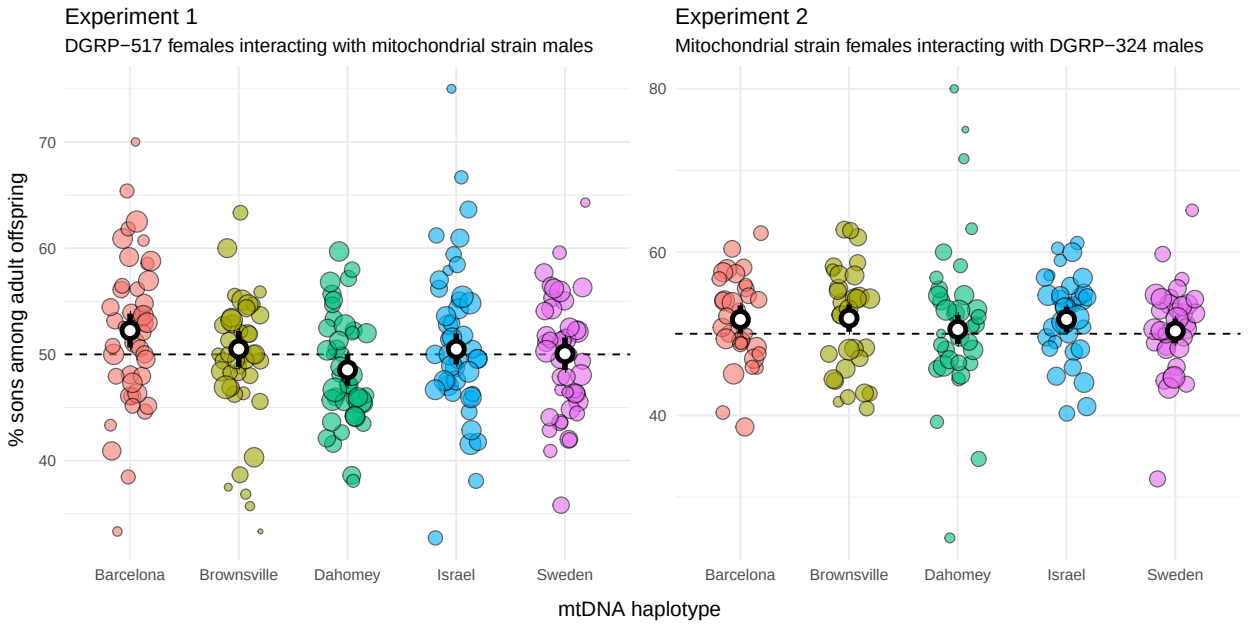
Online Supplementary Material

Mother's curse and indirect genetic effects: do males matter to mitochondrial genome evolution?

The figures and tables in this document, along with the with the R code used to generate them, can also be viewed online:
https://tomkeaney.github.io/maleMitochondria/.



Supplementary Figure 1: Offspring sex ratio for all females in Experiments 1 (left) and 2 (right). The coloured points show the sex ratio for an individual female, with larger dots indicating a larger number of offspring. The black points show the mean sex ratio across females and its 95% confidence limits.

Supplementary Table 1: Results of the 'full model' of Experiment 1, which contains the fixed factors Haplotype (i.e. the mitochondrial strain of the males), Order of exposure (i.e. whether the female first encountered males in her first or second vial), and their interaction. The model is a multivariate Bayesian generalized linear mixed model, with experimental block as a random factor and zero-inflated negative binomial errors. The Bayesian R^2 was 0.18 (95% CIs = 0.1-0.28). Note that the presence of $\hat{R}$ (Rhat) values > 1 (usually a sign that the model has not converged) is misleading in this case, because the results were obtained by running the same model on five imputed datasets (to handle missing values), which gives a false signal of non-convergence. The imputed missing values were mostly from Vial 4, due to an accident in which 7 females' fourth vials were lost (this explains the lower effective sample size for parameters involving Vial 4).

Parameter	Estimate	Est.Error	Q2.5	Q97.5	Eff.Sample	Rhat	p	
Vial1_Intercept	3.19	0.11	2.98	3.41	51016.97	1.00	0.000	*
Vial2_Intercept	3.21	0.12	2.99	3.44	64876.94	1.00	0.497	
Vial3_Intercept	3.25	0.14	2.99	3.52	4850.38	1.01	0.498	
Vial4_Intercept	2.88	0.18	2.54	3.23	300.08	1.04	0.499	
Vial1_HaplotypeBrownsville	0.00	0.00	0.00	0.00	396501.42	1.00	0.492	
Vial1_HaplotypeDahomey	0.00	0.00	0.00	0.00	401910.92	1.00	0.205	
Vial1_HaplotypeIsrael	0.00	0.00	0.00	0.00	397367.30	1.00	0.410	
Vial1_HaplotypeSweden	0.00	0.00	0.00	0.00	397523.85	1.00	0.242	
Vial1_Order.of.exposureFirst	0.07	0.09	-0.10	0.25	105883.62	1.00	0.288	
Vial1_HaplotypeBrownsville:Order.of.exposureFirst	-0.03	0.12	-0.26	0.21	134375.56	1.00	0.147	
Vial1_HaplotypeDahomey:Order.of.exposureFirst	0.08	0.12	-0.15	0.31	130756.22	1.00	0.000	*
Vial1_HaplotypeIsrael:Order.of.exposureFirst	0.06	0.12	-0.16	0.29	131669.59	1.00	0.171	
Vial1_HaplotypeSweden:Order.of.exposureFirst	-0.12	0.12	-0.35	0.11	134067.47	1.00	0.436	
Vial2_HaplotypeBrownsville	-0.13	0.13	-0.39	0.13	92562.04	1.00	0.191	
Vial2_HaplotypeDahomey	0.02	0.13	-0.24	0.28	91290.56	1.00	0.363	
Vial2_HaplotypeIsrael	0.11	0.13	-0.14	0.37	4629.64	1.01	0.020	*
Vial2_HaplotypeSweden	-0.05	0.13	-0.31	0.21	3490.75	1.01	0.439	
Vial2_Order.of.exposureFirst	0.26	0.13	0.01	0.51	65239.17	1.00	0.218	
Vial2_HaplotypeBrownsville:Order.of.exposureFirst	0.03	0.18	-0.33	0.39	24230.77	1.00	0.471	
Vial2_HaplotypeDahomey:Order.of.exposureFirst	0.14	0.18	-0.21	0.50	86085.48	1.00	0.404	
Vial2_HaplotypeIsrael:Order.of.exposureFirst	0.01	0.18	-0.34	0.36	46348.37	1.00	0.000	*
Vial2_HaplotypeSweden:Order.of.exposureFirst	-0.04	0.18	-0.40	0.31	17649.74	1.00	0.163	
Vial3_HaplotypeBrownsville	-0.14	0.14	-0.41	0.14	4053.62	1.01	0.234	
Vial3_HaplotypeDahomey	0.10	0.14	-0.17	0.37	1410.32	1.01	0.077	
Vial3_HaplotypeIsrael	0.19	0.14	-0.08	0.46	1140.87	1.01	0.132	
Vial3_HaplotypeSweden	0.15	0.14	-0.12	0.42	4257.37	1.01	0.493	
Vial3_Order.of.exposureFirst	0.00	0.14	-0.27	0.27	7443.96	1.01	0.478	
Vial3_HaplotypeBrownsville:Order.of.exposureFirst	0.01	0.19	-0.37	0.39	2565.84	1.01	0.431	
Vial3_HaplotypeDahomey:Order.of.exposureFirst	0.03	0.19	-0.34	0.40	6769.32	1.01	0.308	
Vial3_HaplotypeIsrael:Order.of.exposureFirst	-0.09	0.19	-0.46	0.27	3844.60	1.01	0.164	
Vial3_HaplotypeSweden:Order.of.exposureFirst	-0.18	0.19	-0.55	0.18	39766.88	1.00	0.000	*
Vial4_HaplotypeBrownsville	-0.07	0.19	-0.44	0.29	196.55	1.06	0.346	
Vial4_HaplotypeDahomey	0.11	0.17	-0.23	0.45	247.78	1.05	0.263	
Vial4_HaplotypeIsrael	0.11	0.17	-0.22	0.44	406.16	1.03	0.257	
Vial4_HaplotypeSweden	0.21	0.18	-0.14	0.56	218.96	1.05	0.117	
Vial4_Order.of.exposureFirst	0.16	0.17	-0.17	0.50	261.79	1.05	0.168	
Vial4_HaplotypeBrownsville:Order.of.exposureFirst	0.15	0.24	-0.33	0.63	276.96	1.04	0.276	
Vial4_HaplotypeDahomey:Order.of.exposureFirst	0.10	0.23	-0.36	0.55	239.51	1.05	0.340	
Vial4_HaplotypeIsrael:Order.of.exposureFirst	0.15	0.23	-0.30	0.59	447.42	1.03	0.253	
Vial4_HaplotypeSweden:Order.of.exposureFirst	-0.09	0.24	-0.56	0.37	193.12	1.06	0.344	
sd(Vial1_Intercept)	0.25	0.11	0.11	0.53	57320.36	1.00	NA	
sd(Vial2_Intercept)	0.16	0.08	0.06	0.35	59192.37	1.00	NA	
sd(Vial3_Intercept)	0.22	0.10	0.10	0.46	70859.91	1.00	NA	
sd(Vial4_Intercept)	0.28	0.12	0.13	0.57	70087.10	1.00	NA	
cor(Vial1_Intercept,Vial2_Intercept)	0.28	0.35	-0.47	0.85	106207.03	1.00	NA	
cor(Vial1_Intercept,Vial3_Intercept)	0.21	0.35	-0.52	0.80	109165.82	1.00	NA	
cor(Vial2_Intercept,Vial3_Intercept)	0.59	0.30	-0.18	0.96	105102.17	1.00	NA	
cor(Vial1_Intercept,Vial4_Intercept)	0.55	0.31	-0.20	0.95	4260.10	1.01	NA	
cor(Vial2_Intercept,Vial4_Intercept)	0.46	0.33	-0.30	0.93	121274.13	1.00	NA	
cor(Vial3_Intercept,Vial4_Intercept)	0.39	0.33	-0.36	0.89	129235.44	1.00	NA	

Supplementary Table 2: Posterior treatment group means for Experiment 1, estimated from the full model. Each row shows the median, error, and 95% quantiles on the posterior mean progeny production for one combination of Haplotype, vial number (i.e. the age category of the focal flies), and order of exposure treatment.

Haplotype	Order of exposure	Vial	Estimate	Est.Error	Q2.5	Q97.5	Males in the vial
Barcelona	Males in vials 2 and 4	1	24.41	2.71	19.53	30.13	No
Brownsville	Males in vials 2 and 4	1	24.41	2.71	19.53	30.13	No
Dahomey	Males in vials 2 and 4	1	24.41	2.71	19.53	30.13	No
Israel	Males in vials 2 and 4	1	24.41	2.71	19.53	30.13	No
Sweden	Males in vials 2 and 4	1	24.41	2.71	19.53	30.13	No
Barcelona	Males in vials 1 and 3	1	26.35	3.49	20.22	33.75	Yes
Brownsville	Males in vials 1 and 3	1	25.68	3.47	19.58	33.07	Yes
Dahomey	Males in vials 1 and 3	1	28.56	3.80	21.92	36.68	Yes
Israel	Males in vials 1 and 3	1	28.10	3.74	21.54	36.06	Yes
Sweden	Males in vials 1 and 3	1	23.32	3.14	17.82	30.03	Yes
Barcelona	Males in vials 2 and 4	2	24.57	2.89	19.44	30.75	Yes
Brownsville	Males in vials 2 and 4	2	21.66	2.54	17.17	27.12	Yes
Dahomey	Males in vials 2 and 4	2	25.08	2.89	19.94	31.28	Yes
Israel	Males in vials 2 and 4	2	27.51	3.14	21.91	34.21	Yes
Sweden	Males in vials 2 and 4	2	23.46	2.72	18.63	29.30	Yes
Barcelona	Males in vials 1 and 3	2	31.94	3.53	25.63	39.43	No
Brownsville	Males in vials 1 and 3	2	29.01	3.40	22.94	36.26	No
Dahomey	Males in vials 1 and 3	2	37.52	4.23	29.97	46.56	No
Israel	Males in vials 1 and 3	2	36.26	4.05	29.10	44.96	No
Sweden	Males in vials 1 and 3	2	29.23	3.28	23.35	36.23	No
Barcelona	Males in vials 2 and 4	3	25.00	3.44	19.01	32.45	No
Brownsville	Males in vials 2 and 4	3	21.80	2.91	16.70	28.11	No
Dahomey	Males in vials 2 and 4	3	27.59	3.60	21.28	35.38	No
Israel	Males in vials 2 and 4	3	30.27	3.91	23.41	38.74	No
Sweden	Males in vials 2 and 4	3	29.06	3.79	22.40	37.22	No
Barcelona	Males in vials 1 and 3	3	25.03	3.24	19.32	32.01	Yes
Brownsville	Males in vials 1 and 3	3	22.09	3.00	16.84	28.56	Yes
Dahomey	Males in vials 1 and 3	3	28.57	3.71	22.06	36.60	Yes
Israel	Males in vials 1 and 3	3	27.66	3.59	21.34	35.42	Yes
Sweden	Males in vials 1 and 3	3	24.24	3.13	18.71	30.97	Yes
Barcelona	Males in vials 2 and 4	4	16.62	3.00	11.54	23.26	Yes
Brownsville	Males in vials 2 and 4	4	15.43	2.71	10.78	21.34	Yes
Dahomey	Males in vials 2 and 4	4	18.50	3.00	13.37	25.08	Yes
Israel	Males in vials 2 and 4	4	18.49	3.00	13.36	25.06	Yes
Sweden	Males in vials 2 and 4	4	20.42	3.35	14.69	27.76	Yes
Barcelona	Males in vials 1 and 3	4	19.53	3.13	14.10	26.30	No
Brownsville	Males in vials 1 and 3	4	21.03	3.56	14.98	28.84	No
Dahomey	Males in vials 1 and 3	4	24.00	3.88	17.35	32.49	No
Israel	Males in vials 1 and 3	4	25.27	3.99	18.42	33.97	No
Sweden	Males in vials 1 and 3	4	21.89	3.52	15.79	29.50	No
Barcelona	Males in vials 2 and 4	Total across all 4 vials	90.61	7.31	77.27	106.06	No
Barcelona	Males in vials 1 and 3	Total across all 4 vials	102.85	8.18	87.86	120.04	No
Brownsville	Males in vials 2 and 4	Total across all 4 vials	83.31	6.63	71.15	97.29	No
Brownsville	Males in vials 1 and 3	Total across all 4 vials	97.80	8.14	82.89	114.85	No
Dahomey	Males in vials 2 and 4	Total across all 4 vials	95.59	7.53	81.75	111.44	No
Dahomey	Males in vials 1 and 3	Total across all 4 vials	118.64	9.52	101.28	138.60	No
Israel	Males in vials 2 and 4	Total across all 4 vials	100.68	7.94	86.16	117.42	No
Israel	Males in vials 1 and 3	Total across all 4 vials	117.29	9.40	100.07	137.04	No
Sweden	Males in vials 2 and 4	Total across all 4 vials	97.36	7.77	83.14	113.72	No
Sweden	Males in vials 1 and 3	Total across all 4 vials	98.69	7.96	84.10	115.45	No

Supplementary Table 3: Posterior estimates of the differences in mean offspring production for each possible pairs of male haplotypes in Experiment 1, either within a particular vial or summed across the four vials, and split by 'Order of exposure' treatment. Males from the Dahomey, Israel and Sweden haplotypes were associated with higher offspring production than the Brownsville haplotype, and there were also differences between Dahomey and Sweden, Dahomey and Barcelona, and Israel and Sweden (particularly in vial 2; see Figures 1 and 3). Asterisks mark statistically significant differences. The numbers in parentheses are 95% credible intervals. The 'Relative difference' column gives the absolute difference in means divided by the mean for haplotype 1.

Vial	Order of exposure	Haplotype 1	Haplotype 2	Difference in fecundity	SE	Relative difference	
Total across all 4 vials	First	Brownsville	Barcelona	-5.05 (-18.47 to 8.47)	6.85	0.07 (0 to 0.2)	
Total across all 4 vials	First	Dahomey	Barcelona	15.79 (1.62 to 30.58)	7.36	0.13 (0.02 to 0.24)	*
Total across all 4 vials	First	Dahomey	Brownsville	20.84 (6.19 to 36.11)	7.63	0.17 (0.06 to 0.28)	*
Total across all 4 vials	First	Dahomey	Israel	1.35 (-13.81 to 16.56)	7.72	0.05 (0 to 0.15)	
Total across all 4 vials	First	Dahomey	Sweden	19.95 (5.89 to 34.74)	7.34	0.17 (0.05 to 0.27)	*
Total across all 4 vials	First	Israel	Barcelona	14.44 (0.42 to 29.01)	7.26	0.12 (0.01 to 0.23)	*
Total across all 4 vials	First	Israel	Brownsville	19.49 (4.95 to 34.5)	7.52	0.16 (0.05 to 0.27)	*
Total across all 4 vials	First	Sweden	Barcelona	-4.16 (-17.22 to 8.63)	6.56	0.06 (0 to 0.19)	
Total across all 4 vials	First	Sweden	Brownsville	0.88 (-12.54 to 14.14)	6.78	0.05 (0 to 0.15)	
Total across all 4 vials	First	Sweden	Israel	-18.6 (-33.14 to -4.77)	7.24	0.19 (0.05 to 0.35)	*
Total across all 4 vials	Second	Brownsville	Barcelona	-7.3 (-18.32 to 3.38)	5.52	0.09 (0 to 0.23)	
Total across all 4 vials	Second	Dahomey	Barcelona	4.98 (-6.31 to 16.39)	5.77	0.06 (0 to 0.16)	
Total across all 4 vials	Second	Dahomey	Brownsville	12.28 (1.78 to 23.24)	5.46	0.13 (0.02 to 0.23)	*
Total across all 4 vials	Second	Dahomey	Israel	-5.09 (-16.77 to 6.51)	5.91	0.07 (0 to 0.18)	
Total across all 4 vials	Second	Dahomey	Sweden	-1.77 (-13.16 to 9.52)	5.78	0.05 (0 to 0.15)	
Total across all 4 vials	Second	Israel	Barcelona	10.07 (-1.47 to 21.76)	5.89	0.1 (0.01 to 0.2)	
Total across all 4 vials	Second	Israel	Brownsville	17.37 (6.43 to 28.96)	5.73	0.17 (0.07 to 0.27)	*
Total across all 4 vials	Second	Sweden	Barcelona	6.75 (-4.71 to 18.41)	5.87	0.08 (0 to 0.18)	
Total across all 4 vials	Second	Sweden	Brownsville	14.05 (3.34 to 25.35)	5.61	0.14 (0.04 to 0.24)	*
Total across all 4 vials	Second	Sweden	Israel	-3.32 (-15.08 to 8.47)	5.98	0.06 (0 to 0.16)	
Vial 1	First	Brownsville	Barcelona	-0.67 (-6.74 to 5.44)	3.08	0.1 (0 to 0.29)	
Vial 1	First	Dahomey	Barcelona	2.21 (-4.01 to 8.61)	3.20	0.11 (0 to 0.27)	
Vial 1	First	Dahomey	Brownsville	2.88 (-3.39 to 9.39)	3.24	0.12 (0.01 to 0.29)	
Vial 1	First	Dahomey	Israel	0.46 (-6.07 to 7.01)	3.32	0.09 (0 to 0.26)	
Vial 1	First	Dahomey	Sweden	5.24 (-0.73 to 11.65)	3.14	0.18 (0.02 to 0.35)	
Vial 1	First	Israel	Barcelona	1.75 (-4.43 to 8.13)	3.18	0.1 (0 to 0.26)	
Vial 1	First	Israel	Brownsville	2.42 (-3.83 to 8.88)	3.22	0.11 (0 to 0.28)	
Vial 1	First	Sweden	Barcelona	-3.02 (-8.95 to 2.65)	2.95	0.15 (0.01 to 0.42)	
Vial 1	First	Sweden	Brownsville	-2.36 (-8.32 to 3.37)	2.97	0.14 (0.01 to 0.39)	
Vial 1	First	Sweden	Israel	-4.78 (-11.07 to 1.15)	3.11	0.22 (0.01 to 0.52)	
Vial 1	Second	Brownsville	Barcelona	0 (-0.05 to 0.05)	0.02	0 (0 to 0)	
Vial 1	Second	Dahomey	Barcelona	0 (-0.05 to 0.05)	0.02	0 (0 to 0)	
Vial 1	Second	Dahomey	Brownsville	0 (-0.07 to 0.07)	0.03	0 (0 to 0)	
Vial 1	Second	Dahomey	Israel	0 (-0.07 to 0.07)	0.03	0 (0 to 0)	
Vial 1	Second	Dahomey	Sweden	0 (-0.07 to 0.07)	0.03	0 (0 to 0)	
Vial 1	Second	Israel	Barcelona	0 (-0.05 to 0.05)	0.02	0 (0 to 0)	
Vial 1	Second	Israel	Brownsville	0 (-0.07 to 0.07)	0.03	0 (0 to 0)	
Vial 1	Second	Sweden	Barcelona	0 (-0.05 to 0.05)	0.02	0 (0 to 0)	
Vial 1	Second	Sweden	Brownsville	0 (-0.07 to 0.07)	0.03	0 (0 to 0)	
Vial 1	Second	Sweden	Israel	0 (-0.07 to 0.07)	0.03	0 (0 to 0)	
Vial 2	First	Brownsville	Barcelona	-2.94 (-10.66 to 4.73)	3.89	0.14 (0.01 to 0.41)	
Vial 2	First	Dahomey	Barcelona	5.57 (-2.78 to 14.35)	4.35	0.15 (0.01 to 0.33)	
Vial 2	First	Dahomey	Brownsville	8.51 (0.12 to 17.38)	4.38	0.22 (0.03 to 0.4)	*
Vial 2	First	Dahomey	Israel	1.26 (-7.74 to 10.44)	4.61	0.1 (0 to 0.27)	
Vial 2	First	Dahomey	Sweden	8.28 (0.2 to 16.98)	4.26	0.22 (0.03 to 0.39)	*
Vial 2	First	Israel	Barcelona	4.31 (-3.85 to 12.77)	4.21	0.13 (0.01 to 0.31)	
Vial 2	First	Israel	Brownsville	7.25 (-0.88 to 15.77)	4.23	0.2 (0.02 to 0.38)	
Vial 2	First	Sweden	Barcelona	-2.71 (-10.25 to 4.64)	3.78	0.13 (0 to 0.39)	
Vial 2	First	Sweden	Brownsville	0.23 (-7.29 to 7.61)	3.78	0.1 (0 to 0.29)	
Vial 2	First	Sweden	Israel	-7.02 (-15.38 to 0.86)	4.13	0.25 (0.02 to 0.58)	
Vial 2	Second	Brownsville	Barcelona	-2.91 (-9.2 to 3.1)	3.11	0.17 (0.01 to 0.47)	
Vial 2	Second	Dahomey	Barcelona	0.51 (-6.04 to 7.01)	3.30	0.1 (0 to 0.29)	
Vial 2	Second	Dahomey	Brownsville	3.42 (-2.6 to 9.63)	3.10	0.15 (0.01 to 0.33)	
Vial 2	Second	Dahomey	Israel	-2.42 (-9.21 to 4.26)	3.40	0.14 (0.01 to 0.41)	

(continued)

Vial	Order of exposure	Haplotype 1	Haplotype 2	Difference in fecundity	SE	Relative difference	
Vial 2	Second	Dahomey	Sweden	1.62 (-4.59 to 7.9)	3.17	0.11 (0 to 0.29)	
Vial 2	Second	Israel	Barcelona	2.94 (-3.8 to 9.74)	3.42	0.13 (0.01 to 0.31)	
Vial 2	Second	Israel	Brownsville	5.84 (-0.38 to 12.41)	3.24	0.21 (0.02 to 0.39)	
Vial 2	Second	Sweden	Barcelona	-1.11 (-7.46 to 5.14)	3.19	0.12 (0 to 0.36)	
Vial 2	Second	Sweden	Brownsville	1.8 (-4.07 to 7.77)	3.00	0.12 (0 to 0.3)	
Vial 2	Second	Sweden	Israel	-4.04 (-10.66 to 2.33)	3.30	0.19 (0.01 to 0.51)	
Vial 3	First	Brownsville	Barcelona	-2.94 (-9.35 to 3.27)	3.20	0.17 (0.01 to 0.48)	
Vial 3	First	Dahomey	Barcelona	3.54 (-3.23 to 10.62)	3.51	0.14 (0.01 to 0.32)	
Vial 3	First	Dahomey	Brownsville	6.48 (-0.18 to 13.64)	3.50	0.22 (0.03 to 0.41)	
Vial 3	First	Dahomey	Israel	0.91 (-6.27 to 8.16)	3.66	0.1 (0 to 0.28)	
Vial 3	First	Dahomey	Sweden	4.33 (-2.29 to 11.37)	3.46	0.16 (0.01 to 0.34)	
Vial 3	First	Israel	Barcelona	2.63 (-4.06 to 9.55)	3.44	0.12 (0.01 to 0.3)	
Vial 3	First	Israel	Brownsville	5.57 (-1.01 to 12.52)	3.43	0.2 (0.02 to 0.39)	
Vial 3	First	Sweden	Barcelona	-0.79 (-7.09 to 5.46)	3.19	0.11 (0 to 0.33)	
Vial 3	First	Sweden	Brownsville	2.15 (-4.02 to 8.41)	3.15	0.12 (0.01 to 0.31)	
Vial 3	First	Sweden	Israel	-3.42 (-10.27 to 3.14)	3.40	0.17 (0.01 to 0.47)	
Vial 3	Second	Brownsville	Barcelona	-3.2 (-9.97 to 3.24)	3.34	0.18 (0.01 to 0.51)	
Vial 3	Second	Dahomey	Barcelona	2.59 (-4.58 to 9.85)	3.65	0.13 (0.01 to 0.32)	
Vial 3	Second	Dahomey	Brownsville	5.79 (-0.61 to 12.63)	3.37	0.21 (0.02 to 0.39)	
Vial 3	Second	Dahomey	Israel	-2.68 (-10.24 to 4.74)	3.79	0.14 (0.01 to 0.41)	
Vial 3	Second	Dahomey	Sweden	-1.47 (-8.86 to 5.76)	3.71	0.12 (0 to 0.36)	
Vial 3	Second	Israel	Barcelona	5.27 (-2.11 to 12.87)	3.79	0.18 (0.01 to 0.37)	
Vial 3	Second	Israel	Brownsville	8.47 (1.76 to 15.77)	3.56	0.27 (0.07 to 0.44)	*
Vial 3	Second	Sweden	Barcelona	4.06 (-3.21 to 11.5)	3.72	0.15 (0.01 to 0.34)	
Vial 3	Second	Sweden	Brownsville	7.26 (0.64 to 14.42)	3.49	0.24 (0.04 to 0.42)	*
Vial 3	Second	Sweden	Israel	-1.22 (-8.81 to 6.36)	3.84	0.11 (0 to 0.34)	
Vial 4	First	Brownsville	Barcelona	1.5 (-4.76 to 8.29)	3.30	0.13 (0.01 to 0.34)	
Vial 4	First	Dahomey	Barcelona	4.47 (-2.05 to 11.63)	3.47	0.19 (0.01 to 0.4)	
Vial 4	First	Dahomey	Brownsville	2.96 (-4.38 to 10.49)	3.75	0.15 (0.01 to 0.37)	
Vial 4	First	Dahomey	Israel	-1.28 (-8.79 to 6.16)	3.78	0.14 (0.01 to 0.42)	
Vial 4	First	Dahomey	Sweden	2.1 (-4.83 to 9.61)	3.65	0.13 (0.01 to 0.35)	
Vial 4	First	Israel	Barcelona	5.74 (-0.82 to 13.09)	3.52	0.22 (0.02 to 0.43)	
Vial 4	First	Israel	Brownsville	4.24 (-3.06 to 11.78)	3.75	0.18 (0.01 to 0.39)	
Vial 4	First	Sweden	Barcelona	2.36 (-3.72 to 8.75)	3.15	0.14 (0.01 to 0.34)	
Vial 4	First	Sweden	Brownsville	0.86 (-6.27 to 7.66)	3.51	0.13 (0.01 to 0.35)	
Vial 4	First	Sweden	Israel	-3.38 (-10.86 to 3.64)	3.66	0.19 (0.01 to 0.56)	
Vial 4	Second	Brownsville	Barcelona	-1.19 (-7.37 to 4.69)	3.04	0.17 (0.01 to 0.55)	
Vial 4	Second	Dahomey	Barcelona	1.88 (-4.19 to 8)	3.07	0.15 (0.01 to 0.38)	
Vial 4	Second	Dahomey	Brownsville	3.07 (-2.63 to 9.07)	2.95	0.18 (0.01 to 0.41)	
Vial 4	Second	Dahomey	Israel	0.01 (-5.69 to 5.75)	2.88	0.12 (0 to 0.36)	
Vial 4	Second	Dahomey	Sweden	-1.92 (-8.2 to 4.11)	3.11	0.16 (0.01 to 0.5)	
Vial 4	Second	Israel	Barcelona	1.86 (-4.06 to 7.77)	2.98	0.15 (0.01 to 0.37)	
Vial 4	Second	Israel	Brownsville	3.06 (-2.63 to 9.01)	2.95	0.18 (0.01 to 0.41)	
Vial 4	Second	Sweden	Barcelona	3.8 (-2.61 to 10.49)	3.30	0.2 (0.01 to 0.43)	
Vial 4	Second	Sweden	Brownsville	4.99 (-0.93 to 11.47)	3.14	0.24 (0.02 to 0.46)	
Vial 4	Second	Sweden	Israel	1.94 (-4.11 to 8.3)	3.14	0.14 (0.01 to 0.35)	

Supplementary Table 4: Average difference in the effect of the 'exposed first' and 'exposed second' treatments for each pair of male haplotypes in Experiment 1, split by vial or summed over all 4 vials. For example, a difference of 10 means that the effect of the 'exposed first' treatment was more positive by 10 progeny in one haplotype than the other. Only one comparison showed a significant difference: the offspring production of females paired with Dahomey males was more strongly affected by the order of exposure treatment than for females paired with Sweden males. Specifically, females benefitted from being housed with Dahomey males in the first vial rather than the second, but there was no such benefit for Sweden males (see Figure 1). The numbers in parentheses are 95% credible intervals, and the the 'Relative difference' column was calculated as in Table S3.

Vial	Haplotype 1	Haplotype 2	Difference in effect of exposure order	SE	
Total across all 4 vials	Brownsville	Barcelona	2.25 (-14.72 to 19.55)	8.72	
Total across all 4 vials	Dahomey	Barcelona	10.81 (-7.25 to 29.32)	9.31	
Total across all 4 vials	Dahomey	Brownsville	8.56 (-9.41 to 26.77)	9.22	
Total across all 4 vials	Dahomey	Israel	6.44 (-12.68 to 25.79)	9.77	
Total across all 4 vials	Dahomey	Sweden	21.73 (3.65 to 40.6)	9.39	*
Total across all 4 vials	Israel	Barcelona	4.37 (-13.7 to 22.8)	9.30	
Total across all 4 vials	Israel	Brownsville	2.11 (-16.08 to 20.45)	9.33	
Total across all 4 vials	Sweden	Barcelona	-10.91 (-28.38 to 6.3)	8.84	
Total across all 4 vials	Sweden	Brownsville	-13.17 (-30.73 to 3.75)	8.77	
Total across all 4 vials	Sweden	Israel	-15.28 (-34.35 to 3.08)	9.52	
Vial 1	Brownsville	Barcelona	-0.67 (-6.74 to 5.44)	3.08	
Vial 1	Dahomey	Barcelona	2.21 (-4 to 8.61)	3.20	
Vial 1	Dahomey	Brownsville	2.88 (-3.39 to 9.38)	3.24	
Vial 1	Dahomey	Israel	0.46 (-6.07 to 7.01)	3.32	
Vial 1	Dahomey	Sweden	5.24 (-0.73 to 11.65)	3.14	
Vial 1	Israel	Barcelona	1.75 (-4.43 to 8.13)	3.18	
Vial 1	Israel	Brownsville	2.42 (-3.83 to 8.88)	3.22	
Vial 1	Sweden	Barcelona	-3.02 (-8.95 to 2.65)	2.95	
Vial 1	Sweden	Brownsville	-2.36 (-8.33 to 3.38)	2.97	
Vial 1	Sweden	Israel	-4.78 (-11.08 to 1.15)	3.11	
Vial 2	Brownsville	Barcelona	-0.03 (-9.77 to 9.79)	4.97	
Vial 2	Dahomey	Barcelona	5.06 (-5.52 to 15.97)	5.45	
Vial 2	Dahomey	Brownsville	5.09 (-5.25 to 15.68)	5.32	
Vial 2	Dahomey	Israel	3.69 (-7.51 to 15.07)	5.74	
Vial 2	Dahomey	Sweden	6.67 (-3.62 to 17.32)	5.31	
Vial 2	Israel	Barcelona	1.37 (-9.22 to 12.13)	5.42	
Vial 2	Israel	Brownsville	1.4 (-8.91 to 11.79)	5.26	
Vial 2	Sweden	Barcelona	-1.6 (-11.37 to 8.08)	4.95	
Vial 2	Sweden	Brownsville	-1.58 (-11.09 to 7.88)	4.81	
Vial 2	Sweden	Israel	-2.98 (-13.51 to 7.29)	5.28	
Vial 3	Brownsville	Barcelona	0.26 (-8.79 to 9.37)	4.60	
Vial 3	Dahomey	Barcelona	0.95 (-8.96 to 10.97)	5.05	
Vial 3	Dahomey	Brownsville	0.69 (-8.68 to 10.16)	4.78	
Vial 3	Dahomey	Israel	3.59 (-6.78 to 14.09)	5.29	
Vial 3	Dahomey	Sweden	5.8 (-4.06 to 15.99)	5.09	
Vial 3	Israel	Barcelona	-2.64 (-12.68 to 7.33)	5.07	
Vial 3	Israel	Brownsville	-2.9 (-12.53 to 6.63)	4.86	
Vial 3	Sweden	Barcelona	-4.85 (-14.6 to 4.65)	4.90	
Vial 3	Sweden	Brownsville	-5.1 (-14.45 to 3.89)	4.65	
Vial 3	Sweden	Israel	-2.2 (-12.37 to 7.76)	5.10	
Vial 4	Brownsville	Barcelona	2.7 (-5.87 to 11.85)	4.48	
Vial 4	Dahomey	Barcelona	2.59 (-6.34 to 11.98)	4.63	
Vial 4	Dahomey	Brownsville	-0.1 (-9.53 to 9.2)	4.73	
Vial 4	Dahomey	Israel	-1.29 (-10.81 to 8.11)	4.78	
Vial 4	Dahomey	Sweden	4.03 (-5.18 to 13.95)	4.85	
Vial 4	Israel	Barcelona	3.88 (-4.91 to 13.11)	4.55	
Vial 4	Israel	Brownsville	1.19 (-8.39 to 10.72)	4.83	
Vial 4	Sweden	Barcelona	-1.44 (-10.63 to 7.68)	4.63	
Vial 4	Sweden	Brownsville	-4.13 (-14.13 to 4.99)	4.82	
Vial 4	Sweden	Israel	-5.32 (-15.45 to 4.12)	4.95	

Supplementary Table 5: Number of female flies that died or survived in Experiment 1, by Haplotype and male exposure treatment.

Haplotype	Order of exposure	nDeaths	nSurvivors
Barcelona	First	1	23
Barcelona	Second	2	21
Brownsville	First	0	21
Brownsville	Second	1	21
Dahomey	First	1	21
Dahomey	Second	2	21
Israel	First	0	22
Israel	Second	0	22
Sweden	First	0	22
Sweden	Second	1	22

Supplementary Table 6: Results of the model of offspring sex ratio in Experiment 1, which contains the fixed factor Haplotype (i.e. the mitochondrial strain of the males) only. The model is a Bayesian generalized linear mixed model, with female ID and experimental block as crossed random factors and binomial errors. This model only had a posterior model probability of 1.8% when compared to the same model with Haplotype removed.

	Estimate	Est.Error	Q2.5	Q97.5	Eff.Sample	Rhat	
Intercept	0.09	0.04	0.02	0.16	58228.69	1	*
HaplotypeBrownsville	-0.07	0.05	-0.17	0.03	70148.92	1	
HaplotypeDahomey	-0.15	0.05	-0.24	-0.06	69551.64	1	*
HaplotypeIsrael	-0.07	0.05	-0.16	0.02	68225.80	1	
HaplotypeSweden	-0.09	0.05	-0.18	0.00	70124.08	1	
sd(Block)	0.02	0.02	0.00	0.08	32784.82	1	*
sd(Female)	0.06	0.03	0.00	0.11	17339.55	1	*

Supplementary Table 7: Results of the 'full model' of Experiment 2, which contains the fixed factors Haplotype (i.e. the mitochondrial strain of the males), Order of exposure (i.e. whether the female first encountered males in her first or second vial), Vial (i.e. in which of the four vials per female was the measurement taken), and all possible interactions. The model is a univariate Bayesian generalized linear mixed model, with experimental block as a random factor and zero-inflated negative binomial errors. The Bayesian R^2 was 0.28 (95% CIs = 0.17-0.39).

Parameter	Estimate	Est.Error	Q2.5	Q97.5	Eff.Sample	Rhat	p	
Vial1_Intercept	3.38	0.14	3.10	3.66	65974.98	1.00	0.000	*
Vial2_Intercept	2.90	0.16	2.59	3.21	71667.62	1.00	0.324	
Vial3_Intercept	2.89	0.18	2.54	3.24	83891.38	1.00	0.362	
Vial4_Intercept	3.18	0.24	2.71	3.66	77272.74	1.00	0.265	
Vial1_HaplotypeBrownsville	0.06	0.14	-0.22	0.34	110150.08	1.00	0.246	
Vial1_HaplotypeDahomey	0.05	0.13	-0.21	0.31	106360.48	1.00	0.051	
Vial1_HaplotypeIsrael	0.08	0.13	-0.18	0.35	108297.70	1.00	0.313	
Vial1_HaplotypeSweden	0.09	0.13	-0.17	0.35	110357.07	1.00	0.044	*
Vial1_Order.of.exposureFirst	0.22	0.13	-0.04	0.47	78048.72	1.00	0.251	
Vial1_HaplotypeBrownsville:Order.of.exposureFirst	-0.09	0.19	-0.47	0.28	102441.82	1.00	0.088	
Vial1_HaplotypeDahomey:Order.of.exposureFirst	-0.32	0.19	-0.68	0.05	102438.57	1.00	0.000	*
Vial1_HaplotypeIsrael:Order.of.exposureFirst	-0.12	0.19	-0.49	0.24	101657.28	1.00	0.055	
Vial1_HaplotypeSweden:Order.of.exposureFirst	-0.25	0.19	-0.62	0.11	101751.47	1.00	0.079	
Vial2_HaplotypeBrownsville	0.24	0.15	-0.05	0.53	107191.61	1.00	0.016	*
Vial2_HaplotypeDahomey	0.20	0.14	-0.08	0.47	104231.62	1.00	0.000	*
Vial2_HaplotypeIsrael	0.30	0.14	0.03	0.58	102247.78	1.00	0.004	*
Vial2_HaplotypeSweden	0.52	0.14	0.24	0.79	103345.25	1.00	0.209	
Vial2_Order.of.exposureFirst	0.38	0.14	0.10	0.66	75421.34	1.00	0.007	*
Vial2_HaplotypeBrownsville:Order.of.exposureFirst	-0.16	0.20	-0.56	0.23	98116.68	1.00	0.144	
Vial2_HaplotypeDahomey:Order.of.exposureFirst	-0.50	0.20	-0.90	-0.10	100776.64	1.00	0.019	*
Vial2_HaplotypeIsrael:Order.of.exposureFirst	-0.21	0.20	-0.60	0.18	2182.54	1.01	0.000	*
Vial2_HaplotypeSweden:Order.of.exposureFirst	-0.40	0.19	-0.78	-0.02	95592.66	1.00	0.004	*
Vial3_HaplotypeBrownsville	0.57	0.21	0.16	0.99	109741.88	1.00	0.071	
Vial3_HaplotypeDahomey	0.30	0.21	-0.10	0.70	109463.42	1.00	0.002	*
Vial3_HaplotypeIsrael	0.60	0.20	0.20	0.99	108943.31	1.00	0.005	*
Vial3_HaplotypeSweden	0.52	0.20	0.12	0.91	107752.72	1.00	0.001	*
Vial3_Order.of.exposureFirst	0.63	0.20	0.23	1.02	79357.08	1.00	0.013	*
Vial3_HaplotypeBrownsville:Order.of.exposureFirst	-0.64	0.29	-1.20	-0.08	102211.07	1.00	0.079	
Vial3_HaplotypeDahomey:Order.of.exposureFirst	-0.41	0.29	-0.98	0.17	105065.22	1.00	0.009	*
Vial3_HaplotypeIsrael:Order.of.exposureFirst	-0.65	0.28	-1.20	-0.11	70348.46	1.00	0.058	
Vial3_HaplotypeSweden:Order.of.exposureFirst	-0.43	0.27	-0.97	0.11	101428.07	1.00	0.000	*
Vial4_HaplotypeBrownsville	0.20	0.26	-0.31	0.71	99166.30	1.00	0.216	
Vial4_HaplotypeDahomey	0.03	0.25	-0.47	0.52	99020.93	1.00	0.456	
Vial4_HaplotypeIsrael	0.28	0.25	-0.22	0.77	97270.78	1.00	0.136	
Vial4_HaplotypeSweden	0.32	0.25	-0.19	0.82	98902.56	1.00	0.106	
Vial4_Order.of.exposureFirst	0.10	0.25	-0.40	0.59	74213.13	1.00	0.345	
Vial4_HaplotypeBrownsville:Order.of.exposureFirst	-0.14	0.36	-0.84	0.56	97040.11	1.00	0.346	
Vial4_HaplotypeDahomey:Order.of.exposureFirst	0.11	0.37	-0.61	0.84	104103.21	1.00	0.382	
Vial4_HaplotypeIsrael:Order.of.exposureFirst	-0.14	0.34	-0.81	0.53	87625.40	1.00	0.333	
Vial4_HaplotypeSweden:Order.of.exposureFirst	-0.31	0.34	-0.98	0.36	96933.97	1.00	0.183	
sd(Vial1_Intercept)	0.25	0.11	0.11	0.51	73254.19	1.00	NA	
sd(Vial2_Intercept)	0.29	0.12	0.14	0.60	73416.93	1.00	NA	
sd(Vial3_Intercept)	0.24	0.13	0.07	0.56	73431.38	1.00	NA	
sd(Vial4_Intercept)	0.35	0.19	0.11	0.81	83510.53	1.00	NA	
cor(Vial1_Intercept,Vial2_Intercept)	0.53	0.31	-0.21	0.94	106239.26	1.00	NA	
cor(Vial1_Intercept,Vial3_Intercept)	0.19	0.37	-0.56	0.81	136048.81	1.00	NA	
cor(Vial2_Intercept,Vial3_Intercept)	0.36	0.34	-0.40	0.89	146607.99	1.00	NA	
cor(Vial1_Intercept,Vial4_Intercept)	0.28	0.35	-0.48	0.85	144418.12	1.00	NA	
cor(Vial2_Intercept,Vial4_Intercept)	0.09	0.36	-0.61	0.74	151162.11	1.00	NA	
cor(Vial3_Intercept,Vial4_Intercept)	0.28	0.37	-0.51	0.88	136907.70	1.00	NA	

Supplementary Table 8: Posterior treatment group means for Experiment 2, estimated from the full model. Each row shows the median, error, and 95% confidence limits on the posterior mean progeny production for one combination of Haplotype, vial number (i.e. the age category of the focal flies), and order of exposure treatment.

Haplotype	Order of exposure	Vial	Estimate	Est.Error	Q2.5	Q97.5	Males in the vial
Barcelona	Males in vials 2 and 4	1	29.45	4.19	22.13	38.49	No
Brownsville	Males in vials 2 and 4	1	31.42	4.62	23.44	41.43	No
Dahomey	Males in vials 2 and 4	1	30.83	4.26	23.34	40.00	No
Israel	Males in vials 2 and 4	1	32.03	4.50	24.15	41.75	No
Sweden	Males in vials 2 and 4	1	32.28	4.53	24.30	42.05	No
Barcelona	Males in vials 1 and 3	1	36.52	5.02	27.71	47.28	Yes
Brownsville	Males in vials 1 and 3	1	35.48	4.94	26.84	46.11	Yes
Dahomey	Males in vials 1 and 3	1	27.88	3.93	20.98	36.32	Yes
Israel	Males in vials 1 and 3	1	35.10	4.82	26.60	45.44	Yes
Sweden	Males in vials 1 and 3	1	31.16	4.36	23.48	40.48	Yes
Barcelona	Males in vials 2 and 4	2	17.54	2.85	12.65	23.65	Yes
Brownsville	Males in vials 2 and 4	2	22.21	3.65	15.96	30.10	Yes
Dahomey	Males in vials 2 and 4	2	21.33	3.34	15.57	28.52	Yes
Israel	Males in vials 2 and 4	2	23.72	3.75	17.29	31.80	Yes
Sweden	Males in vials 2 and 4	2	29.41	4.62	21.43	39.35	Yes
Barcelona	Males in vials 1 and 3	2	25.54	4.09	18.55	34.38	No
Brownsville	Males in vials 1 and 3	2	27.44	4.35	19.97	36.81	No
Dahomey	Males in vials 1 and 3	2	18.88	3.16	13.49	25.72	No
Israel	Males in vials 1 and 3	2	28.06	4.49	20.41	37.74	No
Sweden	Males in vials 1 and 3	2	28.62	4.49	20.87	38.28	No
Barcelona	Males in vials 2 and 4	3	16.43	3.02	11.39	23.17	No
Brownsville	Males in vials 2 and 4	3	29.09	5.46	19.99	41.20	No
Dahomey	Males in vials 2 and 4	3	22.17	4.03	15.40	31.07	No
Israel	Males in vials 2 and 4	3	29.85	5.24	21.12	41.50	No
Sweden	Males in vials 2 and 4	3	27.50	4.84	19.23	38.08	No
Barcelona	Males in vials 1 and 3	3	30.67	5.37	21.65	42.53	Yes
Brownsville	Males in vials 1 and 3	3	28.74	5.03	20.29	39.87	Yes
Dahomey	Males in vials 1 and 3	3	27.50	5.35	18.65	39.44	Yes
Israel	Males in vials 1 and 3	3	29.02	5.01	20.51	40.04	Yes
Sweden	Males in vials 1 and 3	3	33.41	5.74	23.63	46.02	Yes
Barcelona	Males in vials 2 and 4	4	19.17	4.86	11.51	30.21	Yes
Brownsville	Males in vials 2 and 4	4	23.40	5.61	14.54	36.14	Yes
Dahomey	Males in vials 2 and 4	4	19.62	4.62	12.24	30.03	Yes
Israel	Males in vials 2 and 4	4	25.13	5.88	15.80	38.53	Yes
Sweden	Males in vials 2 and 4	4	26.18	6.12	16.22	39.90	Yes
Barcelona	Males in vials 1 and 3	4	21.08	4.94	13.21	32.26	No
Brownsville	Males in vials 1 and 3	4	22.50	5.56	13.83	35.18	No
Dahomey	Males in vials 1 and 3	4	24.42	6.65	14.24	39.87	No
Israel	Males in vials 1 and 3	4	23.99	5.48	15.13	36.29	No
Sweden	Males in vials 1 and 3	4	21.27	5.01	13.27	32.55	No
Barcelona	Males in vials 2 and 4	Total across all 4 vials	82.60	8.66	67.17	101.19	No
Barcelona	Males in vials 1 and 3	Total across all 4 vials	113.81	11.21	93.72	137.84	No
Brownsville	Males in vials 2 and 4	Total across all 4 vials	106.11	11.02	86.55	129.60	No
Brownsville	Males in vials 1 and 3	Total across all 4 vials	114.16	11.43	93.85	138.65	No
Dahomey	Males in vials 2 and 4	Total across all 4 vials	93.95	9.36	77.25	113.90	No
Dahomey	Males in vials 1 and 3	Total across all 4 vials	98.68	10.99	79.43	122.48	No
Israel	Males in vials 2 and 4	Total across all 4 vials	110.73	11.18	90.91	134.82	No
Israel	Males in vials 1 and 3	Total across all 4 vials	116.17	11.44	95.67	140.54	No
Sweden	Males in vials 2 and 4	Total across all 4 vials	115.37	11.57	94.59	139.97	No
Sweden	Males in vials 1 and 3	Total across all 4 vials	114.46	11.31	94.22	138.59	No

Supplementary Table 9: Posterior estimates of the differences in mean offspring production for each possible pairs of female haplotypes in Experiment 2, either within a particular vial or summed across the four vials, and split by 'Order of exposure' treatment. Females from the Barcelona haplotype tended to have lower offspring production than some of the others, but only in the 'Exposed second' treatment. There was also a difference in offspring production (summed over the four vials) between Dahomey and Sweden mitoline females. Asterisks mark statistically significant differences. The numbers in parentheses are 95% credible intervals. The 'Relative difference' column gives the absolute difference in means divided by the mean for haplotype 1.

Vial	Order of exposure	Haplotype 1	Haplotype 2	Difference in fecundity	SE	Relative difference	
Total across all 4 vials	First	Brownsville	Barcelona	0.35 (-19.34 to 20.24)	10.05	0.07 (0 to 0.2)	
Total across all 4 vials	First	Dahomey	Barcelona	-15.13 (-35.67 to 6.02)	10.58	0.17 (0.01 to 0.4)	
Total across all 4 vials	First	Dahomey	Brownsville	-15.48 (-36.37 to 5.7)	10.66	0.17 (0.01 to 0.4)	
Total across all 4 vials	First	Dahomey	Israel	-17.49 (-38.25 to 3.67)	10.61	0.19 (0.01 to 0.42)	
Total across all 4 vials	First	Dahomey	Sweden	-15.78 (-36.36 to 5.19)	10.56	0.17 (0.01 to 0.41)	
Total across all 4 vials	First	Israel	Barcelona	2.36 (-17.14 to 22.02)	9.95	0.07 (0 to 0.19)	
Total across all 4 vials	First	Israel	Brownsville	2.01 (-17.98 to 21.85)	10.10	0.07 (0 to 0.19)	
Total across all 4 vials	First	Sweden	Barcelona	0.65 (-18.97 to 20.38)	9.98	0.07 (0 to 0.2)	
Total across all 4 vials	First	Sweden	Brownsville	0.3 (-19.54 to 20.09)	10.08	0.07 (0 to 0.2)	
Total across all 4 vials	First	Sweden	Israel	-1.71 (-21.3 to 17.93)	9.97	0.07 (0 to 0.2)	
Total across all 4 vials	Second	Brownsville	Barcelona	23.52 (5.49 to 42.96)	9.51	0.22 (0.06 to 0.36)	*
Total across all 4 vials	Second	Dahomey	Barcelona	11.36 (-4.66 to 27.58)	8.17	0.12 (0.01 to 0.27)	
Total across all 4 vials	Second	Dahomey	Brownsville	-12.16 (-31.36 to 5.94)	9.47	0.14 (0.01 to 0.36)	
Total across all 4 vials	Second	Dahomey	Israel	-16.78 (-35.87 to 1.04)	9.35	0.19 (0.02 to 0.41)	
Total across all 4 vials	Second	Dahomey	Sweden	-21.41 (-40.68 to -3.46)	9.47	0.23 (0.04 to 0.46)	*
Total across all 4 vials	Second	Israel	Barcelona	28.13 (10.47 to 47.4)	9.37	0.25 (0.1 to 0.38)	*
Total across all 4 vials	Second	Israel	Brownsville	4.62 (-15.59 to 24.87)	10.24	0.08 (0 to 0.21)	
Total across all 4 vials	Second	Sweden	Barcelona	32.77 (14.76 to 52.33)	9.56	0.28 (0.14 to 0.4)	*
Total across all 4 vials	Second	Sweden	Brownsville	9.25 (-11.15 to 29.89)	10.40	0.1 (0 to 0.24)	
Total across all 4 vials	Second	Sweden	Israel	4.64 (-15.37 to 24.75)	10.21	0.08 (0 to 0.2)	
Vial 1	First	Brownsville	Barcelona	-1.03 (-10.31 to 8.09)	4.66	0.11 (0 to 0.33)	
Vial 1	First	Dahomey	Barcelona	-8.64 (-17.57 to -0.42)	4.34	0.32 (0.03 to 0.69)	*
Vial 1	First	Dahomey	Brownsville	-7.6 (-16.47 to 0.58)	4.32	0.29 (0.02 to 0.65)	
Vial 1	First	Dahomey	Israel	-7.22 (-15.83 to 0.81)	4.21	0.27 (0.02 to 0.63)	
Vial 1	First	Dahomey	Sweden	-3.27 (-11.34 to 4.48)	3.99	0.16 (0.01 to 0.45)	
Vial 1	First	Israel	Barcelona	-1.42 (-10.53 to 7.5)	4.57	0.11 (0 to 0.33)	
Vial 1	First	Israel	Brownsville	-0.39 (-9.45 to 8.62)	4.57	0.1 (0 to 0.31)	
Vial 1	First	Sweden	Barcelona	-5.36 (-14.38 to 3.24)	4.46	0.2 (0.01 to 0.51)	
Vial 1	First	Sweden	Brownsville	-4.33 (-13.26 to 4.29)	4.44	0.17 (0.01 to 0.47)	
Vial 1	First	Sweden	Israel	-3.94 (-12.68 to 4.46)	4.33	0.16 (0.01 to 0.45)	
Vial 1	Second	Brownsville	Barcelona	1.97 (-6.58 to 10.81)	4.38	0.12 (0 to 0.31)	
Vial 1	Second	Dahomey	Barcelona	1.38 (-6.6 to 9.33)	4.03	0.11 (0 to 0.29)	
Vial 1	Second	Dahomey	Brownsville	-0.59 (-9.3 to 7.82)	4.33	0.11 (0 to 0.34)	
Vial 1	Second	Dahomey	Israel	-1.2 (-9.54 to 6.9)	4.16	0.11 (0 to 0.34)	
Vial 1	Second	Dahomey	Sweden	-1.45 (-9.73 to 6.66)	4.16	0.12 (0 to 0.35)	
Vial 1	Second	Israel	Barcelona	2.58 (-5.63 to 10.97)	4.20	0.12 (0.01 to 0.3)	
Vial 1	Second	Israel	Brownsville	0.61 (-8.29 to 9.4)	4.47	0.11 (0 to 0.31)	
Vial 1	Second	Sweden	Barcelona	2.82 (-5.35 to 11.22)	4.20	0.12 (0.01 to 0.31)	
Vial 1	Second	Sweden	Brownsville	0.86 (-8.1 to 9.73)	4.51	0.11 (0 to 0.31)	
Vial 1	Second	Sweden	Israel	0.25 (-8.31 to 8.79)	4.31	0.11 (0 to 0.3)	
Vial 2	First	Brownsville	Barcelona	1.9 (-5.34 to 9.37)	3.72	0.12 (0.01 to 0.3)	
Vial 2	First	Dahomey	Barcelona	-6.66 (-13.74 to -0.26)	3.42	0.37 (0.04 to 0.81)	*
Vial 2	First	Dahomey	Brownsville	-8.56 (-16.03 to -1.97)	3.57	0.47 (0.09 to 0.94)	*
Vial 2	First	Dahomey	Israel	-9.18 (-16.87 to -2.47)	3.67	0.5 (0.12 to 0.99)	*
Vial 2	First	Dahomey	Sweden	-9.74 (-17.32 to -3.07)	3.63	0.53 (0.14 to 1.01)	*
Vial 2	First	Israel	Barcelona	2.52 (-4.85 to 10.18)	3.81	0.13 (0.01 to 0.32)	
Vial 2	First	Israel	Brownsville	0.62 (-7.01 to 8.34)	3.89	0.11 (0 to 0.31)	
Vial 2	First	Sweden	Barcelona	3.08 (-4.22 to 10.7)	3.76	0.13 (0.01 to 0.32)	
Vial 2	First	Sweden	Brownsville	1.18 (-6.36 to 8.79)	3.82	0.11 (0 to 0.29)	
Vial 2	First	Sweden	Israel	0.57 (-7.17 to 8.32)	3.92	0.11 (0 to 0.3)	
Vial 2	Second	Brownsville	Barcelona	4.67 (-1.06 to 11.05)	3.07	0.21 (0.02 to 0.41)	
Vial 2	Second	Dahomey	Barcelona	3.79 (-1.46 to 9.46)	2.77	0.18 (0.01 to 0.37)	
Vial 2	Second	Dahomey	Brownsville	-0.88 (-7.26 to 5.16)	3.14	0.12 (0 to 0.38)	
Vial 2	Second	Dahomey	Israel	-2.4 (-8.64 to 3.52)	3.08	0.15 (0.01 to 0.45)	

(continued)

Vial	Order of exposure	Haplotype 1	Haplotype 2	Difference in fecundity	SE	Relative difference	
Vial 2	Second	Dahomey	Sweden	-8.08 (-15.62 to -1.47)	3.60	0.39 (0.07 to 0.79)	*
Vial 2	Second	Israel	Barcelona	6.19 (0.52 to 12.49)	3.04	0.26 (0.04 to 0.44)	*
Vial 2	Second	Israel	Brownsville	1.52 (-5.06 to 8.12)	3.33	0.12 (0.01 to 0.31)	
Vial 2	Second	Sweden	Barcelona	11.87 (5.33 to 19.63)	3.66	0.4 (0.22 to 0.55)	*
Vial 2	Second	Sweden	Brownsville	7.2 (0.07 to 15.03)	3.79	0.24 (0.03 to 0.43)	*
Vial 2	Second	Sweden	Israel	5.68 (-1.3 to 13.3)	3.71	0.19 (0.02 to 0.38)	
Vial 3	First	Brownsville	Barcelona	-1.94 (-13.55 to 9.38)	5.80	0.17 (0.01 to 0.55)	
Vial 3	First	Dahomey	Barcelona	-3.17 (-15.35 to 9.1)	6.16	0.21 (0.01 to 0.68)	
Vial 3	First	Dahomey	Brownsville	-1.23 (-12.82 to 10.73)	5.95	0.18 (0.01 to 0.57)	
Vial 3	First	Dahomey	Israel	-1.52 (-13.01 to 10.5)	5.92	0.18 (0.01 to 0.58)	
Vial 3	First	Dahomey	Sweden	-5.91 (-18.53 to 6.55)	6.31	0.28 (0.01 to 0.82)	
Vial 3	First	Israel	Barcelona	-1.65 (-13.35 to 9.66)	5.80	0.17 (0.01 to 0.54)	
Vial 3	First	Israel	Brownsville	0.29 (-10.85 to 11.34)	5.59	0.15 (0.01 to 0.44)	
Vial 3	First	Sweden	Barcelona	2.74 (-9.3 to 15.11)	6.16	0.15 (0.01 to 0.4)	
Vial 3	First	Sweden	Brownsville	4.67 (-6.89 to 16.86)	5.99	0.17 (0.01 to 0.42)	
Vial 3	First	Sweden	Israel	4.39 (-7.14 to 16.56)	5.97	0.17 (0.01 to 0.41)	
Vial 3	Second	Brownsville	Barcelona	12.66 (3.34 to 24.15)	5.30	0.42 (0.15 to 0.63)	*
Vial 3	Second	Dahomey	Barcelona	5.74 (-1.95 to 14.35)	4.12	0.26 (0.02 to 0.51)	
Vial 3	Second	Dahomey	Brownsville	-6.92 (-18.61 to 3.4)	5.57	0.36 (0.02 to 0.97)	
Vial 3	Second	Dahomey	Israel	-7.68 (-18.77 to 2.42)	5.36	0.39 (0.02 to 0.99)	
Vial 3	Second	Dahomey	Sweden	-5.33 (-15.73 to 4.43)	5.07	0.29 (0.01 to 0.83)	
Vial 3	Second	Israel	Barcelona	13.41 (4.43 to 24.23)	5.03	0.44 (0.19 to 0.63)	*
Vial 3	Second	Israel	Brownsville	0.76 (-11.53 to 12.69)	6.11	0.16 (0.01 to 0.46)	
Vial 3	Second	Sweden	Barcelona	11.07 (2.55 to 21.11)	4.71	0.39 (0.12 to 0.6)	*
Vial 3	Second	Sweden	Brownsville	-1.59 (-13.65 to 9.88)	5.92	0.18 (0.01 to 0.58)	
Vial 3	Second	Sweden	Israel	-2.35 (-13.8 to 8.8)	5.68	0.18 (0.01 to 0.59)	
Vial 4	First	Brownsville	Barcelona	1.42 (-9.44 to 12.97)	5.60	0.19 (0.01 to 0.54)	
Vial 4	First	Dahomey	Barcelona	3.34 (-8.52 to 17.42)	6.53	0.22 (0.01 to 0.55)	
Vial 4	First	Dahomey	Brownsville	1.92 (-10.91 to 16.23)	6.81	0.22 (0.01 to 0.6)	
Vial 4	First	Dahomey	Israel	0.42 (-11.99 to 14.64)	6.67	0.21 (0.01 to 0.66)	
Vial 4	First	Dahomey	Sweden	3.14 (-8.63 to 17.11)	6.48	0.21 (0.01 to 0.54)	
Vial 4	First	Israel	Barcelona	2.91 (-7.58 to 13.95)	5.39	0.19 (0.01 to 0.48)	
Vial 4	First	Israel	Brownsville	1.49 (-10.2 to 12.92)	5.80	0.19 (0.01 to 0.53)	
Vial 4	First	Sweden	Barcelona	0.19 (-10.15 to 10.59)	5.19	0.19 (0.01 to 0.58)	
Vial 4	First	Sweden	Brownsville	-1.23 (-12.74 to 9.65)	5.60	0.22 (0.01 to 0.71)	
Vial 4	First	Sweden	Israel	-2.72 (-13.66 to 7.76)	5.36	0.24 (0.01 to 0.77)	
Vial 4	Second	Brownsville	Barcelona	4.22 (-6.77 to 16.03)	5.72	0.23 (0.01 to 0.53)	
Vial 4	Second	Dahomey	Barcelona	0.45 (-9.92 to 10.39)	5.07	0.2 (0.01 to 0.6)	
Vial 4	Second	Dahomey	Brownsville	-3.77 (-15.17 to 6.52)	5.45	0.29 (0.01 to 0.92)	
Vial 4	Second	Dahomey	Israel	-5.5 (-17.28 to 4.89)	5.58	0.35 (0.01 to 1.04)	
Vial 4	Second	Dahomey	Sweden	-6.56 (-18.82 to 4)	5.74	0.4 (0.02 to 1.13)	
Vial 4	Second	Israel	Barcelona	5.96 (-5.06 to 18.02)	5.81	0.26 (0.01 to 0.54)	
Vial 4	Second	Israel	Brownsville	1.73 (-10.1 to 13.86)	5.99	0.19 (0.01 to 0.51)	
Vial 4	Second	Sweden	Barcelona	7.01 (-4.33 to 19.66)	6.02	0.28 (0.02 to 0.56)	
Vial 4	Second	Sweden	Brownsville	2.78 (-9.28 to 15.45)	6.20	0.2 (0.01 to 0.5)	
Vial 4	Second	Sweden	Israel	1.05 (-11.31 to 13.78)	6.28	0.19 (0.01 to 0.54)	

Supplementary Table 10: Average difference in the effect of the 'exposed first' and 'exposed second' treatments for each pair of female haplotypes in Experiment 2, split by vial or summed over all 4 vials. For example, a difference of 10 means that the effect of the 'exposed first' treatment was more positive by 10 progeny in one haplotype than the other. The offspring production of Dahomey females was significantly more sensitive to the order of exposure treatment than all four of the other haplotypes, in one or more of the vials tested. The numbers in parentheses are 95% credible intervals, and the the 'Relative difference' column was calculated as in Table S3.

Vial	Haplotype 1	Haplotype 2	Difference in effect of exposure order	SE	
Total across all 4 vials	Brownsville	Barcelona	-23.17 (-50.71 to 3.56)	13.80	
Total across all 4 vials	Dahomey	Barcelona	-26.49 (-52.81 to -0.07)	13.42	*
Total across all 4 vials	Dahomey	Brownsville	-3.32 (-30.75 to 24.95)	14.18	
Total across all 4 vials	Dahomey	Israel	-0.71 (-27.97 to 27.31)	14.07	
Total across all 4 vials	Dahomey	Sweden	5.63 (-21.27 to 33.76)	14.01	
Total across all 4 vials	Israel	Barcelona	-25.78 (-53.16 to 0.49)	13.59	
Total across all 4 vials	Israel	Brownsville	-2.61 (-30.94 to 25.64)	14.41	
Total across all 4 vials	Sweden	Barcelona	-32.12 (-59.47 to -6.04)	13.63	*
Total across all 4 vials	Sweden	Brownsville	-8.95 (-37.38 to 19.31)	14.39	
Total across all 4 vials	Sweden	Israel	-6.34 (-34.42 to 21.7)	14.26	
Vial 1	Brownsville	Barcelona	-3 (-15.85 to 9.49)	6.41	
Vial 1	Dahomey	Barcelona	-10.01 (-22.05 to 1.34)	5.95	
Vial 1	Dahomey	Brownsville	-7.02 (-19.23 to 4.87)	6.11	
Vial 1	Dahomey	Israel	-6.02 (-17.93 to 5.45)	5.91	
Vial 1	Dahomey	Sweden	-1.83 (-13.21 to 9.41)	5.74	
Vial 1	Israel	Barcelona	-4 (-16.37 to 8.14)	6.22	
Vial 1	Israel	Brownsville	-1 (-13.61 to 11.67)	6.40	
Vial 1	Sweden	Barcelona	-8.19 (-20.57 to 3.63)	6.14	
Vial 1	Sweden	Brownsville	-5.19 (-17.72 to 7.19)	6.32	
Vial 1	Sweden	Israel	-4.19 (-16.44 to 7.71)	6.11	
Vial 2	Brownsville	Barcelona	-2.77 (-12.44 to 6.58)	4.80	
Vial 2	Dahomey	Barcelona	-10.45 (-19.73 to -2.11)	4.47	*
Vial 2	Dahomey	Brownsville	-7.68 (-17.36 to 1.32)	4.73	
Vial 2	Dahomey	Israel	-6.78 (-16.39 to 2.16)	4.71	
Vial 2	Dahomey	Sweden	-1.66 (-11.28 to 7.97)	4.86	
Vial 2	Israel	Barcelona	-3.67 (-13.37 to 5.62)	4.81	
Vial 2	Israel	Brownsville	-0.9 (-11.01 to 9.17)	5.11	
Vial 2	Sweden	Barcelona	-8.79 (-19.28 to 0.83)	5.11	
Vial 2	Sweden	Brownsville	-6.02 (-16.83 to 4.22)	5.34	
Vial 2	Sweden	Israel	-5.12 (-15.91 to 5.2)	5.35	
Vial 3	Brownsville	Barcelona	-14.6 (-30.94 to 0.11)	7.90	
Vial 3	Dahomey	Barcelona	-8.91 (-23.76 to 5.59)	7.43	
Vial 3	Dahomey	Brownsville	5.69 (-9.95 to 22.29)	8.14	
Vial 3	Dahomey	Israel	6.16 (-9.07 to 22.38)	7.94	
Vial 3	Dahomey	Sweden	-0.57 (-16.37 to 15.53)	8.05	
Vial 3	Israel	Barcelona	-15.07 (-30.98 to -0.68)	7.68	*
Vial 3	Israel	Brownsville	-0.47 (-16.78 to 15.98)	8.28	
Vial 3	Sweden	Barcelona	-8.33 (-23.9 to 6.52)	7.68	
Vial 3	Sweden	Brownsville	6.26 (-9.86 to 23.24)	8.39	
Vial 3	Sweden	Israel	6.73 (-9.19 to 23.42)	8.23	
Vial 4	Brownsville	Barcelona	-2.8 (-18.68 to 12.93)	7.93	
Vial 4	Dahomey	Barcelona	2.88 (-12.61 to 20.18)	8.26	
Vial 4	Dahomey	Brownsville	5.69 (-10.79 to 23.94)	8.74	
Vial 4	Dahomey	Israel	5.93 (-10.44 to 24.53)	8.80	
Vial 4	Dahomey	Sweden	9.7 (-6.24 to 28.25)	8.72	
Vial 4	Israel	Barcelona	-3.04 (-18.94 to 12.43)	7.85	
Vial 4	Israel	Brownsville	-0.24 (-17.11 to 16.36)	8.39	
Vial 4	Sweden	Barcelona	-6.81 (-22.91 to 8.1)	7.80	
Vial 4	Sweden	Brownsville	-4.01 (-20.96 to 12)	8.28	
Vial 4	Sweden	Israel	-3.77 (-20.53 to 12.42)	8.28	

Supplementary Table 11: Number of female flies that died or survived in Experiment 2, by Haplotype and male exposure treatment.

Haplotype	Order of exposure	nDeaths	nSurvivors
Barcelona	First	4	17
Barcelona	Second	5	16
Brownsville	First	2	17
Brownsville	Second	2	14
Dahomey	First	5	15
Dahomey	Second	3	18
Israel	First	4	18
Israel	Second	4	17
Sweden	First	3	17
Sweden	Second	2	17

Supplementary Table 12: Results of a Weibull generalized linear mixed model with Haplotype and Order.of.exposure as fixed effects, block as a random effect. The response variable is age at death (expressed as Vial 1, 2, 3 or 4), with right-censoring for flies that survived the 12-day experiment. The death rates of females in Experiment 2 were not significantly affected by their mtDNA haplotype, and did not differ between flies exposed to males in the first or second vial.

	Estimate	Est.Error	Q2.5	Q97.5	Eff.Sample	Rhat	
Intercept	1.88	0.24	1.50	2.45	2172.26	1	*
HaplotypeBrownsville	0.27	0.35	-0.37	1.05	2913.82	1	
HaplotypeDahomey	-0.15	0.27	-0.71	0.37	2682.39	1	
HaplotypeIsrael	0.00	0.28	-0.57	0.56	2678.94	1	
HaplotypeSweden	0.12	0.30	-0.47	0.75	3047.36	1	
Order.of.exposureSecond	-0.13	0.26	-0.68	0.36	2294.39	1	
HaplotypeBrownsville:Order.of.exposureSecond	0.08	0.49	-0.88	1.10	3215.09	1	
HaplotypeDahomey:Order.of.exposureSecond	0.36	0.40	-0.39	1.20	2819.63	1	
HaplotypeIsrael:Order.of.exposureSecond	0.11	0.39	-0.67	0.88	2688.53	1	
HaplotypeSweden:Order.of.exposureSecond	0.27	0.46	-0.59	1.24	3025.43	1	
sd(Intercept)	0.10	0.10	0.00	0.35	2873.57	1	*

Supplementary Table 13: Results of the model of offspring sex ratio in Experiment 2, which contains the fixed factor Haplotype (i.e. the mitochondrial strain of the females) only. The model is a Bayesian generalized linear mixed model, with female ID and experimental block as crossed random factors and binomial errors. This model only had a posterior model probability of 0.1% when compared to the same model with Haplotype removed.

	Estimate	Est.Error	Q2.5	Q97.5	Eff.Sample	Rhat	
Intercept	0.09	0.04	0.02	0.16	58228.69	1	*
HaplotypeBrownsville	-0.07	0.05	-0.17	0.03	70148.92	1	
HaplotypeDahomey	-0.15	0.05	-0.24	-0.06	69551.64	1	*
HaplotypeIsrael	-0.07	0.05	-0.16	0.02	68225.80	1	
HaplotypeSweden	-0.09	0.05	-0.18	0.00	70124.08	1	
sd(Block)	0.02	0.02	0.00	0.08	32784.82	1	*
sd(Female)	0.06	0.03	0.00	0.11	17339.55	1	*