Supporting Information

Further details of laboratory experiments on the laboratory strain of gypsy moths

In this experiment, we used 1cm oak leaf discs as food substrate instead of artificial diet because leaf disks mimic more closely how gypsy moths encounter virus in nature (Elderd et al., 2013). We used higher doses compared to the previous experiment because infection rates are lower when larvae are fed virus on leaf disks (Dwyer et al., 2005). From this experiment we also recorded survival, individual sex and pupal weight.

Further details associated with Fig. 2

To produce Fig 2, we weighed 354 female pupae to the nearest μg. These females were exposed within 24 hours after eclosure to virgin males and allowed to mate. The deposited egg masses were also weighed to the nearest μg. We then used a linear regression to determine how strongly these two traits are correlated. We found that female pupal weight is strongly related to egg mass weight. This relationship (Figure 1A) is described by the equation $EM = -0.081 + 0.28PM$, where EM is the weight of the egg mass and PM is the female pupal weight. The standard errors for the slope and intercept were 0.015, and 0.021, respectively. We then used the residuals of this relationship to determine whether male weight explains any of the remaining variation. As shown in Figure 1B, this relationship is not significant. To produce this figure, we used the residuals between egg mass weight and female pupal weight only using the first females to which a male was mated with. In this case both males and females had eclosed from pupation within 24 hours.

To test for transgenerational effects of virus exposure, each parent was either exposed (E) or unexposed (U) to virus. Parents were then crossed in a factorial design producing offspring from a UU, UE, EU, and EE groups, where the first letter represents the treatment associated with the male parent. After measuring survival probability and pupal weight in the offspring we used a linear mixed effect model with the parental group as a fixed effect and the effects of the sire, dam and rearing cup environment as random effects. We compared this model with a simpler model that omitted the parental group effect to test whether parental exposure can affect offspring phenotypic traits. The results suggests that there is no effect of the parental treatment on either offspring survival or pupal weight (See table S1, below)

Table S1: Deviance information criterion (DIC) for models testing transgenerational effects on survival probability and pupal weight

Trait	DIC transgeneration	DIC no transgeneration
Survival probability	1080.621	**1079.144**
Pupal weight females	13.08246	**12.69344**
Pupal weight males	-195.5596	**-194.4611**

Note: Bold values indicate the best model.

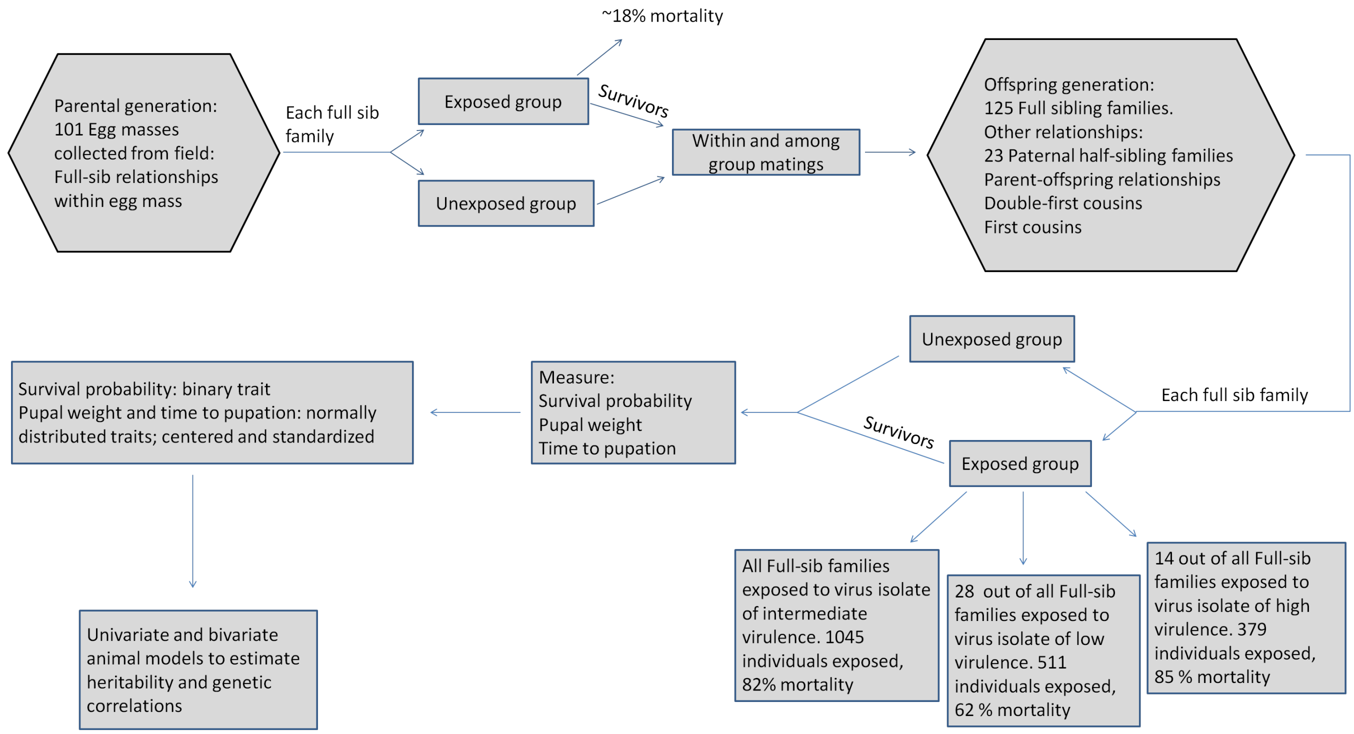

Figure S1: Experiments conducted on the wild-collected insects to measure survival probability, pupal weight and the timing of pupation in individuals of known relationships

Table S2: Variance partitioning of survival probability, pupal weight and the time to pupation.

a Trait	V_A	V_{CE}	V_R
Survival probability	1.48 (0.33, 3.65)	0.16 (<0.01, 0.45)	1
Pupal weight males	0.32 (0.17, 0.49)	0.03 (<0.001, 0.07)	0.68 (0.57, 0.79)
Pupal weight females	0.36 (0.19, 0.56)	0.008 (<0.001, 0.04)	0.67 (0.54, 0.79)
Pupal weight overall	0.32 (0.21, 0.46)	0.01 (<0.001, 0.04)	0.7 (0.62, 0.78)
Time to pupation males	0.65 (0.33, 1.11)	0.09 (0.033, 0.15)	0.35 (0.10, 0.52)
Time to pupation females	0.62 (0.36, 0.92)	0.05 (<0.001, 0.11)	0.40 (0.24,0.56)
Time to pupation overall	0.41 (0.28, 0.55)	0.11 (0.07, 0.16)	0.50 (0.42, 0.58)

b Trait correlation	r_A	r_R
Survival probability - Pupal weight	-0.55 (-0.90, -0.22)	-
Survival probability - Time to pupation	1.12 (0.55, 1.78)	-
Pupal weight-Time to pupation	-0.17 (-0.26, -0.09)	-0.09 (-0.14, -0.04)

Note: a) Overall and sex-specific estimates of variance components used to estimate heritabilities. 95% credible intervals are in parentheses. V_A, V_{CE}, V_R refer to the additive genetic variance, common environmental effects, and residual variation, respectively b) Additive genetic (r_A) covariances for the measured traits. The residual covariance (r_R) was only estimated for traits measured on the same individual.

Table S3: Model selection for the estimation of the heritabilities of pupal weight and the time to pupation

	Model	DIC pupal weight	DIC time to pupation	DIC survival probability
	Full	6948.6	6409.9	1998.6
Overall	No Cup	6949.4	6445	1998.2
	No Dam	**6915.1**	**6272.2**	**1987.7**
	Full	3548.3	3222.8	-
Males	No Cup	3551.21	3243.34	-
	No Dam	**3527.4**	**2648.1**	-
	Full	3407.6	3195.4	-
Males	No Cup	3407.4	3201.8	-
	No Dam	**3375.6**	**2974.1**	-

Note: For the models in the overall class, the fixed effects included individual sex, cohort and the virus exposure treatment. The sex variable was not included in the models classed as Males and Females as the data was a subset of these categories. Bold values indicate the best model.

Table S4: DIC for models testing among cup correlations for the measured traits

Type of correlation	Among cup correlation	No among cup correlation
Survival probability - Pupal weight	**10688.0**	10691.2
Survival probability - Time to pupation	9992.4	**9905.4**
Pupal weight - Time to pupation	**13115.8**	13147.2

Note: Bold values indicate the best model.

Elderd, B.D., Rehill, B.J., Haynes, K.J. & Dwyer, G. 2013. Induced plant defenses, host-pathogen interactions, and forest insect outbreaks. Proc. Natl. Acad. Sci. USA 110: 14978–14983.