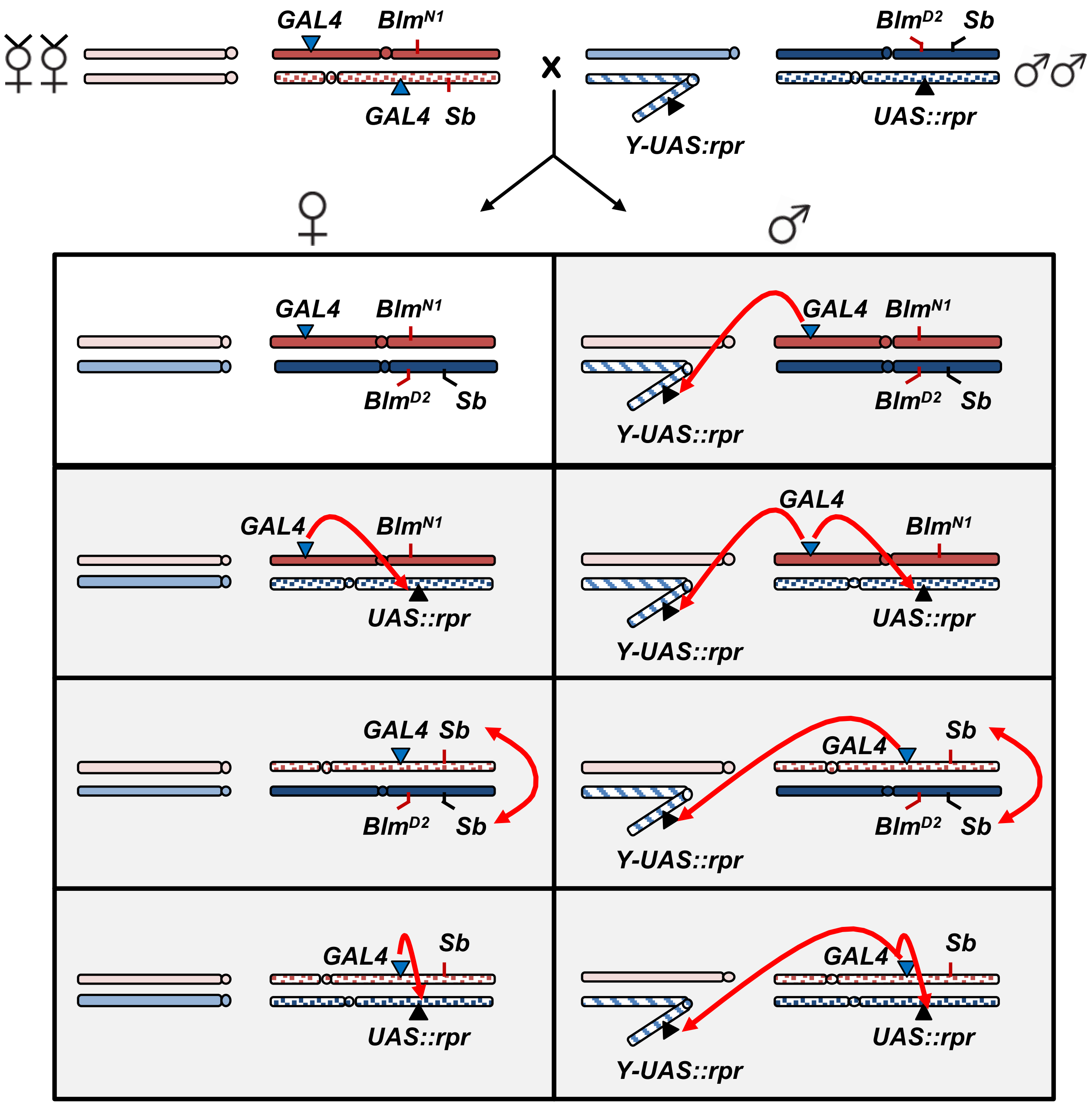

Figure S1: Cross scheme for collecting large numbers of *Blm* mutant mothers. Due to the severe maternal-effect lethality observed in *Blm* females, (90-95% of embryos from *Blm* mothers fail to hatch) we used a scheme to make it easier to collect large numbers of *Blm* mothers, which makes it possible to produce sufficient numbers of progeny in order to carry out our experiments. We utilized the following cross, based on a similar scheme from McMahan et. al (2013) to achieve this aim. Virgin female flies containing the *Blm*^{N1} null allele were crossed to male flies containing the *Blm*^{D2} null allele, both of which were maintained over a balancer chromosome to prevent recombination. Most of the progeny classes from this cross inherit the yeast transcriptional activator GAL4 as well as the GAL4 DNA recognition sequence, UAS, attached to the pro-apoptotic gene *rpr* (this includes all classes of male flies, which inherit the UAS::rpr construct on the Y chromosome). The combination of the GAL4 and UAS::rpr genetic elements in the same cell activates expression of Rpr and is lethal (Wang *et al.* 1999). One additional progeny class inherits two copies of the *Stubble* (*Sb*) allele, which is lethal. Shaded boxes indicate a genotype class of flies that does not survive. Only female progeny inheriting both the *Blm*^{N1} and the *Blm*^{D2} alleles survive (white box). Red arrows indicate the cause of lethality in each class of flies, where applicable.

References

McMahan S., K. P. Kohl, and J. Sekelsky, 2013 Variation in meiotic recombination frequencies between allelic transgenes inserted at different sites in the drosophila melanogaster genome. *G3 Genes, Genomes, Genet.* 3: 1419–1427. https://doi.org/10.1534/g3.113.006411

Wang S. L., C. J. Hawkins, S. J. Yoo, H. A. J. Müller, and B. A. Hay, 1999 The Drosophila caspase inhibitor DIAP1 is essential for cell survival and is negatively regulated by HID. *Cell* 98: 453–463. https://doi.org/10.1016/S0092-8674(00)81974-1

Table S1: Statistical Results from Figure 2

Tests for normal distribution		
Cross	**Shapiro Wilks test statistic**	**p-value**
Blm^{+} x *w*^{1118}	0.95794	0.2921
Blm^{+} x *C(1;Y)3*/O	0.97992	0.9414
Blm^{+} x *C(1;Y)6*/*Y*	0.99062	0.9672
Blm^{+} x *Dp(1;Y)B*^{S}	0.93479	0.09062
Blm^{+} x *Dp(1;Y)y*$^{+}$	0.88919	0.004615*
Blm^{+} x *In(1)sc*^{4L}*sc*^{8R}	0.97212	0.8544
Blm x *w*^{1118}	0.90824	0.0008018*
Blm x *C(1;Y)3*/O	0.77813	< 0.0001*
Blm x *C(1;Y)6*/*Y*	0.8243	< 0.0001*
Blm x *Dp(1;Y)B*^{S}	0.96559	0.008321*
Blm x *Dp(1;Y)y*$^{+}$	0.98927	0.6342
Blm x *In(1)sc*^{4L}*sc*^{8R}	0.9737	0.02033

t-tests comparing observed proportion of female progeny to expected (0.5)			
Cross	**t-statistic**	**Degrees of freedom**	**p-value**
Blm^{+} x *w*^{1118}	0.10861	28	0.9143
Blm^{+} x *C(1;Y)3*/O	2.707	18	0.01444
Blm^{+} x *C(1;Y)6*/*Y*	1.6151	46	0.1131
Blm^{+} x *Dp(1;Y)B*^{S}	2.7044	26	0.01191
Blm^{+} x *Dp(1;Y)y*$^{+}$	0.16313	29	0.8715
Blm^{+} x *In(1)sc*^{4L}*sc*^{8R}	2.0157	16	0.06095
Blm^{-} x *w*^{1118}	13.041	50	< 0.0001
Blm^{-} x *C(1;Y)3*/O	35.02	106	< 0.0001
Blm^{-} x *C(1;Y)6*/*Y*	67.759	106	< 0.0001
Blm^{-} x *Dp(1;Y)B*^{S}	42.147	103	< 0.0001

Blm^{-} x $Dp(1;Y)y^{+}$	36.013	95	< 0.0001
Blm^{-} x $In(1)sc^{4L}sc^{8R}$	29.125	117	< 0.0001

t-tests comparing observed proportions of female progeny

Cross comparisons	**t-statistic**	**Degrees of freedom**	**p-value**
Blm^{+} x w^{1118} vs. Blm^{-} x w^{1118}	11.49	71.706	< 0.0001
Blm^{+} x $C(1;Y)3$/O vs. Blm^{-} x $C(1;Y)3$/O	40.441	93.376	< 0.0001
Blm^{+} x $C(1;Y)6/Y$ vs. Blm^{-} x $C(1;Y)6/Y$	18.418	40.202	< 0.0001
Blm^{+} x $Dp(1;Y)B^{S}$ vs. Blm^{-} x $Dp(1;Y)B^{S}$	29.49	93.556	< 0.0001
Blm^{+} x $Dp(1;Y)y^{+}$ vs. Blm^{-} x $Dp(1;Y)y^{+}$	21.624	63.984	< 0.0001
Blm^{+} x $In(1)sc^{4L}sc^{8R}$ vs. Blm^{-} x $In(1)sc^{4L}sc^{8R}$	11.705	25.674	< 0.0001
Blm^{-} x w^{1118} vs. Blm^{-} x $In(1)sc^{4L}sc^{8R}$	2.6689	81.915	0.009172
Blm^{-} x w^{1118} vs. Blm^{-} x $Dp(1;Y)y^{+}$	5.1182	77.964	< 0.0001
Blm^{-} x w^{1118} vs. Blm^{-} x $Dp(1;Y)B^{S}$	8.0738	78.557	< 0.0001

Table S2: Statistical Results from Figure 3

Tests for female proportion throughout development		
Comparison	**z-test statistic**	**p-value**
Embryo vs. 1st instar larvae	3.1416	0.00168
Embryo vs. 3rd instar larvae	3.7332	0.0002
Embryo vs. adult	3.7191	0.0002
1st instar larvae vs. 3rd instar larvae	1.0314	0.30302
1st instar larvae vs. adult	1.0338	0.30302
3rd instar larvae vs. adult	0.0164	0.98404

Table S3: Statistical Results from Figure 5

Test for normal distribution of data		
Data Set	**Shapiro Wilks test statistic**	**p-value**
w^{1118} fathers (Blm^{+}, Blm^{-}, and Blm^{N2} mothers)	0.97998	0.06055
$B^{S}Y$ fathers (Blm^{+}, Blm^{-}, and Blm^{N2} mothers)	0.90465	$< 0.0001^{\#}$
C(1:Y)6 fathers (Blm^{+}, Blm^{-}, and Blm^{N2} mothers)	0.86422	< 0.0001*

Tests for differences in proportion of females based on maternal genetic background			
Data Set	**ANOVA test statistic**	**df**	**p-value**
w^{1118} fathers (Blm^{+}, Blm^{-}, and Blm^{N2} mothers)	68.095	2	< 0.0001
$B^{S}Y$ fathers (Blm^{+}, Blm^{-}, and Blm^{N2} mothers)	404.85	2	< 0.0001
C(1:Y)6 fathers (Blm^{+}, Blm^{-}, and Blm^{N2} mothers)	786.62	2	< 0.0001

Post-hoc comparisons of proportion female

Comparison	**t-statistic**	**df**	**p-value**
Blm^{-} x w^{1118} vs. Blm^{N2} x w^{1118}	8.879	122	< 0.0001
Blm^{-} x w^{1118} vs. Blm^{+} x w^{1118}	10.560	122	< 0.0001
Blm^{+} x w^{1118} vs. Blm^{N2} x w^{1118}	2.687	122	0.0222
Blm^{-} x $B^{S}Y$ vs. Blm^{N2} x $B^{S}Y$	23.568	166	< 0.0001
Blm^{-} x $B^{S}Y$ vs. Blm^{+} x $B^{S}Y$	21.035	166	< 0.0001
Blm^{+} x $B^{S}Y$ vs. Blm^{N2} x $B^{S}Y$	0.302	166	0.9511
Blm^{-} x *C(1:Y)6* vs. Blm^{N2} x *C(1:Y)6*	24.778	190	< 0.0001
Blm^{-} x *C(1:Y)6* vs. Blm^{+} x *C(1:Y)6*	36.758	190	< 0.0001
Blm^{+} x *C(1:Y)6* vs. Blm^{N2} x *C(1:Y)6*	8.300	190	< 0.0001

$^{\#}$ Nonparametric tests due to non-normally distributed data

*sample size >30, so parametric tests appropriate

Data Set	**Kruskal-Wallis result**	**df**	**p-value**
$B^{S}Y$ fathers (Blm^{+}, Blm^{-}, and Blm^{N2} mothers)	119.04	2	< 0.0001

Post-hoc comparisons of proportion female

Comparison	**Wilcoxon ran sum test**	**p-value**
Blm^{-} x $B^{S}Y$ vs. Blm^{N2} x $B^{S}Y$	3947	< 0.0001
Blm^{-} x $B^{S}Y$ vs. Blm^{+} x $B^{S}Y$	2808	< 0.0001
Blm^{+} x $B^{S}Y$ vs. Blm^{N2} x $B^{S}Y$	525	0.8783

Table S4: Statistical Results from Figure 6

<table>
<tr><th colspan="4">Test for normal distribution of data</th></tr>
<tr><th>Data Set</th><th colspan="2">Shapiro Wilks test statistic</th><th>p-value</th></tr>
<tr><td>w^{1118} fathers (Blm^{+}, Blm^{-}, Blm^{+} $pol\alpha^{+/-}$, and Blm^{-} $pol\alpha^{+/-}$ mothers)</td><td colspan="2">0.95725</td><td>$0.0001305^{\#}$</td></tr>
<tr><td>$C(1{:}Y)6$ fathers (Blm^{+}, Blm^{-}, Blm^{+} $pol\alpha^{+/-}$, and Blm^{-} $pol\alpha^{+/-}$ mothers)</td><td colspan="2">0.77936</td><td>$< 0.0001^{\#}$</td></tr>
<tr><th colspan="4">Parametric tests for differences in proportion of females based on maternal genetic background</th></tr>
<tr><th>Data Set</th><th>ANOVA test statistic</th><th>df</th><th>p-value</th></tr>
<tr><td>w^{1118} fathers (Blm^{+}, Blm^{-}, Blm^{+} $pol\alpha^{+/-}$, and Blm^{-} $pol\alpha^{+/-}$ mothers)</td><td>88.328</td><td>3</td><td>< 0.0001</td></tr>
<tr><td>$C(1{:}Y)6$ fathers (Blm^{+}, Blm^{-}, Blm^{+} $pol\alpha^{+/-}$, and Blm^{-} $pol\alpha^{+/-}$ mothers)</td><td>915.24</td><td>3</td><td>< 0.0001</td></tr>
<tr><th colspan="4">Nonparametric post-hoc comparisons of proportion female</th></tr>
<tr><th>Comparison</th><th>t-statistic</th><th>df</th><th>p-value</th></tr>
<tr><td>Blm^{-} x w^{1118} vs. Blm^{+} x w^{1118}</td><td>11.247</td><td>147</td><td>< 0.0001</td></tr>
<tr><td>Blm^{-} x w^{1118} vs. Blm^{+} $pol\alpha^{+/-}$ x w^{1118}</td><td>10.142</td><td>147</td><td>< 0.0001</td></tr>
<tr><td>Blm^{-} x w^{1118} vs. Blm^{-} $pol\alpha^{+/-}$ x w^{1118}</td><td>1.979</td><td>147</td><td>0.2006</td></tr>
<tr><td>Blm^{+} $pol\alpha^{+/-}$ x w^{1118} vs. Blm^{-} $pol\alpha^{+/-}$ x w^{1118}</td><td>11.585</td><td>147</td><td>< 0.0001</td></tr>
<tr><td>Blm^{+} $pol\alpha^{+/-}$ x w^{1118} vs. Blm^{+} x w^{1118}</td><td>0.512</td><td>147</td><td>0.9561</td></tr>
<tr><td>Blm^{-} $pol\alpha^{+/-}$ x w^{1118} vs. Blm^{+} x w^{1118}</td><td>12.729</td><td>147</td><td>< 0.0001</td></tr>
<tr><td>Blm^{-} x $C(1{:}Y)6$ vs. Blm^{+} x $C(1{:}Y)6$</td><td>43.319</td><td>212</td><td>< 0.0001</td></tr>
</table>

Blm^{-} x *C(1:Y)6* vs. Blm^{+} $pol\alpha^{+/-}$ x *C(1:Y)6*	26.736	212	< 0.0001
Blm^{-} x *C(1:Y)6* vs. Blm^{-} $pol\alpha^{+/-}$ x *C(1:Y)6*	6.193	212	< 0.0001
Blm^{+} $pol\alpha^{+/-}$ x *C(1:Y)6* vs. Blm^{-} $pol\alpha^{+/-}$ x *C(1:Y)6*	28.386	212	< 0.0001
Blm^{+} $pol\alpha^{+/-}$ x *C(1:Y)6* vs. Blm^{+} x *C(1:Y)6*	2.119	212	0.1504
Blm^{-} $pol\alpha^{+/-}$ x *C(1:Y)6* vs. Blm^{+} x *C(1:Y)6*	41.622	212	< 0.0001

$^{\#}$ Nonparametric tests due to non-normally distributed data

Data Set	**Kruskal-Wallis result**	**df**	**p-value**
w^{1118} fathers (Blm^{+}, Blm^{-}, Blm^{+} $pol\alpha^{+/-}$, and Blm^{-} $pol\alpha^{+/-}$ mothers)	92.01	3	< 0.0001
C(1:Y)6 fathers (Blm^{+}, Blm^{-}, Blm^{+} $pol\alpha^{+/-}$, and Blm^{-} $pol\alpha^{+/-}$ mothers)	153.33	3	< 0.0001

Nonparametric post-hoc comparisons of proportion female

Comparison	**Wilcoxon ran sum test**	**p-value**
Blm^{-} x w^{1118} vs. Blm^{+} x w^{1118}	1397	< 0.0001
Blm^{-} x w^{1118} vs. Blm^{+} $pol\alpha^{+/-}$ x w^{1118}	1189	< 0.0001
Blm^{-} x w^{1118} vs. Blm^{-} $pol\alpha^{+/-}$ x w^{1118}	959.5	0.1238
Blm^{+} $pol\alpha^{+/-}$ x w^{1118} vs. Blm^{-} $pol\alpha^{+/-}$ x w^{1118}	6	< 0.0001
Blm^{+} $pol\alpha^{+/-}$ x w^{1118} vs. Blm^{+} x w^{1118}	397	0.5553
Blm^{-} $pol\alpha^{+/-}$ x w^{1118} vs. Blm^{+} x w^{1118}	1334	< 0.0001
Blm^{-} x *C(1:Y)6* vs. Blm^{+} x *C(1:Y)6*	0.5	< 0.0001

Blm^{-} x *C(1:Y)6* vs. *Blm*$^{+}$ *polα*$^{+/-}$ x *C(1:Y)6*	1	< 0.0001
Blm^{-} x *C(1:Y)6* vs. *Blm*$^{-}$ *polα*$^{+/-}$ x *C(1:Y)6*	3902	< 0.0001
Blm^{+} *polα*$^{+/-}$ x *C(1:Y)6* vs. *Blm*$^{-}$ *polα*$^{+/-}$ x *C(1:Y)6*	765	< 0.0001
Blm^{+} *polα*$^{+/-}$ x *C(1:Y)6* vs. *Blm*$^{+}$ x *C(1:Y)6*	289.5	0.096
Blm^{-} *polα*$^{+/-}$ x *C(1:Y)6* vs. *Blm*$^{+}$ x *C(1:Y)6*	0	< 0.0001