

**Table S1.** Comparisons (Wilcoxon-Mann-Whitney test) between male and female chill coma of *Ophryotrocha labronica* offspring within each exposure treatment: A) late exposure treatment and B) early exposure treatment. For each maternal-offspring temperature combination ( $T_M-T_O$ ), the dimension of the sample (N), male and female chill coma values (mean  $\pm$  s.d.), degrees of freedom (d.f.), statistic test ( $U$ ) and  $P$ -values ( $P$ ) are reported.

<i>Chill coma</i>	$T_M-T_O$	Males (°C)		Females (°C)		d.f.	$U$	$P$
		N	Mean $\pm$ s.d.	N	Mean $\pm$ s.d.			
A) Late exposure treatment	18-18°C	8	-1.36 $\pm$ 0.58	10	-2.23 $\pm$ 0.64	18	10.00	0.007
	18-30°C	4	3.53 $\pm$ 0.36	6	2.97 $\pm$ 0.54	10	4.50	0.11
	30-30°C	9	2.19 $\pm$ 0.20	3	1.47 $\pm$ 0.64	12	5.50	0.13
	30-18°C	8	-0.50 $\pm$ 0.38	10	-1.01 $\pm$ 0.42	18	15.50	0.03
B) Early exposure treatment	18-18°C	10	-1.20 $\pm$ 0.42	10	-2.00 $\pm$ 0.45	20	10.50	0.003
	18-30°C	10	2.11 $\pm$ 0.62	10	1.93 $\pm$ 0.37	20	48.00	0.88
	30-30°C	10	3.21 $\pm$ 0.65	10	3.22 $\pm$ 0.68	20	49.50	0.97
	30-18°C	10	-2.03 $\pm$ 0.54	10	-2.26 $\pm$ 0.42	20	29.50	0.11

**Table S2.** Pair-wise comparisons (*t*-test or Wilcoxon-Mann-Whitney test) of thermal tolerance limits between 18°C- and 30°C-acclimated offspring within each exposure treatment (late and early exposure treatment). Data were averaged by offspring acclimation temperature ( $T_O$ ). A) chill coma; B) loss of control over activities; C) onset of spasms; D) lethal temperature. For each comparison, the degrees of freedom (d.f.), statistic test (*t* or *W*) and *P*-values (*P*) are reported.

<b>A) Chill coma</b>	$T_O$	<b>d.f.</b>	<b>test</b>	<b><i>P</i></b>
Late exposure treatment	18°C vs 30°C	58	$W = 1045$	<0.001
Early exposure treatment	18°C vs 30°C	80	$W = 2420$	<0.002
<b>B) Loss of control</b>				
Late exposure treatment	18°C vs 30°C	63	$W = 1236$	<0.001
Early exposure treatment	18°C vs 30°C	80	$W = 2420$	<0.001
<b>C) Onset of spasms</b>				
Late exposure treatment	18°C vs 30°C	53	$t = -4.93$	<0.001
Early exposure treatment	18°C vs 30°C	70	$t = -8.62$	<0.002
<b>D) Lethal temperature</b>				
Late exposure treatment	18°C vs 30°C	57	$t = 3.96$	<0.001
Early exposure treatment	18°C vs 30°C	78	$t = -1.30$	0.20

**Table S3.** Upper and lower thermal limits, measured separately for male and female for each mother-offspring temperature combination ( $T_M-T_O$ ), within each exposure treatment (late and early exposure treatment). A) chill coma; B) loss of control over activities; C) onset of spasms; D) lethal temperature. For each exposure treatment and combination, the mean ( $^{\circ}\text{C}$ ), standard deviation (s.d.) and the sample size (N) of male (M) and female (F) responses are reported.

		A) Chill coma		B) Loss of control		C) Onset of spasm		D) Lethal temperature	
	$T_M-T_O$ _Sex	N	mean $\pm$ s.d.	N	mean $\pm$ s.d.	N	mean $\pm$ s.d.	N	mean $\pm$ s.d.
Late exposure treatment	18-18_M	8	-1.36 $\pm$ 0.58	9	31.81 $\pm$ 0.88	5	37.68 $\pm$ 0.68	9	40.88 $\pm$ 0.84
	18-18_F	10	-2.23 $\pm$ 0.64	10	32.04 $\pm$ 0.78	7	37.69 $\pm$ 0.50	10	41.60 $\pm$ 1.15
	18-30_M	4	3.53 $\pm$ 0.36	4	37.23 $\pm$ 0.76	4	39.03 $\pm$ 0.61	4	40.98 $\pm$ 0.05
	18-30_F	6	2.97 $\pm$ 0.54	8	37.64 $\pm$ 0.14	8	38.84 $\pm$ 0.33	8	40.81 $\pm$ 0.29
	30-30_M	9	2.19 $\pm$ 0.20	9	36.77 $\pm$ 1.60	8	38.26 $\pm$ 0.66	9	41.09 $\pm$ 0.62
	30-30_F	3	1.47 $\pm$ 0.64	3	37.47 $\pm$ 1.70	3	38.70 $\pm$ 0.87	3	40.77 $\pm$ 0.21
	30-18_M	8	-0.50 $\pm$ 0.38	10	32.21 $\pm$ 0.72	10	38.13 $\pm$ 0.76	10	41.81 $\pm$ 0.72
	30-18_F	10	-1.01 $\pm$ 0.42	10	31.98 $\pm$ 0.88	10	37.23 $\pm$ 0.84	10	42.14 $\pm$ 0.61
Early exposure treatment	18-18_M	10	-1.20 $\pm$ 0.42	10	32.89 $\pm$ 0.81	10	37.80 $\pm$ 0.63	10	41.57 $\pm$ 0.86
	18-18_F	10	-2.00 $\pm$ 0.45	10	32.58 $\pm$ 0.82	10	37.16 $\pm$ 0.76	10	41.35 $\pm$ 1.16
	18-30_M	10	2.11 $\pm$ 0.62	10	38.47 $\pm$ 0.57	10	40.07 $\pm$ 0.33	10	42.17 $\pm$ 1.12
	18-30_F	10	1.93 $\pm$ 0.37	10	38.31 $\pm$ 0.30	10	39.93 $\pm$ 0.34	10	41.81 $\pm$ 0.68
	30-30_M	10	3.21 $\pm$ 0.65	10	36.46 $\pm$ 0.27	10	38.18 $\pm$ 0.43	10	41.51 $\pm$ 0.71
	30-30_F	10	3.22 $\pm$ 0.68	10	37.20 $\pm$ 0.60	10	39.18 $\pm$ 0.73	10	41.69 $\pm$ 0.77
	30-18_M	10	-2.03 $\pm$ 0.54	10	33.40 $\pm$ 0.79	10	37.15 $\pm$ 1.76	10	41.57 $\pm$ 0.73
	30-18_F	10	-2.26 $\pm$ 0.42	10	33.58 $\pm$ 1.29	10	36.73 $\pm$ 1.56	10	41.70 $\pm$ 0.73

**Table S4.** Demonstration of the absence of differences in thermal tolerance performance in individuals belonging to first and second broods. We provide the results obtained from a previous experiment (Massamba-N'Siala, unpublished), where we compared the upper and lower sub-lethal thermal tolerance limits of a subset of adult females from a strain originally collected in Porto Palo di Capo Passero (Italy, 36°41'1''N; 15°08'1''E). Individuals were maintained at the same laboratory conditions as the parental generation of the present study. Loss of control over activities (see the main text) and onset of spasms [a response to decreasing temperatures that preceded chill coma and where individuals displayed a spasmodic contraction of the entire body (see Massamba-N'Siala et al., 2012)] were used as proxies for tolerance to heat and cold, respectively. Thermal tolerance limits were measured using the same procedure described in the main text of the present paper, starting each trial at 24°C. For each 'brood' type (1 or 2), individuals from a minimum of two to a maximum of three different parental pairs were used. Statistical analyses were computed using PERMANOVA+ software.

(A) Sub-lethal upper (loss of control over activities) and lower (onset of spasms) data from the first (1) and the second (2) broods. Raw data were normally distributed (Kolmogorov-Smirnov test) and assumption for homoscedasticity was met (Levene test). a-e = parental pair of origin.

(B) Nested two-way ANOVA testing for the effect of brood (nesting) and parental pair (nested in brood) on sub-lethal upper (i) and lower (ii) thermal limits. For each endpoint, the Mean Squares (MS), degrees of freedom (d.f.), statistic test ( $F$ ) and P-values ( $P$ ) are reported.

A)

Brood	Replicate	Parental pair of origin	Number of chaetigers	Loss of control (°C)	Number of chaetigers	Onset of spasms (°C)
1	1	a	16	35.6	16	6.2
1	2	a	17	35.2	16	6.5
1	3	a	14	35.3	16	5.8
1	4	a	15	35.8	16	6.7
1	5	b	14	35.3	17	6.2
1	6	b	15	35.6	17	5.9
1	7	b	14	35.9	16	6.2
1	8	b	16	35.6	17	6.4
1	9	c	15	35.6	15	6.8
1	10	c	15	35.9	16	6.2
1	11	c	16	35.9	15	6.3
1	12	c	15	35.8	16	6.4
2	1	d	16	35.5	15	6.4
2	2	d	15	35.7	16	6.2
2	3	d	15	35.9	14	6.1
2	4	d	15	35.6	15	6.4
2	5	d	16	35.8	16	6.2
2	6	e	17	35.9	16	6.4
2	7	e	16	36.0	16	6.5
2	8	e	17	35.6	15	6.5

B)

**i. Loss of control**

Source	d.f.	MS	<i>F</i>	<i>P</i>
Brood	1	9.26 E-02	1.13	0.40
Parental pair (brood)	3	8.28 E-02	1.90	0.16
Residuals	15	4.36 E-02		
Total	19			

**ii. Onset of spasms**

Source	d.f.	MS	<i>F</i>	<i>P</i>
Brood	1	1.85 E-02	0.27	0.60
Parental pair (brood)	3	6.84 E-02	1.17	0.34
Residuals	15	5.82 E-02		
Total	19			