

Fig. S1. Determination of yolk volume in *Petrolisthes cincipes* embryos. (A) Dorsal view, yolk area delimited by ‘color threshold’ function using Image J. (B) Lateral view, measurement of maximum yolk diameter of a fitted ellipse.

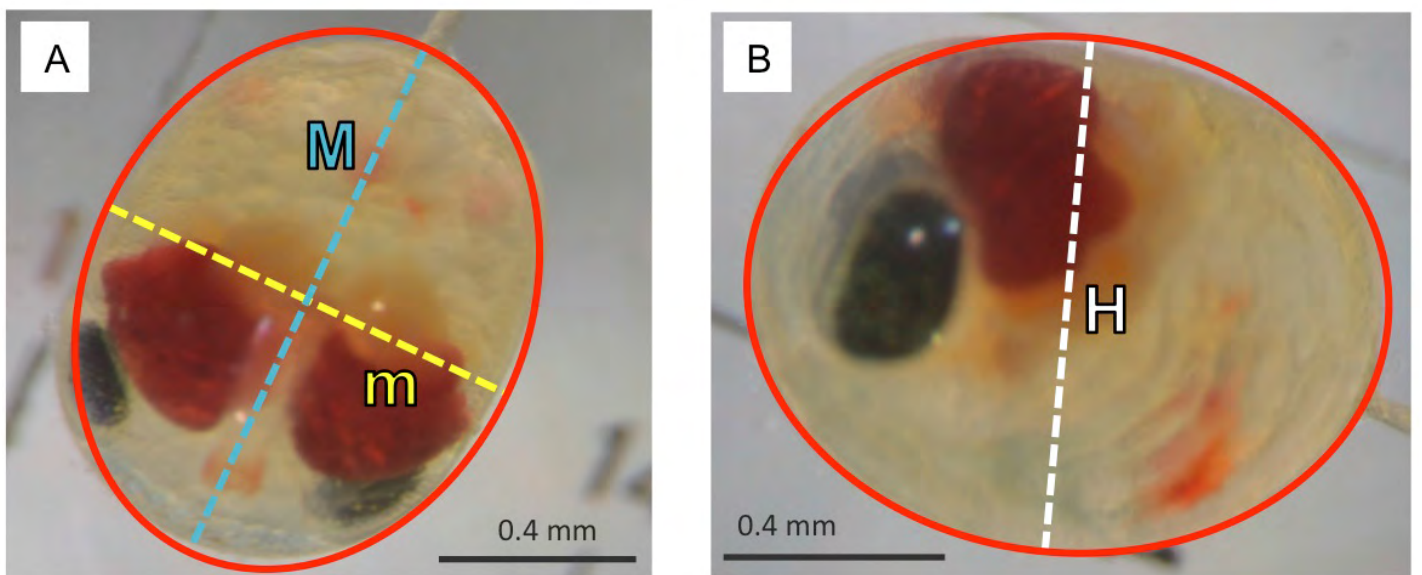


Fig. S2. Morphometric parameters measured on embryos of *Petrolisthes cincipes* to calculate volume and ellipticity. (A) Dorsal view, M=major diameter and m=minor diameter of a fitted ellipse. (B) Lateral view, H=minor diameter of a lateral fitted ellipse.

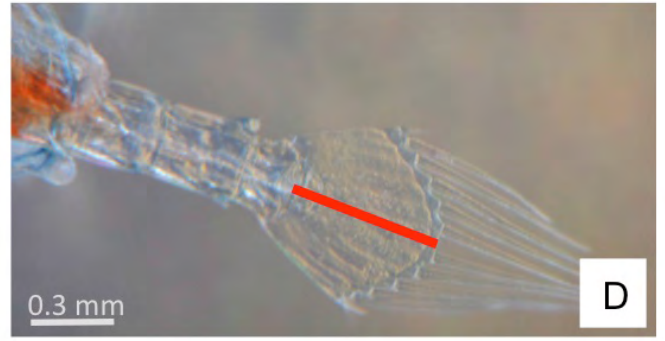
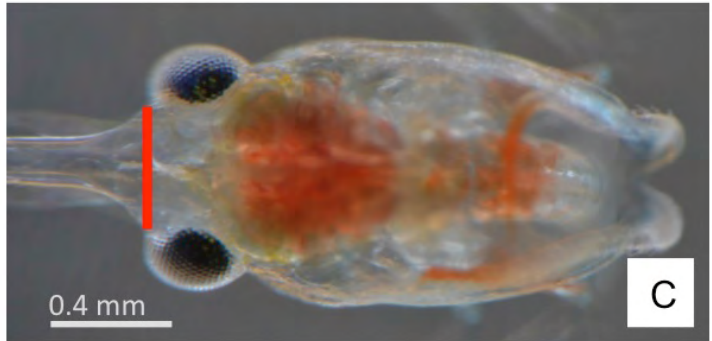


Fig. S3. Morphometric parameters measured on zoea I of *Petrolisthes cinctipes*. (A) Carapace length; (B) spine width; (C) anterior carapace width; (D) telson length.

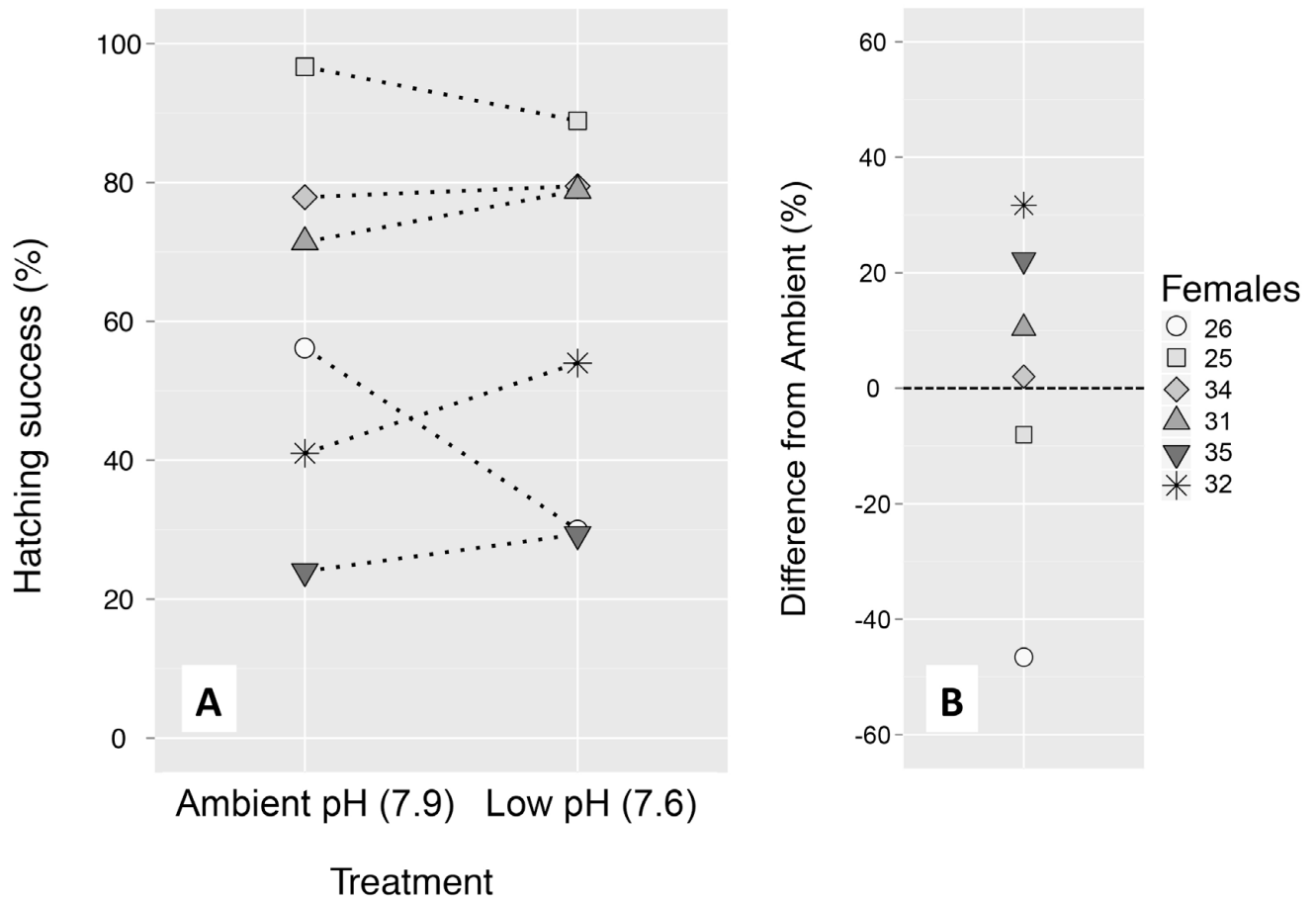


Fig S4. (A) Hatching success of embryos of *Petrolisthes cincipes* from six females divided into the treatments 6–10 days before hatching. Each condition percentage is based on the total hatching of 150–200 eggs per treatment. (B) Effect of low pH on hatching success of embryos from six females. Each percentage is the difference from the ambient mean percentage per female.

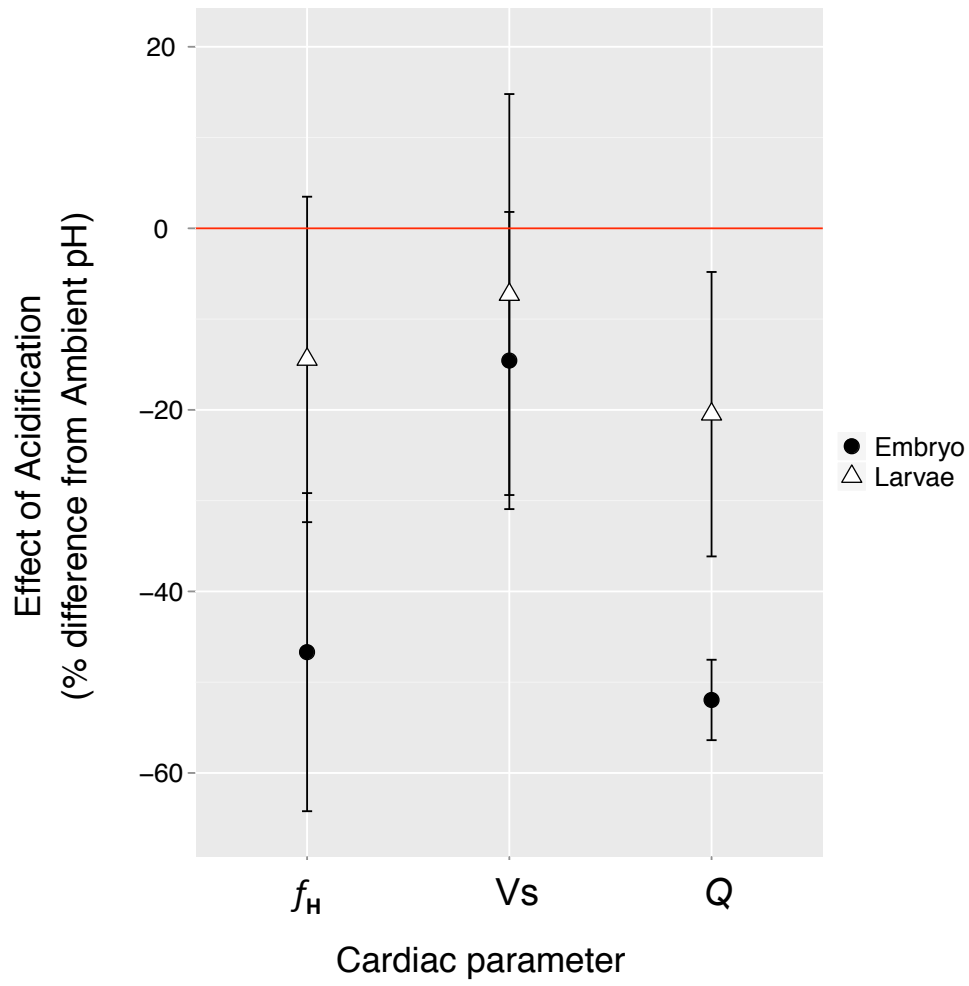


Fig S5. Embryonic and larval cardiac performance of *Petrolisthes cinctipes* (f_H =heart rate, V_s =stroke volume, Q =cardiac output), as a percentage difference from the ambient pH (symbols represent means \pm s.e.m., $N=5-10$ individuals per group per parameter, red line represents values at ambient pH).

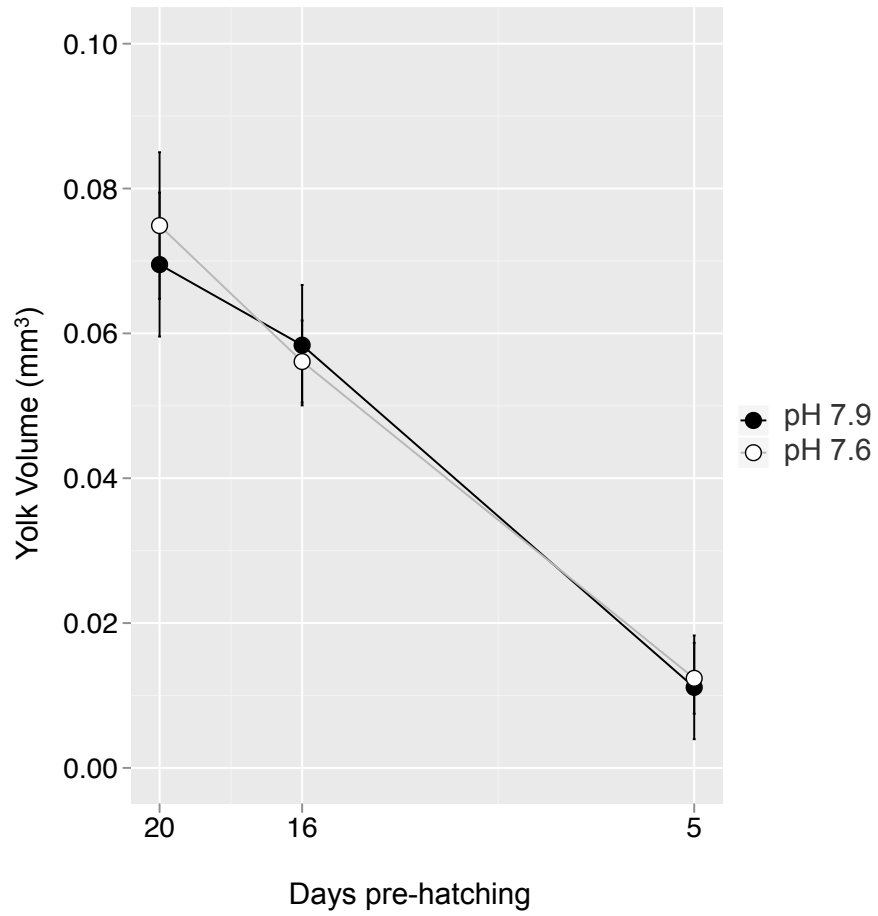


Fig S6. Embryonic yolk volume of two broods of *Petrolisthes cinctipes* placed into the treatments 25 days pre-hatching and measured after 5, 9 and 20 days; representing 20, 16 and 5 days pre-hatching, respectively. Symbols represent means \pm s.d., $N=5$ embryos per time point per treatment; ambient pH 7.9, low pH 7.6).

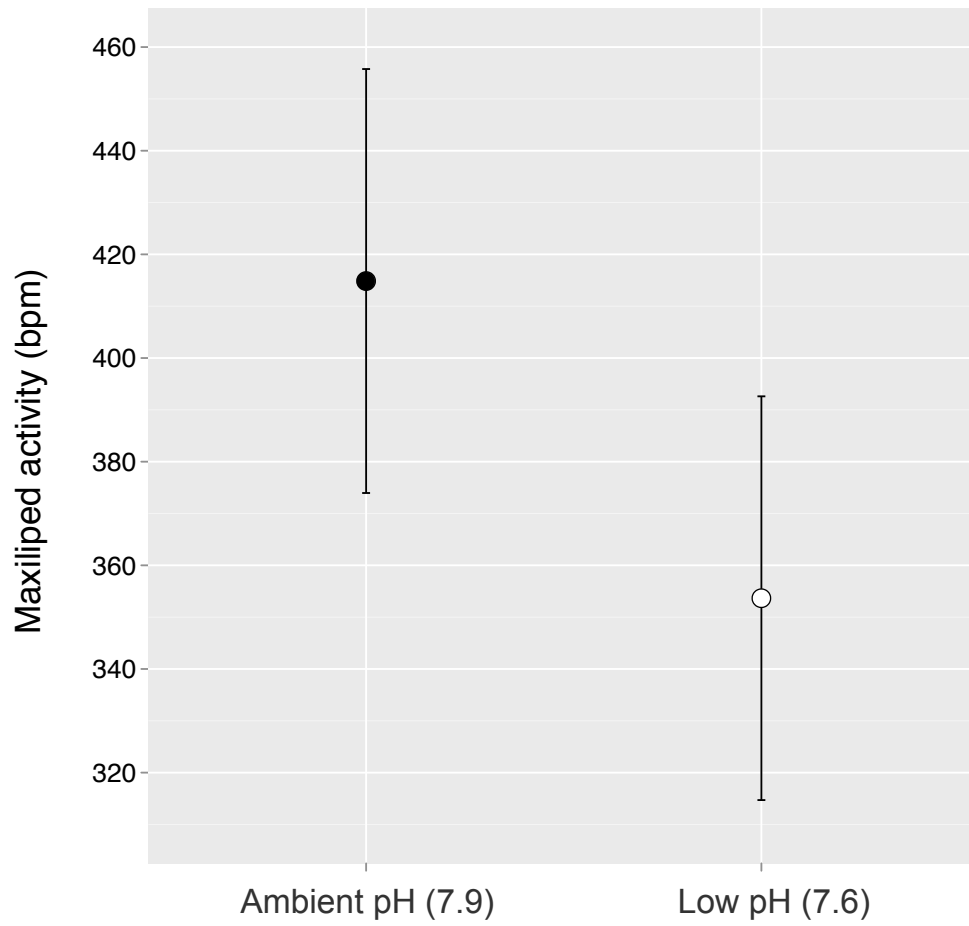


Fig S7. Maxilliped activity of *Petrolisthes cinctipes* larvae after 9–10 days under low pH. Symbols represent means \pm s.d., $N=7$ per treatment.

Table S1. Detailed information about females/broods used in this study

Parameter	N broods	Female ID	Exposure time (days)	Initial date*	Experiment date	Larvae per brood (Ambient pH)	Larvae per brood (Low pH)	Total larvae Ambient pH	Total larvae Low pH
Survival	10	3	9	Mar-11	N.A	34	32	473	468
		5	9	Mar-11	N.A	123	120		
		9	9	9-May-11	N.A	34	34		
		10	9	22-Mar-11	N.A	30	30		
		19	9	8-Jun-11	N.A	24	24		
		20	9	Mar-11	N.A	24	24		
		30	9	18-Mar-11	N.A	72	72		
		36	9	20-Jul-11	N.A	54	54		
		46	9	4-Apr-11	N.A	34	34		
		47	9	4-Apr-11	N.A	44	44		
Hatching success	6	25	8	9-Jun-11	17-Jun-11	90	90	935	935
		26	8	9-Jun-11	17-Jun-11	130	130		
		31	8	11-Jun-11	19-Jun-11	175	175		
		32	6	20-Jul-11	26-Jul-11	200	200		
		34	6	20-Jul-11	26-Jul-11	190	190		
Embryonic heart rate	5	9	8	9-May-11	17-May-11	8	8	26	29
		23	8	8-Jun-11	17-Jun-11	3	5		
		13	8	8-Jun-11	17-Jun-11	7	8		
		25	7	9-Jun-11	17-Jun-11	4	4		
		26	7	9-Jun-11	17-Jun-11	4	4		
Embryonic cardiac performance	4	23	8	8-Jun-11	17-Jun-11	0	1	6	6
		24	8	8-Jun-11	17-Jun-11	1	2		
		25	7	9-Jun-11	17-Jun-11	3	3		
		26	7	9-Jun-11	17-Jun-11	2	0		
Larval heart rate	7	12	10	20-May-11	30-May-11	11	11	40	38
		17	9	1-Jun-11	10-Jun-11	7	7		
		21	9	8-Jun-11	17-Jun-11	3	4		
		31	8	11-Jun-11	19-Jun-11	4	4		
		32	6	20-Jul-11	26-Jul-11	5	4		
		34	6	20-Jul-11	26-Jul-11	5	4		
Larval cardiac performance	6	12	10	20-May-11	30-May-11	3	3	9	8
		17	9	1-Jun-11	10-Jun-11	1	1		
		21	9	8-Jun-11	17-Jun-11	2	1		
		31	8	11-Jun-11	19-Jun-11	1	1		
		32	6	20-Jul-11	26-Jul-11	1	1		
Yolk consumption	2	23	5,9,20	8-Jun-11	28-Jun-11	5,4,6	5,5,4	27	27
		24	5,9,20	8-Jun-11	28-Jun-11	5,3,4	4,4,5		
Larval activity	5	17	9	1-Jun-11	10-Jun-11	2	3	7	7
		19	9	8-Jun-11	17-Jun-11	0	1		
		32	6	20-Jul-11	26-Jul-11	3	1		
		34	6	20-Jul-11	26-Jul-11	2	0		
		36	8	20-Jul-11	29-Jul-11	0	2		

*For larval experiments, initial date is the same as hatching date.

Table S2. Cardiac performance of *Petrolisthes cinctipes* embryos and larvae after 9–10 days in acidified water

	Embryos		Larvae	
	Ambient pH	Low pH	Ambient pH	Low pH
N	6	6	8	8
\dot{Q} (nl min ⁻¹)	1.593±1.009	0.765±0.639	8.302±6.643	6.602±5.186
V_s (nl beat ⁻¹)	0.017±0.004	0.015±0.002	0.041±0.009	0.038±0.018
f_H (beats min ⁻¹)	95.67±73.34	51.00±41.06	185.90±115.68	159.05±94.26

Cardiac output (\dot{Q}), Stroke volume (V_s) and Heart rate (f_H). $N=5-10$ per stage per treatment.

Table S3. Morphometric analysis of *Petrolisthes cinctipes* embryos 6 and 2 days pre-hatching (representing 5 and 9 days in the treatments) applying a Kruskal–Wallis (K–W) test

	pH	5 days (6 days pre-hatching)				9 days (2 days pre-hatching)			
		N	Mean ± s.d.	K–W	P-value	N	Mean ± s.d.	K–W	P-value
Volume (mm ³)	7.9	14	0.27±0.02	2.37	0.12	13	0.31±0.04	1.67	0.20
	7.6	14	0.28±0.03			15	0.28±0.03		
Area (mm ²)	7.9	14	0.53±0.03	1.66	0.20	13	0.58±0.06	1.98	0.16
	7.6	14	0.56±0.05			15	0.55±0.04		
Diameter (mm)	7.9	14	0.83±0.02	1.60	0.21	13	0.87±0.04	1.85	0.17
	7.6	14	0.85±0.04			15	0.84±0.03		
Ellipticity (L/W)	7.9	14	1.27±0.05	2.66	0.10	13	1.29±0.05	0.51	0.48
	7.6	14	1.31±0.09			15	1.31±0.06		

Table S4. Larval morphometrics of *Petrolisthes cinctipes* after 9–10 days under acidification

	pH	N	Mean \pm s.d. (mm)	ANOVA	P-value
Carapace length	Ambient	30	1.62 \pm 0.04	$F_{1,57}=3.14$	0.08
	Low	29	1.64 \pm 0.06		
Anterior carapace width	Ambient	20	0.38 \pm 0.03	$F_{1,41}=0.26$	0.61
	Low	23	0.38 \pm 0.03		
Spine width	Ambient	29	0.15 \pm 0.01	$F_{1,56}=1.54$	0.22
	Low	29	0.15 \pm 0.01		
Telson length	Ambient	21	0.60 \pm 0.06	$F_{1,41}=0.23$	0.64
	Low	22	0.60 \pm 0.04		

Normality and homoscedasticity were assessed using Shapiro Wilk (W) and variances test, differences between treatments was tested applying a one-way ANOVA.