The following supplements accompany the article

Environmentally mediated phenotypic links and performance in larvae of a marine invertebrate

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Supplement. Details of the test construction (Table S1) and expected mean squares (Table S2). Also included are statistical tables for survival (Table S3), duration of development (Table S4), number of instars required to reach the first juvenile stage (Table S5) and the frequency distribution of number of instars categorised by temperature and feeding regime (Fig. S1)

Table S1. Test construction. E = embryonic temperature; T = water temperature during larval development; ‰ = salinity level during larval development; F = access to prey (24 h vs. 4 h); B = brood (= individual female), nested as a random factor within 'embryonic temperature'

Factor	df-n	df-d	Denominator	Numerator
E	1.08	6	1.9548E-2*R +1*E	1.0195*B
T	1	6.11	4.0274E-2*R +1*T	1.0373*BxT + 2.9632E-3*B
‰	1	6.2	5.8346E-2*R+1*S	1.0545*BxS + 3.8249E-3*B
F	1	6.24	8.0593E-2*R +1*F	1.0712*BxF + 9.4132E-3*B
B	6	369	1*B	1*R
E*T	1	6	8.9779E-3*R+1*BxT	1.009*BxT
E*‰	3.06	6	3.1359E-2*R+1*BxS	1.0314*BxS
E*F	1.02	6	3.2937E-2*R+1* BxF	1.0329* BxF
‰* T	1.06	6.36	7.9972E-2*R+ 1*TxS	1.0688*BxTxS + 4.7663E-3*BxS + 6.4081E-3*BxT
T * F	1.01	6.33	9.2717E-2*R+1*TxF	1.0792*BxTxF + 4.3308E-3*BxF + 9.194E-3*BxT
‰ * F	1.02	6.25	0.13257*R+1*SxF	1.1181*BxSxF + 4.8459E-3*BxF + 9.5818E-3*BxS
T*B	6	369	1*BxT	1*R
‰*B	6	369	1*BxS	1*R
F*B	6	369	1*BxF	1*R
E *T* ‰	1.07	6	2.2302E-2*R+1*BxTxS	1.0223* BxTxS
E *T*F	1.01	6	2.0006E-2*R + 1*BxTxF	1.02* BxTxF
E*‰* F	1.63	6	4.4356E-2*R + 1*BxSxF	1.0444* BxSxF
‰* T* F	1.85	6.15	0.11742*R + 1*TxSxF	1.0923*BxTxSxF + 7.3059E-3*BxSxF + 7.7008E-3 *BxTxF + 1.0065E-2*BxTxS
‰*T*B	6	369	1*BxTxS	1*R
T*F*B	6	369	1*BxTxF	1*R
‰*F*B	6	369	1*BxSxF	1*R
‰*T*F*E	1.08	6	3.0517E-2*R +1*BxTxSxF	1.0305*BxTxSxF
‰*T*F*B	6	369	1*BxTxSxF	1*R

Table S2. Expected mean squares. E = embryonic temperature; T = water temperature during larval development; ‰ = salinity level during larval development; F = access to prey (24 h vs. 4 h); B = brood (= individual female), nested as a random factor within 'embryonic temperature'

Factor	
E	1*V(R) + 54.766*V(B) + 215.78*S(E)
T	1*V(R) + 27.389*V(BxT) + 0.15917*V(B) + 214.87*S(T)
‰	1*V(R) + 27.333*V(BxS) + 0.20546*V(B) + 213.94*S(S)
F	1*V(R) + 27.617*V(B)xF) + 0.50565*V(B) + 215.05*S(F)
B	1*V(R) + 53.716*V(B)
E*T	1*V(R) + 26.641*V(BxT) + 104.74*S(ExT)
E*‰	1*V(R) + 26.733*V(BxS) + 105.17*S(ExS)
E*F	1*V(R) + 26.631*V(BxF) + 104.78*S(ExF)
‰* T	1*V(R) + 13.405*V(BxTxS) + 0.12354*V(BxS) + 0.1692*V(BxT) + 104.02*S(TxS)
T * F	1*V(R) + 13.557*V(BxTxF) + 0.11166*V(BxF) + 0.24276*V(BxT) + 104.79*S(TxF)
‰ * F	1*V(Res) + 13.642*V(BxSxF) + 0.12494*V(BxF) + 0.24836*V(BxS) + 105.56*S(SxF)
T*B	1*V(R) + 26.404*V(BxT)
‰*B	1*V(R) + 25.92*V(BxS)
F*B	1*V(R) + 25.782*V(BxF)
E *T* ‰	1*V(R) + 12.821*V(BxTxS) + 50.167*S(ExTxS)
E *T*F	1*V(R) + 12.814*V(BxTxF) + 50.245*S(ExTxF)
E*‰* F	1*V(R) + 12.741*V(BxSxF) + 49.959*S(ExSxF)
‰* T* F	1*V(R) + 6.518*V(BxTxSxF)+8.9135E-2*V(BxSxF)+9.674E-2*V(BxTxF)+0.12623*V(BxTxS)+49.587*S(TxSxF)
‰*T*B	1*V(R) + 12.542*V(BxTxS)
T*F*B	1*V(R) + 12.562*V(BxTxF)
‰*F*B	1*V(R) + 12.2*V(BxSxF)
‰*T*F*E	1*V(R) + 6.1491*V(BxTxSxF) + 23.965*S(ExTxSxF)
‰*T*F*B	1*V(R) + 5.967*V(BxTxSxF)
R	1*V(R)

Table S3. *Palaemon serratus.* Survival: ANOVA to evaluate the effect access to prey (Food), salinity of water during larval stages (25 vs. 32), temperature of water during larval (18 vs. 24°C) and embryonic (12 vs. 18°C) development on survival to the first (J1) juvenile stage. E_T = temperature at egg laying; $L_{‰}$ = salinity; L_T = larval temperature; L_F = access to prey (24 vs. 4 h). Significant terms are highlighted in **bold**

Factor	df	J1
Embryonic temperatu (E_T)	1	0.83
Error	8	
Larval salinity ($L_{‰}$)	1	**<0.01**
$L_{‰}$* E_T	1	0.28
Error	8	
Larval temperature (L	1	0.44
L_T * E_T	1	0.07
Error	8	

Food (L_F)	1	0.33
L_F * E_T	1	0.62
Error	8	
$L_{‰}$* L_T	1	0.88
$L_{‰}$* L_T * E_T	**1**	**<0.01**
Error	8	
$L_{‰}$* L_F	**1**	**<0.01**
$L_{‰}$* L_F * E_T	1	0.35
Error	8	
L_T * L_F	**1**	**0.01**
L_T * L_F * E_T	**1**	**<0.01**
Error	8	
$L_{‰}$* L_T * L_F	1	0.29
$L_{‰}$* L_T * L_F * E_T	1	0.77
Error	8	

Table S4. *Palaemon serratus*. Duration of development: Test-2: PERMANOVA to evaluate the effect access to prey (Food), salinity during larval stages (25 vs. 32), and temperature during larval (18 vs. 24°C) and embryonic (12 vs. 18°C) development on duration of development to the first juvenile stage. MS = mean squares of factors; p(MC) = Monte Carlo p-value. Significant terms are high-lighted in **bold**

Factor	df	MS	Pseudo-F	p(MC)
Embryonic temperature (E)	1	174.08	0.232	0.657
Larval temperature (T)	**1**	19442.00	**89.273**	**0.001**
Larval salinity (‰)	**1**	2809.40	**23.054**	**0.004**
Food (F)	**1**	29131.00	**87.918**	**0.001**
Brood (B)	**6**	737.68	**13.435**	**0.001**
E*T	1	533.53	2.546	0.173
E*‰	1	8.47	8.747×10^{-2}	0.844
E*F	1	176.33	0.569	0.480
‰* T	1	10.42	0.201	0.828
T * F	1	222.49	1.442	0.276
‰ * F	1	920.32	4.629	0.059
T*B	**6**	207.86	3.785	**0.001**
‰*B	6	113.02	2.058	0.064
F*B	**6**	302.89	5.516	**0.001**
E *T* ‰	1	72.81	1.080	0.332
E *T*F	1	153.05	1.055	0.352
E ***‰*** F	1	2.16	2.486×10^{-2}	0.999
‰* T* F	1	157.40	0.668	0.469
‰* T * B	6	67.04	1.221	0.300
T* F * B	**6**	143.19	2.607	**0.016**
‰* F * B	**6**	176.90	3.221	**0.002**
‰* T * F * E	1	78.20	0.349	0.615
‰* T * F * B	**6**	221.47	4.033	**0.004**
Error	369			

Table S5. *Palaemon serratus*. Number of stages: PERMANOVA to evaluate the effect access to prey (Food), salinity during larval stages (25 vs. 32), water temperature during larval (18 vs. 24°C) and embryonic (12 vs. 18°C) development on number of instars required to reach to the first juvenile stage. MS = mean squares of factors; p(MC) = Monte Carlo p-value. Significant terms are highlighted in **bold**

Factor	df	MS	Pseudo-F	p(MC)
Embryonic temperature (E)	1	1.13	4.00×10^{-2}	0.875
Larval temperature (T)	**1**	217.74	22.977	**0.005**
Larval salinity (‰)	**1**	196.42	29.823	**0.002**
Food (F)	**1**	1017.20	74.546	**0.001**
Brood (B)	**6**	28.75	12.107	**0.001**
E*T	1	18.80	2.059	0.185
E*‰	1	9.91×10^{-2}	2.74×10^{-2}	0.992
E*F	1	6.55	0.514	0.486
‰* T	1	6.24	2.124	0.202
T * F	**1**	32.65	6.373	0.050
‰ * F	1	27.47	4.665	0.079
T* B	**6**	9.06	3.814	**0.001**
‰*B	**6**	6.15	2.588	**0.017**
F*B	**6**	12.49	5.259	**0.001**
E *T* ‰	1	1.61	0.589	0.447
E *T*F	1	8.25	1.748	0.240
E ***‰*** F	1	0.38	8.91×10^{-2}	0.884
‰* T* F	1	0.77	0.130	0.851
‰* T * B	6	2.76	1.158	0.311
T* F * B	6	4.65	1.959	0.080
‰* F * B	6	5.22	2.198	**0.023**
‰* T * F * E	1	1.76	0.244	0.650
‰* T * F * B	**6**	7.28	3.067	**0.006**
Error	369			

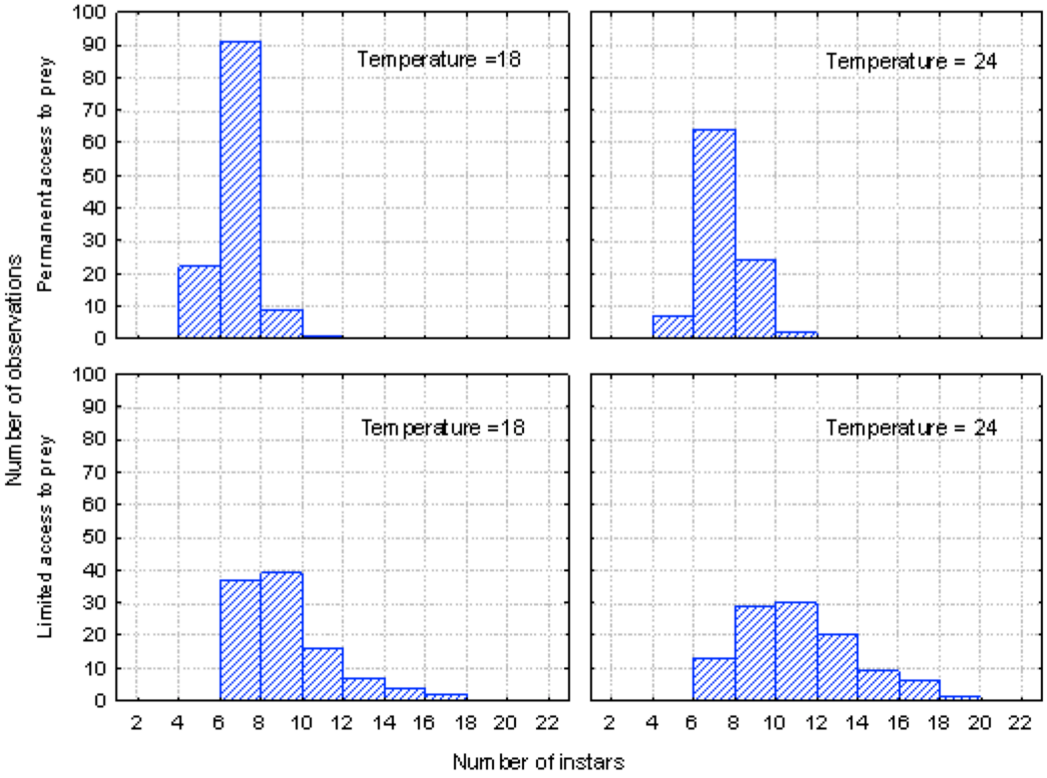

Fig. S1. *Palaemon serratus*. Frequency distribution of number of instars categorised by temperature and feeding regime.