

Supplementary information for:

Experimental influence of pH on the early life-stages of sea urchins II: Increasing parental exposure times gives rise to different responses

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Table S1: Mean morphometric and skeletal parameters (\pm SE; μm) for *Psammechinus miliaris* echinoplutei on Day 7. BW = body width; SL = stomach length; SW = stomach width; ML = mouth length; MW = mouth width; ANA = anterolateral arm length; ANAR = anterolateral arm rod. Superscripts indicate where significant differences lie. Columns without superscripts indicate no treatment effects.

| | BW | SL | SW | ML | MW | ANA | ANAR |
|-----------|------------------------------|------------------------------|------------------------------|-----------------------------|-----------------------------|-----------------------------|--------------------------------|
| C | 195.12 \pm 3.34 a | 140.77 \pm 2.27 a | 119.71 \pm 1.90 a | 79.42 \pm 1.53 a | 50.46 \pm 1.08 a | 87.47 \pm 2.80 a | 243.71 \pm 3.38 a |
| 0d | 162.75 \pm 2.64 b | 114.43 \pm 2.70 b | 101.42 \pm 2.24 b | 69.12 \pm 1.72 b | 49.90 \pm 2.31 | 63.98 \pm 2.55 b | 198.47 \pm 4.41 bcd |
| 28d | 164.99 \pm 3.75 b | 113.57 \pm 3.33 b | 101.30 \pm 2.64 b | 65.21 \pm 1.86 b | 49.65 \pm 1.64 | 69.20 \pm 3.11 b | 204.63 \pm 5.88 bcd |
| 42d | 167.07 \pm 2.83 b | 115.27 \pm 3.11 b | 103.18 \pm 2.63 b | 73.20 \pm 2.05 b | 45.26 \pm 1.45 b | 81.09 \pm 2.92 c | 216.85 \pm 4.85 c |
| 70d | 161.64 \pm 3.71 b | 114.24 \pm 3.60 b | 103.72 \pm 3.01 b | 66.37 \pm 1.99 b | 44.40 \pm 1.72 b | 64.61 \pm 3.11 b | 183.48 \pm 6.26 d |
| Statistic | 18.79 | 68.10 | 46.94 | 9.65 | 2.97 | 54.71 | 18.26 |
| P | 0.002 | 0.002 | 0.002 | 0.002 | 0.030 | 0.002 | 0.002 |

Table S2: Mean morphometric and skeletal parameters (\pm SE; μm) for *Psammechinus miliaris* echinoplutei on Day 11. BW = body width; SL = stomach length; SW = stomach width; ML = mouth length; MW = mouth width; ANA = anterolateral arm length; PD = posterodorsal arm length; ANAR = anterolateral arm rod; PDR = posterodorsal arm rod length. Superscripts indicate where significant differences lie. Columns without superscripts indicate no treatment effects.

| | BW | SL | SW | ML | MW | ANA | PD | ANAR | PDR |
|-----------|-----------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| | 309.91 | 185.16 | 161.23 | 131.64 | 64.07 | 153.25 | 61.50 | 404.35 | 113.03 |
| | \pm | \pm | \pm | \pm | \pm | \pm | \pm | \pm | \pm |
| C | 5.10 | 2.64 | 2.60 _a | 3.51 _a | 1.66 | 3.93 _a | 1.87 _{ab} | 6.13 | 5.49 _a |
| | 309.46 | 183.44 | 171.47 | 126.19 | 66.11 | 165.87 | 70.85 | 399.06 | 136.20 |
| | \pm | \pm | \pm | \pm | \pm | \pm 4 | \pm | \pm | \pm |
| 0d | 7.83 | 4.88 | 4.45 _b | 2.68 _{ab} | 2.96 | 4.88 _a | 3.02 _a | 8.81 | 7.31 _{ac} |
| | 325.10 | 192.60 | 175.59 | 115.19 | 59.82 | 164.33 | 71.36 | 395.19 | 159.15 |
| | \pm | \pm | \pm | \pm | \pm | \pm | \pm | \pm | \pm |
| 28d | 8.46 | 4.75 | 4.24 _b | 2.60 _{ab} | 1.47 | 5.75 _a | 3.37 _a | 10.50 | 8.92 _a |
| | 312.67 | 176.45 | 160.70 | 113.66 | 69.85 | 190.40 | 71.08 | 407.76 | 136.22 |
| | \pm | \pm | \pm | \pm | \pm | \pm | \pm | \pm | \pm |
| 42d | 9.50 | 5.68 | 5.00 _{ab} | 2.48 _{bc} | 9.89 | 5.86 _b | 3.67 _a | 10.10 | 7.49 _{abc} |
| | 302.14 | 176.39 | 165.53 | 104.67 | 57.60 | 158.72 | 53.80 | 388.21 | 105.44 |
| | \pm | \pm | \pm | \pm | \pm | \pm | \pm | \pm | \pm |
| 70d | 9.59 | 4.85 | 4.78 _{ab} | 2.80 _c | 1.65 | 5.23 _a | 2.85 _b | 9.39 | 8.81 _b |
| Statistic | H ₍₄₎ = | F _(4,390) = | F _(4,379) = | F _(4,338) = | F _(4,339) = | F _(4,391) = | F _(4,337) = | F _(4,377) = | F _(4,287) = |
| | 5.02 | 7.06 | 12.51 | 9.03 | 1.13 | 6.22 | 5.82 | 0.71 | 6.51 |
| P | 0.331 | 0.189 | 0.044 | 0.004 | 0.377 | 0.003 | 0.004 | 0.584 | 0.004 |

Table S3: Mean morphometric and skeletal parameters (\pm SE; μm) for *Psammechinus miliaris* echinoplutei on Day 14. BW = body width; SL = stomach length; SW = stomach width; ML = mouth length; MW = mouth width; ANA = anterolateral arm length; PD = posterodorsal arm length; ANAR = anterolateral arm rod; PDR = posterodorsal arm rod length. Superscripts indicate where significant differences lie. Columns without superscripts indicate no treatment effects.

| | BW | SL | SW | ML | MW | ANA | PD | ANAR | PDR |
|-----------|-----------------------|---------------------------|-----------------------|---------------------------|-----------------------|---------------------------|-----------------------|---------------------------|---------------------------|
| | 470.91 | 219.65 | 181.73 | 128.68 | 73.97 | 172.68 | 95.56 | 494.61 | 240.20 |
| | \pm | \pm | \pm | \pm | \pm | \pm | \pm | \pm | \pm |
| C | 9.36 _a | 3.55 | 3.46 _a | 2.99 _{ac} | 1.46 _a | 5.95 _a | 4.38 _a | 8.57 _a | 9.21 _a |
| | 515.00 | 236.78 | 220.19 | 149.26 | 77.96 | 238.20 | 161.90 | 586.50 | 361.26 |
| | \pm | \pm | \pm | \pm | \pm | \pm | \pm | \pm | \pm |
| 0d | 16.30 | 6.62 | 6.37 _b | 4.30 _b | 2.50 _a | 9.76 _b | 7.06 _{bc} | 18.10 _b | 14.10 _b |
| | 484.70 | 229.15 | 207.88 | 136.83 | 77.37 | 252.26 | 174.79 | 590.74 | 369.85 |
| | \pm | \pm | \pm | \pm | \pm | \pm | \pm | \pm | \pm |
| 28d | 13.80 _b | 5.03 | 4.45 _b | 2.56 _{ab} | 1.63 _a | 9.04 _b | 6.84 _b | 15.40 _b | 12.80 _b |
| | 498.30 | 224.50 | 207.52 | 123.76 | 83.39 | 285.52 | 176.17 | 620.90 | 365.33 |
| | \pm | \pm | \pm | \pm | \pm | \pm | \pm | \pm | \pm |
| 42d | 14.70 _b | 5.18 | 4.93 _b | 2.93 _c | 1.96 _b | 8.07 _b | 7.10 _b | 14.10 _b | 13.00 _b |
| | 487.20 | 231.43 | 218.10 | 125.60 | 76.61 | 265.68 | 147.98 | 585.23 | 349.45 |
| | \pm | \pm | \pm | \pm | \pm | \pm | \pm | \pm | \pm |
| 70d | 15.30 _b | 6.95 | 6.57 _b | 2.64 _{ac} | 2.21 _a | 9.25 _b | 7.75 _c | 15.90 _b | 20.00 _b |
| Statistic | H ₍₄₎ = | F _(4,395) = | H ₍₄₎ = | F _(4,380) = | H ₍₄₎ = | F _(4,392) = | H ₍₄₎ = | F _(4,392) = | F _(4,357) = |
| P | 0.033 | 0.292 | 0.002 | 0.002 | 0.006 | 0.002 | 0.002 | 0.002 | 0.002 |

Table S4: Mean morphometric and skeletal parameters (\pm SE; μm) for *Psammechinus miliaris* echinoplutei on Day 17. BW = body width; SL = stomach length; SW = stomach width; ML = mouth length; MW = mouth width; ANA = anterolateral arm length; PD = posterodorsal arm length; P = preoral arm length; ANAR = anterolateral arm rod; PDR = posterodorsal arm rod length; PR = preoral arm rod length. Superscripts indicate where significant differences lie. Columns without superscripts indicate no treatment effects.

| | BW | SL | SW | ML | MW | ANA | PD | P | ANAR | PDR | PR |
|-----------|---------------------|---------------------|--------------------|--------------------|--------------------|----------------------|--------------------|--------------------|----------------------|--------------------|---------------------|
| C | 518.00 | 213.56 | 176.02 | 127.15 | 78.20 | 198.88 | 167.61 | 25.95 | 539.30 | 366.90 | 101.90 |
| | \pm 11.40 a | \pm 4.79 a | \pm 4.29 a | \pm 2.80 | \pm 1.84 a | \pm 7.90 a | \pm 6.69 a | \pm 1.47 a | \pm 10.90 a | \pm 13.40 | \pm 13.00 a |
| 0d | 565.60 | 229.76 | 203.82 | 132.39 | 91.96 | 229.40 | 192.39 | 46.08 | 569.60 | 402.20 | 235.60 |
| | \pm 12.70 | \pm 3.58 ac | \pm 3.76 b | \pm 2.46 | \pm 1.88 b | \pm 12.30 ac | \pm 8.08 b | \pm 3.69 b | \pm 17.30 ac | \pm 15.10 | \pm 13.70 b |
| 28d | 600.50 | 251.76 | 223.34 | 129.88 | 92.48 | 197.60 | 204.82 | 51.00 | 570.20 | 434.40 | 237.60 |
| | \pm 15.50 b | \pm 4.75 bc | \pm 4.17 c | \pm 2.92 | \pm 2.13 b | \pm 14.30 a | \pm 8.94 b | \pm 3.36 b | \pm 18.40 ac | \pm 19.20 | \pm 13.60 b |
| 42d | 579.80 | 227.94 | 203.58 | 136.28 | 94.04 | 273.20 | 203.11 | 79.511 | 641.10 | 444.40 | 312.80 |
| | \pm 16.00 b | \pm 5.06 ac | \pm 4.69 b | \pm 2.60 | \pm 1.73 b | \pm 11.90 b | \pm 8.27 b | \pm 4.50 c | \pm 16.90 cd | \pm 16.40 | \pm 10.70 b |
| 70d | 573.60 | 239.60 | 218.27 | 140.06 | 94.92 | 269.30 | 202.82 | 53.86 | 652.40 | 428.90 | 281.75 |
| | \pm 14.30 b | \pm 5.49 c | \pm 5.01 c | \pm .87 | \pm 6.37 b | \pm 11.00 c | \pm 9.04 b | \pm 3.95 b | \pm 17.00 d | \pm 14.50 | \pm 9.54 b |
| Statistic | $F_{(4,387)}$ = | $F_{(4,387)}$ = | $H_{(4)}$ = | $F_{(4,385)}$ = | $F_{(4,386)}$ = | $F_{(4,387)}$ = | $H_{(4)}$ = | $H_{(4)}$ = | $F_{(4,386)}$ = | $F_{(4,377)}$ = | $F_{(4,284)}$ = |
| P | 4.61 0.002 | 8.46 0.002 | 72.68 0.002 | 2.50 0.062 | 5.71 0.002 | 10.24 0.002 | 19.29 0.002 | 101.86 0.002 | 6.34 0.002 | 1.14 0.380 | 14.65 0.002 |