



**Fig. S1.** Schematics of the experimental setup used to perform experimental exposure of *Solea senegalensis* larvae to ocean warming and acidification.

**Table S1. Results of two-way ANOVA evaluating the effect of temperature and  $p\text{CO}_2$  on the hatching success, survival, length, specific growth rate (SGR) and otolith area of 30 dph *Solea senegalensis* larvae.**

| Measure          | Factor               | df  | F      | p     |
|------------------|----------------------|-----|--------|-------|
| Hatching success | Temperature ( $T$ )  | 1   | 5.44   | 0.048 |
|                  | pH                   | 1   | 1.00   | 0.347 |
|                  | $T \times \text{pH}$ | 1   | 0.11   | 0.747 |
|                  | Error                | 8   |        |       |
| Survival         | Temperature ( $T$ )  | 1   | 38.41  | 0.000 |
|                  | pH                   | 1   | 32.40  | 0.000 |
|                  | $T \times \text{pH}$ | 1   | 0.009  | 0.926 |
|                  | Error                | 8   |        |       |
| Length           | Temperature ( $T$ )  | 1   | 896.58 | 0.000 |
|                  | pH                   | 1   | 346.63 | 0.000 |
|                  | $T \times \text{pH}$ | 1   | 8.80   | 0.003 |
|                  | Error                | 236 |        |       |
| SGR              | Temperature ( $T$ )  | 1   | 874.13 | 0.000 |
|                  | pH                   | 1   | 340.25 | 0.000 |
|                  | $T \times \text{pH}$ | 1   | 0.10   | 0.869 |
|                  | Error                | 236 |        |       |
| Otolith area     | Temperature ( $T$ )  | 1   | 483.56 | 0.000 |
|                  | pH                   | 1   | 22.05  | 0.000 |
|                  | $T \times \text{pH}$ | 1   | 0.07   | 0.797 |
|                  | Error                | 8   |        |       |

**Table S2.** Results of three-way ANOVA evaluating the effect of temperature,  $p\text{CO}_2$  and development stage (hatchlings and 30 dph larvae) on oxygen consumption rate (OCR), upper thermal tolerance limit (LT50) and critical thermal maximum (CTMax) of *Solea senegalensis* larvae.

| Measure | Factor                                   | df  | F     | p     |
|---------|--|-----|-------|-------|
| OCR     | Temperature ( $T$ )                      | 1   | 235.5 | 0.000 |
|         | pH                                       | 1   | 121.8 | 0.000 |
|         | $T \times \text{pH}$                     | 1   | 0.5   | 0.476 |
|         | $T \times \text{stage}$                  | 1   | 0.6   | 0.451 |
|         | pH $\times$ stage                        | 1   | 2.5   | 0.116 |
|         | $T \times \text{pH} \times \text{stage}$ | 1   | 3.6   | 0.062 |
|         | Error                                    | 64  |       |       |
| LT50    | Temperature ( $T$ )                      | 1   | 95.4  | 0.000 |
|         | pH                                       | 1   | 110.6 | 0.000 |
|         | $T \times \text{pH}$                     | 1   | 1.2   | 0.294 |
|         | $T \times \text{stage}$                  | 1   | 13.6  | 0.002 |
|         | pH $\times$ stage                        | 1   | 1.5   | 0.232 |
|         | $T \times \text{pH} \times \text{stage}$ | 1   | 0.1   | 0.736 |
|         | Error                                    | 16  |       |       |
| CTMax   | Temperature ( $T$ )                      | 1   | 146.2 | 0.000 |
|         | pH                                       | 1   | 117.3 | 0.000 |
|         | stage                                    | 1   | 428.1 | 0.000 |
|         | $T \times \text{stage}$                  | 1   | 9.2   | 0.003 |
|         | pH $\times$ stage                        | 1   | 1.2   | 0.269 |
|         | $T \times \text{pH} \times \text{stage}$ | 1   | 0.1   | 0.746 |
|         | Error                                    | 231 |       |       |

**Table S3. Results of two-way ANOVA evaluating the effect of temperature and  $p\text{CO}_2$  on the incidence of skeletal abnormalities in 30 dph *Solea senegalensis* larvae.**

| Measure                          | Factor               | df | F      | p     |
|----------------------------------|----------------------|----|--------|-------|
| Total skeletal abnormalities     | Temperature ( $T$ )  | 1  | 31.84  | 0.000 |
|                                  | pH                   | 1  | 65.70  | 0.000 |
|                                  | $T \times \text{pH}$ | 1  | 3.33   | 0.106 |
|                                  | Error                | 8  |        |       |
| Caudal vertebra abnormalities    | Temperature ( $T$ )  | 1  | 3.26   | 0.108 |
|                                  | pH                   | 1  | 33.49  | 0.000 |
|                                  | $T \times \text{pH}$ | 1  | 0.58   | 0.469 |
|                                  | Error                | 8  |        |       |
| Abdominal vertebra abnormalities | Temperature ( $T$ )  | 1  | 3.76   | 0.089 |
|                                  | pH                   | 1  | 34.91  | 0.000 |
|                                  | $T \times \text{pH}$ | 1  | 6.29   | 0.037 |
|                                  | Error                | 8  |        |       |
| Caudal fin abnormalities         | Temperature ( $T$ )  | 1  | 10.27  | 0.013 |
|                                  | pH                   | 1  | 38.65  | 0.000 |
|                                  | $T \times \text{pH}$ | 1  | 0.67   | 0.438 |
|                                  | Error                | 8  |        |       |
| Dorsal fin abnormalities         | Temperature ( $T$ )  | 1  | 9.55   | 0.015 |
|                                  | pH                   | 1  | 20.26  | 0.002 |
|                                  | $T \times \text{pH}$ | 1  | 10.69  | 0.011 |
|                                  | Error                | 8  |        |       |
| Pelvic fin abnormalities         | Temperature ( $T$ )  | 1  | 55.72  | 0.000 |
|                                  | pH                   | 1  | 17.26  | 0.003 |
|                                  | $T \times \text{pH}$ | 1  | 1.31   | 0.285 |
|                                  | Error                | 8  |        |       |
| Pectoral fin abnormalities       | Temperature ( $T$ )  | 1  | 2.29   | 0.169 |
|                                  | pH                   | 1  | 6.82   | 0.031 |
|                                  | $T \times \text{pH}$ | 1  | 1.55   | 0.249 |
|                                  | Error                | 8  |        |       |
| Cranium abnormalities            | Temperature ( $T$ )  | 1  | 19.88  | 0.002 |
|                                  | pH                   | 1  | 264.23 | 0.000 |
|                                  | $T \times \text{pH}$ | 1  | 1.04   | 0.338 |
|                                  | Error                | 8  |        |       |
| Total severe abnormalities       | Temperature ( $T$ )  | 1  | 3.01   | 0.121 |
|                                  | pH                   | 1  | 79.83  | 0.000 |
|                                  | $T \times \text{pH}$ | 1  | 0.83   | 0.389 |
|                                  | Error                | 8  |        |       |
| Scoliosis                        | Temperature ( $T$ )  | 1  | 11.82  | 0.009 |
|                                  | pH                   | 1  | 17.94  | 0.003 |
|                                  | $T \times \text{pH}$ | 1  | 0.79   | 0.400 |
|                                  | Error                | 8  |        |       |
| Lordosis                         | Temperature ( $T$ )  | 1  | 40.09  | 0.000 |
|                                  | pH                   | 1  | 119.72 | 0.000 |
|                                  | $T \times \text{pH}$ | 1  | 4.97   | 0.056 |
|                                  | Error                | 8  |        |       |

|          |                      |   |       |       |
|----------|----------------------|---|-------|-------|
| Kyphosis | Temperature ( $T$ )  | 1 | 7.98  | 0.022 |
|          | pH                   | 1 | 16.06 | 0.004 |
|          | $T \times \text{pH}$ | 1 | 0.02  | 0.893 |
|          | Error                | 8 |       |       |

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