

**Supplementary material**

**Temperature dependency equation for chub mackerel (*Scomber japonicus*)  
identified by a laboratory rearing experiment and microscale analysis**

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**Table S1. Biometry of the otoliths, environmental data of the tanks and  $\delta^{18}\text{O}$  values of the extracted otolith areas**

Formation date shows the experimental date at which each otolith area was formed. The analytical precisions of  $\delta^{18}\text{O}_{\text{otolith}}$  and  $\delta^{18}\text{O}_{\text{water}}$  were within 0.1 and 0.05‰ respectively. VPDB, Vienna Pee Dee Belemnite; VSMOW, Vienna Standard Mean Ocean Water

Individual ID	Treatment	Otolith area	Otolith radius ( $\mu\text{m}$ )	ALC mark – otolith edge ( $\mu\text{m}$ )	Otolith formation rate ( $\mu\text{m day}^{-1}$ )	Extracted area width ( $\mu\text{m}$ )	Extracted area weight ( $\mu\text{g}$ )	Formation date	Temperature ( $^{\circ}\text{C}$ )	$\delta^{18}\text{O}_{\text{otolith}}$ (‰, VPDB)	$\delta^{18}\text{O}_{\text{water}}$ (‰, VSMOW)	$\delta^{18}\text{O}_{\text{otolith}} - \delta^{18}\text{O}_{\text{water}}$
1	D	Area II	600	240	8.57	50	0.50	66–71	17.56 ± 0.52	−0.79	−0.69 ± 0.032	−0.09
2	D	Area II	600	290	7.38	70	1.82	62–71	17.56 ± 0.51	−0.22	−0.70 ± 0.032	0.48
2	D	Area I	600	290	7.38	50	0.90	29–35	16.26 ± 0.27	0.05	−0.27 ± 0.066	0.32
3	D	Area I	630	270	8.57	45	0.45	29–34	16.27 ± 0.27	0.08	−0.27 ± 0.066	0.35
4	D	Area II	720	300	10.00	45	0.80	67–71	17.58 ± 0.55	−0.56	−0.68 ± 0.022	0.12
4	D	Area I	720	300	10.00	60	0.80	29–34	16.27 ± 0.27	0.08	−0.27 ± 0.066	0.35
5	C	Area II	620	–	9.54	100	3.18	57–67	18.26 ± 0.31	−0.86	−0.76 ± 0.039	−0.10
6	C	Area II	800	–	12.31	60	1.36	63–67	18.52 ± 0.16	−0.74	−0.74 ± 0.064	0.00
7	C	Area II	740	–	11.38	40	2.27	64–67	18.57 ± 0.13	−0.86	−0.74 ± 0.064	−0.12
8	C	Area II	650	–	10.00	60	2.43	62–67	18.45 ± 0.23	−0.89	−0.75 ± 0.046	−0.14
9	B	Area II	900	270	15.75	120	2.43	59–66	19.99 ± 0.12	−1.05	−0.76 ± 0.052	−0.30
10	B	Area I	1000	380	15.50	100	1.52	29–35	19.99 ± 0.12	−0.60	−0.23 ± 0.012	−0.37
10	B	Area II	1000	380	15.50	100	1.52	64–69	19.99 ± 0.13	−1.18	−0.73 ± 0.034	−0.46
11	B	Area I	940	300	16.00	100	0.76	29–34	19.99 ± 0.12	−0.69	−0.23 ± 0.012	−0.46
11	B	Area II	940	300	16.00	100	3.64	64–69	19.99 ± 0.13	−1.04	−0.73 ± 0.034	−0.32
12	B	Area II	880	260	15.50	70	3.03	29–33	20.00 ± 0.12	−0.55	−0.23 ± 0.016	−0.32

Individual ID	Treatment	Otolith area	Otolith radius (µm)	ALC mark – otolith edge (µm)	Otolith formation rate (µm day <sup>-1</sup> )	Extracted area width (µm)	Extracted area weight (µg)	Formation date	Temperature (°C)	δ <sup>18</sup> O <sub>otolith</sub> (‰, VPDB)	δ <sup>18</sup> O <sub>water</sub> (‰, VSMOW)	δ <sup>18</sup> O <sub>otolith</sub> – δ <sup>18</sup> O <sub>water</sub>
12	B	Area II	880	260	15.50	130	1.06	62–69	19.99 ± 0.13	-1.06	-0.73 ± 0.027	-0.33
13	A	Area II	970	310	16.50	80	0.76	65–69	26.53 ± 0.49	-2.85	-0.71 ± 0.070	-2.14
13	A	Area I	970	310	16.50	60	0.45	29–32	23.86 ± 0.39	-1.60	-0.21 ± 0.001	-1.38
14	A	Area I	900	220	17.00	50	1.40	29–31	23.76 ± 0.38	-1.81	-0.21 ± 0.001	-1.60
15	A	Area I	950	270	16.25	50	0.91	29–31	23.76 ± 0.38	-1.53	-0.21 ± 0.001	-1.32
16	A	Area II	970	290	17.00	50	0.60	67–69	26.53 ± 0.53	-2.86	-0.66	-2.20
16	A	Area I	970	290	17.00	40	0.90	29–31	23.76 ± 0.38	-1.68	-0.21 ± 0.001	-1.46
17	A	Area I	870	240	15.75	50	0.61	29–31	23.76 ± 0.38	-1.27	-0.21 ± 0.001	-1.05