BIOASSAY DATA FOR MARINE POLLUTION USING SEA URCHIN EGGS, 1974

In 1974, five experiments for biological assay were made with sea urchin eggs to measure marine pollution around the Seto Marine Biological Laboratory.

I. Spring season: An experiment was made on March 14, with *Hemicentrotus pulcherrimus* (A. Agassiz) eggs, see Table 1.

II. Summer season: Two experiments were made in June-August, with *Anthocidaris crassispina* (A. Agassiz) eggs. For Exp. 1 on June 9 see Table 2, and for Exp. 2 on August 6 see Table 3.

III. Autumn season: Two experiments were made in September-November, with *Anthocidaris crassispina* or *Pseudocentrotus depressus* (A. Agassiz) eggs. For Exp. 1 on September 14 see Table 4, and for Exp. 2 on November 27 see Table 5.

(Notes common to all tables: in Fertilization the membrane formation was checked 3 minutes after insemination; minutes and hours in parentheses respectively after First cleavage and Gastrulation indicate the time after insemination; the maturation state of gonads used was nearly to full ripe and eggs were experimented with after

Table 1. Results of the Mar. 14 experiment with eggs of *Hemicentrotus pulcherrimus*. Wind; NW1. Test water temperature; 19°C. 6 hrs. old eggs

Location (depth)	Fertiliz.	First cleavage (75 min.)			Gastrulation (20 hrs.)			Other notes	Degree of inhibitory effect
	membrane formation	1 cell	2 cell (normal)	multi-cell (poly-spermy)	permanent blastula	gastrula (normal)	exo-gastrula	abnormal develop.	
Running (m) sea water of Laboratory	98.0 %	2.5%	97.5%	0 %	%	%	%		0
	99.5	3.5	96.5	0	1.0	99.0	0		
	94.5	6.5	93.5	0					
Water from open sea side of Hatake-jima Surface	99.0	3.5	96.5	0					0
	96.5	4.5	95.5	0	1.0	99.0	0		
	94.5	7.0	93.0	0					
Water from land side of Hatakejima Surface	75.0	27.0	73.0	0					2
	79.5	24.5	75.5	0	1.0	99.0	0		
	73.5	28.5	71.5	0					
Bottom (27)	80.0	22.0	78.0	0					3
	81.5	20.5	79.5	0	3.0	97.0	0		
	71.5	31.0	69.0	0					
Sea water from Tsuna-shirazu cove Surface	74.0	26.5	73.5	0					2
	75.0	27.5	72.5	0	3.5	96.5	0		
	71.5	29.5	70.5	0					
Bottom (5)	68.5	36.5	63.5	0					3
	70.5	31.5	68.5	0	7.5	91.5	1.0		
	63.0	38.5	61.5	0					

Table 2. Results of the June 9 experiment with eggs of *Anthocidaris crassispina*. Wind; 0. Test water temperature; 22°C. 4 hrs. old eggs

Location (depth)	Fertiliz.	First cleavage (60 min.)			Gastrulation (18 hrs.)			Other notes	Degree of inhibitory effect
	membrane formation	1 cell	2 cell (normal)	multi-cell(poly-spermy)	perma-nent blastula	gastrula (normal)	exo-gastrula	ab-normal develop.	
Running (m) sea water of Laboratory	98.5 %	2.5%	97.5%	0 %	%	%	%		
	98.0	3.0	97.0	0	0.5	99.5	0		0
	99.0	2.0	98.0	0					
Water from open sea side of Hatake-jima Surface	96.5	5.0	95.0	0					
	97.5	3.5	96.5	0	1.5	98.5	0		0
	98.0	3.0	97.0	0					
Water from land side of Hatakejima Surface	95.5	5.0	95.0	0					
	97.0	3.5	96.5	0	3.0	97.0	0		0
	97.5	3.0	97.0	0					
Bottom (27)	95.0	6.0	94.0	0					
	94.5	7.0	93.0	0	7.0	93.0	0		1
	93.0	9.0	91.0	0					
Sea water from Tsuna-shirazu cove Surface	93.0	9.0	91.0	0					
	92.0	8.5	91.5	0	4.0	96.0	0		1
	89.0	13.0	87.0	0					
Bottom (5)	89.0	11.0	87.5	1.5					
	86.5	13.5	85.5	1.0	7.0	93.0	0		1
	83.5	18.0	81.0	1.0					

Table 3. Results of the Aug. 6 experiment with eggs of *Anthocidaris crassispina*. Wind; 0. Test water temperature; 29°C. 3 hrs. old eggs

Location (depth)	Fertiliz.	First cleavage (50 min.)			Gastrulation (15 hrs.)			Other notes	Degree of inhibitory effect
	membrane formation	1 cell	2 cell (normal)	multi-cell(poly-spermy)	perma-nent blastula	gastrula (normal)	exo-gastrula	ab-normal develop.	
Running (m) sea water of Laboratory	97.5 %	3.0%	96.5%	0.5%	%	%	%		
	99.0	1.5	98.5	0	0	100	0		0
	99.5	1.0	99.0	0					
Water from open sea side of Hatake-jima Surface	97.5	3.5	96.0	0.5					
	97.0	4.0	95.0	1.0	1.0	99.0	0		0
	96.0	3.5	95.5	1.0					
Bottom (25)	96.0	4.5	94.5	1.0					
	97.0	4.5	95.0	0.5	0.5	99.5	0		0
	96.5	5.0	94.0	1.0					
Water from land side of Hatakejima Surface	89.5	12.5	84.0	3.5					
	88.5	12.0	85.0	3.0	1.5	98.5	0		1
	90.0	11.0	84.5	4.5					
Bottom (27)	80.5	23.0	70.5	6.5					
	83.5	21.5	73.5	5.0	1.5	98.5	0		2
	79.0	22.0	72.0	6.0					
Sea water from Tsuna-shirazu cove Suraface	80.5	21.5	73.5	5.0					
	76.5	23.0	71.0	6.0	7.5	92.5	0		2
	79.0	22.5	70.0	7.5					
Bottom (5)	78.0	25.0	68.5	6.5					
	76.0	24.5	70.0	5.5	6.5	93.5	0		3
	71.5	27.0	64.5	8.5					

Table 4. Results of the Sept. 14 experiment with eggs of *Anthocidaris crassispina*. Wind; 0. Test water temperature; 25°C. 3 hrs. old eggs

Location (depth)	Fertiliz.	First cleavage (60 min.)			Gastrulation (18 hrs.)			Other notes	Degree of inhibitory effect
	membrane formation	1 cell	2 cell (normal)	multi-cell(poly-spermy)	perma-nent blastula	gastrula (normal)	exo-gastrula	ab-normal develop.	
Running (m) sea water of Laboratory	98.5 %	2.0%	98.0%	0 %	%	%	%		
	99.0	1.0	99.0	0	0.5	99.5	0		0
	98.5	1.5	98.5	0					
Water from open sea side of Hatake-jima Suface	99.0	1.5	98.5	0					
	99.5	0.5	99.5	0	0.5	99.5	0		0
	98.0	3.0	97.0	0					
Water from land side of Hatakejima Surface	90.5	11.5	88.5	0					
	91.0	10.5	89.5	0	1.5	98.5	0		1
	88.5	14.0	86.0	0					
Sea swater from Tsuna-shirazu cove Surface	84.0	16.0	83.5	0.5					
	85.5	15.0	85.0	0	5.5	94.5	0		1
	84.0	18.0	81.5	0.5					

Table 5. Results of the Nov. 27 experiment with eggs of *Pseudocentrotus depressus*. Wind; 0. Test water temperature; 20°C. 8 hrs. old eggs

Location (depth)	Fertiliz.	First cleavage (80 min.)			Gastrulation (20 hrs.)			Other notes	Degree of inhibitory effect
	membrane formation	1 cell	2 cell (normal)	multi-cell(poly-spermy)	perma-nent blastula	gastrula (normal)	exo-gastrula	ab-normal develop.	
Running (m) sea water of Laboratory	98.5 %	1.0%	98.0%	1.0%	%	%	%		
	99.0	1.0	98.5	0.5	1.5	98.0	0		0
Water from open sea side of Hatake-jima Surface	99.0	1.0	98.5	0.5					
	99.5	0.5	99.0	0.5	0	100	0		0
Water from land side of Hatakejima Surface	98.5	1.5	97.5	1.0					
	98.5	1.5	98.0	0.5	1.0	99.0	0		0
Bottom (27)	97.5	2.0	96.5	1.5					
	97.5	1.5	97.0	1.5	1.5	98.5	0		0
Sea water from Tsuna-shirazu cove Surface	97.0	3.0	95.0	2.0					
	97.5	2.0	96.0	2.0	0.5	99.5	0		0
Bottom (5)	95.5	3.5	94.0	2.5					
	96.0	2.0	95.0	3.0	1.0	99.0	0		1

aging of 3–8 hours; in Degree of inhibitory effect, 0 shows no inhibition, 1 a slight inhibition, 2 a weak and 3 a moderate inhibition by the sea water tested (see Publ. Seto Mar. Biol. Lab., XXI (5/6), p. 391, 8 tables, 1974).

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