

**Composition of the Fixed Sea Urchin Colony on Hatakejima  
Island, 1983–1987, with Review of  
the Past 25-years Data**

The regular survey on the density of sea urchins (Echinodermata: Echinoidea) in the fixed quadrat on Hatakejima Island was made once every year in 1983–1987 at spring low tide in May or June (for details of the site and methods, see Tokioka, 1963, Publ. Seto Mar. Biol. Lab. 11: 415–424). In this report the data of the 5 years are presented and the results of the past 25 years since the first year of the survey, are summarized.

*Data of 1983–1987*

Densities of sea urchins are shown in Table 1. Two species, *Anthocidaris crassispina* and *Echinostrephus aciculatus*, appeared every year, besides one juvenile *Mespilia globulus* in 1987 (diameter, 8 mm). Number in the quadrat of *A. crassispina*

Table 1. Numbers of individuals of sea urchins in the four sections in the fixed quadrat, 1983–1987.

	Sections				Total	%
	1 (SW)	2 (NW)	3 (SE)	4 (NE)		
May 13, 1983						
<i>Anthocidaris crassispina</i>	22	34	41	52	169	44.9
<i>Echinostrephus aciculatus</i>	23	68	62	54	207	55.1
May 15, 1984						
<i>A. crassispina</i>	52	41	61	47	201	48.7
<i>E. aciculatus</i>	33	70	64	45	212	51.3
June 3, 1985						
<i>A. crassispina</i>	40	25	25	28	118	39.7
<i>E. aciculatus</i>	31	67	46	35	179	60.3
May 24, 1986						
<i>A. crassispina</i>	28	19	25	28	100	35.0
<i>E. aciculatus</i>	41	61	43	41	186	65.0
June 12, 1987						
<i>A. crassispina</i>	11	9	13	9	42	17.6
<i>E. aciculatus</i>	44	58	48	46	196	82.0
<i>Mespilia globulus</i>	0	0	1	0	1	0.4

successively decreased since 1984, while that of *E. aciculatus* was comparatively constant since 1983.

*Summary: 1963–1987*

Annual change of diversity and density of sea urchins in the past 25 years was examined on the basis of the present and previous data (Tokioka, 1963, Publ. Seto Mar. Biol. Lab. 11: 415–424; Tokioka, 1969, *ibid.*, 17: 187–191; Tokioka, 1971, *ibid.*, 18: 420; Tokioka & Yanagisawa, 1972, *ibid.*, 19: 437; Yanagisawa, 1974, *ibid.*, 21: 409–410; Imafuku & Tokioka, 1976, *ibid.*, 22: 403; Tokioka & Imafuku, 1977, *ibid.*, 23: 425–426; Imafuku & Imaoka, 1983, *ibid.*, 28: 445–446).

Table 2 shows occurrence of sea-urchin species since 1963. The number of species was between 4 and 6 in 1963–1973, 3 in 1974–1977, and 2 or 3 in 1982–1987. *Mespilia globulus* was not or rarely found after 1972, and *Echinometra mathaei* after 1982. After 1982, the sea urchin colony almost exclusively comprised the two species, *A. crassispina* and *E. aciculatus*. Thus, the number of species decreased after 1973.

Table 2. Occurrence of sea urchins in the fixed quadrat in 1963–1987. No observation was made in 1978–1981.  
\*: only one individual was found.

Years	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	82	83	84	85	86	87
<i>Anthocidaris crassispina</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Echinostrephus aciculatus</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Echinometra mathaei</i>			+	+	+	+	+	+	+	+	+	+	+	+	+						
<i>Mespilia globulus</i>			+	+	+	+	+	+	+	*	*										*
<i>Hemicentrotus pulcherrimus</i>	+	+	*			+		*	*		*					*					
<i>Pseudocentrotus depressus</i>	*	*				*	*	*													
<i>Stomopneustes variolaris</i>				*		*															
No. species	4	6	6	4	6	6	4	6	5	4	5	3	3	3	3	3	2	2	2	2	3

Fig. 1 shows the total number of sea urchins and number of each species in the quadrat in the 25 years. After 1963 when intertidal animals on Hatakejima Island were damaged in winter by extremely low air and water temperature (Tokioka, 1963, Publ. Seto Mar. Biol. Lab. 11: 415–424), the total number increased up to 1965, owing to the increase of *A. crassispina* and *E. aciculatus*. In 1964–1976, the total number fluctuated between 650 and 800. It decreased in 1977, for which Imafuku & Imaoka (1983, Publ. Seto Mar. Biol. Lab. 28: 445–446) suggested the effect of the collection by local people of the edible sea urchin, *A. crassispina*. In 1982, the largest total number was recorded, but it decreased markedly in the next year when the density of *E. aciculatus* decreased greatly. After 1983, the total number was under 400 and the smallest in the 25 years. It decreased successively from 1984 to 1987, owing to the rapid decrease of *A. crassispina*.

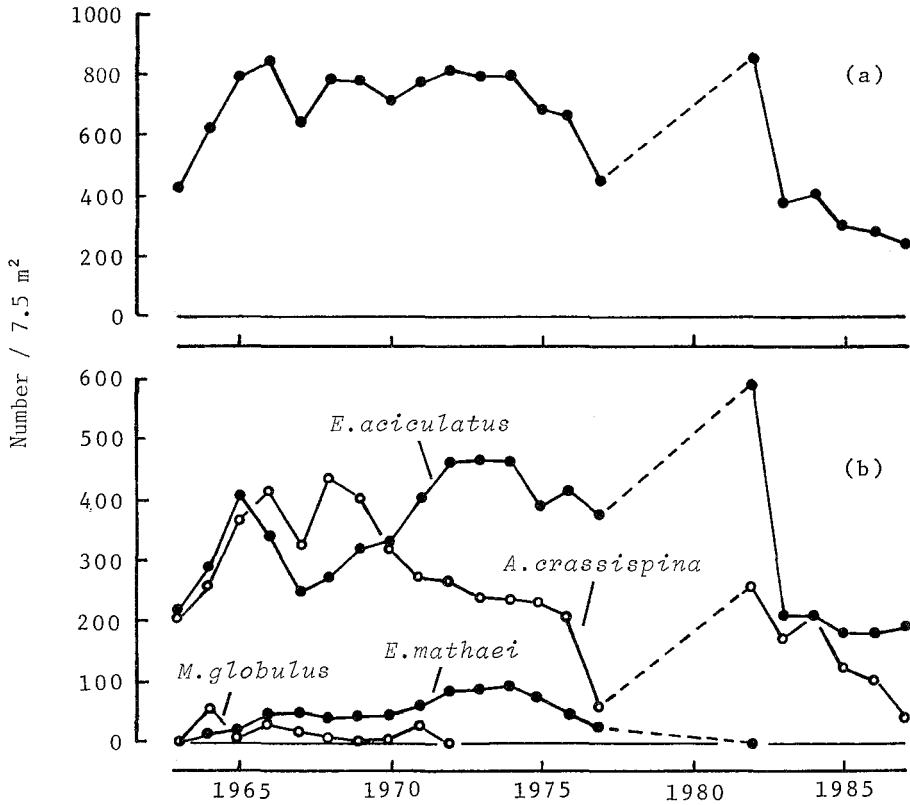


Fig. 1. (a) Annual total numbers of sea urchins in the fixed quadrat in 1963-1987. (b) Density changes in the four sea urchins. The other species whose numbers were always less than 6 are omitted. No observation: 1978-1981.

The 25-years data show the decrease in species diversity after 1973 and in the total number after 1983. Ohgaki et al. (1985, Publ. Seto Mar. Biol. Lab. 30: 325-332) noted that the ranges of sea urchins on Hatakejima Island contracted between 1975 and 1983. The present results also indicate the recent decline of sea-urchin fauna on the island.

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