The Benthic Coastal Fauna of Surtsey in 1969

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INTRODUCTION

The sampling of benthic animals in the littoral and sublittoral zones of Surtsey was continued in a similar way in 1969 as in the year before (Sigurdsson 1970).

As previously the crew of M/S "Sæör" carried out the submarine work in the subtidal zone with active interest.

Due to shortage of time the Danes could not be contacted this year (Sigurdsson 1970).

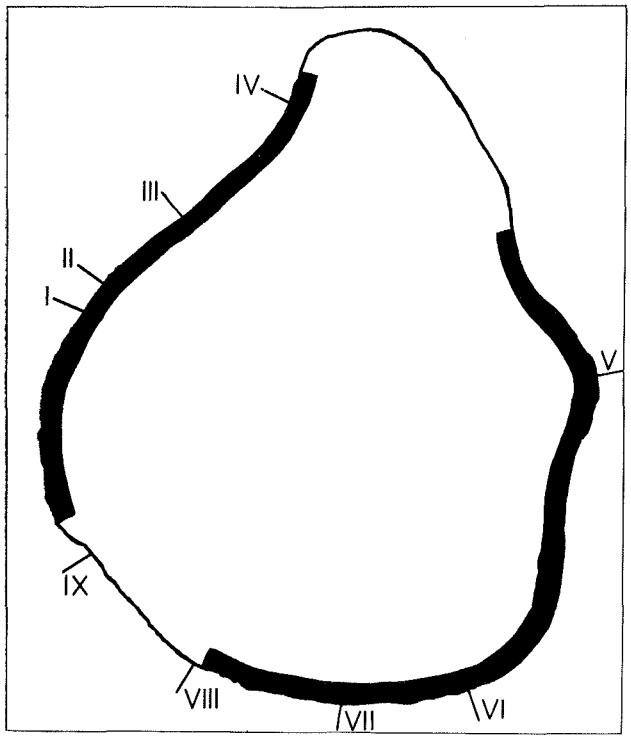

Fig. 1. Map of Surtsey showing the location of traverses I–IX. The thick line indicates the streches surveyed on the shore. For comparison with the samples from 1968, the following shoud be noted: Traverse I = "Off the Northern Part of the Lava Field (W.)" (Sigurdsson 1970, Table 2). Traverse II = "The Boundaries of Sand and Hard Bottom (W.)" (l.c. Table 2). Traverse V = "Off the North-East Cliffs" (l.c. Table 4). Traverse VI = "Off the South-East Cliffs" (l.c. Table 3). Traverse VIII = "The South Coast" (l.c. Table 3).

SAMPLING

The surveys of the tidal zone were made on April 16, May 2, and from July 29 to August 2 (Table 1). Due to a heavy swell the samples from the east and south coasts contain only animals from the upper region of the littoral zone.

The sampling in the sublittoral zone was carried out on traverses I–IX from July 21 to 24 (Fig. 1). The depth range is shown in tables 2–5.

All the traverses were worked from a depth of 20 or 40 metres and as close up to the shore as possible, but because of surf the SCUBA-divers usually could not reach the shore, and on traverses VII and VIII they could not work at less than 20 metres' depth on account of the heavy swell.

On traverse IV the bottom was sandy, but on all the others it was hard and of a similar character. Close to the shore were rounded basalt blocks over 1 metre in diameter, most often with sand and gravel in between, changing to still bigger blocks up to 3 metres in diameter with less or even no sand and gravel at 15 metres' depth. From 15–20 metres' depth the rocks again decreased in size downwards with some sand appearing in between. At 30 metres' depth the blocks were bedded in sand and at traverse VIII they were no longer rounded. At a depth of 40 m there was only sand, except on traverse VIII, where scattered stones were found as well.

RESULTS

The identification of the specimens is still somewhat incomplete, and as the Danish biologists could not be contacted, the author is solely responsible.

Tables 1–5 show the distribution of benthic animals at Surtsey. The samples are not quantitative, but the number of animals (Tables 2–5) should, however, give a rough idea of their

TABLE 1

Animals from the littoral zone of Surtsey in 1969.

	April 16	May 2		July 29 — August 2		
	West Coast	West Coast	[1]Northwest Coast	West Coast	East Coast	South Coast
HYDROZOA	×	..	..	×	×	×
POLYCHAETA	6	17	..	8	9	14
BRYOZOA	×	×	..	×	..	..
COPEPODA	..	..	..	70	50	1
CIRRIPEDIA:	..	..	..	..	..	..
Verruca stroemia (Müller) Schum.	2	18	..	..	11	2
Balanus balanoides (L.) Bruguière	1	4	..	120	26	9
DECAPODA:	..	..	..	..	..	..
Portunus holsatus Fabr.	..	..	1	..	..	..
NUDIBRANCHIA	..	..	..	2	..	..
LAMELLIBRANCHIA:	..	..	..	..	..	..
Heteranomia squamula (L.)	3	5	..	2	..	..
Mytilus edulis L.	8	14	1	12	4	1
Saxicava arctica (L.)	30	50	..	6	..	..
ASTEROIDEA:	..	..	..	..	..	..
Asterias rubens L.	..	..	1	..	..	..

[1]) Drifted ashore.

TABLE 2

Animals from the subtidal zone of the west coast of Surtsey in 1969. Traverse I (see Fig. 1)

	July 22					
	5-10 m	10-20 m	15 m	20 m	28-30 m	40 m
HYDROZOA	..	×	×	×	×	..
ANTHOZOA:	..	..	..	..	..	..
Alcyonium digitatum L.	..	..	..	×	×	..
POLYCHAETA	1	4	5	11	25	27
BRYOZOA	..	×	..	..	×	..
COPEPODA	..	..	..	..	1	..
CIRRIPEDIA:	..	..	..	..	..	..
Verruca stroemia (Müller) Schum.	..	..	×	..	Shell	..
**Balanus balanus* (L.) da Costa	..	..	..	..	Shell	..
Balanus balanoides (L.) Bruguière	1	2	..	..	..	..
Balanus sp. juv.	..	..	1	1	1	..
AMPHIPODA	5	6	75	11	1	..
DECAPODA:	Zoea	..	..	..	..	..
Hyas coarctatus Leach	..	4	3	5	9	..
Portunus holsatus Fabr.	..	..	..	1	..	..
**Galathea nexa* Embl.	..	..	1	1	8	..
PROSOBRANCHIA:	..	..	..	..	..	..
Lacuna divaricata (Fabr.)	..	..	1	..	..	..
NUDIBRANCHIA	..	..	..	1	3	..
LAMELLIBRANCHIA:	..	..	..	..	..	..
Heteranomia squamula (L.)	..	Shells	Shell	Shells	1	..
Chlamys distorta (da Costa)	..	..	..	..	Shells	..
Mytilus edulis L.	..	70	80	100	50	..
Saxicava arctica (L.)	..	9	2	9	27	..
ASTEROIDEA:	..	..	..	..	..	..
Asterias rubens L.	..	..	..	..	1	..
OPHIUROIDEA	..	..	..	..	..	2

* New for Surtsey.

TABLE 3

Animals from the subtidal zone of the northwest coast of Surtsey in 1969. Traverses II to III (see Fig. 1)

	Traverse II Off the N.W. corner of the lava field July 23			Traverse III Off the tephra cliffs of the west coast July 24			
	5-10 m	10-15 m	15-20 m	3-10 m	10 m	13-15 m	18-20 m
HYDROZOA	×	×	×	×	×	×	×
SCYPHOZOA:	..	..	..	..	..	..	..
**Halyclystus octoradiatus* (Lamarck)	..	..	..	1	..	..	..
NEMATODA	..	..	..	..	..	1	..
POLYCHAETA	5	10	37	9	1	18	34
BRYOZOA	..	..	×	..	..	×	..
COPEPODA	..	40	10	20	3	7	3
CIRRIPEDIA:	..	..	..	..	..	..	..
Verruca stroemia (Müller) Schum.	1	..	..	7	..	..	..
Blanus balanoides (L.) Bruguière juv.	..	..	27	..	..	..	..
AMPHIPODA	50	1600	100	60	48	140	49
EUPHAUSIACEA	1	..	..	..	..	..	..
DECAPODA:	..	..	..	..	..	..	..
Hyas coarctatus Leach	..	2	9	2	5	3	6
**Galathea nexa* Embl.	..	..	2	1	..	1	2
Spirontocaris pusiola Kr.	..	..	..	..	..	1	..
PROSOBRANCHIA:	..	..	..	..	..	..	..
Lacuna divaricata (Fabr.)	..	6	2	2	Eggs	3	3
**Odostomia unidentata* (Mont.)	..	..	Shell	..	..	..	..
NUDIBRANCHIA	..	..	..	1	..	..	Eggs
LAMELLIBRANCHIA:	..	..	..	..	..	..	..
Heteranomia squamula (L.)	..	..	2	..	..	Shells	..
Mytilus edulis L.	4	13	80	27	60	350	190
Saxicava arctica (L.)	..	1	20	5	3	14	16
ASTEROIDEA:	..	..	..	..	..	..	..
Asterias rubens L.	..	1	×	..	..	..	..
PISCES:	..	..	..	..	..	..	..
**Cyclopterus lumpus* L. juv.	..	2	..	..	..	..	..

* New for Surtsey.

abundance. × indicates animals present in the samples, but not easily counted, especially those which live in colonies. Of those the hydrozoans are very abundant, the others being less so or even very rare, as for instance the *Porifera*.

Of the animals which have been positively identified, eight species are new for Surtsey, but they are all known from the Vestmannaeyjar archipelago. Moreover the only species of *Porifera* found so far is new for Surtsey. These are marked with asterisks (*) in Tables 2–5.

The absence of four species found in the samples from 1967 and 1968 should be noted (Sigurdsson 1968 and 1970). These are: *Aporrhais pes-pelecani* (L.), *Mya truncata* (L.) (named "bivalve juv." in Table II, Sigurdsson 1968), *Syndosmya nitida* (Müller) and *Ammodytes lancea* Cuvier. The last one is certainly an inhabitant of the sandy bottom at Surtsey from where only few samples were taken in 1969. On the other hand, the three species of molluscs are not likely at present to find suitable substrate for colonization at Surtsey, as all of them are inhabitants of muddy bottom. *Aporrhais pes-pelecani* and *Syndosmya nitida* do, however, live on even bottoms around Surtsey; their larvae being pelagic, young individuals of these species are likely to appear now and then at Surtsey.

Shells, whole and fragmentary, of *Aporrhais pes-pelecani* have been found in the tephra on Surtsey obviously brought up from the bottom of the sea by the eruption, see also Alexandersson 1970.

Fig. 2 shows rough outlines of the vertical distribution of the more abundant benthic animals at Surtsey in July and August 1969. The diagrams are based on the numbers in Tables 1–5, supplimented by the diver's descriptions of the

TABLE 4

Animals from the subtidal zone of the east coast of Surtsey in 1969. Traverses V to VI (see Fig. 1)

	Travers V Off the N.E. cliffs July 21				Travers VI Off the S.E. cliffs July 21		
	5 m	10 m	15 m	19-23 m	7-10 m	15 m	20 m
**PORIFERA*	..	..	..	..	..	..	×
HYDROZOA	..	×	×	×	..	×	×
ANTHOZOA:	..	..	..	..	..	..	..
**Alcyonium digitatum* L.	..	..	..	..	..	..	×
NEMATODA	..	2	..	..	..	..	..
POLYCHAETA	..	20	28	16	3	19	60
BRYOZOA	..	×	×	×	..	..	×
COPEPODA	..	8	1	2	..	20	..
CIRRIPEDIA:	..	..	..	..	..	..	..
Verruca stroemia (Müller) Schum.	..	2	1	1	..	..	49
**Balanus balanus* (L.) da Costa	..	..	..	Shells	..	..	2
Balanus balanoides (L.) Bruguière	..	3	..	..	2	2	..
Balanus hammeri (Ascanius) Brown	..	..	1	3	..	..	1
Balanus sp. juv.	..	..	..	..	..	..	1
AMPHIPODA	1	260	15	19	44	120	17
DECAPODA:	..	..	..	..	..	..	..
Hyas coarctatus Leach	..	2	1	2	..	2	1
**Galathea nexa* Embl.	..	1	..	..	1	..	..
PROSOBRANCHIA:	..	..	..	..	..	..	..
Lacuna divaricata (Fabr.)	..	1	1	1	..	1	..
NUDIBRANCHIA	..	4	..	..	..	4	..
LAMELLIBRANCHIA:	..	..	..	..	..	..	..
Heteranomia squamula (L.)	..	Shells	Shells	5	..	1	11
Chlamys distorta (da Costa)	..	..	1	..	..	..	..
Mytilus edulis L.	..	140	140	120	..	60	320
Saxicava arctica (L.)	..	10	23	19	..	5	27
ASTEROIDEA:	..	..	..	..	..	..	..
Asterias rubens L.	..	1	1	1	..	..	1
ASCIDIACEA juv.	..	..	1	..	..	..	1
PISCES:	..	..	..	..	..	..	..
**Liparis* sp. juv.	..	..	1	..	..	..	..
Limanda limanda (L.)	..	..	..	..	1	..	..

* New for Surtsey.

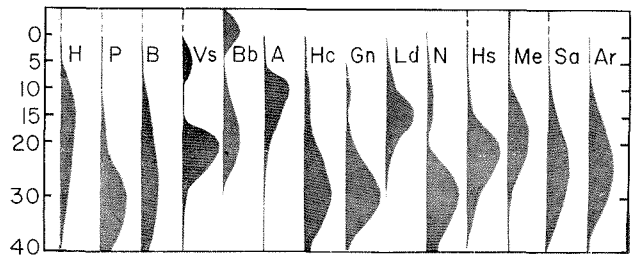

Fig. 2. The vertical distribution of the more abundant benthic animals at Surtsey in 1969. H. = *Hydrozoa*, P. = *Polychaeta*, B. = *Bryozoa*, V.s. = *Verruca stroemia*, B.b. = *Balanus balanoides*, A. = *Amphipoda*, H.c. = *Hyas coarctatus*, G.n. = *Galathea nexa*, L.d. = *Lacuna divaricata*, N. = *Nudibranchia*, H.s. = *Heteranomia squamula*, M.e. = *Mytilus edulis*, S.a. = *Saxicava arctica* and A.r. = *Asterias rubens*.

life on the bottom at the time of sampling. The diagrams do not represent quantitative interrelation between the different species or groups of animals, and each diagram should, therefore, be studied separately.

The vertical distribution of the more rarely-found benthic animals is indicated in Table 6.

In August 1968 the deposit of basalt blocks on the sea floor did not seem to reach farther north along the west coast of Surtsey than traverse II where considerable amount of sand was observed.

By July 1969 the bottom had changed very much and big blocks of rock had replaced the sand. Therefore, traverses III and IV were worked to find out how far north the change had

TABLE 5

Animals from the subtidal zone of the east coast of Surtsey in 1969. Traverses VII to IX (see Fig. 1)

	Traverse VII The Easterly South Coast July 24	Traverse VIII The Middle of the South Coast July 23			Traverse IX The Westerly South Coast July 22		
	20 m	20 m	30 m	40 m	8-10 m	15 m	20 m
HYDROZOA	×	×	×	×	×	×	..
POLYCHAETA	25	15	160	60	3	2	27
BRYOZOA	×	×	×	×	..	..	×
COPEPODA	6	4	..	37	..	..	..
CIRRIPEDIA:	..	..	..	..	..	..	..
Verruca stroemia (Müller) Schum.	4	4	2	1	..	..	..
Balanus balanoides (L.) Bruguière	3	..	..	..	..	..	1
Balanus sp. juv.	..	..	1	2	..	..	..
AMPHIPODA	38	24	7	6	29	..	8
DECAPODA:	..	..	..	..	..	..	..
Hyas coarctatus Leach	17	6	15	4	3	1	2
Portunus holsatus Fabr.	..	..	..	..	..	..	1
**Galathea nexa* Embl.	4	..	4	1	2	..	3
Spirontocaris pusiola Kr.	..	..	4	..	..	..	2
NUDIBRANCHIA	2	Eggs	4	Eggs	..	..	..
LAMELLIBRANCHIA:	..	..	..	..	..	..	..
Heteranomia squamula (L.)	..	..	1	..	..	1	1
Mytilus edulis L.	180	90	9	2	5	100	90
Cardium fasciatum Mont.	..	..	Shell	..	..	..	..
Saxicava arctica (L.)	30	19	7	1	1	9	9
ASTEROIDEA:	..	..	..	..	..	..	..
Asterias rubens L.	1	..	1	..	..	..	..
ASCIDIACEA:	..	1 juv.	..	..	..	..	..
**Styela rustica* (L.)	..	..	..	..	..	..	1
PISCES:	..	..	..	..	..	..	..
**Liparis* sp. juv.	..	..	1	..	..	..	..

* New for Surtsey.

extended. Ca. 300 metres north of travers II, at traverse III, the bottom was paved with huge rocks and was almost without sand at a depth between 5—20 metres, and there were already a rather rich fauna and flora. Of the animals the common mussel and hydrozoans were especially abundant at depth between 10—20 metres just as at other locations with the same type of bottom. The mussels were very small with the exception of one specimen which was more than one year old. Almost all the others had one clear winter ring, but they had obviously been very small at the time of suppression of growth during the winter of 1968—69, which indicates very late spatfall, most likely taking place in early winter. This was not observed in other samples from Surtsey in 1969. As the yearly range of the surface temperature in this region is from 6—12°C (Malmberg 1962 and Stefánsson 1966), the temperature by itself would not prevent successful spatfall in early winter. There might, of course, have been some basalt blocks in this region in the summer of 1968, but it is more likely that most of them were carried north along the coast during the autumn storms in 1968, after which the successful mussel spatfall has occurred. If there had been any considerable population of mussels at this location prior to the autumn of 1968, more than one individual in the samples should have been over one year old. This indicates, therefore, how quickly the animals and plants can colonize a new area.

On traverse IV the bottom was sandy and the only animals found in a sample of sand brought up from 20 metres' depth were 2 polychaete larvae and a single copepod.

ACKNOWLEDGEMENTS

This research has been a part of the Surtsey Research Society's program and in 1969 it was also sponsored by the society. This is highly appreciated.

Thanks are also due to all the others who have assisted in carrying out the research program.

TABLE 6

The vertical distribution of the more rarely found benthic animals

Depth in metres	Porifera	Alcyonium digitatum	Halyclystus octoradiatus	Nematoda	Balanus balanus	Balanus hammeri	Portunus holsatus	Spirontocaris pusiola	Odostomia unidentata	Chlamys distorta	Cardium fasciatum	Ophiuroidea juv.	Ascidiacea juv.	Styela rustica	Cyclopterus lumpus juv.	Liparis sp. juv.	Limanda limanda
	..	..	..	..	..	..		..	..	..	..	..	..	..	..	..	..
							+										
0	..	..	..	..	..	..		..	..	..	..	..	..	..	..	..	..
5	..	..		..	..	..	..	..	..	..	..	..	..	..	..	..	..
			+														
10	..	..		+	..	..	..	+	..	..	..	..	..	..		..	+
															+		
15	..	..	..	..	..	+	..	..		+	..	..	+	..		+	..
									+								
20	+	+	..	..	+	+	+	+		..	..	..	+	+	..	..	..
30	..	+	..	..	+	..	..	+	..	+	+	..	..	..	..	+	..
40	..	..	..	..	..	..	..	..	..	..	..	+	..	..	..	..	..

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