

Marine Biological Studies of the Sublittoral Bottoms
Around Surtsey

by

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In order to follow the invasion of bottom animals onto the newly formed bottom around Surtsey, the author collected bottom samples at the end of August 1966 and the end of May 1967.

Most of the samples were obtained by means of a 0,1 m² Smith-MacIntyre quantitative bottom sampler but the "Mouse trap" bottom sampler was used in some cases.

The sampling stations were located by means of an echosounder and a radar.

In August 1966 sampling was carried out on the Surtsey cross (i.e. at distances 1, 3, 7 and 12 nautical miles N, E, W and S of the island). Furthermore, the slope from the island down to the old bottom was sampled. In most cases 3 samples were taken at each station. A total of about 100 samples was obtained.

Since the effect of the eruptions seemed to have been negligible at the stations at larger distance from the island, the majority of the samples obtained in May 1967 were taken on the slope. A few samples were though taken at a distance of 1 and 2 nautical miles from Surtsey. Also, a transect at right angles to the coast of Iceland N.E. of Surtsey was sampled in order to get material from an unaffected area. Altogether about 140 grab hauls were made.

The Bottom

From the shore of Surtsey the bottom slopes rather steeply down to a depth of about one hundred meters.

The samples from August 1966 showed that to the north this slope was covered with a thick layer of gravel of volcanic origin

which contained many calcareous fragments of serpulid tubes. To the east, south and west of the island the slope was rocky down to a depth of 90-100 m. On many stations on the slope the bottom was covered by a layer of fine volcanic ash. Outside a depth of 100 m the bottom material was fine sand or mud.

In May 1967 the picture had altered completely. The samples showed that the new eruption on Surtsey which started in August 1966 had caused considerable changes on the slope. At some stations on the slope especially off the southern coast of Surtsey the bottom was rocky but elsewhere it had been covered by a layer of volcanic gravel very much like that which was found off the north coast in the previous survey. The new gravel, in contrast to that of August 1966, contained no tube fragments.

The Animals

The following list shows the bottom animals that have been found in the samples from August 1966 which have been worked up so far.

ANTHOZOA:

Some species of soft bottom Actinians have been found in the samples from depths larger than 100 m.

NEMERTINI:

One species has been found in the samples from outside 100 m depth.

POLYCHAETA:

Harmothoe sp. One individual was found in a grab sample taken at a depth of 34 m north of Surtsey.

Pholoe minuta. A few individuals have been found outside 100 m depth.

Sthenelais filamentosus. Two individuals of this species, which so far is only known from Icelandic waters, were found in a sample from 125 m depth.

Anaitides groenlandica. A few individuals of this species have been found both inside and outside 100 m depth.

Kefersteinia cirrata. One individual has been found in a grab sample from the slope north of Surtsey (68 m depth).

Goniada maculata has been found both inside and outside 100 m depth.

Nephtys hombergi. Three individuals were found in a grab sample from 125 m depth, east of Surtsey.

Scoloplos armiger. This species was common on the bottom outside 100 m depth. Inside 100 m depth, an individual has been found at 16 m depth north of Surtsey.

Spio filicornis. Two individuals were found in a sample from 16 m depth, north of Surtsey. One specimen has been found in a sample from 100 m depth.

Spiophanes bombyx. Three individuals have been found in a grab sample from the slope (68 m depth).

Spionidae sp. A yet unidentified spionid was common on the slope south-west of Surtsey.

Diplocirrus glaucus. Some individuals have been found outside 100 m depth.

Ammotrypane aulogaster. This species was frequently found outside 100 m depth. One individual has been found in a grab sample from 90 m depth east of Surtsey.

Capitella capitata has been found both inside and outside 100 m depth. One individual had the gut filled with fine volcanic ash.

Owenia fusiformis. Of this species which seems to be very common outside 100 m depth, one individual has been found on the slope (68 m depth, north of Surtsey).

Pectinaria koreni was common inside and outside 100 m depth. The length of the individuals varied between 8 and 14 mm. The gut of several of the specimens contained fine volcanic ash.

Ditrupa arietina. This species was common at depths larger than 100 m.

CRUSTACEA:

Eurynome aspera. This crab has been found in a sample from the northern slope of Surtsey.

Some Crustaceans have been found in the samples from depths larger than 100 m.

BIVALVIA:

Cardium echinatum. This species has been found at depths larger than 100 m.

Cyprina islandica has been found outside 100 m depth.

Spisula elliptica. One individual has been found in the samples from depths larger than 100 m.

Macoma calcarea. This species is rather frequent outside 100 m depth.

Abra nitida. The species was common in the samples from outside 100 m depth. It was also rather frequent inside 100 m depth.

Abra prismatica has only been found in the samples from depths larger than 100 m.

ECHINODERMATA:

Amphiura filiformis. Some individuals have been found in the samples from depths larger than 100 m.

Ophiura affinis. Small individuals of this species were common in the samples from the slope. The species was also found outside 100 m depth.

The grab samples taken in August 1966 show that several species of bottom invertebrates had already invaded the slope.

In the sediment from the slope off the west coast of Surtsey animal life was sparse; the only common species being a small spionid polychaete. The sediment in this area most likely derives

from the Jólnir eruption which started in December 1965 i.e. a little more than half a year before these samples were collected. In contrast to this, the grab samples from other parts of the slope where the sediment seems to have been deposited earlier than that of the west coast, contained several species of bottom invertebrates. The most common species were the Polychaetes *Pectinaria koreni*, *Scoloplos armiger* and *Capitella capitata*, the Bivalve *Abra nitida* and the Echinoderm *Ophiura affinis*

The latest eruption which started in August 1966 had a disastrous effect on the fauna of the slope. The samples from May 1967 showed that the new eruption had killed all animal life on the slope. Neither the samples from the newly deposited gravel, nor those from the rocky bottom contained any animals. Evidently the fauna had not been able to survive the deposition of gravel on the bottom. On the old bottom outside the slope, life seemed to be normal.

Discussion

The bottom animals that invade the slope can either be migrating adults or pelagic larvae. The first type cannot be of great importance. The most important group of invaders must be the pelagic larvae.

Dispersal by pelagic larvae is very dependant on change factors. The larger the distance is between the new substrate and a potential parent population, the smaller is the chance that the currents will carry a larval swarm to this new environment. It is therefore not surprising that the species of the unaffected bottom areas close to Surtsey were the first to invade the slope of the island.

Many of the species found on the slope are known to be very tolerant of variations in factors such as temperature, salinity, bottom texture and depth.

It was to be expected that the first invaders of the sediment on the slope would be species that feed on particles suspended in the water. It was therefore surprising that the most common

polychaetes were *Pectinaria koreni*, *Scoloplos armiger* and *Capitella capitata*. These species are known to feed by ingesting the bottom material in order to utilize the organic content. In fact the intestine of these animals is very often filled with the volcanic bottom substrate.

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