

# A survey of the subtidal fauna of Surtsey in 1974

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## ABSTRACT

Investigations on the subtidal fauna of Surtsey were continued in the summer of 1974. Marine benthic invertebrates were collected with use of SCUBA-diving. The aim of these investigations is to study the progression of the colonization by marine animals, of the hard substrates which formed during and after the eruption in 1963, and to follow the development and succession of the epifauna associations.

## INTRODUCTION

Investigations on the subtidal fauna of Surtsey were continued in the summer of 1974. These investigations were initiated shortly after the formation of the volcanic island in 1963 (Nicolaisen 1967 and 1968 and Sigurdsson 1968, 1970, 1972 and 1974). The purpose is to study the colonization by marine animals, of the hard substrates which formed during and after the eruption, and to follow the succession of the epifauna associations, which have developed.

This paper describes the preliminary results of the survey in 1974. So far, only species of the following animal-groups have been identified; Prosobranchia, Nudibranchia, Lamellibranchiata, Cirripedia, Isopoda, Decapoda, Asteroidea, Ophiuroidea, Ascidiacea and Pisces. Hydrozoans have partly been worked by the author, but not fully enough for publication. Much identification work remains to be done, on Polychaeta, Amphipoda, Bryozoa, Nemertinea, Porifera and some other groups.

## SAMPLING

Animals were collected by SCUBA-diving on July 11-13 1974, on the same transects and depths as in 1971. Transects I, II and III are at the west coast, V at the east coast and VIII at the south coast (see Sigurdsson 1974, Fig. I).

## RESULTS AND DISCUSSION

Table 1 shows the observed distribution of marine animals, that were collected at the coast of Surtsey in 1974, and so far have been identified. The most common species was the wrinkled rock-borer *Hiatella arctica* (L.). It was found on 15 out of 17 sampling sites, at all depths except the shallowest one. It occurred both on bare rock as well as on *Laminaria* holdfasts. The crabs *Hyas coarctatus* Leach and *Galathea nexa* Embleton, the barnacle *Balanus balanus* (L.) and the common mussel *Mytilus edulis* (L.), were also common. *M. edulis* was locally abundant, especially on hard bottom between 10 and 30 m depth, where it occasionally formed dense colonies. On these colonies the star-fish *Asterias rubens* L. was frequently found. A rich epifauna was usually observed on the shells of *M. edulis*, especially the larger ones. The barnacles *B. balanus* and *Verruca stroemia* (O. Fr. Müller) were quite common, but hydroids and bryozoans were most dominating in this epifauna association. A rich epifauna was also found on kelps (*Laminaria* spp. and *Alaria* sp.), the most common being *V. stroemia*, hydroids, bryozoans and the banded chink snail *Lacuna divaricata* (Fabr.). Many animals were found hiding between the branches of *Laminaria* holdfasts e.g. the brittle-star *Ophiopholis aculeata* (O. Fr. Müller) and numerous polychaets and nemerteans.

The east-transect seems to be the richest in number of species observed. Some species seemed to be restricted to this transect, e.g. the clam *Chlamys distorta* (Da Costa), the saddle-oyster *Heteranomia squamula* (L.) and the fish *Liparis montagui* (Donovan). Some species were more abundant here than elsewhere, e.g. "dead men's fingers" (*Alcyonium digitatum* L.), the isopods *Janiropsis breviremis* Sars and *Munna kröyeri* Goodsir, the brittle-star *O. aculeata* and the sea-

TABLE 1  
Distribution of marine benthic animals at the coast of Surtsey in 1974

| Transects                                   | West coast |    |    |    |     |       | East coast |    |    |    |    | South coast |    |       |    | Frequency |    |    |
|---|------------|----|----|----|-----|-------|------------|----|----|----|----|-------------|----|-------|----|-----------|----|----|
|   | I          |    | II |    | III |       | V          |    |    |    |    | VIII        |    |       |    |           |    |    |
| Depth (m)                                   | 5          | 10 | 15 | 20 | 30  | 10-18 | 10-17      | 5  | 10 | 15 | 20 | 30          | 40 | 12-15 | 20 | 30        | 40 |    |
| <b>OCTACORALLIA:</b>                        |            |    |    |    |     |       |            |    |    |    |    |             |    |       |    |           |    |    |
| <i>Alcyonium digitatum</i> L.               | ..         | .. | .. | .. | ×   | ..    | ..         | .. | .. | .. | ×  | ×           | ×  | ..    | .. | ..        | .. | 4  |
| <b>PROSOBRANCHIA:</b>                       |            |    |    |    |     |       |            |    |    |    |    |             |    |       |    |           |    |    |
| <i>Buccinum undatum</i> (L.)                | ..         | .. | .. | .. | ..  | ×     | ..         | .. | .. | .. | .. | ..          | .. | ..    | .. | ..        | .. | 1  |
| <i>Lacuna divaricata</i> (Fabr.)            | ×          | ×  | .. | .. | ..  | ×     | ×          | .. | ×  | .. | ×  | ×           | .. | ×     | .. | ..        | .. | 8  |
| <i>Odostomia unidentata</i> (Mont.)         | ..         | .. | .. | .. | ..  | ..    | ..         | .. | .. | .. | .. | ×           | .. | ..    | .. | ..        | .. | 1  |
| <i>Velutina velutina</i> (Möller)           | ..         | .. | .. | .. | ..  | ..    | ..         | .. | .. | .. | .. | ..          | ×  | ..    | .. | ..        | .. | 1  |
| <b>NUDIBRANCHIA:*</b>                       |            |    |    |    |     |       |            |    |    |    |    |             |    |       |    |           |    |    |
| <i>Aeolidia papillosa</i> (L.)              | ..         | .. | .. | ×  | ×   | ..    | ..         | .. | .. | .. | .. | ..          | .. | ..    | .. | ..        | .. | 2  |
| <i>Acanthodoris pilosa</i> (Müller)         | ..         | ×  | .. | .. | ..  | ..    | ..         | .. | .. | .. | .. | ..          | .. | ..    | .. | ..        | .. | 1  |
| <i>Dendronotus frondosus</i> (Ascanius)     | ..         | ×  | .. | ×  | ..  | ..    | ..         | .. | ×  | .. | .. | ..          | .. | ×     | .. | ..        | .. | 4  |
| <i>Doto coronata</i> (Gmelin)               | ..         | .. | ×  | ×  | ..  | ..    | ..         | .. | ×  | .. | .. | ×           | .. | ×     | ×  | ..        | .. | 6  |
| <i>Tergipes tergipes</i> (Forskål)          | ..         | ×  | ×  | ×  | ×   | ..    | ..         | .. | .. | .. | .. | ..          | .. | ×     | .. | ..        | .. | 5  |
| <b>LAMELLIBRANCHIATA:</b>                   |            |    |    |    |     |       |            |    |    |    |    |             |    |       |    |           |    |    |
| <i>Chlanys distorta</i> (Da Costa)          | ..         | .. | .. | .. | ..  | ..    | ..         | .. | .. | ×  | ×  | ×           | ×  | ..    | .. | ..        | .. | 4  |
| <i>Heteranomia squamula</i> (L.)            | ..         | .. | .. | .. | ..  | ..    | ..         | .. | .. | .. | .. | ×           | ×  | ..    | .. | ..        | .. | 2  |
| <i>Hiatella arctica</i> (L.)                | ..         | ×  | ×  | ×  | ×   | ×     | ×          | .. | ×  | ×  | ×  | ×           | ×  | ×     | ×  | ×         | ×  | 15 |
| <i>Mytilus edulis</i> (L.)                  | ..         | .. | ×  | .. | ×   | ×     | ×          | ×  | ×  | ×  | ×  | ×           | ×  | ..    | ×  | ..        | .. | 10 |
| <b>CIRRIPEDIA:</b>                          |            |    |    |    |     |       |            |    |    |    |    |             |    |       |    |           |    |    |
| <i>Verruca stroemia</i> (O. Fr. Müller)     | ..         | .. | ×  | .. | ..  | ..    | ..         | .. | ×  | ×  | ×  | ×           | .. | ..    | ×  | ..        | .. | 6  |
| <i>Balanus balanus</i> (L.)                 | ..         | .. | .. | .. | ×   | ..    | ×          | .. | ×  | ×  | ×  | ×           | ×  | ..    | ×  | ×         | ×  | 10 |
| <b>ISOPODA:</b>                             |            |    |    |    |     |       |            |    |    |    |    |             |    |       |    |           |    |    |
| <i>Janiropsis breviremis</i> Sars           | ..         | .. | ×  | .. | ..  | ..    | ..         | .. | ×  | ×  | ×  | ×           | .. | ×     | ×  | ..        | .. | 7  |
| <i>Munna krøyeri</i> Goodsir                | ..         | .. | ×  | .. | ..  | ..    | ..         | .. | ×  | ×  | ×  | ×           | ×  | ..    | ×  | ..        | .. | 7  |
| <b>DECAPODA:</b>                            |            |    |    |    |     |       |            |    |    |    |    |             |    |       |    |           |    |    |
| <i>Eualus pusiolus</i> (Krøyer)             | ..         | ×  | .. | ×  | ..  | ..    | ..         | .. | .. | .. | .. | ×           | ×  | ..    | ×  | ×         | ×  | 7  |
| <i>Galathea nexa</i> Embleton               | ×          | ×  | .. | .. | ×   | ×     | ..         | .. | .. | .. | ×  | ×           | ×  | ×     | ×  | ×         | ×  | 11 |
| <i>Hyas coarctatus</i> Leach                | ×          | ×  | ×  | ×  | ×   | ..    | ×          | .. | .. | ×  | ×  | ×           | ×  | ..    | ×  | ×         | ×  | 13 |
| <i>Pandalus montagui</i> Leach (juvenile)   | ..         | .. | .. | .. | ..  | ..    | ..         | .. | .. | .. | .. | ..          | .. | ..    | .. | ..        | ×  | 1  |
| <b>ASTEROIDEA:</b>                          |            |    |    |    |     |       |            |    |    |    |    |             |    |       |    |           |    |    |
| <i>Asterias rubens</i> L.                   | ..         | .. | ×  | ×  | ..  | ..    | ×          | .. | .. | .. | ×  | ×           | .. | ..    | .. | ..        | .. | 5  |
| <b>OPHIUROIDEA:</b>                         |            |    |    |    |     |       |            |    |    |    |    |             |    |       |    |           |    |    |
| <i>Ophiopholis aculeata</i> (O. Fr. Müller) | ..         | .. | .. | .. | ..  | ..    | ..         | .. | ×  | ×  | ×  | ..          | ×  | ..    | ×  | ..        | .. | 5  |
| <i>Ophiura</i> sp. (juvenile)               | ..         | .. | .. | .. | ..  | ..    | ..         | .. | .. | .. | .. | ..          | .. | ..    | .. | ..        | ×  | 1  |
| <b>ASCIDIACEA:</b>                          |            |    |    |    |     |       |            |    |    |    |    |             |    |       |    |           |    |    |
| <i>Ascidia callosa</i> Stimpson             | ..         | .. | ×  | .. | ..  | ..    | ..         | .. | .. | .. | .. | ..          | .. | ..    | .. | ×         | .. | 2  |
| <i>Styela rustica</i> L.                    | ..         | .. | .. | ×  | ..  | ..    | ..         | .. | ×  | .. | .. | ×           | ×  | ..    | .. | ..        | .. | 4  |
| <b>PISCES:</b>                              |            |    |    |    |     |       |            |    |    |    |    |             |    |       |    |           |    |    |
| <i>Liparis montagui</i> (Donovan)           | ..         | .. | .. | .. | ..  | ..    | ..         | ×  | .. | .. | .. | ..          | .. | ..    | .. | ..        | .. | 1  |

\* also a few unidentifiable specimens

squirt *Styela rustica* L. Nudibranchs are an exception to this, as they were more common on the transects at the west and south coasts.

Several species were collected in 1974, which have not been recorded from Surtsey earlier. These are the common welk *Buccinum undatum* (L.), the prosobranch *Velutina velutina* (Möller) and the brittle-star *O. aculeata*.

Identification of the 1974 material has not been completed yet. Further analyses of the data are therefore premature. Thus the results of the sampling in 1974 cannot be compared with results from earlier samplings, at this stage. Treatment of the data in order to evaluate species association, faunal similarity, community structure, progression of the colonization and suc-

cessional stages, will have to wait for the time being.

The aim of the investigations at Surtsey has been to obtain information on the qualitative, as well as the quantitative aspects of colonization of subtidal substrates, but because of lack of suitable quantitative sampling methods for sublittoral fauna and flora on hard bottoms, most emphasis has been laid on the former aspect. At this stage of the investigations, a quantitative approach to the problem is highly needed, because of growing species diversity and complexity of the epifauna associations. Therefore, the aim of the marine biological research group is to fulfill this need by using a new quantitative photogrammetric method, described by Lundälv (1971).

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