

Preliminary Study of the Development of Population
of Marine Algae on Stones Transferred from
Surtsey to Heimaey 1965

by

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During the Surtsey Biology Conference held in May 1965 in Reykjavik it had been suggested that selected substrate from Surtsey be transferred to an adjacent region with a known flora in order to follow the development of possible algal population on such a substrate, and to study the factors on which colonization of marine algae depends.

This report describes preliminary experiments intended to throw light upon some of the factors governing the settlement and population of marine algae on virgin rock.

On the 3rd of June 1965 S. Jónsson and the writer transferred two stones (size approx. 10 x 20 cm) of different shape and physical nature, from the higher littoral zone on the north-east shore of Surtsey to Heimaey, the main island of Vestmannaeyjar. The stones were marked with chrome-yellow marine lacquer and thrown into the higher littoral zone at a relatively sheltered place called Urdir, south-east of the harbour in Heimaey. The rock adjacent to the site of the stones was also painted with arrows to simplify location of the stones for inspection. One of the stones (stone 1), which has an oval and smooth surface, landed in the lower littoral zone beside a large rock covered with *Acrosiphonia* and *Porphyra*. The second stone (stone 2), of irregular shape with large holes on the surface, landed in the upper littoral zone amongst prolific algal vegetation, of which the following algae and animals were observed: *Porphyra*, Barnacles, *Ascophyllum nodosum*, *Gigartina stellata*, *Ceramium acanthonotum*, *Rhodomenia palmata*, *Fucus inflatus*, *Acrosiphonia albescens*, *Ulva lactuca* and *Enteromorpha* species.

When examined on the 20th of July, about seven weeks later, no algae or animals were found on stone 1 in the lower littoral zone. Stone 2 in the higher littoral zone, however, was already populated by various species of Diatoms (mucilage of Schyzimena, Licmophora and Fragellaria) Uruspora mirabilis (fertile), young Ulva, young Acrosiphonia albescens, Rhodymenia palmata and by a fragment of Ceramium acanthonotum and Corallina officinalis. Young barnacles, sea-snails and worms were also found. Three months later, i.e. on the 8th of September, the Diatoms were still present on stone 2, particularly on its base. The Enteromorpha now covered half of the stone along with Ulva, Acrosiphonia albescens, young Fucus and Porphyra, which was affixed in the holes, and few specimens of Ceramium rubrum, Callithamnion and sterile Ectocarpus.

During the summer of 1965 no vegetation was established on the pebble shore of Surtsey from where the rock samples had been taken. The only vegetation encountered was found on firm substrate, on the west coast of the island (see S. Jónsson, this report).

It may be mentioned here that two additional stones (stone 3 with a smooth surface and stone 4 of irregular shape with large holes) were transferred to Reykjavik on the 3rd of June and placed on the beach west of Reykjavik on the 5th of June.

No algae were found during 1965 on stone 4, which had been placed in the lower littoral (Fucus serratus) zone, but green algae was observed on stone 3 in the upper littoral (Ascophyllum) zone, one month after the transference, or on the 6th of July. About a week later Ulva was found growing on this stone and a sea-snail was affixed on its base.

The algae found around stone 3 were Ascophyllum nodosum, Polysiphonia fastigiata, Enteromorpha, Fucus vesiculosus, Dictyosiphon, Acrosiphonia albescens, Ulva lactuca and Porphyra.

Although the stones studied were relatively "old" and newer rock from Surtsey should be studied and examined at shorter intervals, this preliminary study throws light upon two important

factors delaying the colonization of marine algae in Surtsey:

- (1) The distance of algal population from Surtsey (the nearest island, Geirfuglasker, is 4.4 km from Surtsey).
- (2) The extreme mobility of the substrate.

One of the special factors that opposed colonization of marine algae on Surtsey during great part of 1965 was the scouring action of the sea and the sand formed during the lava eruption (see S. Jónsson, this report).

This experiment also confirms what we observed in Surtsey (see S. Jónsson, this report) that diatoms and green filamentous algae are the first settlers on virgin substrate.

This preliminary study seems to indicate that the algal colonization is dependant on the seasonal variation and on certain competition between the species.