ABSTRACT

Goose Barnacles (Lepas spp.) on Surtsey Pumice

by

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During the years 1964-1966 one of us (A.I.) was engaged in a comparative study of the food and feeding habits of Icelandic gulls. In the course of this study it was found quite unexpectedly that goose barnacles (Lepas spp.) were an important food item in gulls collected in October/November 1965, at Sandvik on the Reykjanes Peninsula in S.W. Iceland. This was unexpected because at high latitudes goose barnacles rarely occur in sufficient abundance to become a likely food source of any importance for sea-birds. The percentage of gulls (all species lumped together) which had fed on goose barnacles increased until October 18, when it reaches the maximum of 70%, but after that the percentage quickly decreases. Although goose barnacles were among the chief foods taken by the gulls in the Sandvik area during the above period, they by no means confined themselves to this food item as they sometimes do when some foods (e.g. capelin (Mallotus villosus) or sandeel (Ammodytes lancea)) are present on a very large scale. In only 40% of the gulls that had fed on goose barnacles did they amount to half or more of the stomach contents.

The explanation of the unexpected quantity of goose barnacles in many of the gulls collected at Sandvik was not far to seek. The beaches on the South and West of the Reykjanes Peninsula were dotted with heaps of Surtsey pumice covered by vast quantities of goose barnacles. Their presence there can be accounted for as follows:

On November 14, 1963, a submarine volcanic eruption began off the Westman Islands, about 120 km (75 miles) to the southeast of Sandvik, and this gave rise to a new permanent island, Surtsey. In late May 1965 a second eruption began close to Surtsey, and soon another island of tephra rose from the sea (Syrtlingur). Later on a third island (Jólnir) was formed, but these two subsidiary crater islands disappeared again (see Thorarinsson, 1966, for an exact

chronology of events). The term "Surtsey pumice" is used here and elsewhere in this report for pumice produced during this whole period of submarine eruptions.

On October 27, 1965, we collected samples of pumice with goose barnacles that had been washed upon the shores of the Reykjanes Peninsula. Collections were made at four stations on the south side of the peninsula (Herdisarvik, Thorkötlustadabot, Arfadalsvik and Sandvik), and at one station on the west side (Stora-Sandvik). Three species of Lepas were found on the pumice samples. Lepas fascicularis was by far the most common species. Next in abundance was Lepas anatifera, while the third species, Lepas pectinata, was rare compared with the other two. This species had not previously been recorded in Iceland, but was now found at three of the five stations where collections were made. The material collected at Herdisarvik contained 7 specimens of L. pectinata, the material from Thorkötlustadabot contained 15 specimens, and the material from Arfavik 33 specimens of this species.

Unfortunately it is not known when pumice with goose barnacles began to drift onto the beaches of the Reykjanes Peninsula. No gulls were collected there during the summer and autumn of 1965 before October 8. And during the same period no search for pumice with goose barnacles was made along the shores of the peninsula. It may be mentioned, however, that during the winter of 1964-1965 no traces of goose barnacles were found in 87 gulls collected in the Sandvik area during the period October 5, 1964 - February 2, 1965. Neither were any traces of goose barnacles on pumice found on the shores of Stóra-Sandvik on March 9, 1966. However this may be, it is obvious that the great abundance of goose barnacles found on pumice in various parts of Reykjanes in the autumn of 1965 could not have reached maturity unless certain conditions were present simultaneously: Vast numbers of larvae of the species in question must have reached the waters off South Iceland at a time when very large quantities of floating pumice were available and when the temperature of the sea was exceptionally high. All these requirements were apparently fulfilled during the summer of 1965. The temperature of the sea off South Iceland was then well above the average, which

means that there must have been a strong influx of Atlantic water, probably carrying vast numbers of viable Lepas larvae into the areas of floating pumice off South Iceland. And in April, 1965, the Syrtlingur eruption began and throughout the summer this crater island produced ash and pumice at an average rate of 4 - 5 cubic yards per second.

The case of the pumice that was produced during the first months of the Surtsey eruption that began in the November of 1963 was quite different. This eruption occurred in the winter when the sea off the South coast of Iceland was not warm enough to enable Lepas larvae to survive and make use of the pumice that was available then. And at the beginning of April, 1964, or before the temperature of the sea off the Icelandic coasts had begun to rise again to any appreciable degree, the Surtsey eruption ceased to produce pumice. And as the summer of 1964 advanced the greater part of this pumice had either been washed upon the mainland shores or drifted away from the land to the open sea. Besides, the sea temperature was never as high in the summer of 1964 as in the summer of 1965. This must be the reason why no traces of goose barnacles were found in the stomachs of 87 gulls that were shot at Sandvik in the autumn of 1964 and the winter of 1964-1965.

The same is most likely true of the pumice that was produced by the Jólnir eruption that began at Christmas of 1965. This eruption, which produced a similar quantity of material as the Syrtlingur eruption, admittedly lasted until August 10, 1966, and therefore growth of goose barnacles on the pumice might have taken place that summer, too. Unfortunately, however, other work prevented us from making a study of this question then.

We can assume that every year larvae of the three Lepas species that were found on the Surtsey pumice in 1965 are carried to the South coast of Iceland, but their quantities most likely vary a great deal from one year to another. Normally, the greater part of this larva mass probably perishes owing to the absence of requisite living conditions. This is a good example of the enormous wastage of life which is characteristic of many invertebrates, their reproductive rate therefore being high to the same degree. Such

species can with impunity stand enormous setbacks and sacrifice countless millions of individuals in their search of favourable living conditions. It is because of these relatively aimless volleys of organisms that the Lepas larvae were able to make use of the Syrtlingur pumice in 1965 to the large extent indicated above. Then a volley of organisms scored a direct hit, a relatively rare occurrence. But in a direct connection with this fact the question arises if and to what extent volcanic eruptions and pumice production in past geological epochs may have contributed to the development and diversity of marine organisms depending on floating objects for their survival.