

AN EXPERIMENTAL INTRODUCTION OF PLANTS TO THE ANTARCTIC

By M. W. HOLDGATE

IN a recent check list of Antarctic flowering plants, Greene and Greene (1963) cite records of two alien grasses, *Poa annua* L. and *Poa pratensis* L., probably inadvertently imported by man to Deception Island. In a private communication S. W. Greene has informed me that the third alien plant record, of *Stellaria media* (L.) for Signy Island, South Orkney Islands, is invalidated by the discovery of a note in the station register stating that the plant in question was grown indoors in a pot of hyacinths, a fact not mentioned on the label attached to the plant.

In 1960-61 tufts of living *Poa pratensis* were found by Corte (1961) established at Cierva Cove, Hughes Bay, Danco Coast. The plants were growing in soil imported from Ushuaia in Tierra del Fuego in the 1954-55 season with six small trees of *Nothofagus pumilio* (Poepp. et Endl.) Krass and *N. antarctica* (Forst. f.) Derst. The trees are reported to have put out new shoots during that Antarctic summer but were all dead when re-examined in 1960-61. Around the dead trees Corte found the dead remains of an unidentifiable leguminous plant and of a fern, as well as the living *Poa*. The latter species had therefore maintained itself for six years and dead inflorescences showed that flowering had occurred in at least one season. In 1960-61 inflorescences again developed but seed was not set. Corte noted that the grass was growing in a favourable site, on imported soil and that it had failed to spread, and concluded that the lack of suitable local soils as well as the inability to set seed may limit the further colonization of Antarctic habitats by this species.

Corte's paper is the only published account of the successful establishment of alien phanerogamic plants on the Antarctic mainland. An earlier attempt at such an introduction to the South Orkney Islands by R. N. Rudmose Brown, who in 1904 sent seeds of 22 Arctic phanerogams to Scotia Bay, Laurie Island, is said to have failed completely, none of the plants germinating (Brown, 1912). A more casual sowing of "grass seeds" by the British Graham Land Expedition at the Argentine Islands in 1935 resulted in germination, but as far as is known it did not lead to the establishment of any species, even for a short period (British Graham Land Expedition, 1934-37, unpublished). The present paper is concerned with an experimental introduction of plants comparable in scope with those described by Rudmose Brown and Corte and intermediate in success between them. It has been compiled from unpublished records housed in the offices of the British Antarctic Survey.

IMPORTATION OF PLANTS TO GOUDIER ISLAND, PORT LOCKROY

On 11 December 1944, I. Mackenzie Lamb set up an experimental plot on Goudier Island, Port Lockroy (lat. 64°49'S., long. 63°30'W.) using four hundredweights of peaty soil imported from the Falkland Islands. The plot was sited on a north-facing slope against steep granodiorite rocks, to the east of the boat harbour (Fig. 1). Nine species of vascular plant brought from the Falkland Islands were "puddled in" in a normal horticultural manner (Fig. 2). Some Falkland Island lichens brought south at the same time were set out on stones and the whole plot was covered with wire netting to exclude birds.

Table I, which has been constructed from Lamb's diary, summarizes the available information about these plants over the period from their establishment until 16 January 1946. During the first summer Lamb recorded a great deficiency of precipitation; after their establishment on 11 December 1944, the plants experienced drought conditions until 23 December, when there was a slight snowfall barely sufficient to wet the ground, and thereafter until 19 January 1945, when Lamb himself watered them. The site chosen for the plot received no run-off from above and Lamb considered that this lack of constant summer water-supply militated heavily against the success of flowering plants in such an Antarctic environment. Furthermore, observations by G. J. Lockley revealed that the site was one of heavy winter snow accumulation and in the 1945-46 season it did not become snow-free until 16 December.

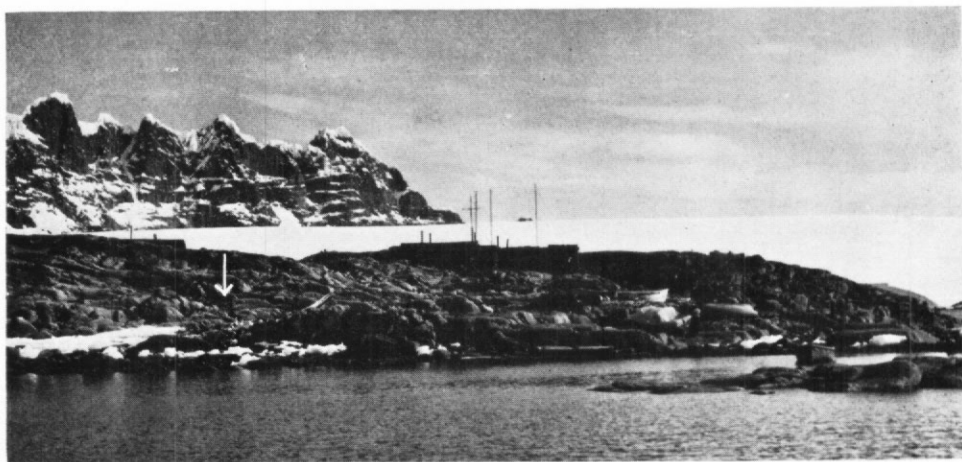


Fig. 1. Goudier Island, Port Lockroy, showing the site of the experimental garden (marked by the arrow).



Fig. 2. The experimental garden on 24 January 1945.

Ecological conditions were not ideal, therefore, and it is consequently noteworthy that the majority of species survived well during the summer of their introduction and that four species survived the ensuing winter, although only two were described as healthy during their second Antarctic summer. It is unfortunate that no records are available after January 1946, until January 1950, at which time none of the imported plants was to be found.

TABLE I. CONDITION OF IMPORTED FALKLAND ISLAND PLANTS AT PORT LOCKROY;
BETWEEN DECEMBER 1944 AND JANUARY 1946

<i>Species</i>	<i>Condition</i>			
	7 January 1945	28 January 1945	30 December 1945	16 January 1946
<i>Armeria macloviana</i>	apparently healthy	no record	healthy	healthy
<i>Azorella caespitosa</i>	apparently healthy	healthy	alive	apparently dying
<i>Baccharis magellanica</i>	apparently healthy	healthy, flowering	dead	dead
<i>Empetrum rubrum</i>	apparently healthy	healthy, with berries	alive	apparently dying
<i>Luzula</i> sp.	apparently healthy	healthy	dead	no record
<i>Pernettya pumila</i>	apparently healthy	dead or dying	dead	dead
<i>Taraxacum</i> sp.	apparently healthy	healthy	no record	healthy
<i>Blechnum tabulare</i>	somewhat unhealthy	dead or dying	mostly dead but with small green shoots	dead
<i>Blechnum penna-marina</i>	somewhat unhealthy	dead or dying	mostly dead but with small green shoots	dead

GERMINATION OF IMPORTED SEEDS AT PORT LOCKROY

The peaty soil imported by Lamb evidently contained seeds, and a number of seedlings appeared in the experimental plot during the first summer. Three seedlings also grew on the stony and shelly detritus between the hut and the boat harbour, thus proving that germination and early development could occur on local soil. In January 1946, G. J. Lockley successfully grew cabbage seedlings on this substratum. In the summer of 1950, J. H. Chaplin noted several small plants of uncertain provenance growing on local soil around the station and stated that they attained a moderate size. While these may have grown from seed imported in 1950, there is a possibility that they had lain dormant from an earlier year, surviving the period between February 1949 and January 1950, when the station was unoccupied.

DISCUSSION

The experiment carried out by Lamb is of considerable interest in demonstrating that some southern temperate zone plants can survive for at least a full year in the Antarctic. It must be emphasized on the one hand that these imported plants were favoured ecologically by being provided with temperate-zone soil. On the other hand, the site was not the best available in other respects. Summer drought is not a problem in many Antarctic regions, for example, on Signy Island where melt water in many places percolates throughout the season through extensive bryophyte mats. In such areas, furthermore, there is no shortage of apparently rich substrata. Excessive exposure and excessive snow cover can be avoided by careful choice of site in such regions. It is most desirable that experiments be made in such areas, and that the species selected for testing are such as have already displayed some degree

of cold tolerance by their colonization of a sub-Antarctic region such as South Georgia. Their experimental introduction would help to reveal whether adverse ecological conditions or barriers to dispersal are responsible for the floristic barrenness of the Antarctic. Such experiments must be rigorously controlled and the permanent establishment of imported aliens in a wider area must be prevented.

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