The Falkland Islands. Forestry. Tussock Grass

Author(s): W. Dallimore

Source: *Bulletin of Miscellaneous Information (Royal Botanic Gardens, Kew)*, Vol. 1919, No. 5 (1919), pp. 209-221

Published by: Springer on behalf of Royal Botanic Gardens, Kew

Stable URL: <http://www.jstor.org/stable/4107566>

Accessed: 27-06-2016 15:41 UTC

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ROYAL BOTANIC GARDENS, KEW.

BULLETIN
OF
MISCELLANEOUS INFORMATION.

No. 5]

[1919

XI.—THE FALKLAND ISLANDS.

FORESTRY.

TUSsock GRASS.

W. DALLIMORE.

The records of the Royal Botanic Gardens, Kew, indicate that on several occasions between 1842 and the present date correspondence has taken place between the Governor of the Falkland Islands and other individuals, the Colonial Office, and the Director of the Royal Botanic Gardens, Kew, respecting trees suitable for experimental planting in the Islands, and the advisability of planting the Falkland Islands Tussock Grass extensively in certain parts of the British Isles; therefore, in view of recent interest shown in the two subjects, the following notes have been prepared.

FORESTRY.

In order that the difficulties which beset the islanders when considering the establishment of trees may be understood, it is necessary to give a few details respecting the geographical position of the islands and the prevailing physical and climatic conditions.

* They are situated in the South Atlantic Ocean, between 51° and 53° S. lat., and between 57° and 62° W. lon., about 480 miles N.E. of Cape Horn, and about 1000 miles due south of Monte Video. They consist of East Falkland (area 3000 square miles), West Falkland (2300 square miles), and about 100 small islands, with an area of nearly 1200 square miles. The surface is undulated with Mount Adam, the highest ground, rising to 2315 ft. above the level of the sea. The entire country is wild moorland with outcrops of rocks and wide stone runs which litter large areas of the valleys with stones. Much of the soil is peat, often of a wet and boggy nature. In other places it is loam or clay, and in some instances peat overlies clay of such tenacity that natural drainage is almost impossible and the peat becomes semi-liquid. There are, however, areas

* Colonial Office List.

of fertile soil suitable for potatoes, cabbages, turnips, oats and other agricultural crops, whilst various vegetables, currants, gooseberries and raspberries can be grown in sheltered gardens. Oats rarely ripen but are grown as a green fodder crop. There is naturally a great shortage of lime in the soil and agricultural lime cannot be easily obtained from other countries to correct the acidity of sour soil. Occasional movements of bog land on the hills and mountains take place, and in several instances such movements have caused the inhabitants a good deal of inconvenience.* The only roads in the islands are in the neighbourhood of Port Stanley, communication between the various points being by sea or on horseback.

The climate is severe but healthy, except for those predisposed to pulmonary affections. It is uniformly cold, the mean temperature being 42° Fahr. The thermometer ranges between 20° and 50° in winter, and between 40° and 65° in summer. The cold is intensified by constant high winds which prevail, especially in the summer, rising about 10 a.m. and falling away between 4 and 5 p.m. The annual rainfall seldom exceeds 25 in., though there are a good many wet or damp days, the number ranging between 220 and 240 a year. In the summer the atmosphere is remarkably dry, and evaporation is rapid. The population in 1915 was 3451,† the majority of the people being engaged in sheep farming or in seafaring industries.

The flora consists of herbaceous plants and shrubs. The largest bush is *Veronica elliptica*. A few plants approaching 7 ft. in height have been recorded from West Falkland, otherwise its average height is from 3 to 5 ft. *Chiliodendron amelloideum* (Fachina), grows 3 to 4 ft. high and *Myrtus nummularia* is also prominent. The commonest shrub is the "Diddle-dee" (*Empetrum nigrum* var. *rubrum*), which is found from a prostrate plant to dense, rounded bushes 1 to 2 ft. high. A few of the other low-growing shrubs are *Pernettya empetrifolia* (*P. pumila*), *Gaultheria microphylla*, *Baccharis magellanica*, and *Veronica serpyllifolia*. *Poa flabellata*, Hook. f., the "Tussock" or "Tussac" Grass, a large-growing perennial at one time the most prominent feature of the shores but now scarce on the larger islands, is a valuable fodder plant, otherwise the natural vegetation is poor as fodder, and only carries one sheep to four acres.

The chief difficulties to encounter in forestry operations appear to be wind, wet, sour and badly drained ground, and apathy or lack of initiative and knowledge on the part of the inhabitants. But considering the difficulties that have been surmounted in other countries where successful forests have been established under what were equally disheartening conditions, there appears to be no good reason why the subject should not be given a proper trial, for in a place where natural trees do not exist, the establishment of woods of even moderate growth would be of great benefit to the islanders both from the shelter they would afford, and as a source of firewood and timber for fencing.

The general amenities of the Islands would also be much

* Kew Correspondence.

† Whitaker's Almanack, 1917.

improved should successful forests be established. From the time when the earliest emigrants entered the country the absence of trees appears to have made the greatest impression upon newcomers, and from the middle of last century successive Governors and a few of the more progressive settlers have considered the possibility of establishing trees either for ornament or profit. Planting schemes, usually of a very half-hearted character, have been suggested from time to time, but, whether from apathy, lack of general sympathy, or the disinclination to risk money on a project that could only be considered in the light of an experiment, they have not materialised, and the introduction of young trees or tree seeds has not gone beyond the individual efforts of a few settlers and a few attempts by Government officials to procure trees and shrubs for the garden at Government House. Unfortunately in the few efforts that have been made the persons interested have not possessed sufficient technical knowledge to enable them to give the young trees the special attention necessary to enable them to overcome the unfavourable conditions which prevail, neither have they made proper reports upon the behaviour of the various species tried, therefore the position has not altered from what it was when Col. Moody, the first Lieut.-Governor of the Islands, took office in 1842.

During that year the Ross Expedition wintered in the Islands and the Governor apparently became interested in plant life partly through the enthusiasm of Dr. (Sir Joseph) Hooker, one of the officers of the expedition. The first information we possess of trees and shrubs being introduced into the Islands is a *despatch from Governor Moody to Lord Stanley at the Colonial Office, dated 16th November, 1842, advising him that the Antarctic Expedition (Captain Ross) returning from St. Martin's Cove, Cape Horn, brought to the Colony 700 young trees, chiefly winter barks, beeches, and holly-leaved berberies, &c., and that the trees were immediately planted with hopes that they might succeed. We know nothing of the fate of those trees save that on 1st February, 1844, the Governor, in a letter to Sir William Hooker, reported that the elder trees and the Antarctic beeches in the graveyard were doing well.

The next information we have of trees and shrubs being sent to the Falklands is a list of plants forwarded from Kew on 27th December, 1848. The plants were:—*Arbutus Unedo*, *Aucuba japonica*, *Berberis Aquifolium*, *Betula alba* 2, *Buxus sempervirens* 2, *Colutea arborescens*, *Crataegus orientalis*, *C. Oxyacantha*, *Cytisus albus*, *C. scoparius* 2, *Elaeagnus orientalis* 2, *Euonymus japonicus*, *Fagus sylvatica*, *Garrya elliptica*, *Hedera Helix*, *Hippophae salicifolia* 2, *Ilex Aquifolium*, *Laburnum vulgare*, *Ligustrum vulgare*, *Picea alba*, *Pinus Laricio* 2, *P. montana* var. *Mughus* 2, *P. Pinaster* 2, *P. rigida* 2, *P. sylvestris* 4, *Platanus*? [*Ulmus*] *campestris*, *Platanus orientalis*, *Prunus Laurocerasus*, *P. lusitanica*, *Quercus pedunculata*, *Q. sessiliflora*, *Q. sp.*, *Ribes alpinum* 2, *R. aureum*, *R. Menziesii*, *R. nigrum* 2, *R. sanguineum*, *Rosa sp.*, *Salix Caprea*,

* Information respecting the Falkland Islands. Chas. Knight, 1843.

S. lanigera? *Spartium junceum*, *Spiraea Lindleyana*, *Syringa vulgaris*, *Taxus baccata*, *T. b.* var. *fastigiata*, *Thuya occidentalis*, *Tilia* sp., *Ulex europaeus* 4, *Vinca major*, *V. minor* and the following fruits:—Currant, white 6, Currant, red 6. Gooseberry 6 varieties, 12 plants, Raspberry, double bearing 6, R., Yellow Globe, 6, R., Fastolff 6, Blackberry (*Rubus fruticosus*). Whether these plants arrived safely and became established is unknown, but it appears likely that the plants of *Ulex europaeus* may have been the parents of the numerous Gorse plants now present in the Islands. The Laburnum is still to be found in one or two places.

Their introduction does not appear to have made much difference to the general aspect of the Islands, for in 1870 the Governor, Col. G. D'Arcy, wrote on 2nd May to Sir Joseph Hooker that "the people of the settlement are very industrious and very anxious to help themselves by raising vegetables, but the wind actually blows the seed out of the ground," and asking whether in his wide experience he could suggest any hardy tree or bush to make a fence. He added, "there is not a tree or bush on the islands of any kind." He had apparently overlooked the Veronica, and Sir J. Hooker suggested that he should try that.

In 1886, Mr. Arthur Barkly, recently returned from the Seychelles, relieved Governor Kerr for a year. After the luxuriant plant growth of those islands he was unfavourably impressed by the bareness of the Falklands, and during his term of office wrote to Kew for seeds or roots of any hardy bushes or shrubs that would be likely to thrive; he thought that they might be expected to grow 12 or 15 ft. high, and that evergreen bushes would greatly improve the appearance of the country. It is not very clear whether seeds were sent on this occasion but on 10th June, 1891, a letter was received at Kew from the Colonial Office saying that the Government of the Falkland Islands wished for a small supply of seeds and plants, and asking for the advice of the Director as to selection and packing. Seeds for indoor and outdoor cultivation were obtained from Messrs. Sutton and included Palms, Crotons, Caladiums, Magnolias, Laurestinus, Azalea, Arbutus, Roses and Hardy Ferns. A more comprehensive list of plants was sent, however, with the approximate price, apparently, for approval, but it appears to have been rejected on account of expense. The Governor, however, was determined to procure seeds, and the Colonial Secretary of the Falklands on his return home in 1891 was requested to approach Dr. (Sir Daniel) Morris regarding plants or seeds. In the end it was decided that an amount not exceeding £10 should be spent on seeds and plants, the amount to include packing. The order was executed by Messrs. Veitch, of Chelsea, and seeds of a variety of trees, including Pines, Birches, Poplars, etc., were sent on 17th January, 1893.

In 1893 Mr. Edward Rawlings wrote to Kew for advice respecting *Pinus insignis*, as his nephew, Mr. R. E. Nichol, was desirous of attempting a plantation in the Falkland Islands.

About 25 or 30 years ago Mr. Robert Blake, a prominent sheep farmer in the Falklands and now a Director of the Falk-

land Islands Company, made what was probably the most determined attempt that has yet been undertaken to establish a plantation of trees in the Islands. Unfortunately he left the Islands in 1898 and was thus unable to give the young trees personal attention. They, however, made fairly good progress and some reached the height of 30 ft. A few years ago they were reported to have lost their heads as soon as they rose above their shelter.* Mr. Blake, in giving Kew the benefit of his experience, writes: "I may be optimistic but I honestly believe many places in the Falklands could be planted with trees and that they would flourish. It must always be remembered in those latitudes that the further west one travels the warmer the climate and that the north coast of the Islands is warmer than the southern shores. This, no doubt, is accounted for by the cold current which runs continuously from west to east, passing south of the Islands; this is not felt on the northern coasts. I fear the situation of Port Stanley is not at all suitable for tree raising experiments. I think, therefore, in making experiments these should be carried out on the north coast of the West Island. Native bushes like the *Fachina*, *Veronica* and *Diddle-dee* grow far larger in the north of the West Island, also there is a marked difference in some of the grasses and herbs, all going to show that the climate on the west is milder than on the east. . . . In *Tierra del Fuego*, with a climate far more rigorous than ours, bushes and trees grow freely. I have been able to bring a few of these bushes to the Islands—the Antarctic Beech (*Nothofagus* spp.), a kind of Laurel (*Laurelia serrata*), and Califate (*Berberis buxifolia*)—they grow freely at Hill Cove, on the West Island. My first experiment was taking out some small Austrian Pines. Many survived the voyage and grew quite well, then I tried seeds of Austrian and Scots Pines and had no difficulty with them. I transplanted several hundreds when they were about 6 in. high in 1898 [apparently the trees mentioned by Skottsberg] when I came home, but my manager took more interest in breaking land for hay and green corn crops than in my hobby. . . . I tried in 1914 to engage a man who would be capable of carrying out experiments for me in the Islands but without success; what is needed is a good nurseryman, one accustomed to raising trees from seed, and a man who would know when and how to transplant. . . . There are no men in the Islands with knowledge of the craft, and again it is so long before there are any tangible results. . . . Ground must be prepared by ploughing and the rubbish must be cleared off. The soil in the best ground is a mass of roots, and to insure some measure of success the experiments should be made on a fairly large scale, ploughing and cleaning the ground is a laborious process and people in the Falklands are hardly in a position to sink the required capital. I don't think there would be much trouble over wind-breaks if suitable ground were selected in the valleys, but I doubt if any good results would be obtained by planting on the ridges where hard clay is generally found 6 or 9 in. below the surface. Gorse

* Carl Skottsberg, *A Botanical Survey of the Falkland Islands, 1907-1909.*

makes a good wind-break and grows freely, but the bushes I mentioned as coming from Tierra del Fuego would be better, and there is a kind of Poplar whose leaf on the underside is a silvery colour; this grows like a weed. The original plant was in Government House Gardens and I obtained a slip or two in Governor Kerr's time. Willows grow freely."

In January, 1911, suggestions for tree planting in the Falklands were made by Kew on behalf of Mr. E. P. Cotton, and within the last few months advice has again been sought.

From the foregoing notes it is plain that with the exception of the work carried out by Mr. Blake no real effort has been made to establish trees in the Falkland Islands under forest conditions and that the trees planted in gardens have apparently survived only so long as they were well sheltered. Therefore, although many of the introduced trees seem to have disappeared within a few years, it has yet to be found out whether trees planted in large enough blocks to afford one another shelter will succeed. With this in view the following suggestions have been made.

In any attempt that may be made to establish trees in the Islands, the authorities must be prepared for a good deal of experimental work and many disappointments before they can entertain an idea of establishing a successful forest area or be certain of the impossibility of such an object. Unfortunately there are no native trees to guide them in the selection of likely subjects for forest work, whilst soil and climate are very indifferent. Wind and the comparative scarcity of natural shelter appear to be the chief difficulties standing in the way of any attempt to establish trees in the Islands. In addition, cold and wet soil, often of a sour, peaty nature, and a comparatively low maximum temperature, all of which are more or less detrimental to tree growth, have to be faced. On the other hand, the absence of severe frost and the fact that several European trees have grown well until they reached the top of their shelter are favourable signs, and it is an encouraging fact that the European Gorse or Furze attains its maximum height in the Islands and that a Poplar and Willows thrive. This proves that, given shelter, the soil conditions can be adapted for the successful growth of certain exotic trees and in any future operations that may be contemplated provision should be made for planting the trees in large blocks, for the greater the depth of a plantation the taller the trees are likely to grow. In small woods planted in exposed places, practically all the trees are exposed and stunted, whereas in a wider area each succeeding rank of trees grows a little taller than the one immediately in front until finally well-developed specimens are obtained. For experimental purposes at least 50 acres in not more than three areas should be planted, provision being made for their proper upkeep for at least ten years. The most suitable position would probably be found in the valleys of the West Island. At the end of ten years it would be possible to form a fairly accurate idea as to whether tree planting upon a more extended scale was justifiable and likely to be of benefit

to the islanders, or whether the project was doomed to failure. In any case, if proper records were kept, the experiment would be of considerable value in the event of future operations of the same nature being suggested.

In order that any experiments that may be contemplated should not fail through want of proper attention to details, it is desirable that an intelligent man should be appointed who would be able to give his whole time to the work and be able to keep proper records. A young man with practical knowledge of forest work at a high elevation in the West Highlands of Scotland or on the mountains of Wales would be desirable, more particularly a man who was capable of training youths in all kinds of practical work, *i.e.*, seed sowing, nursery planting, permanent planting, preparing ground, fencing, draining, road-making, &c.

The provision of shelter appears to be the key to successful tree planting in the Falklands for, given shelter from wind, other conditions of climate and soil can be met. The only native plant that can be depended upon for shelter is *Veronica elliptica*, and the maximum height of that plant is barely 7 ft. For shelter purposes the height may be taken as from 4 to 5 ft. There are other native shrubby plants growing from 1 to 4 ft. high which may also be of some value for certain places. Fortunately the common Gorse grows well in the Islands. It is a good shelter plant and in addition to being used for hedges, seed might be sown over land to be planted with trees two or three years in advance of the trees. Land that is already covered with Gorse could be dealt with immediately. In addition, various subjects such as those mentioned by Mr. Blake might be procured from Tierra del Fuego. Round the outskirts of a plantation a belt of Gorse or *Veronica* as dense as possible should be formed. The accompanying photograph gives a good idea of the value of Gorse as a hedge plant for the Falklands. The outer belt for a plantation should be 6 or 8 ft. wide, or perhaps a little wider on the side of the prevailing wind. Behind this the shelter plants should be thin enough to allow of trees being planted 3 ft. apart. This distance is approximate, and it may be found advisable to have small groups of shelter plants with young trees in between or even parallel, narrow hedges 12 to 20 ft. apart. In no case, however, ought the shelter plants to be allowed to form large gaps amongst the trees. They are simply to protect the young trees for a few years, afterwards they must provide their own shelter, which they are best able to do by forming a dense mass of branches. It is not advisable to form a straight boundary line to a plantation, an undulating outline often forming a better wind-break in addition to presenting a better appearance.

In places where the soil is naturally of a loamy or sandy nature and is naturally drained, it can be prepared for planting with little trouble. If clear of bushes it may be ploughed or turned over by some other means, but when bushes exist the intervening spaces should be dug, removing at the same time any plants not required for shelter. When the ground is naturally wet, open drains, 15 in. wide and 1½ to 2 ft. deep,

or wider and deeper if necessary, should be dug at intervals of from 12 to 20 ft., parallel with the natural slope of the land. In the case of wet and sour peat, drains should be opened about 6 ft. apart. They should be 15 in. wide and 15 to 18 in. deep, the peat being removed in large blocks and laid upside down on the margins of the drains to sweeten; occasional wider and deeper drains may be required. From 4 to 6 months afterwards, a young tree may be planted in the centre of each turf, taking care to pulverize the soil well as it is replaced about the roots. A little basic slag may be mixed with the soil at the time. By the time the young trees have filled the upturned and inverted sod with roots, the upper or drained portion of the peat bed will have become sufficiently sweetened by drainage and the admission of air for the roots to enter. When cutting drains and arranging planting positions in this way the men should work in pairs, otherwise, for convenience, they are inclined to cut the peat out in small sections which are unsuitable for the subsequent reception of plants. As a rule the turves are so arranged that the plants can be placed about 3 ft. apart. Vacancies caused by the death of young trees must be filled at an early opportunity. Should a hard pan of clay or gravel occur a little below the surface of the ground it must be broken up during the preparatory work.

All ground that is to be planted with trees must be provided with a sheep- and rabbit-proof fence, otherwise the young trees will probably be eaten off soon after they are planted.

An acre or two of ground in a favourably situated part of the area selected for planting should be set apart for a nursery. The ground must be trenched, manured, and properly cultivated. Any ground not required for immediate use might be planted with potatoes, turnips or some other crop. Shelter must be provided by a wall or by a good hedge of Veronica, Gorse or some other subject; one or two cross hedges would also be an advantage. The seeds should be sown in beds 4 ft. wide and any convenient length, separated by paths 15 in. wide, advantage being taken of the earliest dry days of spring to carry out the work. When the young plants are about 3 in. high they must be transplanted into nursery lines 12 in. apart and 2 to 4 in. between the plants. In this position they will remain until 6 or 9 in. high. Any trees that can be increased by cuttings, such as Willows or Poplars, may be started in the nursery or in the places the trees are to occupy. Stock plants ought, however, to be kept for cuttings so that trees in permanent positions could be left untouched.

When the young trees are from 6-9 in. high they should be placed in permanent positions and spaced from 3-4 ft. apart, according to the nature of the soil and the species. They must be lifted carefully so that all the roots are preserved, and during planting, if the ground has not been previously worked, care must be taken to make the holes wide enough to allow the roots to spread out to their full extent. Care must also be taken to keep the upper roots near the surface of the soil. Early autumn and spring are the best times for planting trees. Probably autumn

will be the most satisfactory time for the Falklands as the winds are stated to be at the worst in spring.

On account of the peculiar conditions prevailing in the Islands it is probable that evergreen coniferous trees will prove more successful than deciduous, broad-leaved trees, and for general planting, particularly on the wetter ground, it is likely that the most appropriate tree of all will be *Picea sitchensis*, followed by *Picea Engelmanni* and *Picea alba*. The two former are natives of Western N. America and the latter of Eastern N. America. For well-drained land *Pinus Banksiana* from N. America, *P. contorta* var. *Murrayana* from Western N. America and the European *Pinus Cembra* and *Pinus sylvestris* might be tried. As a shelter tree for the outskirts of plantations a trial should be made of the Austrian Pine (*Pinus Laricio* var. *nigricans*). This is an excellent shelter tree although its timber is not of good quality. Other Conifers such as *Cupressus nootkatensis*, *Cupressus macrocarpa*, *Thuja plicata*, and *Araucaria imbricata* are worth a trial.

Amongst broad-leaved trees the most likely ones to succeed are Birches, Alders, Willows, Poplars and the Antarctic Beeches. Of the Birches the form of *Betula alba*, known as *pubescens*, and the N. American *B. occidentalis* and *B. papyrifera* should be tried. The most suitable Alders are *Alnus glutinosa*, and *A. incana*, both European trees adapted for wet ground. Of the tree Willows *Salix alba*, *S. coerulea*, *S. fragilis* and *S. viridis* are suitable, whilst of basket-making Willows *S. triandra*, *S. viminalis*, *S. purpurea* and *S. rubra* might be tried. Poplars should be represented by *P. Eugenei*, *P. serotina*, *P. canescens*, and *P. trichocarpa*. The Sycamore, *Acer Pseudoplatanus*, and the Antarctic Beeches from Tierra del Fuego are also worth attention. For shelter and ornament the following small trees and shrubs may be tried. *Ligustrum ovalifolium*, *L. vulgare*, *Tamarix* in variety, *Sambucus nigra*, the stronger-growing New Zealand Veronicas, *Hippophae rhamnoides*, *Escallonia macrantha*, *Pyrus Aucuparia*, *P. Aria*, *P. intermedia*, *Berberis Darwinii*, *B. Aquifolium*, *Rhododendron ponticum*, *R. catawbiense*, *Olearia Haastii*, *Calluna vulgaris*, and *Cytisus scoparius*.

To conduct anything like an exhaustive experiment with trees planted under forest conditions will entail some considerable expense, but that cannot be avoided, and in a letter to Kew, dated 14th April, 1919, Mr. Blake says that he is willing to undertake the preparation of all the land required for such an experiment providing an expert man is provided to control the work.

It is to be hoped that the Government of the Falkland Islands may find itself in a position to accept Mr. Blake's interesting offer, as the proper preparation of the ground, which is a matter of considerable expense, is of prime importance, and such an experiment should certainly be made.

TUSSOCK GRASS OR TUSSAC GRASS.

Poa flabellata, Hook. f., the Tussock or Tussac Grass, is one of the most interesting plants of the Falkland Islands. It is

a perennial and forms large clumps or masses rising to a height of 7 ft. with long, arching leaves which possess valuable feeding properties and are greedily eaten by horses, cattle and sheep. The bases of the leaves, stem and rootstock are sweet, with a nutty flavour, and offer such a temptation to horses and cattle that when allowed free access to the plants they almost invariably kill them by eating them to the ground line. Sections of the stems cut into small pieces and prepared in various ways are also eaten by the inhabitants, whilst one of the early Governors of the Islands records that two deserters from an American ship kept themselves alive for 14 months by eating the stems.

Attention was originally directed to the plant by Col. Moody, the first Lieut.-Governor of the Falklands, in 1842, in a despatch to Lord Stanley at the Colonial Office. During the same year the Antarctic Expedition under Sir James Clark Ross wintered in the Islands and Dr. Hooker paid a good deal of attention to the grass, sending home a description and apparently seeds to his father, Sir William Hooker, at Kew, who, in turn, read a paper on the plant before the Geological Society in November, 1842. From that time onwards for several years Governor Moody continued to direct the attention of the Colonial Office to the value of the grass as a fodder plant and strongly recommended on several occasions that experiments should be made with it on the exposed shores of the islands on the coast of Scotland, suggesting that one of the small islands of the Orkneys, such as Hunda, should be given up for the purpose. He further recommended that a man should be sent out to study the plant and collect seeds.

In 1844 Governor Moody reported to Lord Stanley that a settler, Jergen Christian Detleff, had a parcel of 6 lbs. of Tussac seed for sale, which he was desirous of sending to England and for which he expected not less than £2 10s. a pound, but for a large quantity he would probably accept a less price per pound. In this report the Governor very strongly recommended that the grass should be given an extensive trial in Britain, and on 1st February, 1844, in a letter to Sir W. Hooker, he advised the despatch of a quantity of seed for Kew, enclosed with a larger amount to Lord Stanley at the Colonial Office, with a quantity from a settler on speculation for sale. This seed appears to have been widely distributed, and there is evidence that within a few months plants were growing at Kew, Glasnevin, Clonbrenny in County Meath and in the Island of Lewis. It is only in the latter place, however, that there is any reason to suppose that it was planted as a farm crop. The seed was sent to Lewis by Mr. (afterwards Sir James) Matheson, then a Member of Parliament, and the cultivation of the grass was undertaken by Mr. Scobie. Writing to Mr. Matheson in 1849, Mr. Scobie reported "The seeds which you sent me in 1844 were sown the following spring in various parts of the islands, viz., Coll, Holm, Linshader, Golson, &c.; of all these the two former were the only places where this valuable grass appeared, and of these two Holm was the most successful and vigorous, being sown in a square plot of deep, brown moss of

medium dryness close to the sea." About this time Lewis-grown seed appears to have germinated fairly well and all spare seed was sent to Messrs. Lawson of Edinburgh. The only sample in the Kew Museums was procured from that firm and was from the 1850 crop. Some years later when seeds were required to send to Australia there was a difficulty in obtaining them fully developed or fertile. On several occasions between 1850 and 1888 plants were sent from Stornoway to Kew for distribution to other places. In 1888, however, the farm-grown plants had disappeared from Lewis owing to the apathy of the farmers and their objection to planting a grass that required cultivation and could only be fed to stock in a cut state, through the animals killing the plant when allowed to graze upon land where it was planted. The plants obtained in 1888 were from the private garden of Sir James Matheson at Stornoway, and some were sent to Prof. Hartog at Cork, who reported the following year that the grass was doing well on drained bog at Dunmanway. In 1889 Prof. Hartog received seeds direct from the Falkland Islands which seem to have grown well in Ireland. He sent seeds to Kew and other places which do not appear to have caused later comment. As a matter of fact the grass does not grow well at Kew; it never becomes vigorous and soon dies out. It apparently must have a comparatively cool climate and a peaty soil. As Mr. Scobie attained a greater degree of success than any other planter in Britain so far as records show, it may be advisable to quote his remarks regarding the behaviour of the grass in Lewis. He says: "The seed was sown in a square plot of deep brown moss of medium dryness close to the sea. The moss, scarcely yielding anything previous to its being turned over and enclosed, was delved and cut into small pieces with the spade, and the seeds sprinkled in and roughly covered with a rake, and trampled at the same time with the feet. The second year the stools were almost as strong as the third, though it is allowed this grass only attains maturity the third year, it cast seed the second and third years. Three acres were delved over, of the same deep moss, in spring, 1847, to the depth of 12 in., and after it was packed with a hoe, a sprinkling of guano applied, and single plants dibbled in 3 ft. 4 in. apart. The whole of this prepared moss is drained 3 ft. deep and 20 ft. apart, being moss drains. . . . I think the moss for the Tussac should be delved over in January, and a light spading of moss thrown over the surface, out of the bottom of the trench, to keep out the sun from drying-up the moss too much. February March and April are most advisable for planting, May and June having proved too late and dry. Plants supplied with seaweed manure are greener in the leaf and thriving better than the rest. Some failure occurred from wet rising from below in the moss, and also from imperfect drainage, and from drought, the peat being liable to become very hard in summer. Seaweed spread over the surface of the ground in summer is an advantage."

According to a Kew record dated 1877,* the plants on Sir

* Kew Report, 1877, p. 21.

James Matheson's land in the Hebrides had for some time suffered from the attacks of a coleopterous larva. By the same note we find that Sir Joseph Hooker had by that time modified his views regarding the general value of the grass, for he says: "I have expressed my doubts as to the plant being really adapted for pasture purposes. The Tussocks are only formed slowly, and would be soon destroyed by cattle, and the plant consequently exterminated."

Within the last few years recommendations have been made that the grass should be widely planted in the colder and more exposed parts of Britain, but before undertaking experiments, intending cultivators would be well advised to take advantage of the experience gained from previous experiments, and to remember that the plant can only be grown successfully in positions near the sea, and on properly drained and cultivated ground. Moreover, the leaves must be cut and fed to cattle, for if cattle are allowed free access to the plants they are invariably killed by the animals eating the bases. It must also be remembered that the grass has not come up to expectations in the past, either here or in the Falklands, where in 1844 it was referred to as the Golden Glory of the Falkland Islands.*

There appears to have been some disagreement as to the date of introduction of Tussock Grass into the British Isles. The Ross Expedition has been credited with its introduction in 1842, and another date is given as 1844. The matter appears to be settled in "Life and Letters of Sir J. D. Hooker," i. p. 130. Answering a letter to Sir J. Ross in November, 1844, Sir Joseph wrote: "I am delighted to hear that some of the old Tussac vegetated, as everyone has said that our expedition seed all failed. It is quite a triumph to me, I can assure you, as now the expedition was the first to introduce the grass. I have 11 plants in my bedroom, growing very slowly, and there are a great many in the garden." This evidence is, however, discredited by a later letter written to Sir J. Ross on 1st September, 1845, for Sir Joseph wrote: "your excellent brother's plant of Tussac flowered with us and turned out to be the British *Dactylis glomerata*, to our shame and confusion at Kew. . . . The fact is that we have only lately procured seeds and raised young plants of the true Tussac." This suggests that the first plants were raised from seeds sent by Governor Moody in 1844.

For an exhaustive account of the introduction to, and experimental planting of Tussock Grass in Britain, the Journal of the Royal Agricultural Society, 1842-1850, should be consulted.

EXPLANATION OF PLATES.

Plate IV.—The homestead surrounded by Gorse hedges some 6 ft. or 8 ft. high. The crop being cut is green oats for hay. The house stands about 80 ft. above sea level. All the land under oats is suitable for tree-growing. The hill in the distance rises to 2000 ft.

* A Report on the capabilities of the Falkland Islands.

[*To face page 220.*

FIG. 1.

FIG. 2.

V

To face page 221.]

Plate V., Fig. 1.—A crop of oats with potatoes in the foreground close to the fence.

Fig. 2.—The same batch of oats seen in Fig. 1. The fence and potatoes being on the right of the photograph. The ground is all ploughed down to the beach.

XII.—DECADES KEWENSES

PLANTARUM NOVARUM IN HERBARIO HORTI REGII CONSERVATARUM.

DECADES XCII. & XCIII.

911. *Aconitum funiculare*, Stapf [Ranunculaceae-Helleboreae]; inter species sectionis *Napelli* tuberibus hornotinis pluribus funicularibus insigne.

Tubera (in specimine unico viso) 5; unum annotinum, caetera hornotina, omnia cylindrica, basin versus attenuata, tota longitudine radices secundarias circiter 1 cm. distantes emittens, 3-9 cm. longa, 2-5 mm. diametro, viva pallide fusca, fractura nivea amylacea, sapore tolerabili; cambium cylindrum centrale tenuissimum formans. *Gemmae* tuborum breviter conicae, 3-5 mm. altae. *Caulis* erectus, 4-5 dm. altus, gracilis, pilis reversis crispo-pubescentibus vel superne tomentellus. *Folia* infrafloralia sub anthesi 2, caetera 4 ramulos unifloros (vel si mavis pedicellos) suffulgentia, sensim reducta, illa ambitu reniformia, circiter 3 cm. alta, 6 cm. lata, sinu lato, 5-pedato-partita, carnosula, utrinque sparse minute pilosula, segmentis cuneatis interioribus 3-lobatis extimis 2-lobatis, lobis late linearibus vel linearilanceolatis acutis; petiolus infimus 5 cm. longus, folii floralis infimi brevissimus, omnes parce minute pubescentes. *Racemus* pauciflorus; pedicelli distantes, 10-6 cm. longi, pube eadem ac caulis induti, medio 2-bracteolati, bracteolis integris lineare-lanceolatis, pedicellis superioribus ad 1.5 cm. longis. *Sepala* pubescentia, decidua, summum galeiforme; galea erecta, apice depressa et in rostrum breve subacutum horizontaliter producta, ad 2 cm. alta, superne 1 cm. lata (a latere visa) lilacina, rostro virescente; sepala lateralibus oblique rotundato-obovata, vix unguiculata, 1.3-1.4 cm. diametro, cum galea contigua, superne pallide, inferne magis saturate lilacina, supra medium viridimaculata; sepala inferiora elliptica, subacuta, circiter 1 cm. longa, virescentia vel virescentia. *Nectariorum* ungues in galea recte ascendentes, apice prorsus curvati, 1.4-1.8 cm. longi, summo parce pilosuli, mitella latissima suborbiculari dorso vix gibbosa, glandula terminali lata viridi vel violacea, labio lato integro obtusissimo recurvo albido. *Filamenta* glabra, a medio basin versus alata pallida, supra intense coerulea. *Carpella* 5, subcontigua, patule pubescentia, apice abrupte contracta; styli 2 mm. longi.

BHOTAN, *Cooper* 3586.

The affinity of this new Aconite lies probably with *A. Hookeri*, Stapf, with which it has much in common, as to the general structure of the tubers, the facies of the leaves and the inflorescences.