

3. Geography and climate

§ a. The Islands

The Islands are an archipelago of 782 islands situated between the parallels of 51° and 52° 45' South and the meridians of 57° 20' and 61° 46' West. The land is generally low, flat and undulating, but rises in various places to 705m particularly in the western and northern mountains. 'The Islands owe their existence to the folding movements of the sedimentary rocks in the Palaeozoic and Mesozoic eras.'¹ A large area in the southern part of East Falkland - known as Lafonia - is the only substantial open/rolling countryside in the Islands, and all of this land is less than 90m above sea level.

The Islands are located approximately 500km north-east from the coast of South America - the nearest point being the island of Tierra del Fuego. From east to west the Islands cover a distance of 240km and from north to south they cover a distance of 150km. The approximate land area of the Islands is 12,200 km² (1.2M ha). The Islands vary enormously in size, but only two of them are of any size - East and West Falkland respectively - which occupy 77% of the land area. Falkland Sound separates the two main islands and is 13 km wide at its widest point.

The geological evidence found in the Islands suggests that approximately 400 million years ago the Islands were part of the giant supercontinent of Gondwana. The Islands were adjacent to the south-east coastline of what would become Africa, and part of what would eventually become Antarctica. By approximately 200 million years ago Gondwana began to split apart as plate tectonics began to break up the supercontinent. The Islands broke away from Africa and gradually twisted round - eventually rotating 180°. By about 150 million years ago the Islands were pushed into the margins of the South American continent.

The surface soil of the Falklands is predominantly peat overlaying a mixture of clay, shale, sandstone and quartzite. The peat of the Falklands is very different from

¹ Strange, I; (1992) *A Field Guide to the Falkland Islands*; London: Harper Collins; p19.

Northern European peat. It is formed mainly from the roots and foliage of Diddle-Dee (*Empetrum rubrum*), Teaberry (*Myrteola nummularia*), and Whitegrass (*Cortaderia pilosa*). Other plants that form the peat bog include a dwarf variety of Marsh Marigold (*Caltha sagittata*), Brown Swamp Rush (*Rostkovia magellanica*), and the Sedge (*Astellia pumila*).

One of the striking features of the geology of the Islands is the existence of stone runs. The origin of these large accumulations of stone debris - some of which contain very large blocks of stone - is uncertain, but they may be the result of peri-glacial heave, which may have occurred somewhere between 14,000 and 25,000 years ago. The stone runs appear to have been formed over more than one of the many cold stages that have punctuated the recent past. Boulders that are further down the slope, or in the bottoms of the valleys, are older than those that are higher up on the slopes.

Charles Darwin made extensive geological investigations during his visits to the Falklands, and in particular upon the stone runs:

In many parts of the island, the bottoms of the valleys are filled up with an astonishing number of large angular fragments of Quartz. These are so excessive that I am at a loss to describe the appearance presented by them ... the Blocks vary in size from a man's chest to 10 or 20 times that size; and of course occasionally much larger; they must in many places form a mass of considerable depth; the water is often trickling deep below ... In the great 'valley of fragments', as we called one valley, it is necessary to cross by jumping from stone to stone an uninterrupted band of about half a mile.²

Darwin seems uncertain about the cause of this striking feature; he speculates that earthquakes possibly caused them. But later, when he edited his journals for his book *The Voyage of the Beagle* he remarks 'the progress of knowledge will probably will someday give an explanation to this phenomenon.'³

² Darwin Archive; Cambridge University Library; ref.: DAR 32.2/ pp. 147-148.

³ Darwin, C; (1930) *Voyage of a Naturalist*; Oxford: OUP; p203.

The most important native plant in the Islands is Tussac Grass. (*Poa flabellata*) These plants can reach immense size - 4m in height - and while plants can grow to 1m high in one season, thereafter they are slow growing. Mature specimens are thought to be possibly 200 years old. The plant provides an environment for many birds and insects, as well as shelter for seals. A survey in 1987 estimated the total remaining area of this grass in the Falklands to be 4,159 ha. The estimated area of the grass on the Islands, which grew prior to human settlement, is estimated to have been 22,181 ha.

The coastline of the Islands is heavily indented, with many bays and harbours, and the main features of these coastal areas are the extensive beds of kelp. The two most common species of these plants are Giant Kelp (*Macrocystis pyrifera*), and Tree Kelp (*Lessononia flavicans*). West Falkland is generally more rugged, with many cliffs, rocky headlands and boulder beaches.

The climatic conditions of the Falklands are similar to those of the Orkney and Shetland Islands, although the Falklands rainfall averages are considerably lower. The climate is cool temperate oceanic, with the predominant wind direction being westerly. Weather fronts pass through the area rapidly, and the Islands are subject to continuous variations in weather. Local folklore describes the Islands weather in terms of 'having all four seasons in one day.' The mean wind speed in knots is 15.1. The average temperature in the summer is 10°C and in the winter 6°C. The highest annual maximum temperature is 22°C and the lowest annual minimum temperature is -8°C. Rainfall is low; the mean annual precipitation in the low lying part of the eastern Islands ranges between 400 - 680mm. There is evidence to suggest that the Islands in the west are significantly drier and warmer than East Falkland. In the winter sunshine averages 2.1 hours/day and the summer 7.3 hours/day. Winter snowfalls are generally light and localised, and lie for an average of 48 days per year.

Charles Darwin's initial impressions of the Falkland climate are fairly typical of early visitors to the Islands:

Everyone has heard of the climate of these regions; it may be compared to that which is experienced at the height of between one and two thousand feet on

the mountains of North Wales; having however, less sunshine and less frost, but more wind and rain.

However he later, rather half-heartedly, modified his opinions:

From accounts published since our voyage, and more especially from several interesting letters from Captain Sullivan, RN employed on the survey, it appears that we took an exaggerated view of the badness of the climate of these islands. But when I reflect on the almost universal covering of peat, and on the fact that wheat seldom ripens here, I can hardly believe that the climate in the summer is so fine and dry as it has lately been represented.⁴

In another letter Darwin compared the Islands with Patagonia thus:

If I had to choose, I would incomparably prefer the Falkland Islands to Patagonia - there you would have cattle and horses and pigs - peat and brushwood for fire - plenty of fish as is asserted. There are no severe frosts and the snow does not lie long. On [the] other hand no timber, country looks desolate and is very stormy. I have reason to believe that though twice there we happened to be very unfortunate with our weather. An emigrant would there be under British Government and free of Indians. Wild cattle thrive there and most vegetables; I rather think wheat has lately succeeded.⁵

§ b. South Georgia

The Islands of South Georgia are situated between the parallels of 53° 56' and 54° 55' South and the meridians of 34° 45' and 38° 15' West. South Georgia consists of one main island and several smaller islands. The islands have been described as:

The Alps in mid-ocean; and is roughly crescent shaped along a north-west to south-east axis, about 170km long and from 2 to 30km wide. The surface area

⁴ *ibid.*; p193.

⁵ I am greatly indebted to Quentin Keynes - the great grandson of Charles Darwin - for the information contained in this letter, and for the use of his extensive collection of Islands material.

is approximately 3,755 km², well over half of which is permanently covered with ice and snow.⁶

The highest elevation is Mount Paget at 2,934m. The Island is located approximately 1,450 km. south-east of the Islands.

South Georgia is largely composed of an approximately 8km. thick sequence of volcanoclastic sandstones and shales, termed the Cumberland Bay Formation ... It was derived from a series of active volcanoes during the Late Jurassic to Early Cretaceous ages (about 140 million years ago).⁷

There are four main types of soils on the Island: organic soils, meadow tundra soils, brown soils and raw mineral soils. Large moss banks are a notable feature - many of which are very old (up to 9000 years) and they form a major component of the peat deposits of the Island.

The most notable plant species on South Georgia is the Tussock Grass. It occurs on the coastal areas and also on the steep slopes rising from the shoreline. In the dry areas the Tufted Fescue (*Festuca contracta*) grows widely; the Woody Stemmed Burnet (*Acaena magellanica*) is very common. Ferns, mosses and lichens are widespread.

30 breeding and 27 non-breeding species of bird occur on South Georgia in great numbers. The waters around South Georgia swarm with many marine invertebrates such as the Antarctic Krill (*Euphausia superba*). Two species of seals - the Antarctic Fur Seal (*Arctocephalus gazella*) and the Southern Elephant Seal (*Mirounga leonina*) also occur in great numbers.

'Up to the early part of this century, whales abounded in the Island's fjords as well as in the surrounding ocean.'⁸ A least 8 species of whales have been encountered in the

⁶ Headland, R K; (1984) op.cit.; p170.

⁷ ibid.; p 16. For details of an early geological survey of South Georgia see: Ferguson, D; (1915) Geological Observations in South Georgia; *Transactions of the Royal Society of Edinburgh*; Vol. L; Part IV; No. 23.

⁸ ibid.; p225.

waters around South Georgia, but it is estimated that only 10% of the whale population, which existed at the beginning of this century, now survive.

George Forster, who was one of the naturalists on the James Cook expedition of 1775, made some far-sighted economic predictions:

But South Georgia, besides being uninhabitable, does not appear to contain any single article for which it might be visited occasionally by European ships. Seals and Sea Lions, of which the blubber is accounted as an article of commerce, are much more numerous on the desert coast of South America, the Falkland, and the New Year Islands, where they may likewise be obtained at a much smaller risk. If the northern ocean should ever be cleared of whales, by our annual fisheries, we might then visit the other hemisphere where those animals are known to be numerous ... It should therefore seem probable, that though Southern Georgia may hereafter become important to mankind, that period is at present so far remote, and perhaps will not happen, till Patagonia and Tierra del Fuego are inhabited, and civilised like Scotland and Sweden.⁹

South Georgia is 350 km south of the Antarctic Convergence and this has a significant effect on the climate of the Island. Winds in excess of 100 knots have been recorded. The general climate of South Georgia is cold, wet, windy and cloudy, and is subject to rapid changes. Although air temperatures rarely rise above 10°C, the short summer season can occasionally produce sunny days with the temperature of 20°C. Winter temperatures of -15°C have been recorded at King Edward Point.

⁹ *ibid.*; p29.

