taken from the atmosphere of that region and disappears, being locked up in the watery vapour. There it remains in its latent condition until the south-west wind, carrying it, strikes the shores of Britain, when the vapour is again condensed into rain and the heat is once more set free. When we consider that 100 units of heat bring a given quantity of water at zero to 100° centigrade, and yet it takes 537 units to transform the same quantity of boiling water into steam without any rise of temperature, we may get a faint idea of how great a quantity of heat may be set at liberty when watery vapour is condensed into rain.

In the *Glasgow Herald* of 7th March, 1908. there is an article, "The Gulf Stream Myth," by Professor J. W. Gregory, which will well repay perusal.

GLACIAL PHENOMENA IN BUTE.

By W. J. Millar.

[Read 10th December, 1907.]

The town of Rothesay occupies, geologically, a rather interesting position, as it is situated over the junction of the schistose rocks of the Highlands and the sandstones of the Lowlands. This line of junction lies in a north-easterly direction, passing close to Helensburgh, Callander and Crieff, thence onwards until it reaches the east coast about Stonehaven, and it passes through Bute by Loch Fad to the west side. On geological maps, this line of junction is a well-marked feature. Geologists call this a line of fault, and, with a somewhat parallel one, crossing from Girvan to Dunbar, divides the Highlands from the Southern Uplands by the Lowland districts, contained within these two lines; in mining terms this peculiar condition indicates a down throw of the rocks in this area.

Now, we are all familiar with the very different kinds of rock on the East and West Bays. On the east side we have the Red sandstones and allied conglomerates extending South to Kilchattan, where some fine specimens of Columnar Sandstone are found close to the shore, whilst on the West Bay we see a greyish green Schistose rock with veins of quartz, which passes into Slate to the north of Port-Bannatyne, afterwards becoming coarsely Schistose in character, and allied to the Metamorphic rocks on the mainland to the north. Throughout these rocks, many trap dykes find their way, some running north and south and others east and west. Besides these well-marked features we have strewed along our shores, and extending upwards and over the country southwards, many large stones or boulders; these are

frequently of very different character from the rocks upon which they lie. Thus, one very fine example is that of the large Schistose boulder lying on the red conglomerate on the shore a short distance beyond the Bute Museum and Aquarium. It is now well understood that these boulders, or travelled blocks, have been left by the great ice sheets of the Glacial Period. Such a period, or periods, seems to have been the last great influence to which the rock surfaces have been subjected, and authorities consider that the great ice sheets passed southwards as far as Central Europe.

Our nearest centres of glacial activity are now in Switzerland and in Norway, where the great snow fields are still able to form glaciers which fill up the valleys and are ever slowly passing downwards. Visiting the Burbræ glacier near Odde, on the upper end of the great Hardanger Fijord, in Norway, one can readily note the distinctive features of glacial action. All the way up the valley leading from the sea to a lake a mile or two upwards, traces of old glaciers can be seen, principally in the moraines or great heaps and mounds of gravelly debris. Crossing the lake, a short walk up a side valley brings us face to face with the glacier itself, which stretching away up to the great snowfields shows a wide expanse of ice of a dirty grey or brown colour, due to the stones, gravel, and earth which it carries with it; these having fallen from the sides of the valley. This rocky and gravelly covering is ultimately deposited in heaps at the lower end of the glacier. Some pieces fall down through crevasses or cracks in the ice, and whilst carried along below, grind the surface of the ground beneath, and in turn become smoothed and grooved. At the lower end of this great river of ice appears a large cavern from which a full grown stream rushes. The interior of the cavern is of a fine blue colour, but the water that issues out is quite muddy. Throughout our own country, and notably in and around Glasgow, extensive and deep deposits of boulder clay are found and this clay contains many stones, small and large; this clay is understood now to be the result of glacial action and has probably been laid down underneath or in the bed of a glacier.

The colour of this boulder clay varies with its locality. Around Glasgow it is of a dirty, dull, bluish colour, due to the carboniferous rock of the district. In other districts it assumes a red or grey tone. The colour of this clay is therefore of interest, as it indicates the nature of the rocky bed over which the old glacier or ice-river forced its way.

The boulders which we see on the shores, and more or less distributed over the island, vary considerably in size, nature of rock, and position in regard to the surface upon which they rest. The schistose boulder resting on the conglomerate of the East Bay, already referred to, may weigh about seven tons; another larger one at Ardbeg Point may be thirteen tons. All round Ardmaleish Point there are many large boulders, and at Ettrick Bay and onwards to Kilmichael there are several large and peculiarly situated blocks; one of massive quartz, which may have come from a large quartz bed on the shore to the north, whilst a very large one on the north side of Ettrick Bay is of similar material to the great trap-dyke running to the north of Glenmore, and this dolerite boulder rests almost like a rocking stone on the schistose rocks of the shore to the south. Again, resting on the red sandstones of the Ascog shores we find some large green or greyish schistose boulders, and, indeed, onwards as far down as Kilchattan, and around Ascog Loch boulders of similar material are found. All this points to some agency which has transferred these heavy masses from some district to the north, having a rock of similar character, to points, more or less, in the southern part, and where we find them resting upon a very different kind of rock.

But it is not only in the distribution of these boulders that we have evidences of glacial action. Near the summit of Barone and to the west of that point we find a finely exposed part of the rock of the hill itself not only smoothed, but marked by more or less parallel narrow grooves of varying length, extending in one case to thirteen feet, which shows that some agent has passed from the north southwards, and in doing so has left its mark in the smoothed and grooved

face of the rock. There are also many parts on the hills where we find the exposed rock surfaces finely rounded and smoothed on the side exposed towards the north. An interesting example of the boulder clay, with its smoothed and striated stones and blocks, may be seen at low water opposite Pointhouse Crescent. The clay is of a reddish colour and very tenacious. On removing any of the stones still embedded in it we find them finely smoothed with, in some cases, well marked striæ. Scattered over the shore there are many boulders of varying sizes. Some of these have smoothed surfaces, whilst a number of the large flat stones lying about are finely striated. The study of the phenomena of the glacial period is one which may be readily carried out by anyone interested, the evidences being well marked and quite noticeable. As we walk or drive through the country, or by the shore, or even as we sail up some of the various sea lochs of the Firth of Clyde, we frequently find the rock surfaces smoothed and rounded by the action of the glaciers, which at a far back period had filled the valleys.

NOTES ON THE FRESH WATER FLORA OF BUTE.

By Robert D. Whyte.

[Read 25th February, 1908.]

True Waterplants—technically known as Hydrophytes—live always in water. They take carbonic acid from the water and die if exposed to air for any time. But there are many plants which we popularly call Water plants, as they usually grow in watery places, Lochs or Streams. The upper stem and leaves of these plants are exposed to the air, they draw carbonic acid from the air, and while they prefer to live in water they may live on moist earth and are really marsh plants. In popular language, water flora includes both kinds of plants and I propose to deal with the water flora of Bute in the purely popular sense.

Lochsides, generally speaking, show a succession of plants in something like the following order:—(1) Wet Meadow Plants; (2) Rushes; (3) Flag or Iris; (4) Reeds; (5) Water Lily; (6) Pondweed; (7) and then the open water teeming with free swimming Algae. Lochs Fad, Quien and Greenan show a similar succession of water plants.

The Buttercup family is represented over the entire area from the beginning of the marshy ground into the water. The Lesser Spearwort (*Ranunculus flammula*) grows in marshy ground, ditches and lochsides, and is generally distributed throughout Bute. The flowers are yellow and the leaves are always entire, that is not cut up into segments. In muddy pools the Ivy-Leaved Crowfoot (*R. Hederaceus*) is very common—a small plant often creeping over the mud, with a little white flower. Then there is the very variable variety—The Water Crowfoot—the appearance of which depends to a large extent on its place of growth. The common form (*R.*