

to the Royal Society of Edinburgh.* The results arrived at are briefly as follows:—

The yearly cycle of changes in a loch such as Loch Ness is very much the same from year to year. Fig. 69 shows graphically what may be called the typical curves for each month of the year, being drawn from the monthly means of the temperature readings during the period of the observations. From these curves it appears that in September there is the greatest quantity of heat in the loch. Thereafter the loch cools gradually till March or April, when the water again begins to gain heat. This is the time when the mean air temperature begins to be higher than the surface temperature. From May till August the increase in temperature at various depths proceeds regularly, and the typical curves representing the temperature of the water to a depth of 200 feet are practically straight lines. Below that depth it is probable that the temperature increases less rapidly in proportion to the depth, but even in the deepest waters of Loch Ness there is a range in temperature of about 2° Fahr. The lowest recorded temperatures in the deepest parts of the loch are in April, and the highest in the middle of November. During the period in which the loch gains heat, the most remarkable changes are those taking place at and near the surface. Rapid changes are of frequent occurrence, and are probably due to convection currents. On one occasion the temperature at the point of observation rose 6° Fahr. in two minutes.

When the mean air-temperature falls below the surface temperature, which is usually in August, the loch begins to part with its heat. This is shown in the change of type in the typical curve for September. The surface layers lose heat, while lower down the water still continues to rise in temperature, as already mentioned, the highest temperature at 700 feet was observed in November, or about three months after the loch began to lose heat. In August the discontinuity between the upper and lower layers of the loch usually becomes well marked. As the upper layers of water become colder, there is a layer at the surface of nearly uniform temperature, and of gradually increasing depth. Below this layer there is a sudden change of temperature—a discontinuity layer—below which there is the colder water in the loch. As the season advances this discontinuity layer gradually sinks lower, and the layer of uniform temperature above it increases in depth, until finally the whole loch is of nearly uniform temperature.

Before the discontinuity layer makes its appearance, the currents produced by winds are distributed through the whole loch. There is

* "The Temperature of the Fresh-water Lochs of Scotland, with special reference to Loch Ness, with an appendix containing observations made in Loch Ness by members of the Scottish Lake Survey," *Trans. Roy. Soc. Edin.*, vol. 45, p. 407 (1907), "An Experimental Investigation of the Temperature Changes occurring in Fresh-water Lochs," *Proc. Roy. Soc. Edin.*, vol. 27, p. 2 (1907)