

lake has a considerable influence in determining the depth to which wind-produced currents are felt; and it is found that comparatively deep lakes which are small always have a greater range of temperature from top to bottom than longer lakes of equal depth.

(2) **Effect of Altitude.**—The effect of altitude on the temperature of a lake requires no elaboration. Altitude enters into the temperature of the atmosphere, and so into the temperature of the lake, for conduction from the atmosphere is one of the methods in which heat is communicated to a lake. Rarefaction of the atmosphere has also a small effect on the rate of conduction to or from a lake. Lakes at considerable altitudes have usually small drainage areas, and this too must be taken into account; sometimes the quantity of water caught in the drainage area of a lake in the course of a year is sufficient to fill the lake-basin several times over, and it is evident that such a lake cannot be considered a stagnant body of water. The effect of water flowing into a lake, however, is chiefly felt at the surface, and the bottom temperature is not greatly affected, for, in general, drainage water is in summer warmer than the bulk of water in the lake, and in winter colder, and therefore remains on the surface.¹

(3) **Effect of Latitude.**—In the same way latitude is a factor determining the temperature of a lake, owing to the difference in atmospheric conditions, and in the incidence of the sun's rays brought about by difference in latitude. Difference in latitude produces great changes in the range of temperature to be found in lakes. Thus in the Lake of Geneva the mean surface temperature in the harbour of Geneva for the years 1853 to 1875 for the month of February was 40°·9 Fahr., and for the month of August 65°·6—a range of nearly 25°. In Loch Ness, the means at Fort Augustus for these months for two consecutive years were respectively 41°·9 and 54°·9 Fahr.—a range of only 13°, or little more than half the range in Lake Geneva. And it is not only the yearly range that diminishes with latitude, but also the temperature gradient in the lake. In low latitudes the heating is comparatively rapid, so that much greater temperature gradients are found. Thus in the Wolfgangsee (which is a lake with a maximum depth of 375 feet) from the surface to a depth of 70 feet there was a fall in temperature of 30° Fahr., whereas in Loch Ness a fall of 10° or 11° in a similar distance was all that was found, and the greatest range observed in any Scottish lake was 21°·2 in Loch Achilty (see page 137). As will be seen in the sequel, large temperature gradients such as these have an important bearing on the temperature changes which occur in lakes.

(4) **Effect of Orientation.**—The effect of orientation of a lake is not at first sight so apparent. By orientation is meant the direction

¹ But see pages 100–101.