

water to its organisms everywhere in the arctic zone from lake to lake as well as in all localities within the same lake.

THE NORTH EUROPEAN LAKES

The uniform character of the arctic lakes does not characterise the lakes of the northern temperate zone. The country surrounding the lakes is most varied: perpetual snow, naked rock, but much oftener beds of moss and peat which creep round the mountain crests and clefts like a mantle, in Scotland about $\frac{3}{4}$ m. thick, and through which the water oozes on its way down to the water-basins; wide bogs, forests with humic acid ground, and in part, but to rather a slight extent, arable land.

The *height* of the surface of the lakes above the level of the sea is extremely variable. The zone contains numerous mountain lakes, especially in Norway and North Sweden, elevated into completely arctic conditions, and many, *e.g.* several Scottish lakes, very near the level of the sea. The *shape* of the lake-basins is often long and narrow; a great many may no doubt be considered as exceedingly large pre-glacial river-beds, formed by erosion (see Ahlenius, 1900, p. 28; 1905, p. 17); their *depth* is often very considerable. More than half of the twenty-seven European lakes whose depth exceeds 200 m. lie in Norway and Scotland, and the four deepest lakes of Europe are in Norway (Hornindalvatn, 486 m.) and Scotland (Loch Morar, 329 m.) (see Holmsen, 1898-9, p. 1; Helland, 1872, p. 538; John Murray, 1904c, p. 67, and Halbfass, 1903-4, p. 221). Most of the lakes are of medium size or small; still, the zone includes several large lakes—the great Swedish and Finnish-Russian lakes. A great many, especially the Scottish and many Norwegian lakes, have exceedingly precipitous *sides* with depths of more than 100 m. near land. The shores are generally covered with rubble-stones, dislodged and rounded by the waves; in front of the river mouths we often find large, well-marked delta formations, in sharp contrast to the firm rocks. Still, a littoral region is probably in many cases, especially in the deeper lakes, fairly sharply delimited from a pelagic region, differing from the latter by greater variations in temperature. Only in very few cases is the *bottom* naked rock; the primary lake bottom is probably always covered by secondary deposits. In Scottish lakes it can be stated that lime is absent except where the rocks are limestone, and most probably also in the great majority of Scandinavian lakes, especially those north of the large Swedish lakes. In so far as the surroundings mainly consist of snow and the ground is frozen in winter, the *height of the water* will undergo regular periodical variations, being highest in early summer and decreasing later; where the surrounding country is