

and rain are the characteristics of winter rather than cold. In early May the temperature begins to rise steeply in the southerly parts of this region, but at the Arctic Circle the rapid climb begins after the equinox. By the beginning of July the country along the Mackenzie valley, and the whole basin drained by its tributaries, the Peace, Athabaska, Slave, Hay, Liard and others, has reached a mean temperature of about 60°. Temperatures exceeding 90° or even 95° sometimes occur in the short summer of the northwest, and except for the more frequent chilliness at night there is very little to indicate to the traveller that the weather is different from that of regions one thousand miles or more to the south. The long period of sunlight with scarcely any darkness, but only a short twilight, is said to contribute to the extremely rapid growth of native grasses and plants. This may be due, however, to characteristics acquired from northern habitat. At any rate the writer has not seen any experiments described where the effect of varying hours of sunlight upon the rate of growth has been measured. The effect of the oblique rays of these latitudes as distinguished from the more nearly vertical rays of southern regions has often been referred to, but the writer can only point out that the diffused light of a cloudy day in southerly regions is sufficient for growth and is probably less bright than a fine day at the Arctic Circle, especially considering the longer time the sun is above the horizon. Enquiry from botanists brings the information that very bright direct sunlight checks growth, while plants grow taller and faster in shade. It may be, therefore, that the softer, more oblique rays of the north allow growth to be more rapid provided the temperature of the air is sufficiently high. Reference should be made to the reports of the botanists attached to various parties of the Geological Survey, where native and cultivated growth of many parts of the far north are described. At different posts of the missionaries and of the Hudson's Bay Company, vegetables which require only a short time to render them fit for use, have been successfully grown. The Experimental Farms at Fort Vermilion and at Beaver Lodge in the Peace River country grow wheat successfully, while settlement in the region surrounding and north of the latter farm is increasing rapidly. At Smith, which is on the northern boundary of Alberta, the temperature of July is nearly the same as that of the Grande Prairie at Beaver Lodge Experimental Farm, but as will be seen from page 43 the summer is shorter. It is also much shorter than the summer of Tobolsk in Siberia and not so warm. This latter place, mentioned before, is probably the northern limit of successful wheat-growing in Siberia. It should be noted that where the annual mean temperature is below the freezing point permanently frozen soil is likely to be encountered close to the surface in the summer, since the surface heat has a very considerable lag in reaching downwards. At Toronto the maximum temperature of the soil some feet below the surface is attained in December, while it is coldest in July, on account of the great lag in heating. In the most northerly places along the Mackenzie river and in the Yukon, frozen soil is encountered very close to the surface. At Smith the annual mean temperature is 24° or eight degrees below freezing. At Good Hope the annual mean is less than 17° and frozen soil is encountered in midsummer at the depth of a spade. At Smith the temperature has been as low as 24° in July, 21° in August and 19° in June. The average daily lowest temperature is 41° in June and 43° in August, which are temperatures at which growth is said to cease. In some warm years, however, very good results have been obtained in the gardens attached to the various posts. Whether an early maturing variety of grain would be successful in a sufficiently large percentage of years to pay rent and labour, in the latitude of 60° north, can be determined only by the establishment of an experimental station