

boundary, is located the terraced group of the Mammoth hot springs. About here, and nearly around Swan lake and Indian creek, are large, open, grass-covered areas. The slopes of the Gallatin range are well clothed with forest up to the timber line, which, in the park, varies from nine thousand four hundred to nine thousand seven hundred feet. The tops of the long ridges sloping westward are, in some cases, bare.

From the Gallatin range southward, along the western border of the park, extends the Madison plateau. Its southern limit is the Pitchstone plateau (eight thousand seven hundred feet), at the base of which, on the north and east, lie Shoshone and Lewis lakes. The very flat top of the plateau is more than half covered with grassy parks, but the sides are heavily timbered. To the westward it slopes down to the low, open, swampy area of the Falls river basin, in the extreme southwest corner of the park. On the Madison plateau, as elsewhere throughout the region, are scattered small, open parks and meadows, but, taken as a whole, it is heavily timbered, and is cut by numerous dry, rocky canyons. It has an average altitude of about eight thousand five hundred feet, and from Shoshone lake it is traversed, in a north-westerly direction, by the continental divide. At the foot of the abrupt eastern slope of this plateau lie the Upper and Lower geyser basins, in a wilderness of forest. The Fire-hole river, draining these areas, flowing northward, meets the Gibbon river, from the northeast, the latter draining the Norris geyser basin, and heading on the plateau northwest of the Washburne range. These two streams, uniting, form the Madison, which, in its course westward, has cut a gorge two thousand feet deep through the Madison plateau. Within the park the Madison river has a drainage area of about seven hundred square miles.

The region of the Yellowstone park has been the scene of great volcanic activity, the rocks being mainly of igneous origin, with the exception of the Gallatin range, which is, in a great part, sedimentary. The plateaus have been formed by great lava flows, principally rhyolite. The rugged Yellowstone range is mainly composed of volcanic breccias and conglomerates. The principal geyser areas are those of the Upper and Lower geyser basins, Norris geyser basin, Shoshone lake geyser basin, and the Heart lake geyser basin. Hundreds of boiling springs are scattered over the whole region, and have formed extensive deposits, mainly calcareous, while those of the geysers are a form of silica, called geyserite. The great quantities of silici-

fied wood, and size of many of the specimens, would lead us to suppose that the ancient forests were of much greater magnificence than at present.

The Yellowstone park, like most mountain regions where terrestrial radiation is great, has, during the summer months, great extremes of diurnal temperature, although the day temperature is low—not generally above seventy-five degrees, Fahrenheit. Frequent summer frosts are a characteristic feature. This coolness of climate, coupled with a high relative humidity, that is, for the Rocky mountain region, accounts for the fact of its being densely timbered. A very copious rainfall is shown in marsh, spring, stream and lake. From observations taken at Yellowstone lake (seven thousand seven hundred and forty feet), from July 15th to August 15th, 1885, we obtained the following: Average of readings of minimum thermometer, which, practically, is the temperature at sunrise, twenty-nine and seven-tenths; average of two o'clock p. m. readings, sixty-five and six-tenths; average of readings of maximum thermometer, from August 1st to August 15th, sixty-eight and three-tenths. The greatest recorded temperature was seventy-eight degrees, and the lowest, twenty-two degrees. The growing season, over the main area of the park, is from about May 1st to September 1st. The lower and dryer portions, up to seven thousand feet, are in their greenest garb about July 1st, and the subalpine and alpine regions early in August. When in vigorous growth, vegetation does not seem to be affected in the least by a temperature of ten degrees below freezing, but a little later in the season its effects are apparent, when the plants have lost much of their vitality. The change from the luxuriance of August to the decay of September is abrupt. Generally, by September 15th snow has fallen, to lie upon the ground for a day or two.

The park has suffered, at various times, from the ravages of fire. There are probably one hundred square miles of burnt forest. Over a large portion of the region will be found masses of fallen timber in the green and standing forest. There are some areas of considerable extent which are not forest covered, and at lower elevations are covered with a luxuriant growth of grass and more or less sage brush. The most extensive of these are in the northeast portion, in the vicinity of the Mammoth hot springs, about the mouth of the East Fork, and along this stream. The former, including the greater portion of the region of Mt. Everts, Blacktail Deer creek, Swan lake, and the Upper West