

the surrounding mountains, thus making it possible for the geologist to determine the relative ages of lacustrine structures and those produced by ice streams.

The works of first importance in the study of the Basin region are G. K. Gilbert's monograph on Lake Bonneville (Monogr. U. S. Geol. Surv., vol. I, 1890), Clarence King's Report (U. S. Geol. Explor. 40th Parallel, Syst. Geol., vol. I, 1878, pp. 488-592), and I. C. Russell's on Lake Lahontan (Monogr. U. S. Geol. Surv., vol. XI, 1885).

In order to bring to the reader's attention the situation and extent of the Great Basin and the areas occupied by Lakes Lahontan and Bonneville, as well as the location of many smaller lakes, two drawings, based on sketch maps illustrating a paper by Oscar E. Meinzer (Bull. Geol. Soc. Amer., vol. XXXIII, pp. 453, 545) are presented (figs. 5, 6). These are explained on page 142.

The feature which today characterizes this basin is the fact that none of its rivers or lakes send their waters beyond the rim of the basin into any ocean. The rivers may disappear in the sands of deserts or they may discharge into lakes whose level is determined solely by the evaporation. Thus the rainfall of the whole basin is about equal to the evaporation. As a result, with few exceptions, the waters of lakes now existing are more or less strongly impregnated with mineral matter, mostly common salt. Some of them, as Great Salt Lake, are very saline.

Gilbert's work just referred to will be taken as a basis for remarks on Lake Bonneville. At the time of the greatest extension of this lake its area was 19,750 square miles; its maximum depth, 1,050 feet. Today it is represented by Great Salt Lake, with an area of about 2,070 square miles, and the much smaller Utah and Sevier Lakes, but principally by desert. At the time of highest water the surface of this lake stood about 1,000 feet above the present Great Salt Lake. Gilbert concluded that Lake Bonneville had passed through two stages of high water and twice had been reduced nearly or quite to complete desiccation. During the first stage the water did not quite reach a height of 1,000 feet above the present level of Great Salt Lake. Its presence at that level is shown by shore lines, by a deposit of yellow clay, and other phenomena. The water did not overflow the rim of the basin at any point. The traces of this stage form on the shore what are called the Intermediate shore lines. This time of high water was followed by a nearly complete desiccation of the basin; and this is believed to have occupied a very long time. To this succeeded the second stage of high water; and then the lake overflowed and discharged its water at the north end into Snake River. In Gilbert's opinion this period of time embraced what is called the Bonneville stage; and it is indicated by the deposit of a white marl and by the Bonneville terraces.

At the point of overflow the deposit traversed consisted of alluvium; and in this the outflowing river rapidly cut a gorge 375 feet deep. Here limestone rock was encountered which retarded further deepening of the outlet and the level was retained for a long time, a longer time than had been occupied by the Bonneville stage. This new stage is known as the Provo; and the lake has left on the slopes of the basin unmistakable evidences of its existence. The Provo water line is somewhat more than 600 feet above the level of Great