

this has led to the formation of lakes in the Upper Engadine has been already explained. In addition to these alterations in the river-system, recent changes of level are said to have diverted the courses of some of the rivers, and to have drowned parts of their valleys. The dams due to river-cones and glacial moraines have had the same effect. In general, the rivers follow the original folds of the strata, or cut across them at right angles, and in the latter case it is most probable that the river is older than the folds, and cut through them as they rose. Lakes may have existed there for a time, but as the ridges were cut down the lakes were then drained. The valley of the Rhine above Martigny, and the valley of the Rhone above Chur, mark the sites of such temporary lakes.

According to Heim,¹ the Alps were formerly higher than they are at present, and the rivers cut out wide valleys at that time. Later, the Alps sunk as a whole from 200 to 500 metres (650 to 1640 feet), and by this sinking part of the valleys were drowned and lakes were formed. Proof of this sinking is found in the old terraces of many of the rivers, which run in the opposite direction to the present course of the rivers, in the filling up of the principal valleys with gravel, and in a bending in the Molasse which can be followed along the whole northern border. This view is supported by Aeppli and by Römer, and also by recent researches made in the Alpine border lakes by Dr E. Gogarten. On the other hand, Penck and Brückner² hold the theory that these lakes can be explained by glacial erosion, and that there is no evidence of subsidence.

The Upper Rhine is generally stated to have its source in the small lakes, Siarra and Toma.

Lake of Constance (or Bodensee) is the first large lake in its course, and lies at an elevation of about 1300 feet above sea-level. It has an area of 208 square miles, and is 40 miles in length; the maximum depth is 827 feet, and the mean depth 295 feet. The volume of water is estimated at 1,711,000 million cubic feet. At its west end it is dammed up to a certain height by the deposits of the ancient Rhine glacier, but this would not account for more than, say, a quarter of its depth. Penck³ considers it a rock-basin due to changes in relative levels or to excavation by the glacier.

Below the Lake of Constance the course of the Rhine gives indications of being comparatively recent, and is interrupted by bars of rock, one of these bars causing the magnificent fall of Schaffhausen and regulating the height of the Lake of Constance, which

¹ Albert Heim, "Geologische Nachlese," No. 1, "Die Entstehung der alpinen Rand-Seen," *Vierteljahrsschr. naturforsch. Ges. Zürich*, vol. xxxix. p. 1 (sep.), 1894.

² *Die Alpen im Eiszeitalter*, vol. ii. p. 537, Leipzig, 1909.

³ Cited by Lubbock, *op. cit.*, p. 414.