

dence of this extension is to be seen both among the mountains and far out into the surrounding regions. On the sides of the great valleys, ice-striated surfaces and transported blocks are found at such heights as to show that the ice must have been in some places 3000 or 4000 feet thicker than it now is. The glacier of the Aar, for instance, which was a comparatively short one, being turned aside by and merging into the large stream of the Rhone glacier near Berne, attained such dimensions as not only to fill up the valley now occupied by the Lakes of Thun and Brienz, but to override the surrounding hills. The marks made by it are found at a height of 930 metres above the valley, which with 305 metres for the depth of Lake Brienz gives a depth of at least 1235 metres or 4000 feet of ice moving down that valley. Judging from the evidence of the heights of the stranded blocks, the slope of this glacier varied from 45 in 1000 in its upper parts to not more than 2 in 1000 toward its termination.<sup>37</sup> From the variation in the direction of the striæ, as well as in the distribution of the transported blocks, there can be little doubt that the Alpine glaciers varied from time to time in relative dimensions, so that there was a kind of struggle between them, one pushing aside another, and again being pushed aside in its turn.

Turning to the regions beyond the mountains, we find that proofs of glaciation reach to almost incredible distances. The Rhone glacier has already been referred to as overwhelming the mountainous and hilly intervening country, and throwing down its moraines with blocks of the characteristic rocks of the Valais where Lyons now stands, that is, 170 miles in direct distance from where the present glacier ends. The same ice-sheet, swelled from the northern side of the Bernese Oberland, overflowed the lower ridges of the Jura, streaming through the transverse valleys, even as far as Ornans near Besançon. Turning northeastward, it filled up the great valley of Switzerland, and, swollen by the tributary glaciers of the Aar, the Reuss, and the Linth, joined the vast stream of the Rhine glacier above Basel. This enormous *mer du glace* poured over the Black Forest and down the valley of the Danube at least as far as Sigmaringen, where blocks of the rocks of the Grisons occur. Eastward it was joined by the great glacier that descended from the Swabian and Bavarian Alps, and of which the moraine-heaps are strewn over the lowlands as far as Munich. The

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<sup>37</sup> A. Favre, Arch. Ann. Sci. Phys. Nat. Genève, xii. 1884.