

at many different elevations, give a rate of increase of temperature downward, or "temperature gradient," which has been usually taken to be  $1^{\circ}$  Fahr. for every 50 or 60 feet of descent, this computation being based especially on observations in deep mines and borings. Professor Prestwich concluded from a large series of observations collated by him, that the average increment might be taken at  $1^{\circ}$  Fahr. for every 45 feet.<sup>38</sup> Observations taken in the extraordinarily deep boring at Schladebach, near Dürrenberg, showed that in a depth of 5736 feet the average rise of temperature was  $1^{\circ}$  Fahr. for every 65 feet.<sup>39</sup> According to data collected by a Committee of the British Association, the average gradient appears to be  $1^{\circ}$  Fahr. for every 64 feet, or  $\frac{1}{64}$  of a degree per foot.

Isogeotherms near the surface follow approximately the contours of the surface, but are flatter than these, and "their flattening increases as we pass to lower ones, until at a considerable depth they become sensibly horizontal planes. The temperature gradient is consequently steepest beneath gorges and least steep beneath ridges."<sup>40</sup>

Irregularities in the Downward Increment of Heat.—While there is everywhere a progressive increase of temperature downward, its rate is by no means uniform. The more detailed observations which

<sup>38</sup> Proc. Roy. Soc. xli. (1885), p. 55.

<sup>39</sup> Brit. Assoc. 1889. Report of Underground Temperature Committee.

<sup>40</sup> J. D. Everett, Brit. Assoc. 1879, Sections, p. 345. Compare also the elaborate observations made in the St. Gothard Tunnel, F. Stapff, "Rapports, Conseil Féd. St. Gothard," vol. viii., and "Geologische Durchschnitte des Gothard Tunnels"; "Etude de l'Influence de la Chaleur de l'Intérieur de la Terre," etc., Revue. Univ. Mines, 1879-80. Min. Proc. N. England Inst. Mining-Mechan. Engin. xxxii. (1883), p. 19. "Reports of Committee on Underground Temperature," Brit. Assoc. Rep. from 1868 onward, with summary of results in the volume for 1882. A voluminous and valuable collection of data bearing on this subject was compiled by Prof. Prestwich and is published in Proc. Roy. Soc. xli. (1885), p. 1.