or porphyritic rocks are dry. This may have been the case in many instances, and no inrush of water of large magnitude has ever been recorded to last for any great length of time in such formation. That water penetrates and travels at great depths through practically any kind of formation, has been proved time and again, and large caves, water-worn contact zones, etc., resulting from erosion or corrosion have been recorded in driving tunnels, shafts and mines. In the Simplon tunnel, springs tapped by the bore, several thousand feet below the surface, were found to have (I) a temperature equal to that of the surrounding rock; (2) a temperature lower than that of the 5,000 from the south portal (Fig. 4) underlying the Lake of Sella, situated 7,300 ft. above sea level, that is, some 3,500 ft. about tunnel grade. Stapf had noticed that, in winter, the temperature of the lake was still 38.1° F. at a depth of 18 ft., whereas, water in the St. Gothard Lake, lying nearby, at an elevation of 3,240 ft., had a temperature of 35.9° F. only at a depth of 42.6 ft. Also, that fish were living in the lake of Sella, free of ice, during four months of the year only, whereas no fish could live in the St. Gothard Lake. Stapf concluded that water from the lake of Sella undoubtedly penetrated a great depth in the range, through fissures, thereby becoming heated, and,



surrounding material, or (3) a temperature higher than that of the rock penetrated; showing that, in the first instance, cold surface water, flowing from high altitudes, had acquired a relatively high velocity, and had not absorbed the temperature of the material penetrated, and that it had travelled but over a short distance, whereas those springs possessing a higher temperature than that of the rock penetrated had travelled more slowly, at greater depths than the tunnel, and thus had acquired the temperature existing at such depths.

Another striking example was found in that section of the St. Gothard tunnel, between meters 4,000 and by rising again to the surface, was increasing the temperature of the lake. His hypothesis was fully justified, for, when that section of the tunnel underlying the lake was driven, much water was encountered, together with a fissure 3 feet wide. At a distance of 4,540 meters from the south portal, the rock was so fissured and waterbearing that four months were required to excavate a very short section.

The circulation of underground water causes both erosion and corrosion of the surrounding material. It also increases or decreases its temperature. Erosive and corrosive effects are more apparent in limestone forma-