

Bering Strait—now only 150 feet deep; and if so, this current, upon the opening of the deep passage for discharge northward, would have been augmented in its size and its heating influence.

THE EARTH'S INTERIOR AS A SOURCE OF HEAT.

Diminution in the heat reaching the surface from the earth's interior.—The proofs of the existence of a source of heat within the earth are the following:—

1. Borings for Artesian wells and shafts in mines have afforded a means of taking the temperature of the earth at different depths. It has thus been found that, after passing the limit of surface action, the heat increases downward, but at a varying rate. The common rate within 4000 feet of the surface is 55 to 60 feet for 1° F., or the mean $57\frac{1}{2}$ feet; or in geothermic language, $57\frac{1}{2}$ feet corresponds to 1 *geothermic degree*. At Sperenberg, near Berlin, large variations were obtained in a well 4172 feet deep; but it went down through a stratum of salt, excepting the upper 300 feet; at bottom, the temperature was 118.6° F.

At the Artesian well of Grenelle, Paris, a temperature of 85° F. was obtained at 2000 feet, equivalent to 1° F. for every 60 feet. In Westphalia, at Neusalzwerk, in a well 2200 feet deep, the temperature at the bottom was 91° F., or 1° F. for 50 feet of descent. At Yakutsk, Siberia, Magnus found a gain of 15° F. in descending 407 feet, equal to 1° F. for 27 feet. In Algiers, an increase of 1° in 42 feet has been observed; and in the Sahara 1° in 32 feet. In Great Britain the mean is 1° F. for $51\frac{1}{2}$ feet.

At Schladenbach, in Prussia, at a depth of 5735 feet, the temperature 134° F. was obtained; and at Pesth, Hungary, at 3120 feet a boring supplied daily 176,000 gallons of water at 158° F. The municipality were carrying it down in order to reach 176° F. (80° C.) for the brewers.

A boring at Wheeling, W. Va., to a depth of 4500 feet (in 1892), 3700 feet below the sea level, through nearly horizontal rocks, shows a mean rate of increase for the upper half of 1° F. for 80 feet, and in the lower half of 1° F. for 60 feet. For great depths the ratio is not an arithmetical one, because of the greater conductivity of the earth below (owing to greater density) and the augmented pressure. But nothing is yet known as to the rate of increase downward, or the number of feet to a geothermic degree.

Doubts with regard to the observations on the increase of heat downward in borings, and in shafts in mines, come from the facts that chemical action, and, prominently, the oxidation of pyrite and other sulphides, is a source of heat; and this has always to be considered in such investigations. Besides, local sources of subterranean heat may exist. At the Comstock lode, in Nevada, the temperature of the mine in some parts, at a depth of 1800 to 2000 feet, is 130° to 157° F., and, when mining was there in progress, over 30 tons of ice per day were expended in keeping the air cool enough for the