

wards in a direct line, accumulates as in a reservoir, and is ready to ooze out into any opening which may be made, in the same manner as we see the salt water flow into, and fill, any hollow which we dig in the sands of the shore at low tide.

The facility with which water can percolate loose and gravelly soils is clearly illustrated by the effect of the tides in the Thames between Richmond and London. The river, in this part of its course, flows through a bed of gravel overlying clay, and the porous superstratum is alternately saturated by the water of the Thames as the tide rises, and then drained again to the distance of several hundred feet from the banks when the tide falls, so that the wells in this tract regularly ebb and flow.

If the transmission of water through a porous medium be so rapid, we cannot be surprised that springs should be thrown out on the side of a hill, where the upper set of strata consist of chalk, sand, or other permeable substances, while the subjacent are composed of clay or other retentive soils. The only difficulty, indeed, is to explain why the water does not ooze out every where along the line of junction of the two formations, so as to form one continuous land-soak, instead of a few springs only, and these far distant from each other. The principal cause of this concentration of the waters at a few points is, first, the frequency of rents and fissures, which act as natural drains; secondly, the existence of inequalities in the upper surface of the impermeable stratum, which lead the water, as valleys do on the external surface of a country, into certain low levels and channels.

That the generality of springs owe their supply to the atmosphere is evident from this, that they become languid, or entirely cease to flow, after long droughts, and are again replenished after a continuance of rain. Many of them are probably indebted for the constancy and uniformity of their volume to the great extent of the subterranean reservoirs with which they communicate, and the time required for these to empty themselves by percolation. Such a gradual and regulated discharge is exhibited, though in a less perfect degree, in every great lake which is not sensibly affected in its level by sudden showers, but only slightly raised; so that its channel of efflux, instead of being swollen suddenly like the bed of a torrent, is enabled to carry off the surplus water gradually.

Much light has been thrown, of late years, on the theory of springs, by the boring of what are called by the French "Artesian wells," because the method has long been known and practised in Artois; and it is now demonstrated that there are sheets, and, in some places currents of fresh water, at various depths in the earth. The instrument employed in excavating these wells is a large auger, and the cavity bored is usually from three to four inches in diameter. If a hard rock is met with, it is first triturated by an iron rod, and the materials, being thus reduced to small fragments or powder, are readily extracted. To hinder the sides of the well from falling in, as also to prevent the spreading of the ascending water in the surrounding soil, a jointed pipe is introduced, formed of wood in Artois, but in