

broad, passing along the whole floor of the excavation. There are also amid the stratified formations many immense subterranean lakes, one of the most remarkable examples of which is the Lake of Zirknitz, in Carniola, which is about six miles long by three broad. This lake is below a meadow, which has various openings or holes in it, through which the waters rise in the wet season, and cover the plain. That there is a regular subterranean lake here, is clearly proved by the ejection of living (but *blind*) ducks, fishes, &c., when the waters issue. This is most unquestionably an accumulation of water between two hard rocks, where it has found a site by infiltration, and by the displacement of some soft layer. There have, moreover, been found in one spot successive sheets of water at various depths, and which have collected in the same manner. Running streams have also repeatedly been observed in the stratified formations in various places.

More need not be said, we think, to exhibit the *source* of subterranean waters, the *manner* in which they descend into the earth, and the *position* which they there take up; all of which points have been here adverted to, because, without a clear comprehension of them, it is impossible to understand the real nature of Artesian wells. The waters, then, of these wells, have their site among the stratified formations, into the soft masses of which they have infiltrated from the surface. "What is the power which causes these subterranean waters to rise, and projects them at the surface of the globe?" This important point remains to be explained. "If water (says M. Arago) be poured into a tube which is bent into the shape of the letter U, it there assumes a level, and maintains itself in the two branches at vertical heights, which are exactly equal. Let us suppose, then, that the left branch of this tube opens towards the top, with a large reservoir which can maintain itself always full; that the right branch is cut across towards its lower part; that only a short portion of its vertical part is left, and that this portion is fitted with a stopcock. When this stopcock is open, the water will be projected into the air, through the remaining portion of the right branch, to exactly the height it would have risen if this

branch had remained entire. It will ascend as far as it has descended from the level of the reservoir, which, without ceasing, supplies the opposite branch." This is the grand hydrostatic principle upon which many cities (Edinburgh, for example) are supplied with water. An illustration of the manner in which artificial jets or spouts of water are formed, may be offered by supposing an opening to be made in the pipe that supplies Edinburgh, at that part of it which lies in the vale between the fount and the city. The water would spring to the height, great in proportion to the length of fall in the descending current. M. Arago thus applies these principles to the Artesian wells:—"Let us now recall to our recollection the manner in which the rain water penetrates certain beds of the stratified series; not forgetting that it is only upon the slopes of the hills, or at their summits, that these beds are exposed, on edge; that it is there they admit the water, which, therefore always occur in somewhat elevated situations: let us reflect, moreover, that these *water-carrying* beds, after having descended along the sides of the hills, extend themselves horizontally, or nearly so, along the plains; that there they are often imprisoned, as it were, between two *impermeable* beds of clay or solid rock—and we may then easily conceive the occurrence of subterranean waters, that are naturally in the same hydrostatic conditions of which the conduits leading to cities from a height along a vale supply us with artificial models; and the sinking of a pit in the valleys, through the upper strata, down through the more elevated of the two impermeable beds betwixt which the water is confined, will form, as it were, the second branch of a pipe, in the form of a letter U—or, we may say, of a *reversed syphon*; and the water will rise in this pit to a height corresponding to that which the water maintains on the side of the hill where it commences to descend. From these statements every one may understand how, in any given horizontal plain, the different subterranean waters which may be placed at different levels, may have very different powers of ascending; and also how the same water should be here projected to a great height, and should there rise no higher than the