

texture, which have just been named. These crystalline rocks have therefore furnished the material for all the immense masses which, in parallel layers, now cover the surface of our globe, and more particularly the material for that portion of the earth which forms the soil—its outer crust. The study of the influences to which, during thousands of years, these crystalline rocks were exposed and in consequence of which they became loose and friable, and were converted into new forms of various character, capable of supporting vegetable life, must therefore form the natural basis for understanding in what manner the wants of plants depend on the soil, as also the manner in which those wants may be supplied.

The degradation of rocks,—a term applied to the natural changes they undergo,—takes place under the double influence of mechanical powers and chemical affinity.

The commencement of this process manifests itself in the formation of small clefts and fissures, which extend through the body of the rocks, a phenomenon the consequence of changes in their temperature. We know that all substances, without exception, are expanded under the influence of heat and contracted again by cooling; the degree of this expansion is however not the same in different substances submitted to the same temperature. The crystalline rocks, of which alone we here speak, are always an aggregation of different minerals. Changes in the temperature to which they are periodically exposed, consequently effect an unequal expansion or contraction of these different constituent minerals; besides this, the surface of the rock is more directly warmed or cooled, and therefore more expanded or contracted, than the interior. The consequence of these influences, is the production of small clefts or fissures, which originating on the surface, gradually extend themselves towards the centre, and thus weaken the cohesion of the whole mass.

To the effects of heat on solid masses, we must also add those occasioned by water. The property inherent in water, to occupy a larger space when frozen, than in the liquid state, aids materially the preceding influences in destroying the cohesion of rocks. It is a well known fact that this increase of the bulk of water when frozen, is able to overcome any resistance however great, which may oppose it. In Autumn, the season in which rains usually fall, we find mountainous countries very moist; the caverns and fissures of the rocks filled with water, which gradually leaks through the smaller clefts, percolates through the pores and finally pervades every part of the rock. The inclosed water converted by the first frost into ice, expands and bursts the rocks, which oppose its expansion, and by these means aids materially in their comminution.

Besides, water when falling to the earth in the form of rain, and running from mountainous regions to level countries, and also air, by its weight when in motion, act mechanically on rocks and materially contribute to their degradation.