

ted as we now see them. Crystallization by natural laws is constantly going on around us and we can at pleasure, form crystals of many substances; in some cases, we produce those that never have been discovered in nature, and in others we can surpass them in size and beauty. Although, as already remarked, it is possible that crystals might have been the first forms of mineral matter, it is in the highest degree improbable; it is far more reasonable and philosophical to admit that wherever we find a crystal in the earth, it has been formed by the laws of crystallization operating upon the crude materials and there is no reason to doubt that we could always imitate natural crystals, provided we could command the powers and circumstances which operated in the original crystallization of mineral bodies. In all the geological epochs, after the primitive, there is decisive evidence of great mechanical changes,\* operating first on the primitive rocks, to produce the materials for the derivative rocks, which often exhibit unquestionable proofs of mechanical destruction and mechanical formation; in a word, of changes from the pristine state of the materials in the primitive rocks, greater than crystallization implies in relation to the constituent or integrant particles, which we may presume to have been originally created.

As to the proximate causes of crystallization among minerals it can be referred only to two agents, heat and solution. The only powers with which we are acquainted, that are at all equal to the effect, are water, and fire, aided by various acid, alkaline, saline, and other energetic chemical agents, which, in large quantities, we now find actually entering into the constitution of the rocks, and which were therefore originally provided in the grand store-house of created materials.

The solution theory, once almost universally prevalent, has now given way to the igneous, which not stopping with actual or extinct volcanos or with trap, porphyry or pitchstone, has taken possession of the granite mountains and of the very centre of the earth. It undoubtedly explains with great felicity, the appearances of granite veins and of many other phenomena, although neither the igneous nor any other theory has explained every feature of the planet.

It is allowed by nearly all geologists, that the ocean has for a long time occupied all countries. It is now evident also, that ignition and fusion have always existed in the earth on a great scale, and this

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\* Among the primitive rocks, mechanical force is exhibited in fractures, elevations, &c.