

lingford. The conglomerate at the latter place, which frequently passes into the green talcose schist that forms its cement, has a high westerly dip. The pebbles were derived for the most part from quartz rock such as is abundant along the west side of the Green Mountains, which may be of Devonian age. To prove this semi-plastic subsequent to consolidation, is to make it probable that all rocks exhibiting a similar metamorphism were so also; for quartz is the most difficult of all to bring into that condition, and did not facts compel us to admit it, we should perhaps say it is impossible.

6. The superinduced structures in the crystalline slates and schists, show that they must have been in a semi-fluid state when these were made. We refer to cleavage, foliation and joints. Whatever theory we adopt as to their mode of formation, a yielding state of the ingredients was essential, whether we suppose with Sir John Herschell, that cleavage is a sort of crystallization in plastic materials, or that, as Sharp and Sorby maintain, it has resulted from compression and extension; or, as to foliation, if, as David Forbes supposes, it has resulted from chemical action; or, as to joints, if we regard them as due solely to shrinkage and fracture. In all these cases, however, of cleavage, foliation, and joints, (we add the latter because they seem to us to belong to the same general class of phenomena, and not to be explicable by simple mechanical agency,) we must, with Professor Sedgwick, suppose polarizing forces (*ex. gr.*, heat or galvanism), to have been concerned, and these require the molecular movement among the particles which only plasticity can give. We know that joints are sometimes found in rocks that have not been much softened, and of course chiefly by mechanical agencies; but we do not believe that such as occur in the quartzose conglomerates of Rhode Island and Vermont could have been formed, such as they are, if the whole mass had not been plastic. But here is not the place to go into details on such a point.

7. The insensible passage of schistose into unstratified rocks, (gneiss, for instance, into granite,) affords a presumption that the former have been in a semi-plastic state. For all admit the fluidity of granite, either simply igneous or aqueo-igneous. But if we can hardly tell, often, where the one ends and the other begins, it is fair to conclude that the unstratified have resulted from the more thorough and complete operation of the same agency that produced the stratified crystalline group. This argument, however, would only show that the schistose rocks have been plastic, but gives us no information as to their previous consolidation.

We should not have spent so much time on this subject had it been discussed in other elementary works, and did it not seem to have a most important bearing on the whole subject of metamorphism. Admit the schists to have been in a plastic state subsequent to their consolidation, by the agency of hot water, steam and other agents, and the whole subject of metamorphism is easily explained. But deny this, and the phenomena seem inexplicable.

We resume now a detail of the effects of metamorphism. Several of these, however, have been touched upon in the preceding argument, and will need but little further notice.

2. *A second effect of metamorphism is the abstraction of one or*