

solution and redeposition of the minerals which make up the rock. The percolating waters, it is held, tend to dissolve material at those points where the pressure is greatest, and to redeposit it where the pressure is wholly or partially relieved; the movements thus being accompanied by a more or less complete recrystallisation of the whole rock. Moisture would thus be a necessary factor in all rock folding or contortion, and recrystallisation the essential feature of the phenomenon. The deformation of a body of dry rock would be impossible. The opinion that water is a very important, if not an absolutely essential, factor in the folding of rocks was held by MACCULLOCH, DE LA BECHE, and a number of the earlier geologists; who based their opinions on the fact that rocks are often much softer while they still contain their quarry water than after they are thoroughly dry, a fact which has been emphasised by tests of the relative strength of wet and dry rocks recently carried out at the arsenal at Watertown, Mass.* It is a matter of great difficulty, and, in fact, in most cases it is quite impossible to decide with certainty upon the relative merits of these conflicting views from a study of the deformed rocks themselves. Had this been possible, the controversy would long since have been brought to a close. HEIM, however, in his great work on the 'Mechanism of Mountain Making,'† published some twenty years since, refers to the very valuable results which might be looked for in elucidation of these questions from carefully conducted experiments upon the deformation of rocks under conditions as nearly as possible approximating those which obtain in the deeper parts of our earth's crust. He expresses grave doubts, however, as to the possibility of reproducing the conditions in question.‡

From the time of Sir JAMES HALL§ experimental investigations have been undertaken at intervals, aiming more particularly at the reproduction of the forms exhibited by folded strata. Those by DAUBRÉE,|| REYER,* CADELL,** FAVRE,†† OBERMEYER,‡‡ FORCHEIMER,§§ and BAILEY WILLIS||| may be especially mentioned. In these experi-

* 'Report of the Tests of Metals and other Materials for Industrial Purposes made at Watertown Arsenal, Mass., during 1894,' Washington, Government Printing Office, 1895. Also subsequent Report of same series for 1895.

† 'Untersuchungen über den Mechanismus der Gebirgsbildung,' vol. 2, pp. 4, 84.

‡ 'Zum Mechanismus der Gebirgsbildungen,' 'Zeit. d. deutsch. Geol. Gesell.,' 1880. See also BALTZER, 'Der Glärnisch,' p. 52.

§ "On the Vertical Position and Convolutions of Certain Strata," 'Trans. Roy. Soc. Edin.,' vol. 7, 1815.

|| 'Etudes Synthétiques de Géologie Expérimentale,' Paris, 1879.

* 'Ursachen der Deformationen und der Gebirgsbildung,' Leipzig, 1892.

** "Experimental Researches in Mountain Building," 'Trans. Roy. Soc. Edin.,' vol. 35, 1888.

†† "The Formation of Mountains," 'Nature,' December 5, 1878.

‡‡ "Versuche über das Ausfluss plastischen Thones," 'Sitz. der Wiener Akad. Math.-Natur. Class.,' 58, 1868.

§§ "Über Sanddruck und Bewegungs-Erscheinungen im Inneren trocknen Sandes," 'Inaugural Dissertation der Eberhard-Carls-Universität in Tübingen,' Aachen, 1883.

||| 'Thirteenth Annual Report U.S. Geological Survey.'