

matter concerning which there has been much discussion and a wide divergence of opinion. Some authorities—among whom HEIM,* whose work in Alpine geology must command the admiration of all, may be mentioned—have held that while, in the upper portions of the earth's crust, rocks, when submitted to pressure, will break, giving rise to faults and overthrusts, the same rocks in the deeper portions of the earth's crust are unable to break up in this way, owing to the great weight of the superincumbent strata. The lines of fracture become smaller and greatly increase in number, the various minerals constituting the rock thus breaking down into grains, which, however, move around and past one another, the adjacent grains always remaining within the sphere of cohesion. The structure becomes cataclastic; the rock mass, acting as plastic bodies do, and flowing in the direction of least resistance, maintains its coherence while altering its shape. HEIM believes that there is a further stage in the process which he thus describes:—

“Wird die umformende Kraft endlich so gross dass sie anstatt an ein paar tausend Stellen die Festigkeit durch Bruch aufheben zu können, dieselbe in jedem einzelnen Punkte überwindet, so wird das Spaltennetz unendlich fein und das Gesteinskorn zur Kleinheit eines Moleküles reducirt, d. h. die mechanische Bewegungseinheit ist nicht mehr ein Gesteinsbrocken sondern unendlich klein so dass die Bewegung eine continuirliche Umformung ohne Bruch wird.”

Now, according to SPRING,† the property known as regelation is really due to a power which fragments of bodies have of uniting if brought within the range of the molecular forces, a property which, although possessed in a marked manner by ice, is also, as he has experimentally demonstrated, exhibited by many other bodies, and would probably be displayed by all if the required conditions could be attained. The “flow of rocks” would therefore, according to this view, be a manifestation of regelation on an enormous scale.

Other writers on this subject have maintained that rocks are absolutely destitute of plasticity in any proper sense of the term. Thus MALLETT‡ based his theory on the supposition that in the earth's crust rocks under pressure are shattered. PFAFF§ has held that in the depths of the earth great pressure alone will tend rather to prevent molecular movement and thus keep the rocks rigid. Those holding such views attribute the deformation of rocks either to crushing with subsequent recementation of the fragments by mineral matter deposited from percolating waters as the movements proceed or after they are completed,|| or to a continuous process of

* ‘Der Mechanismus der Gebirgsbildung,’ p. 31; see also VAN HISE, C. R., ‘Metamorphism of Rocks and Rock Flowage,’ ‘Bull. Geol. Soc. of America,’ vol. 9, 1898.

† ‘Recherches sur la propriété que possèdent les corps de se souder sous l'action de la pression.’ ‘Revue Universelle des Mines,’ 1880.

‡ ‘Philosophical Transactions,’ vol. 163, 1874.

§ ‘Der Mechanismus der Gebirgsbildung,’ pp. 19–21.

|| STAPFF, ‘Zur Mechanik der Schichtenfaltungen,’ ‘Neues Jahrbuch für Mineralogie,’ 1879, p. 792; REYER, ‘Theoretische Geologie,’ p. 443.

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