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THE STRUCTURAL FAILURE OF THE LITHOSPHERE[1]

As a foundation for ordinary human activities it is but natural that the lithosphere or solid earth should be a popular symbol of strength and permanence; but the geologist sees abundant evidences that it has fared badly in the contest with environmental forces, past and present. It has been weak and incompetent; it has bent, crumpled, broken and mashed; structurally it has failed; in considerable part it now consists of structural ruins.

The problem of the structural geologist includes the restoration of these ruins and a determination of the conditions and causes of failure. His problem is not rendered easier by the fact that it is seldom possible to see the structures in three dimensions, and that he must base his restoration on fragments of evidence seen at the surface or on the very limited outlook of underground openings or on inferences from environmental conditions. Furthermore, the geologist seldom sees rock failure in actual progress. If he does he may not recognize it because the movement is so slow. He arrives after the disturbance is over and must infer the nature of the forces and processes from the results. In attempting to picture conditions in the inaccessible deep zones, he must make long range inferences from the few available facts.

The study of structural geology naturally begins with the mapping and description of separate structures like folds, faults, joints, and cleavage. Too often this has been regarded as the end and not as a step toward the understanding of the structural conditions as a

[1] Address of the retiring vice-president and chairman of Section E, the American Association for Advancement of Science, Chicago, December 28, 1920.