THE ORIGIN AND ECONOMIC IMPORTANCE OF BEDDING PLANE MOVEMENTS

BY

CHARLES H. BEHRE, JR.

Northwestern University, Evanston, Illinois

The term "fault" is restricted in practice to such movements only as take place in planes at sufficient angle to the bedding to produce noteworthy offsets. On account of their difficulty of recognition, movements parallel to the bedding or nearly so are largely neglected, yet they are mechanically necessary under many structural conditions.

In the case of parallel folds, gliding on bedding planes necessarily results if the folding is at all measurable. The famous Bendigo saddle reefs are clearly related to such movements. In folding produced by lateral compression bedding plane movements pass upward along the limbs of the folds until they come near the anticlinal crest, where load and support from below are lessened; here on the crests they tend to pass into recognizable reverse faults—the obvious results of thrusting. Such larger movements are frequently accompanied by smaller fractures which allow internal adjustments within the hanging- and foot-walls. Such fractures are reported from numerous mining districts.

Most larger thrust faults are either nearly horizontal, in which case they are commonly almost parallel to the bedding planes, as in the Wisconsin-Illinois lead-zinc district (where the movements are small), or the fault plane curves so that the angle of dip varies as the surface is approached. It is shown diagrammatically that such a curvature tends to result in openings of considerable width along the major fault plane. These openings afford means for the ingress of solutions; hence in part the common occurrence of mineralization in lens-like masses along the dip of the plane, forming at least some of the familiar "ore shoots" of such districts as Grass Valley, California, and Leadville, Colorado. Moreover small faults whose planes intersect the major thrust at sharp angles represent a mode of adjustment by the underlying and overlying rock masses, permitting the partial "chinking-in" of lenticular openings like those mentioned. Minor faults of this origin also afford means of ingress for mineralizing solutions.

Finally, where the major fault plane is curved, as mentioned above, and intersects the bedding at a steep angle, the strata cut by the fault are put under varying horizontal stress by the shift in the bulge on the opposite rock wall. Under such conditions those beds which project farther into the fault plane than others tend to be pressed back, away from the fault. Thus again movement along bedding planes is set up.

Several faults which have been carefully studied in ground plan or vertical section or both are cited as illustrations, the examples selected being partly from the published literature, partly from the writer's experience. Their bearing on mineralization and mining problems is discussed and the conclusion is drawn that many ore deposits are definitely related to faults of the types mentioned in which the movement is essentially along bedding planes.